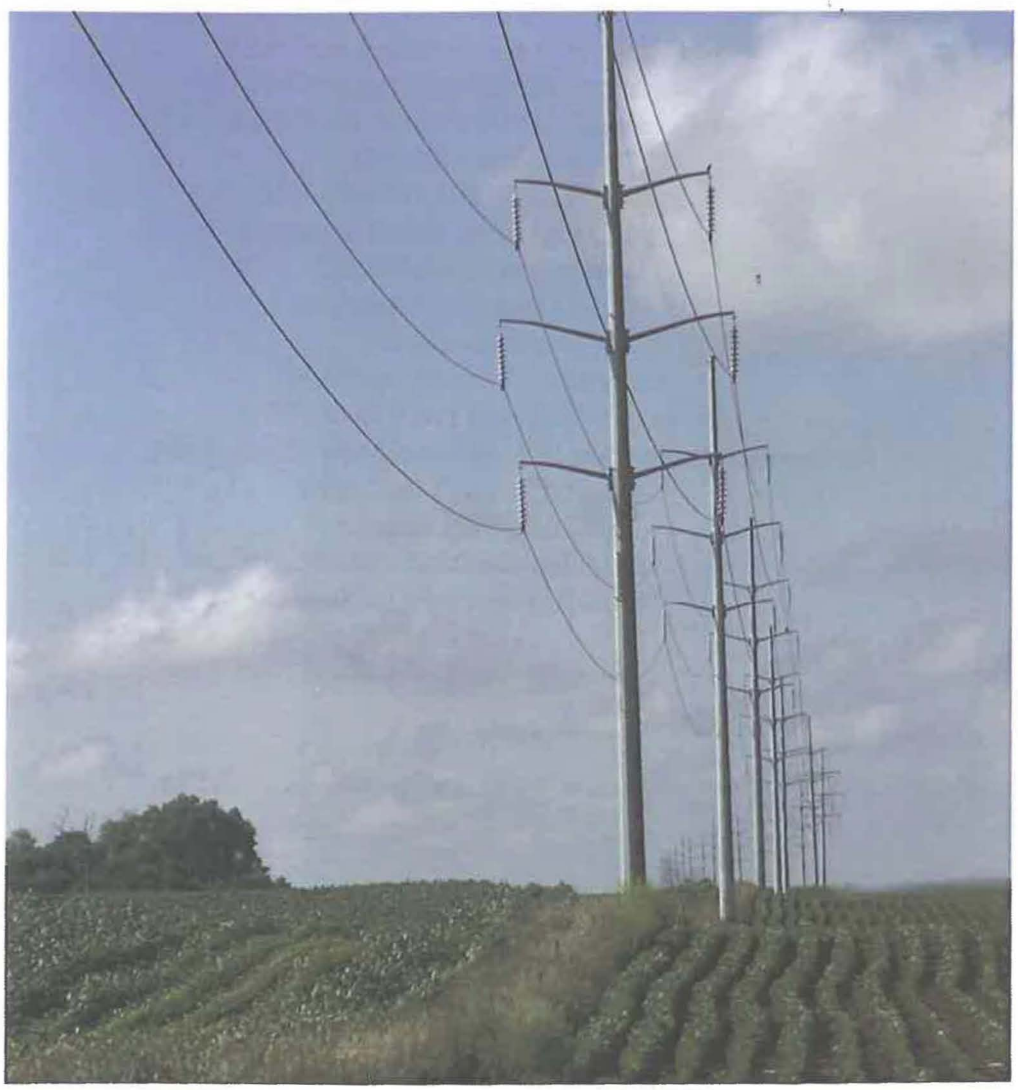
2009 Minnesota Biennial Transmission Projects Report



November 1, 2009

2009 MINNESOTA BIENNIAL TRANSMISSION PROJECTS REPORT

NOVEMBER 1, 2009

American Transmission Company, LLC
Dairyland Power Cooperative
East River Electric Power Cooperative
Great River Energy
Hutchinson Utilities Commission
Interstate Power and Light Company
L&O Power Cooperative
Marshall Municipal Utilities
Minnesota Power
Minnkota Power Cooperative
Missouri River Energy Services
North States Power Company, a Minnesota corporation
Otter Tail Power Company
Rochester Public Utilities
Southern Minnesota Municipal Power Agency
Willmar Municipal Utilities

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1.0 Executive Summary

The 2009 Biennial Report has been prepared pursuant to Minnesota Statutes § 216B.2425, which requires utilities that own or operate electric transmission facilities in the state to report by November 1 of each odd numbered year on the status of the transmission system, including present and foreseeable inadequacies and proposed solutions.

This is the fifth round of reports. Reports were filed in 2001, 2003, 2005, and 2007. All biennial reports are available on a webpage maintained by the utilities specifically for the purpose of providing information about transmission planning. That webpage is:

www.minnelectrans.com

This Report is a joint effort of the Minnesota Transmission Owners – those utilities that own or operate high voltage transmission lines in the state of Minnesota. These utilities include the following:

- American Transmission Company, LLC
- Dairyland Power Cooperative
- East River Electric Power Cooperative
- Great River Energy
- Hutchinson Utilities Commission
- ITC Midwest LLC
- L&O Power Cooperative
- Marshall Municipal Utilities
- Minnesota Power
- Minnkota Power
- Missouri River Energy Services
- Northern States Power Company, a Minnesota corporation
- Otter Tail Power Company
- Rochester Public Utilities
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A major purpose of the Report is to list all present and reasonably foreseeable transmission inadequacies in the transmission system and identify possible alternatives for addressing each situation. An "inadequacy" is essentially a situation where the present transmission infrastructure is unable or likely to be unable in the foreseeable future to perform in a consistently reliable fashion and in compliance with regulatory standards.

The State of Minnesota is divided into six transmission planning zones: the Northwest Zone, the Northeast Zone, the West Central Zone, the Twin Cities Zone, the Southwest Zone, and the Southeast Zone. Chapter 5 describes each of the zones generally. Chapter 6 of the report contains a discussion of the inadequacies identified in each zone. The Report lists more than 90 separate inadequacies across the state.

Each inadequacy is assigned a Tracking Number. The Tracking Number reflects the year the inadequacy was identified and the zone in which it is located. A map is included for most inadequacies and a map of the entire zone locating each inadequacy is also provided. A brief description of the inadequacy – the reason or reasons why the present system is inadequate or may be inadequate – is given and the potential alternatives are described. In some cases, the preferred alternative has already been determined. For each Tracking Number, a brief overview of the analysis that has been conducted is provided, along with a possible schedule for addressing the problem.

Certain projects have been completed since the 2007 Report was filed two years ago. These completed projects are listed in a table in the discussion for each zone in chapter 6. Once a project has been completed and an inadequacy addressed, the matter is closed and that particular Tracking Number is no longer reported. The practice is to permanently close a matter only after the selected alternative has been constructed and placed into service.

If a project requires approval from the Public Utilities Commission, the PUC Docket Number is reported so interested persons can easily find more information about the project on the PUC edockets webpage.

https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showeDocketsSearch&showEdocket=true

Chapter 2 provides an overview of the biennial reporting requirements.

Chapter 3 of the Report provides a brief description of a number of studies that have been completed over the past two years and studies that are underway. Some studies are specific to Minnesota but others are broad studies by regional and national organizations looking at wide-spread issues affecting the transmission grid. Some studies are relevant to the utilities' efforts to obtain renewable energy and meet Renewable Energy Standard milestones.

Chapter 4 summarizes the efforts the utilities have made to keep the public advised of ongoing planning activities and transmission inadequacies. A summary of six separate webinars that were held in September 2009 to advise the public of the inadequacies identified in each transmission planning zone is included. The utilities also suggest a number of ways in which the biennial transmission planning process might be improved.

Chapters 5 and 6 are the chapters that focus on the six transmission planning zones and the transmission inadequacies in each zone.

Chapter 7 focuses on the sixteen utilities that are jointly filing this report. A brief description of each utility and the transmission lines it owns is provided. A contact person for each utility is provided, and a separate contact list can be found at the end of the report. For the investor-owned utilities, information regarding their transformer inventory is provided in response to request by the Public Utilities Commission for this information.

Chapter 8 provides an analysis of the utilities' progress toward compliance with state Renewable Energy Standards and the transmission needs that might be required to assure compliance with upcoming RES milestones. Not all utilities that own transmission lines are subject to the state Renewable Energy Standards, and some utilities that are not required to participate in the Biennial Report must meet the RES milestones. All utilities subject to the RES participated in providing information for this part of the report. Generally, the utilities are in compliance with present standards and expect to have enough generation and transmission to meet RES milestones through 2016, although demands of neighboring states for renewable energy will undoubtedly affect what resources will be required.

Upon receipt of this Report, the Public Utilities Commission will solicit comments from the Department of Commerce, interested parties, and the general public about the Report. Any person interested in commenting on the Report or following the comments of others, should check the efiling docket for this matter or in some other manner contact the Public Utilities Commission. The Docket Number is E-999/M-09-602.

2.0 Biennial Report Requirements

2.1 The Statute

Minnesota Statutes § 216B.2425 requires any utility that owns or operates electric transmission lines in Minnesota to submit a transmission projects report to the Minnesota Public Utilities Commission by November 1 of each odd numbered year. The Minnesota Legislature enacted Minnesota Statutes § 216B.2425 in 2001 as part of the Energy Security and Reliability Act. The law became effective on August 1, 2001.

The major purposes of the transmission planning requirement are to inform the public of transmission issues in the region and to enable regulators and the public to track development of solutions to these transmission issues. Another purpose of the statute is to expedite approval of projects that do not raise significant issues.

Minnesota Statutes § 216B.2425, subd. 1, provides that the transmission projects report must contain the following information:

(1) specific present and reasonably foreseeable future inadequacies in the transmission system in Minnesota;
(2) alternatives for addressing each alternative;
(3) general economic, environmental, and social issues associated with each alternative; and
(4) a summary of public input the utilities have gathered related to the list of inadequacies and the role of local government officials and other interested persons in assisting to develop the list and analyze alternatives.

2.2 The PUC Rules

In June 2003 the Minnesota Public Utilities Commission adopted rules that govern the content of the transmission projects report and established procedures for reviewing the report. Those rules are codified in Minnesota Rules chapter 7848.

Minn. Rules part 7848.1300 sets forth a list of categories of information that must be included in a transmission projects report.

> Each biennial transmission projects report, whether or not it seeks certification of a high-voltage transmission line, must contain at least the following information:
>
> A. contact person for each utility.
>
> B. copy of most recent regional load and capability report of MAPP or other regional reliability council.
>
> C. copy of most recent regional transmission plan produced by the appropriate regional transmission organization.

D. list of inadequacies currently affecting reliability and list of reasonably foreseeable future inadequacies over next ten years.

E. list of all alternative means of addressing each inadequacy, including nontransmission alternatives.

F. list of studies that have been completed, are in progress, or are planned that are relevant to each of the inadequacies identified.

G. general description of the economic, environmental, and social issues raised by each alternative.

H. an account of the measures taken to gather public input and to involve local government officials, tribal government officials, and other interested persons.

I. report on the number of members of the public who provided input.

J. report on the number of local and tribal government officials who provided input.

K. list and description of every transmission project the utility considers necessary now or in the next ten years to remedy any transmission inadequacies identified in the report.

L. a list and description of every nontransmission project the utility considers necessary now or in the next ten years to remedy any transmission inadequacies identified in the report.

M. statement as to whether the utility seeks certification of any transmission project or the time frame within which it plans to file a certificate of need application.

N. approximate time frame for filing a certificate of need application for any nontransmission project identified as necessary.

2.3 The PUC Order

The Minnesota Transmission Owners submitted the 2007 Report on November 1, 2007. The Public Utilities Commission afforded interested persons an opportunity to submit comments regarding the completeness of the Report. After considering all comments that were filed, the Commission issued its Order Accepting Reports, Requiring Further Filings, and Setting Future Filing Requirements on May 30, 2008. PUC Docket No. E-999/M-07-1028.

One provision of the Commission's May 30, 2008 Order, Ordering paragraph 8, directs the utilities to address transmission issues related to upcoming renewable energy milestones. The Order states, "Future biennial transmission projects reports shall incorporate and address transmission issues related to meeting the standards and milestones of the new renewable energy standards enacted at Minn. Laws 2007, ch. 3." Chapter 3 is the 2007 Minnesota Renewable

Energy Act. Accordingly, Chapter 8 of this report provides information responsive to the Commission's direction.

2.4 Reporting Utilities

Minnesota Statutes § 216B.2425 applies to those utilities that own or operate electric transmission lines in Minnesota. The PUC has defined the term "high voltage transmission line" in its rules governing the Biennial Report to be any line with a capacity of 200 kilovolts or more and any line with a capacity of 100 kilovolts or more and that is either longer than ten miles or that crosses a state line. Minn. Rules part 7848.0100, subp. 5. Each of the entities that are filing this report owns and operates a transmission line that meets the PUC definition. Information about the utility and transmission lines owned by each utility is provided in Chapter 7 of this Report. In addition, a contact person for each utility is included in Chapter 7.

The statute allows the entities owning and operating transmission lines to file this report jointly. The Minnesota Transmission Owners have elected each filing year to submit a joint report and do so again with this report. The utilities jointly filing this report are:

- American Transmission Company, LLC
- Dairyland Power Cooperative
- East River Electric Power Cooperative
- Great River Energy
- Hutchinson Utilities Commission
- ITC Midwest LLC
- L&O Power Cooperative
- Marshall Municipal Utilities
- Minnesota Power
- Minnkota Power Cooperative
- Missouri River Energy Services
- Northern States Power Company d/b/a Xcel Energy
- Otter Tail Power Company
- Rochester Public Utilities
- Southern Minnesota Municipal Power Agency
- Willmar Municipal Utilities

2.5 Certification Requests

Minnesota Statutes § 216B.2425, subd. 2, provides that a utility may elect to seek certification of a particular project identified in the Biennial Report. According to subdivision 3, if the Commission certifies the project, a separate Certificate of Need (CON) under section 216B.243 is not required.

On May 29, 2009, the Minnesota Transmission Owners advised the Commission that there would be no certification requests included with the 2009 Biennial Report.

2.6 Past Biennial Reports

The 2009 Biennial Report is the fifth such report filed by the Minnesota Transmission Owners. All of the Biennial Reports are available on the webpage maintained by the utilities at:

http://www.minnelectrans.com

In addition, for quick reference the following table shows the PUC Docket Number for each Biennial Report and the date of the PUC Order accepting and approving the report.

Biennial Report	PUC Docket Number	PUC Order
2009	E-999/M-09-602	
2007	E-999/M-07-1028	May 30, 2008
2005	E-999/TL-05-1739	May 31, 2006
2003	E-999/TL-03-1752	June 24, 2004
2001	E-999/TL-01-961	August 29, 2002

2.7 Renewable Energy Standards

The 2007 Biennial Report included an entirely separate report called the Renewable Energy Standards Report, which was required by the Legislature as part of the 2007 Renewable Energy Act to be submitted to the Commission by November 1, 2007. This requirement was a one-time obligation and the 2009 Biennial Report does not include a separate RES Report.

Notwithstanding that there is no statutory requirement to file an RES Report in 2009, there are other obligations to report on activities related to compliance with upcoming RES milestones. Minnesota Statutes § 216B.2425 – the statute requiring this report – provides in subdivision 7 that each entity subject to this statute must determine necessary transmission upgrades to support development of renewable energy resources required to meet the Renewable Energy milestones and include those in the biennial report. Also, as described above in Section 2.3, the Public Utilities Commission has ordered the utilities to address transmission issues related to the RES standards and milestones in future biennial reports.

Accordingly, the utilities that are subject to the RES have provided in Chapter 8 of this report, information describing the present situation with renewables and what is estimated to be required in the future to meet upcoming RES milestones.

2.8 Distributed Generation

Another matter that is addressed throughout this Report is the issue of distributed generation. Minnesota Statutes § 216B.2426 provides:

> The Commission shall ensure that opportunities for the installation of distributed generation, as that term is defined in section 216B.169, subdivision 1, paragraph (c), are considered in any proceeding under section 216B.2422, 216B.2425, or 216B.243.

Section 216B.169, subd. 1(c) defines "High-efficiency, low-emissions, distributed generation" to mean "a distributed generation facility of no more than ten megawatts of interconnected capacity that is certified by the commissioner under subdivision 3 as a high-efficiency, low-emissions facility."

Distributed generation has been considered in various ways. In identifying and analyzing alternatives to the inadequacies that have been listed in the Report, the Minnesota Transmission Owners describe whether distributed generation is a possible alternative. For some Tracking Numbers, such as providing an interconnection for a new generation source, distributed generation can quickly be taken off the table. For others, a distributed generation option requires additional study, and more details will be provided at the time a Certificate of Need or other authorization is requested.

More significantly, the Minnesota Transmission Owners, working closely with the Department of Commerce and other stakeholders, and at the direction of the Minnesota Legislature, has completed two studies looking at the possibility of injecting first 600 MW of dispersed renewable generation into the transmission grid, and then, as a Phase II study, another 600 MW of renewable generation. Phase I (the first 600 MW) was completed in June 2008 and Phase II (a second 600 MW) was completed on September 15, 2009.

For further reference the reader is referred to the *White Paper on Distributed Generation*, which the Minnesota Transmission Owners completed in February 2006 and submitted to the Public Utilities Commission. The White Paper is available on the PUC edockets webpage under the 05-1739 Docket Number at:

https://www.edockets.state.mn.us/EFiling/ShowFile.do?DocNumber=2757788

3.0 Transmission Studies

3.1 Introduction

The Public Utilities Commission requires that the utilities include in each Biennial Report a "list of studies that have been completed, are in progress, or are planned that are relevant to each of the inadequacies identified" in the Report. Minnesota Rules part 7848.1300, item F. In the 2005 Biennial Report, the utilities not only identified completed, ongoing, and planned studies but also described in general terms the transmission planning process. In the 2007 Report, the utilities again described the relevant studies and in addition, pursuant to legislative directive, described planning processes and studies related to compliance with Renewable Energy Standards.

In this 2009 Biennial Report, the utilities identify a number of studies that have been completed that either address expansion of the transmission network to generation expansion, in particular renewables, or address local inadequacy issues (noted with a Tracking Number). Section 3.3 describes ongoing regional studies that focus on expansion of the bulk electric system to address broad regional reliability issues and support expansion of renewables in the upper Midwest. Section 3.4 focuses on ongoing studies that are attempting to resolve local inadequacy issues.

3.2 Completed Studies

The following studies have been completed and where specific transmission projects have been identified, a Tracking Number is provided. The Tracking Number identifies the year the project was first considered for inclusion in a Biennial Report and the zone where the project is located.

Study Title	Completed	Utility Lead	Description
Dispersed Renewable Energy Study	2009	MTO	State legislation in 2007 required a statewide study of dispersed renewable generation potential to identify locations in the transmission grid where a total of 1200 MW of relatively-small renewable energy projects could be operated with little or no change to the existing infrastructure. For the purposes of the study, dispersed renewable energy projects are wind, solar and biomass projects that will generate between 10 and 40 MW of power. The Phase I study goal was to identify locations in the transmission grid where a total of 600 MW of relatively-small sized renewable energy projects could be operated with little or no changes required to the existing infrastructure. The potential locations studied were based on public input, regional availability of renewable resources, current dispersed generation in the MISO queue, and access to existing transmission. Phase II of the study began in October of 2008. The goal of Phase II is to identify locations for an additional 600 MW of dispersed renewable energy. Study details can be found on the PUC website: http://www.puc.state.mn.us/PUC/electricity/documents/reports-studies/index.html
Renewable Energy Standard (RES) Transmission Study	2009	MTO	The objective of the Minnesota RES Update Study was to investigate and recommend future transmission alternatives to increase generation beyond that enabled by the proposed Southwest Twin Cites – Granite Falls upgrade. The study identified future limiting facilities on the transmission system with emphasis on several generation development zones. The study also addressed the operational impacts of increasing wind generation in the region on the transmission system. Study details can be found on the Minnelectrans website: www.minnelectrans.com
Study Title	**Completed**	**Utility Lead**	**Description**

Study Title	Completed	Utility Lead	Description
Southwest Twin Cities – Granite Falls Transmission Upgrade Study (Corridor Study)	2009	MTO	The objective of the Southwest Twin Cities – Granite Falls Transmission Upgrade Study was to confirm that upgrading the existing 230 kV corridor removes a key limiter to increasing generation delivery between western and southwestern Minnesota (as well as points further west) and the load centers in Minnesota. The study clarified the optimal transmission endpoint configuration for the recommended project. The study also determined that the upgrade created an additional 2000 MW of outlet capability. Study details can be found on the Minnelectran website: www.minnelectrans.com
Capacity Validation Study	2009	MTO	The study looked at several specific transmission projects, taken individually and in combination, to determine how much additional generation can be added to the system and where as a result of the transmission additions. The study results provide a range of additional generation that can be added by various combinations of transmission projects along with estimated locations of new generation. The study sought to verify and validate the transfer capabilities which have been estimated by other studies. Study details can be found on the Minnelectran website: www.minnelectrans.com
Green Power Express Study	2009	ITC	The proposed Green Power Express is a 3000 mile network of 765 kV transmission lines stretching from North and South Dakota, across Minnesota and Iowa, into Wisconsin, Illinois and Indiana. Four 765 kV substations and approximately 800 miles of the proposed project's transmission lines would be in Minnesota. When complete, the Green Power Express would facilitate movement of approximately 12,000 MW of power from wind-rich areas to major load centers in the Midwest ISO and PJM regions. Additional detail can be found on the ITC website: http://www.itctransco.com/projects/thegreenpowerexpress.html
Facility Study Report for Midwest ISO Project # F-075 (A411)	2009	Otter Tail Power	2009-NW-N5
Results of Interconnection Facilities Study Following Attachment X Process for MISO F-075 (Maple River Substation	2009	Xcel Energy	2009-NW-N6

Study Title	Completed	Utility Lead	Description
and Sheyenne Substation Line Upgrade to 336.5 MVA)			
Great River Energy Long Range Plan	2008	GRE	The study is a guide for future needs in the GRE service territory that assures its customers a reliable, cost-effective, and energy efficient power source to the year 2031. Although different plans may eventually be developed, this guide gives a good foundation for formulating ideas for future plans in specific areas.
North Mankato	2008	Xcel Energy GRE	2007-SE-N3
Mankato Area Study	2007	Xcel Energy GRE	2003-SE-N3
Outer Metro 115 kV	2007	Xcel Energy	2007-TC-N1
Regional Incremental Generation Outlet Study (RIGO)	2007	Xcel Energy	The RIGO Study was described in the 2007 RES Report. Currently, the Certificate of Need is moving forward on the 161 kV line from Pleasant Valley-Byron. It is expected to be filed by the end of 2009 or early in 2010. The other upgrades recommended in the RIGO Study will be pursued as generation interconnections necessitate their completion.
Bemidji, Minnesota Area Electric Transmission Study: Evaluation of Near-Term Transmission Needs in the Bemidji/Wilton Area	2007	CapX 2020	The objective of this study was to identify what transmission reinforcements were needed in the Bemidji / Wilton load center prior to the in-service date of the Bemidji – Grand Rapids 230 kV Line. As a result, additional capacitors are being added at Cass Lake, Under Voltage Load Shedding (UVLS) has been added in the Bemidji / Wilton load center, and the 115/69 kV transformer at Cass Lake has been replaced (all of these short-term upgrades are under described in more detail under tracking number 2007-NW-N2).
Adams-Rochester 161 kV Study	2008	Dairyland	2007-SE-N1
South Minneapolis Distribution Study	2008	Xcel Energy	2007-TC-N3
Dotson Area Load Serving Study	2007	ITC Midwest	Upgrades identified (2007-SW-N1, 2007-SW-N2, 2007-SW-N3) in the

Study Title	Completed	Utility Lead	Description
			study were based on the interconnection of a MISO wind generation project near Storden and based on future load serving needs in the southwest zone. The wind generation Developer has recently unsuspended the interconnection project driving 161 kV upgrades in southwest Minnesota, but while the project was in suspension, load serving needs changed, as proposed plans for area ethanol plants were either delayed or cancelled. The need for upgrades to accommodate ethanol plant loads has diminished, and a restudy is required.
Worthington Area Study	2007	ITC Midwest	2007-SW-N1
Red River Valley / Northwest Minnesota Load Serving Transmission Study (Transmission Improvement Planning Study – TIPS Update)	2006 (Update)	CapX 2020	The Fargo – Alexandria – Monticello 345 kV line (2005-CX-1) was one of the transmission projects identified in this study. The PUC Docket number is CN-06-1115. The Boswell – Wilton 230 kV Line (Bemidji – Grand Rapids) (2005-NW-N2) is another transmission project identified in this study. The PUC Docket number is CN-07-1222.
West Central Community based Energy Development (CBED) Study	2007	Several utilities	The focus of the study was to determine the impact dispersed generation might have on the transmission network. The high level study focused on identifying generation locations in the west-central planning zone.
Analysis of Transmission Alternatives to the Boswell – Wilton 230 kV Line Addition	2006	CapX 2020	This study evaluated different transmission alternatives to the Bemidji – Grand Rapids 230 kV Line. After evaluation of 3 different alternatives, the Bemidji – Grand Rapids 230 kV Line was determined to be the best alternative to meet the long-term needs of the transmission system (more information can be found under 2005-NW-N2 and within PUC Docket number CN-07-1222).
Mud Lake—Wilson Lake Study	2006	GRE	Project has been energized.
Buffalo Ridge Incremental Generation Outlet Transmission Study (BRIGO)	2005	Xcel Energy	The study identified three 115 kV lines and a new 345/115 kV transformer and capacitor additions at three substations. The PUC docket number is CN-06-1542
Southwest Minnesota-Twin Cities 345 EHV Development Study	2005	CapX 2020	The study identified the Brookings - Hampton Corners 345 kV project (2005-CX-2) as a transmission project that would create additional

Study Title	Completed	Utility Lead	Description
			generation outlet on the Buffalo Ridge. The PUC docket number is CN-06-1115
Southwest Minnesota Exploratory Study	2005	MISO	This study was discussed in the MTEP-06 Report. This study was also described in the 2005 Biennial Report.
Northwest Exploratory Study.	2004	MISO	This study was discussed in the MTEP-05 Report. This study was also described in the 2007 Biennial Report.

3.3 Regional Studies

While every study that is undertaken adds to the knowledge of the transmission engineers and helps to determine what transmission will be required to address long-term reliability and to transport renewable energy from various parts of the state to the customers, some studies are intentionally designed to take a broader look at overall transmission needs. Regional studies analyze the limitation of the regional transmission system and develop transmission alternatives that support multiple generation interconnect requests, regional load growth, and the elimination of transmission constraints that adversely affect utilities' ability to deliver energy to the market in a cost effective manner. Many of these studies are especially important for focusing on transmission needs for complying with upcoming Renewable Energy Standards.

3.3.1 Midwest ISO Transmission Expansion Plans

The Midwest ISO engages in annual regional transmission planning and documents the results of its planning activities in the MISO Transmission Expansion Plan (MTEP). The MTEP process coordinates the transmission plans of individual MISO member utilities to develop a coordinated regional transmission plan. The Minnesota Transmission Owners have reported on the latest MTEP Plans in each of the Biennial Reports.

MTEP-08 Report. The MTEP-08 Report was approved by the Midwest ISO Board of Directors on December 4, 2008. The subtitle of the report is "Growing the Grid Across the Heartland." The MTEP-08 Report identifies those projects required to maintain reliability for the ten year period through the year 2018, as well as a preliminary evaluation of projects that may be required for economic benefit up to twenty years in the future. There are 332 new projects recommended for approval by MISO in the 2008 plan, totaling $2.4 billion, bringing the total of currently approved projects in MISO to 475 projects, totaling $4.2 billion. Other planning projects are also listed in the report but are still in development or under study for possible inclusion in future approved plans.

MTEP-09 report. The 2009 Midwest ISO Transmission Expansion Plan is still being finalized. The following language from Section 1.2 of the Executive Summary of the draft MTEP-09 Report explains the purpose of this planning activity.

> The MTEP Report is produced on an annual basis to provide interested parties with an overview of the Midwest ISO's planning processes, an update on the transmission planning studies underway, and an understanding of the analyses used in the execution of those processes. The report is also the vehicle to communicate the projects that, as a result of those analyses, are recommended to the Midwest ISO Board of Directors for approval and subsequent implementation.
>
> MTEP 09, the 6th edition of this publication, is the culmination of eighteen-plus months of collaboration between the Midwest ISO's planning staff and its many stakeholders. For each report cycle, efforts are focused on identifying issues and opportunities related to the strengthening of the transmission grid, developing alternatives to be considered, and evaluating those options to determine if there is an effective solution among them. The objective is to identify projects that:

- Ensure reliability of the transmission system
- Provide economic benefit, such as through allowing increased efficiency in market operations (i.e. reducing cost of energy production and/or the price paid by load)
- Enable public policy objectives, such as the integration of renewables, to be achieved
- Address other issues or goals identified through the stakeholder input process.

The draft MTEP 09 Report recommends 275 new projects totaling $892 million of investment in transmission infrastructure.

The MTEP-09 Report should be finalized for approval by the Midwest ISO Board before the end of 2009.

MTEP-10 and Beyond. In the MTEP-09 Executive Summary, the following quote describes future planning activities by MISO.

> A focus of MTEP 10 will be on the continued implementation of the value-based planning process that the Midwest ISO has been evolving to over the last couple of years. The Midwest ISO will be refining the robustness testing methodology with stakeholders and will seek to further the amalgamation of its planning functions. As these functions - short term reliability, long-term value based and targeted studies - become fully integrated, longer-term solutions that provide greater benefits will become alternative solutions to address issues that are today solved through a series of shorter-term, and many times less valuable, mitigation steps. That is not to say, however, that the discrete analyses will disappear. Studies over each of the timeframes are still required to meet the planning needs of the region in the most expedient and efficient standpoint. In fact, with continued experience the Midwest ISO has recognized the value of having the combination of plans. As the Midwest ISO seeks to implement nearer term reliability upgrades through the queue and the NERC reliability analyses, results from targeted studies provide insight into potentially more efficient alternative solutions based on the larger-scale transmission developed therein. Similarly, targeted studies such as the Regional Generation Outlet Study are informed by the long-term transmission roadmaps created through efforts such as the MTEP long-term value-based planning and the Joint Coordinated System Plan. By planning in the reverse order from which transmission is actually built, the nearer term transmission solutions can be developed in such a way to support future goals through more efficient plan development, including such considerations as preserving future right of way requirements.

The MISO Expansion Plans are available through the MISO webpage at:

http://www.midwestiso.org/page/Expansion+Planning

This link will lead directly to the reports.

http://www.midwestiso.org/publish/Folder/3e2d0_106c60936d4_-75240a48324a

3.3.2 Manitoba Hydro-Electric Board Transmission Service Request

MISO continues to process generation interconnection requests and transmission service requests. These studies will likely have an impact on the need for transmission in Minnesota. It is difficult to predict which projects, if any, will actually move forward, as the decision to move forward on a transmission project that is related to generation interconnection and transmission service is up to the generation developer. There is one particularly large transmission service request that involves the possible construction of a 500 kV transmission line in Minnesota. The transmission service request is asking to increase the ability to transfer power from Manitoba into the United States by 1100 MW. Two options have initially been identified, one involves a 500 kV line from Winnipeg to the Twin Cities via Northeast Minnesota, and the second option involves a 500 kV line between Winnipeg to the Twin Cities via the Red River Valley (Fargo). MISO continues to study these options as well as others.

3.3.3 Study of a LaCrosse to Madison 345 kV Transmission Line

ATC is continuing its efforts to study the potential benefits of a 345 kV transmission line that would extend from LaCrosse to the Madison area in Wisconsin. The line would be approximately 150 miles long, possibly include substation enhancements, and cost an estimated $545 million to construct. ATC has submitted a North LaCrosse – Cardinal (located near Madison) 345 kV line with a possible in-service date of 2017 to Appendix C of the Midwest ISO Midwest Transmission Expansion Plan. The line is identified as project #2845 in the MTEP projects database.

ATC views that a LaCrosse to Madison 345 kV line would be driven by a combination of benefits – reliability, economic, and integration of renewable energy – and these benefits would potentially be provided to ATC's service territory and the region, including Minnesota. For instance, the combined Southwest Twin Cities – Granite Falls Transmission Upgrade Study and Minnesota RES Update Study indicated that when wind generation increases beyond the level required for Minnesota's 2016 RES milestone, a new 345 kV line that extends from LaCrosse to the Madison area would help avoid system stability issues in the Twin Cities. The Southwest Twin Cities – Granite Falls Transmission Upgrade Study and Minnesota RES Update Study also found that combining the Southwest Twin Cities – Granite Falls upgrade with a 345 kV line from LaCrosse to Madison would create a total of 3,600 MW of new generation delivery capability, 1,600 MW of which is attributed to the LaCrosse to Madison line.

In 2008, ATC began studying the potential economic benefits of a transmission line that would extend from LaCrosse to Madison and those efforts are continuing. Through ATC's strategic flexibility approach, the company is analyzing various configurations of a 345 kV line from LaCrosse to Madison under several plausible futures. Results are expected in the first quarter of 2010. More information about ATC's economic planning can be found on ATC's 10-Year Assessment Website: www.atc10yearplan.com.

There also is an effort underway that will analyze the reliability benefits of a 345 kV transmission line from LaCrosse to the Madison area in Wisconsin. The Western Wisconsin Study is investigating the long-term reliability issues in the western Wisconsin area and transmission solutions to address those needs. The study is led by ATC and is a collaborative effort that includes Xcel Energy, Dairyland Power Cooperative, ITC Midwest, Great River Energy, Southern Minnesota Municipal Power Agency and the Midwest ISO. It is anticipated that the Western Wisconsin Study will be completed in the first quarter of 2010.

A LaCrosse to Madison 345 kV line also is being analyzed as part of phase I of the Midwest ISO's Regional Generation Study (RGOS I) as a possible transmission facility needed to satisfy renewable portfolio standards and goals in Upper Midwest states. It is anticipated that a LaCrosse to Madison 345 kV line will be included in the final 345 kV designs developed in RGOS I, results from which will be provided to the Upper Midwest Transmission Development Initiative (UMTDI) for its consideration in identifying transmission needed to satisfy renewable portfolio standards in five states.

3.3.4 Regional Outlet Generation Study (RGOS)

The Midwest ISO, in collaboration with stakeholders, has undertaken a Regional Generation Outlet Study in two phases.

The purpose of the RGOS Phase I is to develop transmission projects that will fulfill the renewable energy mandates in the four states of Illinois, Iowa, Minnesota and Wisconsin. The public policy is a major input component to RGOS and successful plan development. The Upper Midwest Transmission Development Initiative (UMTDI) is providing that public policy input. The (UMTDI) is a collaboration of the Governors and state Regulatory Commissions of Iowa, Minnesota, North Dakota, South Dakota and Wisconsin. The UMTDI has a two-fold purpose; encourage interstate transmission for renewable energy and develop an equitable cost-sharing methodology for transmission. The UMTDI and stakeholder helped the Midwest ISO define renewable energy zones within the five-state region of ND, SD, MN, WI, and IA for 15 & 25 GW wind outlet scenarios. The Midwest ISO along with the stakeholders performed the studies and 345 and 765 kV transmission expansion plans were developed for the two generation outlet scenarios. This RGOS Phase I work is expected to be completed and an Executive Report published in the December 2009 timeframe.

The objective of the RGOS Phase II study is to develop a mid-term (5-15 years, approx.) set of regionally coordinated transmission projects that meet the state renewable portfolio standard requirements for the states of Missouri, Illinois, Michigan, Ohio and the Midwest ISO load in Pennsylvania; as well as any increased requirements in the states studied in the RGOS Phase I at the least cost to the consumer. This study will leverage the renewable energy zones and transmission designs identified and established in RGOS Phase I. The RGOS Phase II study is intended to be completed in the January 2010 timeframe.

3.3.5 SMARTransmission Study

The Strategic Midwest Area Renewable Transmission Study (the "SMARTransmission Study") is a comprehensive study of the transmission infrastructure that may be needed in the Upper Midwest to support renewable energy development and to transport that energy to consumers in the Upper Midwest, the Ohio River Valley, and farther East. The study is being sponsored by American Transmission Company, Electric Transmission America, LLC (a joint venture of American Electric Power & MidAmerican Energy Holdings), Exelon Corporation, MidAmerican Energy Company, Xcel Energy, and NorthWestern Energy.

Sponsors of the SMARTransmission Study have retained Quanta Technology to conduct the analysis, which will evaluate transmission alternatives 345 kV and higher and provide recommendations for new transmission development and how to appropriately stage that development. Results and recommendations will be folded into regional planning efforts such as the Midwest ISO Transmission Expansion Plan and PJM's Regional Transmission Expansion Plan for additional study and validation. The study will include reliability and economic analyses and will focus on an area that covers the seams of three Regional Transmission Organizations – Midwest ISO, PJM and Southwest Power Pool. An open stakeholder process is being conducted to gather input and will be continued as results are published.

Completion of the SMARTransmission Study is anticipated in early 2010. More information about the study is located at: www.smartstudy.biz

3.4 Load Serving Studies

Load serving studies focus on addressing load serving needs in a particular area or community. Since many of the inadequacies in Chapter 6 are load serving situations, many of these studies relate to specific Tracking Numbers.

Study Title	Anticipated Completion	Utility Lead	Description
Cromwell-Wrenshall-Mahtowa-Floodwood Area	2010	Minn Power GRE	See Northeast Section for further study description (2003-NE-N2)
Duluth Area 230 kV	2010	Minn Power	See Northeast Section for further study description (2007-NE-N1)
Deer River area Reliability	2010	Minn Power	See Northeast Section for further study description (2009-NE-N2)
Enbridge Transmission Study	2010	Otter Tail Power Company	2003-NW-N2 2007-NW-N3

Study Title	Anticipated Completion	Utility Lead	Description
Ramsey Transformer Study	2010	Otter Tail Power Company	2003-NW-N2
Fergus Falls Area Transmission Study	2010	Otter Tail Power Company	2009-NW-N1

3.5 MAPP Load & Capability Report

The 2009 Mid-Continent Area Power Pool Load & Capability Report, dated May 1, 2009, can be found at:

http://www.mapp.org/DesktopDefault.aspx?Params=454b040717565c79401a0c0b7b615d4600000003cd

The Introduction to the 2009 Load & Capability Report provides an overview of what the report is intended to do:

> The MAPP Load and Capability Report is prepared in response to the requirement set forth in the MAPP Agreement and the MAPP Generation Reserve Sharing Pool Handbook for a two-year monthly and a ten-year seasonal load and capability forecast from each MAPP Participant. The report contains actual and forecast monthly load and capability data for the period of May 2008 through December 2011 and seasonal load and capability data for the ten-year period Summer 2009 through Winter 2018-19.

4.0 Public Participation

4.1 Opportunities for Public Input

Annual Zonal Meetings

The Public Utilities Commission has established certain procedures that utilities must follow to advise local governmental officials and the general public about planning activities and possible new high voltage transmission lines. These procedures involve the holding of a public meeting in each Transmission Planning Zone at least once per year. Minn. Rules part 7848.0900. The utilities must announce the public meetings by mailing notice to certain local and state and tribal officials and to certain individuals and by publishing notice in local and statewide newspapers. Minn. Rules part 7848.1000. The utilities are also required to prepare a summary of each planning meeting that is held. Minn. Rules part 7848.1100.

The utilities did hold transmission planning meetings in each of the six transmission planning zones in the state every year from 2004 to 2007. Summaries of these meetings were provided in the biennial reports that were submitted. It is generally agreed that these public meetings were not well attended by local officials or the general public. As part of its decision accepting the 2007 Biennial Report, the Public Utilities Commission granted the utilities a variance from the requirement in the rules to hold annual public meetings in each transmission planning zone in the biennial period 2008-2009.

The Commission directed its staff to solicit ideas on how to better involve the public in transmission planning. On June 12, 2008, the Commission issued a Notice of Comment Period and announced that it would accept comments on how the PUC rules might be changed to enhance public participation. Only a few comments were submitted and no specific procedures have been developed as a result of the notice and comment exercise for involving the public in transmission planning.

Webinars

In place of the transmission planning meetings that had been held in previous years, the utilities in September 2009 held six webinars, one for each transmission planning zone, in which utility representatives addressed transmission planning generally and described those transmission inadequacies in each zone that are reported upon in this Report. Notice was mailed to those persons who in the past received notice of the planning meetings, and notice was published in local newspapers around the state. Interested persons could either attend the presentation in person or simply log in on their computer at home or in the office and hear utility representatives address the issues while power point slides were projected on the computer monitor. Participants could e-mail questions or comments to the utility representatives. A summary of each webinar is provided in Section 4.2 below. The webinars were not any better attended than zonal meetings were in past years and not many questions or comments were generated.

Transmission Planning

Much of the utilities' planning activities and analyses are reviewed and discussed in open forums, and local officials, state regulators, citizen groups, and the general public are welcome at these planning sessions. Recently, certain studies relating to renewable energy and distributed generation were prepared with the advice and participation of stakeholder groups. The utilities will continue to seek opportunities to keep interested persons aware of ongoing planning activities.

The utilities have for several years maintained the web site www.minnelectrans.com where information about transmission planning and past studies can be found. Recently, the utilities devoted a significant effort to improving the webpage to provide additional information. Every Biennial Report, for example, is available on that webpage. Various planning studies that have been performed, such as the West Central Minnesota Renewable Generation Study, are also available on this webpage. The use of the Internet to provide access to broad transmission planning studies will continue to be expanded. In addition, any person may use the webpage to submit a question or comment to the utilities.

Local Contacts.

Local officials and the general public are generally interested in transmission issues that impact their local community. Utilities routinely meet with local officials to describe potential transmission inadequacies affecting the community. Electric cooperatives throughout the state have close relationships with city and county staff in their service areas, and investor-owned utilities employ community service representatives who work closely with local governments. Many local transmission needs are identified by local electrical cooperatives or municipal utilities. Utility representatives are available to speak to the League of Minnesota Municipalities, Minnesota Association of Townships, and the Association of Minnesota Counties to advise local officials of pending transmission concerns and have on occasion spoken at regional meetings of these Associations.

Local officials and the public are primarily interested in the routing of specific transmission projects. Numerous steps are taken by the utilities to advise interested persons of proposed transmission lines. Even with the smallest of transmission projects, such as a 69 kV line or a 115 kV line, utilities will publish ads in the local paper, mail notification letters to landowners in the area about the project, and host open houses to discuss the need for the project and preliminary routing options and encourage landowners and stakeholders to provide input on the information presented. In addition, it is common to hold meetings with county and city staff where the utilities present plans and request feedback from local officials.

With larger projects, even more extensive efforts to involve local officials and the general public are undertaken. The efforts undertaken by the eleven utilities participating in the CapX 2020 projects are an example of the kind of steps that are taken to make sure the public is aware of ongoing activities related to possible new significant transmission projects. The CapX 2020 projects include up to 700 miles of high-voltage transmission lines (three 345 kV projects and one 230 kV project) that cross a number of counties across the state. The CapX 2020 transmission lines are designed to ensure that the transmission system is adequate to reliably meet a growing demand for electricity and renewable resources in the region.

The CapX 2020 transmission projects have been included in the Biennial Report since the 2005 Report. The eleven utilities participating in CapX 2020 have maintained a separate webpage just for the CapX project. http://www.capx2020.com/ The CapX utilities established large lists of landowners, more than 70,000 people in all, who live along possible routes; these lists were used to notify landowners of the proposed projects. Also, the CapX utilities met with city and county staff throughout the project areas to ensure that local officials were aware of the project and to identify potential issues in each area. The utilities studied county comprehensive plans, worked with zoning administrators, planners and engineers to help ensure that local government plans and utility proposals were compatible.

PUC Procedures

Once a utility has selected a specific transmission project to address an identified inadequacy, numerous requirements regarding public notice will commence. For the smaller projects, the utility may decide, or even be required, to apply to a local unit of government for a conditional use permit or other authorization. Local officials will have significant input into a final decision on the project in such a situation.

In other cases, with larger projects, a Certificate of Need and a Route Permit will be required from the Public Utilities Commission. The Commission requires an applicant for a Certificate of Need for a high voltage transmission line to file a proposed Notice Plan for notifying the public about the proposed project. Minnesota Rules part 7829.2550. With a Route Permit, notice requirements are spelled out right in the rule. Minnesota Rules parts 7850.2100 and 7850.2300. These requirements include mailing notice to certain individuals and publishing notice of the project in local newspapers. Any person who wants to learn more about a project or desires to comment upon a project and to let governmental officials know of his or her concerns will have an opportunity to do so before the PUC will make a final decision.

4.2 Webinars

In September 2009 the utilities held six webinars, once for each Transmission Planning Zone. Each webinar consisted of a number of power point slides with narration by utility representatives. Each webinar began with an overview of the transmission system and general planning techniques, followed by a discussion of each transmission inadequacy in the zone by Tracking Number. The webinar presentations are available in their entirety at www.minnelectrans.com. Persons who missed the presentation when it was given can watch the presentation at any time by going to the webpage and following the instructions for logging on to the particular webinar of interest.

Interested persons were able to log on to the webinar on their home or office computers through use of their e-mail. The only information that is available about each registrant is the name of the person who logged in. It is not possible to know how many people were listening at that person's computer or whether the registrant represented a particular group or organization, unless the person asked a question or was known to the utility representatives.

The following is a summary of each of the webinars.

4.2.1 Twin Cities Zone

The webinar for the Twin Cities Zone was held on Monday, September 14, 2009, at 10:00 a.m. Nineteen people logged in to the presentation. At least half of the registrants can be identified as utility employees or state agency people.

After a general discussion of transmission planning, utility representatives discussed each of the Tracking Numbers reported for the Twin Cities Zone. Each utility with transmission facilities in the Twin Cities Zone had a representative present to describe any projects under consideration by the utility and to respond to questions. Several questions were asked via e-mail. Some questions related to transmission needs for possible new generation sources, and one question had to do with transmission needs in south Minneapolis.

4.2.2 Southwest Zone

The Southwest Zone webcast was held on September 16 at 1:00 pm. Twenty-two people participated in the webinar and four people attended in person. After the general presentation, the only questions were from representatives of the Upper Sioux Community who were interested in learning more about the possibility of a line from Granite Falls to the Southwest Twin Cities area. An Xcel Energy representative explained the recent studies completed by utilities about potentially upgrading the existing 230-kV line to a 345-kV line to increase wind generation outlet. After the webinar concluded, one in-person attendee asked a question about the status of specific transmission projects identified in the past for a generation interconnection project and another who owns land near the Lakefield Substation recounted his experiences with utility representatives on a recently completed transmission project.

4.2.3 West Central Zone

The West Central webcast was presented at 1:00 p.m. on September 17. Nineteen people attended. After the presentation, several questions were asked about the Green Power Express, distributed generation, placing peaking plants near wind turbines (to increase access to the transmission grid for small wind projects), and if electric vehicles are figured into transmission and load planning, and a comment suggested that the West Central Zone is missing out on wind generation potential because of a lack of transmission access. Utility representatives responded to each question.

4.2.4 Northwest Zone

The webcast for the Northwest Zone was held on September 16 at 10:00 a.m. Eighteen people logged on, many of whom were utility personnel or regulatory staff. Two questions were asked via the webcast chat function, both of which were about the status of the CapX 2020 Fargo-St. Cloud/Monticello project.

4.2.5 Northeast Zone

The webcast for the Northeast Zone was held on September 15 at 10:00 a.m. Sixteen people logged on, many of whom were utility personnel or regulatory staff. No questions were asked after panelists presented the general transmission planning information and the zone-specific projects.

4.2.6 Southeast Zone

The Southeast Zone webcast was conducted on September 17 at 10:00 a.m. and had twenty-two attendees on the webcast and four in-person attendees. After the general presentation and zonal project presentation, three questions were asked and responded to, one about Phase II of the Distributed Renewable Generation study and its impacts on Phase I sites; another about Big Stone II and the impact on CapX 2020 if Big Stone II is cancelled, and another about the benefits of reconductoring lines vs. building new ones for wind interconnection.

4.3 Recommendations for Improvement in the Biennial Transmission Projects Report Process

Zonal Meetings. The utilities appreciate the fact that the Commission granted a variance from the requirement to hold an annual public meeting in each Transmission Planning Zone over the past two years. Minnesota Rules part 7849.0900. The zonal meetings for the Biennial Transmission Report process have never been well-attended. Despite significant effort and large expenditures, the zonal meetings failed to attract more than a handful of people. Unfortunately, holding webinars instead of public meetings did not increase the attendance a great deal, and while the webinars were less costly than traveling around the state for zonal meetings, the webinars still resulted in significant expense (on the order of $30,000), primarily for publication of notice in newspapers in each zone. The utilities request that the Commission continue to exempt the utilities from this requirement, either through the granting of another variance or the amendment of the rule.

Planning Activities. The number of individuals in the general public who are interested in transmission planning in this state is quite small. The utilities can identify on the www.minnelectrans.com webpage the major transmission planning studies that are underway and provide a link where people can sign up to receive notices of planning meetings for studies of interest. Also, notice of upcoming planning activities could be posted on the webpage. Recently, the final reports of major transmission planning studies have been posted there and this practice can continue in order to provide a convenient, public location for dissemination of transmission information.

Specific Projects. The PUC rules (part 7849.1000) require the utilities to invite local government and tribal governments and agencies and other organizations to designate a liaison to be involved in planning activities with the utilities. These groups have not responded to the invitation. Local and tribal government and state agencies have not participated in general planning activities on a state-wide, or even a zone-wide, basis. But they are often interested in local projects. It makes sense, then, to devote efforts to contacting officials directly about specific situations. Indeed, that is what is done now. The utilities will continue to work with local officials to establish mechanisms that work best in individual situations to keep local officials and residents advised of developments and to provide opportunities for input into the process at an early stage.

Internet. The Internet is a wonderful tool to provide notice in a timely fashion and to provide ready access to information. The MTO group has begun to enhance the use of the Internet by re-designing the www.minnelectrans.com website, posting studies and zone specific information throughout, and providing background on the transmission system and transmission planning processes. The utilities will continue to look for ways to utilize the Internet to get information to the public. The Commission, as well, can consider ways to utilize its Internet capability to encourage the public to get involved in transmission issues.

Certification. The statute directs the Commission to adopt a list of certified high voltage transmission line projects by June 1 of each even-numbered year. A transmission line shall be certified as a priority project if the Commission finds that the line is necessary to maintain or enhance reliability, is needed, and is in the public interest. Minnesota Statutes § 216B.2425, subd. 3. The intent of the legislation was to expedite the process for certifying high priority transmission lines.

In practice, however, the procedural and substantive requirements the Commission established in Minnesota Rules chapter 7848 for certifying priority transmission lines do not provide any advantages over the usual Certificate of Need requirements. Minnesota utilities elected to follow the certification requirements specified in chapter 7848 in only one reporting biennium. As part of the 2005 Biennial Report, Minnesota Power and Great River Energy requested certification of the Tower line (Tracking Number 2003-NE-N1) and the Badoura line (Tracking Number 2003-NE-N3). In 2007, and again with this 2009 Biennial Report, no utility has opted to pursue the certification option recognized by section 216B.2425.

The Minnesota Transmission Owners invite the Commission to take another look at the process that is employed to determine whether a particular transmission line project qualifies for priority certification. The Commission could establish a mechanism for identifying priority transmission projects as part of the Biennial Report so that between November 1, when the Report is submitted, and June 1, when the Commission is directed to adopt a state transmission project list, the Commission can evaluate the project and compare its features with the criteria required in the statute for a priority classification.

The Commission could make a general determination regarding what kind of transmission projects are eligible for an expedited certification project. Perhaps load serving situations, or transmission for renewables, are the type of projects that lend themselves to a shorter, less comprehensive review that what is required under a full-blown Certificate of Need proceeding. Perhaps the Commission could establish a voltage limitation, so only lines under 345 kV were eligible for certification rather than a Certificate of Need, or even a length limit so that certified lines could not be more than a certain number of miles long. This approach would be similar to the distinction that is made for the routing of transmission lines, where an alternative, more expedited process has been established for certain smaller lines. Minnesota Rules parts 7850.2800 to 7850.3900.

Once the minimum qualification criteria were established, the Commission could determine the extent of the information that must be included in the Biennial Report on a particular project for which certification is sought. It is probably not necessary, for example, to require an econometric load forecast for a load serving problem in a small area, when other more generic load forecasting and resource planning data would suffice in that situation. Also, this approach would eliminate the step of a separate exemption proceeding that usually takes several months to complete. Of course, the Commission could also establish a mechanism for determining that a particular project did not qualify for the certification process, and a Certificate of Need, with everything that a CON requires, was more appropriate.

Importantly, the biennial reporting process lends itself to sufficient opportunity for the public to participate in the certification of a particular project. A utility seeking certification could notify local officials and citizens in the area of the certification request in the Biennial Report. The Commission could afford the public an opportunity to comment on the request, similar to what it does now when it establishes a public comment period on the entire Report. The Commission could provide for the right to request a hearing, if there was something unique about a load serving project or a wind interconnection that needed to be examined in such detail that a hearing was required.

This expedited process would apply only to whether a project qualifies for placement on the priority list. The necessary routing process could still be followed to determine the best route for a certified transmission line. However, it also makes sense that if a project qualifies for the expedited certification process, and the utility is prepared to identify a proposed route and provide the necessary information about the route as part of the Biennial Report, that not only could a decision on certification be made by June 1, but a decision on a route permit could also be made within that same timeframe, so that upon adoption of the state transmission project list by June 1 of each even-numbered year, the Commission could also make a decision on a route permit for the line. This approach is consistent with the statutory provision directing the Commission to combine routing and need into one joint proceeding. Minnesota Statutes § 216B.243, subd. 4.

Summary. The utilities recognize that these concepts need further attention and development. It might be appropriate for the Commission to consider amending chapter 7848. The Minnesota Transmission Owners would welcome the opportunity to participate with the Commission staff and other interested parties in establishing procedures for preparing the biennial report and identifying and approving priority transmission projects.

5.0 Transmission Planning Zones

5.1 Introduction

Minnesota has been divided geographically into the following six Transmission Planning Zones:

- Northwest Zone
- Northeast Zone
- West Central Zone
- Twin Cities Zone
- Southwest Zone
- Southeast Zone

The map below shows the six Zones.

Chapter 5 of the 2009 Report describes each of the Transmission Planning Zones in the state. The counties in the zone and the major population centers are identified. The utilities that own high voltage transmission lines in the zone are listed. Much of the information included in this chapter is reprinted from the 2007 and 2005 Biennial Reports.

Chapter 6 describes the needs that have been identified for each zone. A table identifying these needs in each zone is provided at the start of the discussion, and then further detail is provided in narrative form. A map of each zone showing the existing transmission lines and the inadequacies that have been identified is also included. A separate table showing the projects that have been completed in the last two years is also included for each zone.

Transmission systems in one zone are highly interconnected with those in other zones and with regional transmission systems. A particular utility may own transmission facilities in a zone that is outside its exclusive service area, or where it has few or no retail customers. Different segments of the same transmission line may be owned and/or operated by different utilities. A transmission line may span more than one zone, and transmission projects may involve more than one zone.

5.2 Northwest Zone

The Northwest Planning Zone is located in northwestern Minnesota and is bounded by the North Dakota border to the west and the Canadian border to the north. The Northwest Planning Zone includes the counties of Becker, Beltrami, Clay, Clearwater, Kittson, Lake of the Woods, Mahnomen, Marshall, Norman, Otter Tail, Pennington, Polk, Red Lake, Roseau, and Wilkin.

Primary population centers within the Northwest Planning Zone (population greater than 10,000) include the cities of Bemidji, Fergus Falls, and Moorhead.

The following utilities own transmission facilities in the Northwest Zone:

- Great River Energy
- Minnkota Power Cooperative
- Missouri River Energy Services
- Otter Tail Power Company
- Xcel Energy

A major portion of the transmission system that serves northwestern Minnesota is located in eastern North Dakota. Two 230 kV lines and one 345 kV line reach from western North Dakota to substations in Fargo, North Dakota, and four 230 kV lines reach out to Audubon, Morris, and Winger, Minnesota, and Wahpeton, North Dakota. The 230 kV system supports an underlying 115 kV system. Much of the load in the zone is actually served by 69 kV and 41.6 kV subtransmission lines.

5.3 Northeast Zone

The Northeast Planning Zone covers the area north of the Twin Cities suburban area to the Canadian border and from Lake Superior west to the Walker and Verndale areas. The zone includes the counties of Aitkin, Carlton, Cass, Cook, Crow Wing, Hubbard, Isanti, Itasca, Kanabec, Koochiching, Lake, Mille Lacs, Morrison, Pine, St. Louis, Todd, and Wadena counties.

The primary population centers in the Northeast Planning Zone include the cities of Brainerd, Cambridge, Cloquet, Duluth, Ely, Grand Rapids, Hermantown, Hibbing, International Falls, Little Falls, Long Prairie, Milaca, Park Rapids, Pine City, Princeton, Verndale, Virginia, and Walker.

The following utilities own transmission facilities in the Northeast Zone:

- American Transmission Company, LLC
- Great River Energy
- Minnesota Power
- Xcel Energy

The transmission system in the Northeast Planning Zone consists mainly of 230 kV, 138 kV and 115 kV lines that serve lower voltage systems comprised of 69 kV, 46 kV, 34.5 kV, 23 kV and 14 kV. American Transmission Company's 345 kV line runs between Duluth, Minnesota, and Wausau, Wisconsin. The 345 kV and 230 kV system is used as an outlet for generation and to deliver power to the major load centers within the zone. From the regional load centers, 115 kV lines carry power to lower voltage substations where it is distributed to outlying areas. In a few instances, 230 kV lines serve this purpose.

A +/- 250 kV DC line runs from North Dakota to Duluth and serves as a generator outlet for lignite-fired generation located in North Dakota. In May 2009 Minnesota Power petitioned the Public Utilities Commission for approval to purchase this line. PUC Docket No. E-015/PA-09-526. Minnesota Power plans to over time transmit wind power from the Dakotas over this line to its customers in Minnesota. In addition, a 500 kV line and a 230 kV line provide interconnections with Manitoba and a 115 kV line interconnects with Ontario at International Falls. The interconnections with Canada provide for generation resource sharing as well as seasonal and economic power interchanges between Minnesota and Canada.

5.4 West Central Zone

The West Central Transmission Planning Zone extends from Sherburne and Wright counties on the east, to Traverse and Big Stone counties on the west, bordered by Grant and Douglas counties on the north and Renville county to the south. The West Central Planning Zone includes the counties of Traverse, Big Stone, Lac qui Parle, Swift, Stevens, Grant, Douglas, Pope, Chippewa, Renville, Kandiyohi, Stearns, Meeker, McLeod, Wright, Sherburne, and Benton.

The primary population centers in the zone include the cities of Alexandria, Buffalo, Elk River, Glencoe, Hutchinson, Litchfield, Sartell, Sauk Rapids, St. Cloud, St. Michael, and Willmar.

The following utilities own transmission facilities in the West Central Zone:

- Great River Energy
- Hutchinson Utilities Commission
- Missouri River Energy Services
- Otter Tail Power Company
- Willmar Municipal Utilities
- Xcel Energy

This transmission system in the West Central Planning Zone is characterized by a 115 kV loop connecting Grant County – Alexandria – West St. Cloud – Paynesville – Willmar – Morris and back to Grant County. These 115 kV transmission lines provide a hub from which 69 kV subtransmission lines provide transmission to loads in the zone.

A 345 kV line from Sherburne County to St. Cloud and 115 kV and 230 kV lines from Monticello to St. Cloud provide the primary transmission supply to St. Cloud and much of the eastern half of this zone. Two 230 kV lines from Granite Falls – one to the Black Dog generating plant in the Twin Cities and one to Willmar – provide the main source in the southern part of the zone.

Demand in the St. Cloud area continues to grow and several individual projects are being considered to address the need for more power into this area. A new 345 kV line from Fargo to Monticello, which is part of the CapX 2020 group of projects, is a significant part of the solution to transformer overloads and low voltage contingencies that are anticipated in the St. Cloud area.

Some of the 69 kV "subtransmission" network is becoming inadequate for supporting the growing load in the area. Solutions to the 69 kV transmission inadequacies may involve construction of new 115 kV transmission lines. Therefore, any discussion about the inadequacy of the existing system must include an analysis of parts of the existing 69 kV subtransmission system.

5.5 Twin Cities Zone

The Twin Cities Planning Zone comprises the Twin Cities metropolitan area. It includes the counties of Anoka, Carver, Chisago, Dakota, Hennepin, Ramsey, Scott and Washington.

The following utilities own transmission facilities in the Twin Cities Zone:

- Great River Energy
- Xcel Energy

The transmission system in the Twin Cities Planning Zone is characterized by a 345 kV double circuit loop around the core Twin Cities and first tier suburbs. Inside the 345 kV loop, a network of high capacity 115 kV lines serves the distribution substations. Outside the loop, a number of 115 kV lines extend outward from the Twin Cities with much of the local load serving accomplished via lower capacity, 69 kV transmission lines.

The GRE DC line and 345 kV circuits tie into the northwest side of the 345 kV loop and are dedicated to bringing generation to Twin Cities and Minnesota loads. Tie lines extend from the 345 kV loop to three 345 kV lines: one to eastern Wisconsin, one to southeast Iowa and one to southwest Iowa. The other tie is the Xcel Energy 500 kV line from Canada that is tied into the northeast side of the 345 kV loop.

Major generating plants are interconnected to the 345 kV transmission loop at the Sherburne County generating plant and the Monticello generating plant in the northwest, the Allen S. King plant in the northeast, and Prairie Island in the southeast. On the 115 kV transmission system in the Twin Cities Planning Zone there are three intermediate generating plants: Riverside (located in northeast Minneapolis), High Bridge (located in St. Paul), and Black Dog (located in north Burnsville). There are also two peaking generating plants – Blue Lake and Inver Hills – interconnected on the southeast and the southwest, respectively.

5.6 Southwest Zone

The Southwest Transmission Planning Zone is located in southwestern Minnesota and is generally bounded by the Iowa border on the south, Mankato on the east, Granite Falls on the north and the South Dakota border on the west. It includes the counties of Brown, Cottonwood, Jackson, Lincoln, Lyon, Martin, Murray, Pipestone, Redwood, Rock, Watonwan, and Yellow Medicine.

The primary population centers in the Southwest Zone include the cities of Fairmont, Granite Falls, Jackson, Marshall, New Ulm, Pipestone, St. James, and Worthington.

The following utilities own transmission facilities in the Southwest Zone:

- ITC Midwest LLC
- East River Electric Power Cooperative
- Great River Energy
- L&O Power Cooperative
- Marshall Municipal Utilities
- Missouri River Energy Services
- Otter Tail Power Company
- Xcel Energy

Since the last Biennial Report was filed in November 2007, ITC Midwest LLC purchased the transmission assets of Interstate Power and Light Company. The Public Utilities Commission approved the sale of Interstate transmission assets to ITC Midwest in an Order dated February 7, 2008. PUC Docket No. E001/PA-07-540. ITC Midwest now has the obligation to participate in the preparation of this Biennial Report.

The transmission system in the Southwest Zone consists mainly of two 345 kV transmission lines, one beginning at Split Rock Substation near Sioux Falls and traveling to Lakefield Junction and the second traveling from Lakefield Junction to Mankato, which serves as a major hub with several 161 kV lines throughout the zone. A number of 115 kV lines provide transmission service to loads in the area, particularly the large municipal load at Marshall. Much of the load in the southwestern zone is served by 69 kV subtransmission lines which have sources from 115/69 kV or 161/69 kV substations.

The 115 kV lines also provide transmission service for the wind generation that is being developed along Buffalo Ridge. The transmission system in this zone has changed significantly in recent years with new transmission additions to enable additional generation delivery. Continuing these changes, the system will soon be enhanced by the addition of the Twin Cities – Brookings 345 kV transmission line to provide additional outlet for the wind generation in the Southwest Zone. In addition to enabling additional delivery of wind generation, these lines will provide opportunities for new transmission substations to improve the load serving capability of the underlying subtransmission system.

5.7 Southeast Zone

The Southeast Planning Zone includes Blue Earth, Dodge, Faribault, Fillmore, Freeborn, Goodhue, Houston, Le Sueur, Mower, Nicollet, Olmsted, Rice, Sibley, Steele, Wabasha, Waseca, and Winona Counties. The zone is bordered by the State of Iowa to the south, the Mississippi River to the east, the Twin Cities Planning Zone and West Central Planning Zone to the north, and the Southwest Planning Zone to the west.

The primary population centers in the zone include the cities of Albert Lea, Austin, Faribault, Mankato, North Mankato, Northfield, Owatonna, Red Wing, Rochester, and Winona.

The following utilities own transmission facilities in the Southeast Zone:

- Dairyland Power Cooperative
- Great River Energy
- ITC Midwest LLC
- Rochester Public Utilities
- Southern Minnesota Municipal Power Agency
- Xcel Energy

The transmission system in the Southeast Planning Zone consists of 345 kV, 161 kV, 115 kV and 69 kV lines that serve lower voltage distribution systems. The 345 kV system is used to import power to the Southeast Planning Zone for lower voltage load service from generation stations outside of the area. The 345 kV system also allows the seasonal and economic exchange of power from Minnesota to the east and south from large generation stations that are located within and outside of the zone. The 161 kV and 115 kV systems are used to carry power from the 345 kV system and from local generation sites to the major load centers within the zone. From the regional load centers and smaller local generation sites, 69 kV lines are used for load service to the outlying areas of the Southeast Planning Zone.

6.0 Needs

6.1 Introduction

Chapter 6 contains a discussion of each of the present and reasonably foreseeable inadequacies that have been identified in the six transmission planning zones. The discussion for each zone begins with a table summarizing each inadequacy and a map showing the general location of each inadequacy. Then a table is presented that lists those inadequacies that were identified in previous biennial reports that have been addressed through the completion of a project, or perhaps through combination with another inadequacy. These tables are followed with a discussion of each inadequacy in the zone and, in most cases, a map showing the general location of the inadequacy. The following information describes the type of information that is presented for each inadequacy.

Tracking Number. The utilities developed a numbering system in the 2005 Report that is continued here. The numbering system has three parts to it: the year the inadequacy was reported, the zone in which it occurs, and a chronological number assigned in no particular order, starting with number one for each reporting year. Thus, the Tracking Number for inadequacies first identified in the 2009 Biennial Report will begin with 2009, followed by the zone, and followed by a number. Tracking Numbers beginning with other years means that that particular inadequacy was first identified in that year. For example, Tracking Number 2009-WC-N6 (the Elk River – Becker Area) is an inadequacy in the West Central Zone first identified in this report. Tracking Number 2007-SE-N1, (the overload of the Rochester to Adams 161 kV line) was first identified in the 2007 Report.

Utility. This category lists the utility or utilities that have the main responsibility for addressing the inadequacy. In some instances the local municipal utility or other entity that is primarily responsible for the inadequacy is not a transmission-owning utility that is required to file this biennial report, so the reporting utility with the most involvement with the project is identified.

Inadequacy. Minnesota Statutes § 216B.2425 – the statute requiring the filing of this biennial report – requires the utilities to identify "present and reasonably foreseeable future inadequacies in the transmission system in Minnesota." Neither the statute nor the PUC rules define the term "inadequacy."

Consistent with the statute and the PUC objective to identify those situations that may affect reliability of service, the utilities have for each Tracking Number included an entry describing the inadequacy that has been found. The inadequacy may be an overload of certain facilities in a contingency situation, it may be an interconnection request, it may be increasing demand, or it may be a combination of factors jeopardizing the reliability of the transmission infrastructure. An inadequacy may be identified through transmission planning, such as when the impact of contingency events are examined, or through the announcement of a new development, such as an ethanol plant or the proposed construction of a new generating facility, or through an increase in the demand for energy in a particular area.

For those inadequacies reported in prior years, the discussion in many cases is similar to the language from a previous biennial report because the inadequacy remains the same as was reported previously, although an update on the status of the matter is provided.

Alternatives. The statute requires the utilities to identify alternative means of addressing each inadequacy listed. Initially, the utilities engage in a preliminary screening analysis – a qualitative exercise relying on experience and judgment – to determine what alternatives are within the realm of possible solutions to the problem. It is common to look at both short-term and long-term options.

There are a number of general factors that are relied on to make this initial cut. For example, the utilities will favor a transmission alternative that does not involve the creation of new right-of-way, such as the reconductoring of an existing line, over one that requires additional easements or land for a new line or new generation. Obviously, the utilities are going to prefer alternatives that are less expensive than the more expensive solutions. It can cost upwards of $1500 per kilowatt to install generation. It is often readily apparent that a transmission option will be less expensive than a generation alternative. Sometimes transmission is the only option, such as when a new generating facility needs to connect to the grid.

Both the statutes (Minnesota Statutes § 216B.2426) and the PUC rules (Minnesota Rules part 7848.1300, item E) require the utilities to consider the possibility of installing distributed generation and other nontransmission alternatives, in addition to transmission solutions. The utilities have attempted to identify those situations in which a distributed generation option might be possible.

Analysis. The intent of this category is to summarize the information the utilities have compiled with respect to identifying the inadequacy and evaluating possible alternatives for addressing the situation. In some cases, studies have been completed or are underway and these studies can be consulted for more detailed information. Obviously, the farther out into the future an inadequacy needs resolving, the less detail there will be about various alternatives. In some cases the utility may have selected a preferred alternative and an explanation will be provided of why that alternative was selected.

Importantly, once the utility reaches the point where an alternative is selected and governmental approval is required before the project can be undertaken, the utility will examine all those alternatives that are required to be examined under the applicable requirements. Identifying a preferred alternative in the biennial report will often be the project that is ultimately implemented, but the analysis is not complete until the authorization is obtained.

Schedule. This category sets forth the utility's best estimate on when certain steps will have to be taken to avoid or correct an inadequacy. In some cases, the timing of a solution may depend on developments in the future, like load growth or decisions by independent power producers, and the timing is uncertain. Also, it is not always possible to know whether a particular option will have to be reviewed and approved by the Public Utilities Commission, but the utilities have attempted to identify those projects that would require a Certificate of Need and a Route Permit from the Commission.

PUC Docket Numbers. If a decision has been made on a solution for a particular situation, and the project selected requires review and approval by the Public Utilities Commission and the Utility has applied for PUC approval, the PUC will have assigned a docket number to the utility's request for approval. It is helpful to know the PUC Docket Number because that number can be used to review documents that are part of the administrative record in the matter. Click on

https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showeDocketsSearch&showEdocket=true

and enter the docket number to find the complete record.

For nearly every Tracking Number, a map of the area is included following the discussion. For those Tracking Numbers where a route permit has been applied for, and a PUC Docket Number is provided, more specific maps showing proposed transmission line routes can be found in the PUC docket for that matter.

Completed Projects. At the beginning of each zone discussion, a table is presented that lists those projects that have been completed within the last two years, since the 2007 Report was prepared. Those Tracking Numbers in the table will not be reported upon in future biennial reports. If a particular project has been approved by the PUC or other regulatory body, but the construction is not complete, the matter is not listed in this table and the Tracking Number is reported on in the body of the report. In a few cases, projects are listed in this table not because they are complete, but because they have been combined with other Tracking Numbers and are reported with the other matter. The reader can refer to the other Tracking Number to read the full discussion of the closed matter.

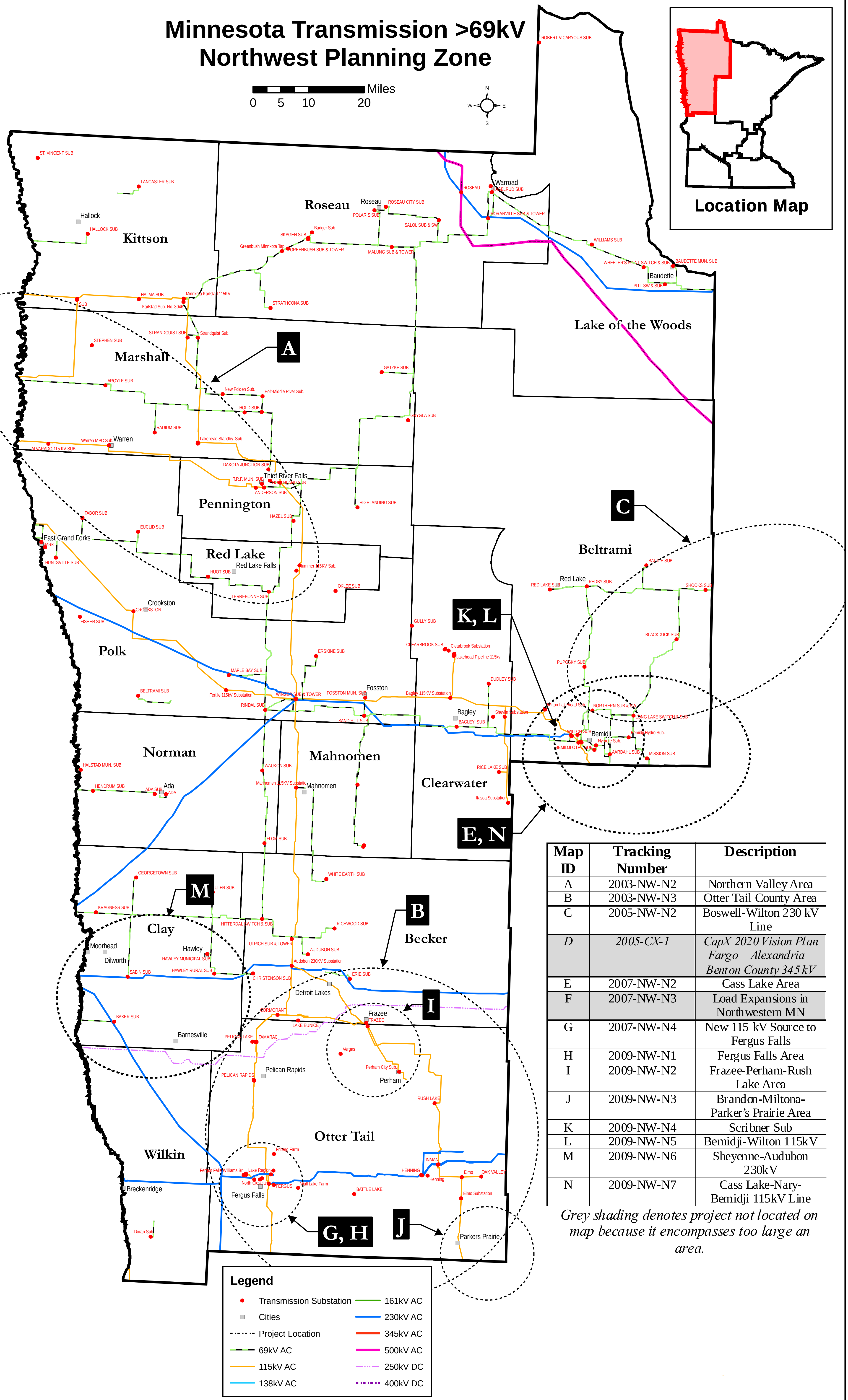
6.2 Northwest Zone

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

Northwest Zone

Tracking Number	Description	Projected In-Service Year	Need Driver	Section No.
2003-NW-N2	Northern Valley Area	2011	Loading issues on Hensel and Moranville transformers and expanded area under contingency conditions	6.2.2
2003-NW-N3	Otter Tail County Area	2011	Summer peak loading issues on transformers and 41.6 kV system	6.2.3
2005-NW-N2	Bemidji – Grand Rapids 230 kV Line	Mid-2012	Low voltage issues in the Bemidji area	6.2.4
2005-CX-1	CapX 2020 Projects Bemidji – Grand Rapids 230 kV and Fargo – Alexandria – St. Cloud -Monticello 345 kV	2013-2015	Voltage stability and other Reliability Concerns in the Red River Valley and West Central Minnesota; Renewable Energy Support	6.2.5
2007-NW-N2	Cass Lake Area	2009 and 2012	Low voltage and 115/69 kV Transformer Loading Issues in the Cass Lake area	6.2.6
2007-NW-N3	Load Expansions in Northwestern Minnesota	2010/2011/2012	Enbridge Energy Load Increases	6.2.7
2007-NW-N4	New 115 kV Source to Fergus Falls 12.5 kV System	2010	Load Growth Related Voltage Issues on Distribution System	6.2.8
2009-NW-N1	Fergus Falls Area	2014	Load Growth Related Loading and Voltage Issues on Transmission System	6.2.9
2009-NW-N2	Frazee – Perham – Rush Lake Area	2012	Load Growth Related Voltage Issues	6.2.10
2009-NW-N3	Brandon – Miltona – Parkers Prairie Area	2010 – 2013	Load Growth Related Loading and Voltage Issues	6.2.11
2009-NW-N4	Bemidji Area 69 kV Deficiencies	2010	Increasing Load	6.2.12
2009-NW-N5	Bemidji – Wilton 115 kV Line	2010	Maple River Wind Projects	6.2.13
2009-NW-N6	Sheyenne – Audubon 230 kV Line	2013/2014	Maple River Wind Projects	6.2.14
2009-NW-N7	Cass Lake – Nary – Bemidji 115 kV Line	2012	Bemidji – Grand Rapids 230 kV Line	6.2.15

Minnesota Transmission >69kV
Northwest Planning Zone



Map ID	Tracking Number	Description
A	2003-NW-N2	Northern Valley Area
B	2003-NW-N3	Otter Tail County Area
C	2005-NW-N2	Boswell-Wilton 230 kV Line
D	*2005-CX-1*	*CapX 2020 Vision Plan Fargo – Alexandria – Benton County 345 kV*
E	2007-NW-N2	Cass Lake Area
F	2007-NW-N3	Load Expansions in Northwestern MN
G	2007-NW-N4	New 115 kV Source to Fergus Falls
H	2009-NW-N1	Fergus Falls Area
I	2009-NW-N2	Frazee-Perham-Rush Lake Area
J	2009-NW-N3	Brandon-Miltona-Parker's Prairie Area
K	2009-NW-N4	Scribner Sub
L	2009-NW-N5	Bemidji-Wilton 115kV
M	2009-NW-N6	Sheyenne-Audubon 230kV
N	2009-NW-N7	Cass Lake-Nary-Bemidji 115kV Line

Grey shading denotes project not located on map because it encompasses too large an area.

6.2.1 Completed Projects

Some inadequacies in the Northwest Zone that were identified in the 2007 Biennial Report were alleviated through the construction and completion of specific projects over the last two years. Information about each of the completed projects is summarized briefly in the table below, and those matters will be removed from the list of inadequacies that are discussed in the 2009 Report. More information about these projects and inadequacies can be found in the 2007 Report. Also, additional information is available by contacting the designated person for the utility that was responsible for constructing the project.

Tracking Number	Utility	Description	PUC Docket	Date Completed
2003-NW-N4	Otter Tail Power Company, Minnkota Power Cooperative Minnesota Power Great River Energy Missouri River Energy Services Xcel Energy	Red River Valley and West Central Minnesota Area	CN-06-1115 TL-09-246 TL-09-1056 CN-07-1222 TL-07-1327	Combined with Tracking Numbers 2005-CX-1 2005-NW-N2
2007-NW-N1	Great River Energy	Tamarac Substation Addition of 115 kV Circuit Breaker and 20 MVAr Capacitor Bank	None	2009
2007-NW-N5	Minnkota Power Cooperative	Helga Substation	None	2008

6.2.2 Northern Valley Area

Tracking Number. 2003-NW-N2

Utility. Otter Tail Power Company and Minnkota Power Cooperative

Inadequacy. The Northern Valley Area consists of the northernmost part of the Northwest Planning Zone as well as a portion of northeastern North Dakota, and includes the communities of Donaldson, Karlstad, Viking, Thief River Falls, Plummer, Crookston, and Oslo in Minnesota and Warsaw, Hensel, and Langdon in North Dakota. Otter Tail Power and Minnkota Power Cooperative serve the majority of the customers in this region.

Historical customer demand data indicates that loads in this area have grown substantially over the past several years. Due to the increased load, concerns of high facility loadings and low voltage levels have arisen. This area is winter peaking and thus the transmission system has the highest loadings and lowest voltages during the winter months. The situation is exacerbated when contingencies occur.

A map of the area is shown following the discussion.

Alternatives. As described in the 2007 Report, several alternatives, both short-term and long-term, have been identified. Short-term alternatives include (1) installation of capacitor banks, (2) reconductoring existing lines, and (3) employing alternative switching procedures.

Long-term alternatives include (1) upgrading existing 41.6 kV lines to 115 kV, and (2) adding a new 230 kV source into the 115 kV system around the Warsaw/Minto (North Dakota) area. Since the loading and voltage concerns within the area are so widespread, a combination of these alternatives is likely necessary to address the situation.

Analysis. Facility additions completed in late 2007 and early 2008 have relieved some concerns in this region, specifically in extreme northwestern Minnesota. As part of the Langdon Wind Project, an existing 35-mile 41.6 kV line was upgraded to 115 kV between Hensel, North Dakota, and Langdon, North Dakota, to allow for an increase in transmission capacity for generation outlet. Although the construction of this line was driven by the Langdon Wind Project in 2007, it is likely that this same 115 kV line would have been needed in the future to address the load serving deficiencies identified in this region. Studies completed for the Langdon Wind Project have identified that the load serving ability of the transmission system in this area is greatly enhanced by the addition of the Langdon – Hensel 115 kV line.

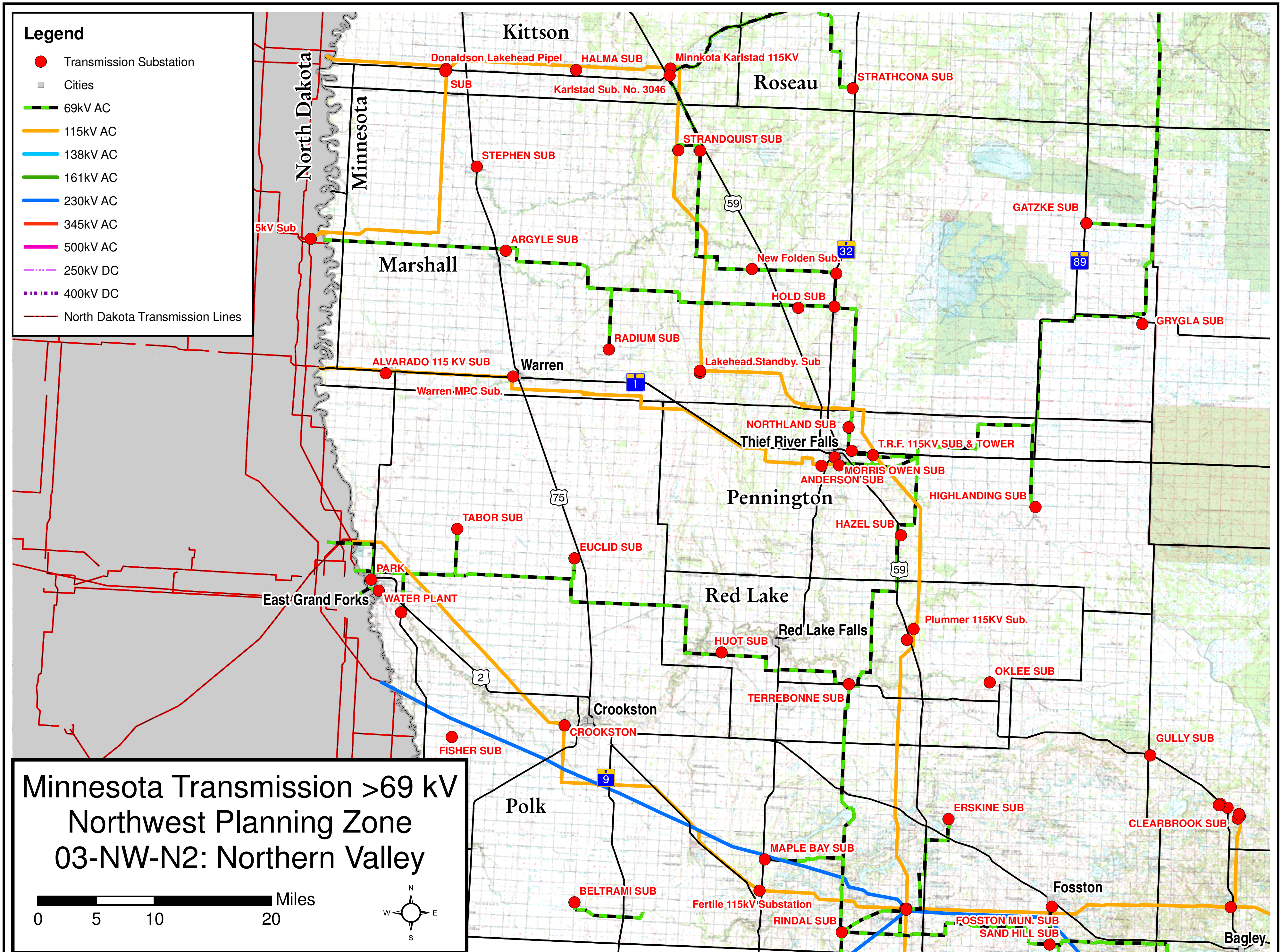
The addition of a second 115/69/41.6 kV transformer at the Hensel Substation was also completed in late 2007 by Minnkota Power Cooperative. The addition of this second transformer was not part of the transmission plan for the Langdon Wind Project, but was constructed in the same timeframe given the delivery date of the new transformer and the availability of crews in the Hensel area during construction of the Langdon – Hensel 115 kV line. This new 92 MVA transformer alleviates the overloads identified on the existing 56 MVA 115/69/41.6 kV transformer at the Hensel Substation during critical contingencies.

Given these recent facility additions in northeastern North Dakota, there has been some additional load serving ability created for the transmission system in the Northern Valley region. At the current time, there are still two studies underway (and nearing completion) for addressing other load serving concerns in a larger geographic area within the northern valley. The Ramsey Transformer Study was initiated following the completion of the Langdon Wind Project to address overload concerns on the existing 84 MVA, 230/115 kV transformer at the Ramsey Substation near Devils Lake, North Dakota. The recommendation of the Ramsey Transformer Study is to increase the capacity of the existing 84 MVA, 230/115 kV transformer by replacing it with a 140 MVA or 187 MVA transformer. Along with this transformer replacement (expected in the 2011 timeframe), capacitor banks are recommended at Hensel to increase voltages at the Hensel Substation for an outage of the Hensel – Drayton 115 kV line.

The previously identified system deficiencies on the eastern portion of the northern valley (within Minnesota) have been rolled into the Enbridge Transmission Study. Further information about the Enbridge Transmission Study can be found under tracking number 2007-NW-N3.

Distributed generation is not believed to be an adequate solution to this system deficiency due to the extent of the system deficiency (wide-spread voltage and loading concerns), and the need for that generation to be online at times in advance of the critical contingency. Furthermore, some of the transmission enhancements in this area seem to be driven by generation in the area already, an indication that minimal transmission capacity is available for additional generation on the system in this area.

Schedule. As mentioned previously, specific study efforts to address the system deficiencies in the Northern Valley Area have been rolled into other completed and on-going studies for this region; namely the *Langdon Wind Powered Generation Facility System Impact Study*, the *Ramsey Transformer Study*, and the *Enbridge Transmission Study*. Facility additions to address load serving concerns in this region were completed in late 2007 and early 2008 with additional system enhancements expected in 2010 (Hensel capacitor bank) and 2011 (Ramsey 230/115 kV transformer replacement). Additional system enhancements to address the reliability concerns in the Northern Valley Area are expected to be installed within existing substations and will not require prior review by the Public Utilities Commission.


Legend
Transmission Substation
Cities
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
North Dakota Transmission Lines
Minnesota Transmission >69 kV
Northwest Planning Zone
03-NW-N2: Northern Valley
Miles
0
5
10
20
N
S
E
W
North Dakota
Minnesota
Kittson
Roseau
Marshall
Pennington
Red Lake
Polk
Warren
Thief River Falls
East Grand Forks
Red Lake Falls
Crookston
Fosston
Bagley
Donaldson Lakehead Pipel
SUB
HALMA SUB
Minnkota Karlstad 115KV
Karlstad Sub. No. 3046
STRATHCONA SUB
STRANDQUIST SUB
STEPHEN SUB
GATZKE SUB
5kV Sub
ARGYLE SUB
New Folden Sub.
HOLD SUB
GRYGLA SUB
RADIUM SUB
ALVARADO 115 KV SUB
Lakehead Standby. Sub
Warren MPC Sub.
NORTHLAND SUB
T.R.F. 115KV SUB & TOWER
MORRIS OWEN SUB
ANDERSON SUB
HIGHLANDING SUB
HAZEL SUB
TABOR SUB
EUCLID SUB
PARK
WATER PLANT
Plummer 115KV Sub.
HUOT SUB
OKLEE SUB
TERREBONNE SUB
CROOKSTON
FISHER SUB
GULLY SUB
ERSKINE SUB
CLEARBROOK SUB
MAPLE BAY SUB
BELTRAMI SUB
Fertile 115kV Substation
RINDAL SUB
FOSSTON MUN. SUB
SAND HILL SUB
59
32
89
1
75
2
9

6.2.3 Otter Tail County Area

Tracking Number. 2003-NW-N3

Utility. Otter Tail Power Company and Great River Energy

Inadequacy. Past study efforts have shown that the transmission system in Otter Tail County falls below acceptable operating limits during summer peak contingency conditions. It has been shown that several contingencies within the area cause transformer loading violations, line-loading violations, and under-voltage violations.

A number of facility additions have been completed and are planned to address the various deficiencies identified on the transmission system within Otter Tail County. Some of the facility additions that have been completed to date include: (1) the installation of capacitor banks between Fergus Falls and Henning (2004); (2) protective relay upgrades at the Pelican Rapids and Hoot Lake Substations (2005); and (3) construction of a new 2.5-mile, 115 kV line (currently operated at 41.6 kV) to the Pelican Rapids Turkey Plant (2005).

These various smaller scale facility additions are expected to maintain acceptable voltage levels and line loadings in the area until such time that larger scale facility additions can be completed in the future.

A map of the area is shown following the discussion.

Analysis. Given that the transmission system within Otter Tail County is rather extensive and covers a large geographic area, the discussion of specific deficiencies and their corresponding alternatives has been separated into two different areas (the Henning – Hoot Lake Area and the Tamarac – Pelican Rapids Area).

Henning - Hoot Lake (Fergus Falls) Area

Description of Area. This area is located in the southernmost part of the Northwest Transmission Planning Zone. Loads in this area are primarily served by a 230/41.6 kV source from Henning and 115/41.6 kV source from Hoot Lake.

Studies have shown that facility additions completed in the last five years are not sufficient to keep the voltages and loadings on the transmission system within the required limits beyond the 2011 timeframe. The most critical contingencies that cause system deficiencies are the Henning 230/41.6 kV transformer, the Henning to Henning Tap two mile long 41.6 kV line, the Hoot Lake 115/41.6 kV transformer, and the Hoot Lake to Aurdal 41.6 kV line. The loss of the Henning 230/41.6 kV transformer or the Henning to Henning Tap 41.6 kV line causes an overload on the Hoot Lake 115/41.6 kV transformer and the Hoot Lake to Aurdal 41.6 kV line. Similarly, the loss of the Hoot Lake 115/41.6 kV transformer or the Hoot Lake to Aurdal 41.6 kV line causes loading violations on the Henning 230/41.6 kV transformer.

Alternatives. Two alternatives were developed to address the near-term and long-term transmission needs of the Henning – Hoot Lake area.

Alternative 1: New Silver Lake 230/41.6 kV Substation

This alternative involves rebuilding a 0.5-mile portion of the Hoot Lake to Aurdal, 5.9 mile, 41.6 kV line, establishing a new 230/41.6 kV source at Silver Lake and reconfiguring the normally open locations on the 41.6 kV transmission system between Hoot Lake and Henning. The Hoot Lake to Aurdal 41.6 kV line consists of 0.5 mile of 3/0 ALUM (Aluminum) and 5.4 miles of 266 ACSR (Aluminum Conductor, Steel Reinforced) conductors. This alternative recommends rebuilding the 3/0 ALUM portion of the line with 266 ACSR conductor to lower the line impedance and create more line capacity. The new Silver Lake source will boost the voltage in the area and unload the 41.6 kV transmission lines including the Hoot Lake and Henning transformers.

Alternative 2: Hoot Lake – Inman 115 kV line

This alternative involves building 40 miles of new 115 kV transmission line from Hoot Lake to Inman in the 2010 timeframe and converting multiple 41.6 kV substations, such as the Battle Lake and Underwood 41.6 kV distribution substations, to 115 kV. Relatively large loads in the area are found on relatively long radial lines at either sides of the Hoot Lake to Henning 41.6 kV line. This alternative involves significant transmission costs since several 41.6 kV substations would need to be converted to 115 kV. This alternative recommends converting one substation from the 41.6 kV system to the new 115 kV system every two or three years.

Comparison of Alternatives. Present worth analysis was performed on the alternatives mentioned above. Line losses for the area were evaluated with Alternative 1 being the benchmark for loss savings. The MW loss savings for Alternative 2 are as follows:

Alternative	2011 Summer	2021 Summer
2	0.5 MW	-0.2 MW

The cumulative investment, present worth, and present worth with loss savings are summarized in the following table.

Alternative	**Cumulative Investment**	Present Worth	Present Worth with Loss Savings
1	$2,979,000	$5,868,0000	NA
2	$23,423,000	$45,949,000	$46,112,000

Alternative 1 is the least cost plan which involves the minimum cumulative investment. In addition to being the more expensive plan, Alternative 2 would be difficult to implement in the required timeframe. Therefore, Alternative 1 is the recommended plan for this area.

Capacitor bank installations for voltage support were not considered as an alternative in this area because the substations in this area are already saturated with capacitor banks. If additional capacitor banks were to be installed in this area, it would be costly since additional capacitor banks would need to be installed in small increments to avoid unacceptable voltage transients from capacitor bank switching.

Distributed generation is not a desirable option to address the long-term transmission deficiencies of the area. The Hoot Lake to Henning area is a relatively large area. When considering the extent of the Hoot Lake and Henning transformer overloads, or the low voltage problems of the area, it is likely that several small generators would have to be installed at multiple locations throughout the transmission system in the area. The investment in a distributed generation alternative seems to exceed the investment of the preferred option that is necessary for the transmission enhancements needed. Therefore, the distributed generation option is not a practical idea for this large area of concern.

Schedule. Great River Energy anticipates establishing the Silver Lake substation in the 2011 timeframe. The new substation site will be directly adjacent to the existing 230 kV transmission line and will therefore not require additional 230 kV line construction. As such, it is not believed that the Public Utilities Commission will need to review the project.

Tamarac -Pelican Rapids Area

Description. The Tamarac - Pelican Rapids Area is served by four 115/41.6 kV transformers: two 12.5 MVA transformers at the Tamarac Substation and two at the Pelican Rapids Substation (one rated at 12.5 MVA and the other rated at 10 MVA).

This area has acceptable voltage profiles during single line contingencies up to the 2022 timeframe. In the 2022 timeframe, the Barnesville area will experience low voltage problems for the loss of the Tamarac 115/41.6 kV transformers. However, contingency analyses in the area have also shown that the loss of the Tamarac 115/41.6 kV transformers will overload the Pelican Rapids 115/41.6 kV transformers in the near future. The long-term transmission deficiencies of the area include the Tamarac 115/41.6 kV transformer overload for loss of Pelican Rapids 115/41.6 kV transformers.

Alternatives. Two alternatives were developed to address the near-term and long-term transmission deficiencies of the area.

Alternative 1: Replace Pelican Rapids 115/41.6 kV transformers

This alternative involves replacing the existing Pelican Rapids 10 MVA and 12.5 MVA 115/41.6 kV transformers with two 25 MVA transformers in the 2012 timeframe. The existing transformers at Pelican Rapids are overloaded during system intact conditions in the 2013 timeframe. The new Pelican Rapids transformers are recommended to have load tap changers (LTC) for voltage support needs in the 2022 timeframe.

Alternative 2: 115 kV Load Conversions

This alternative involves converting loads from the 41.6 kV system to the nearest 115 kV transmission system to relieve loading on the Tamarac and Pelican Rapids transformers. The Pelican Rapids Turkey Plant is one of the largest loads in the area, and converting it to 115 kV unloads the Pelican Rapids transformers and strengthens the voltage in the area. This alternative also recommends converting the Erhard 41.6 kV load to 115 kV in the 2014 timeframe. This will further relieve the loading on the Pelican Rapids transformers during contingency conditions. Converting Erhard from 41.6 kV service to 115 kV service requires building about 1.5 miles of new 115 kV line.

Comparison of Alternatives. Present worth analysis was performed for each alternative with Alternative 1 being the benchmark for loss savings. Line losses for the area were evaluated with Alternative 1 being the benchmark for loss savings. The MW loss savings for Alternative 2 are as follows:

Alternative	2011 Summer	2021 Summer
2	0.1	-0.3

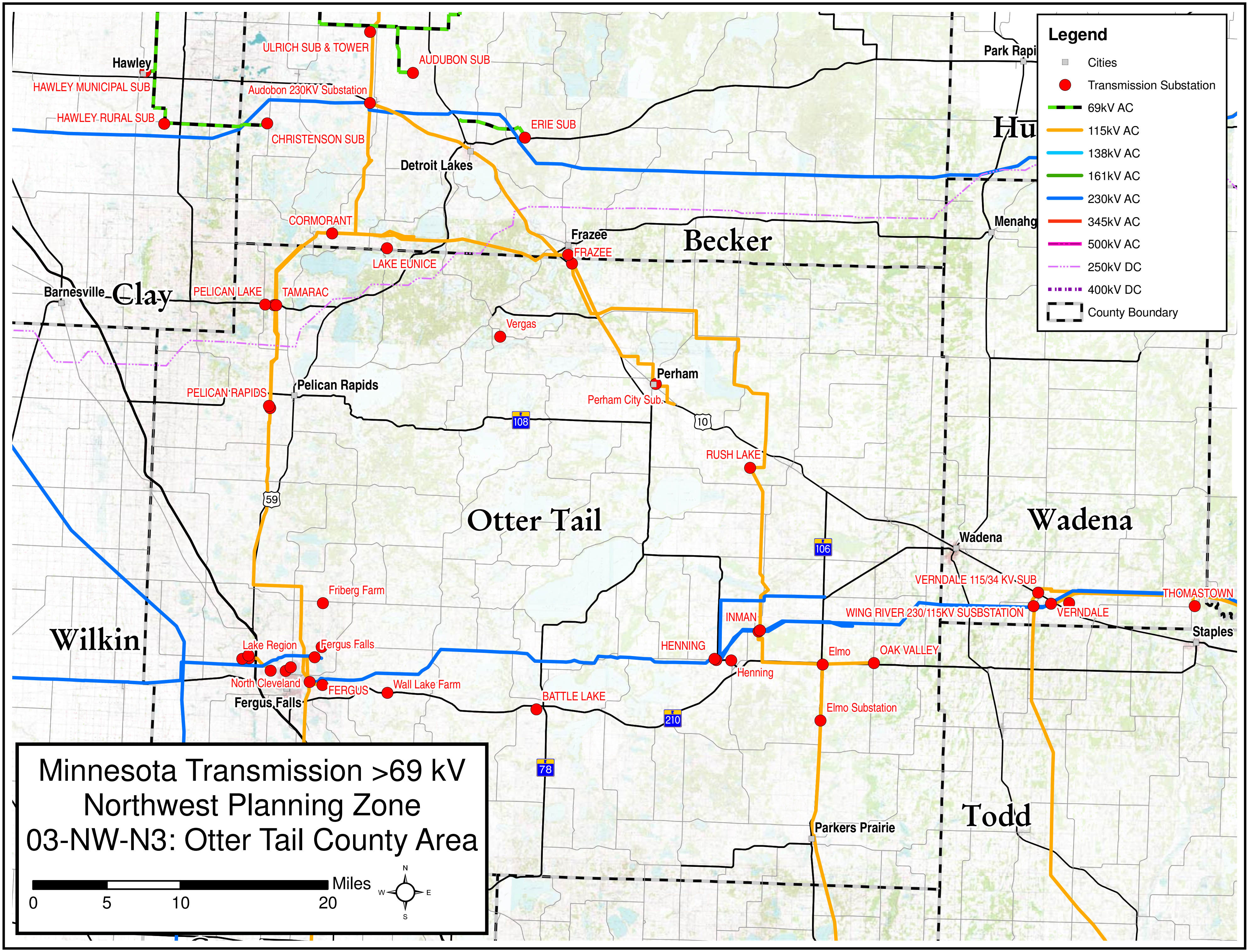
The cumulative investment, present worth, and present worth with loss savings are summarized in the following table.

Alternative	Cumulative Investment	Present Worth	Present Worth with Loss Savings
1	$2,300,000	$5,316,000	NA
2	$2,723,000	$5,088,000	$5,260,000

Alternative 2 is the least cost plan which involves the lowest present worth value over the time period analyzed. The line to the Turkey Plant load in Alternative 2 is already constructed to 115 kV standards and was not accounted for in the cost analysis shown above, further making Alternative 2 more attractive from an economic point of view. As Alternative 2 were constructed, future load conversions could be required if loads continue to grow as they have historically to ensure acceptable loading levels on the Pelican Rapids transformers. Alternative 2 is the recommended alternative that will address the long-term transmission needs of the area.

Distributed generation is not a preferred alternative for this area. As mentioned previously, the tap line to the Pelican Rapids Turkey Plant load is already built and ready for 115 kV operation. Thus, the substation upgrade to 115 kV is a much more economic option than a distributed generation alternative to fix the transformer loading issues in the area.

Schedule. Otter Tail Power Company is planning to convert the Pelican Rapids Turkey Plant load to 115 kV in the near future. Given that the 115 kV line is currently constructed and being operated at 41.6 kV, the remaining work to convert this line to 115 kV will need to occur at the existing Pelican Rapids Substation and the new 115 kV tap point along the Pelican Rapids – Tamarac 115 kV line. Since conversion of the line to 115 kV operation will be limited to substation work near Pelican Rapids, no prior review by the Public Utilities Commission will be required.



Minnesota Transmission >69 kV
Northwest Planning Zone
03-NW-N3: Otter Tail County Area

6.2.4 Bemidji – Grand Rapids 230 kV Line

Tracking Number. 2005-NW-N2

Utility. Otter Tail Power Company, Minnesota Power, Minnkota Power Cooperative, Great River Energy, and Xcel Energy

Inadequacy. Projected peak demand over the next 10-15 years in the Red River Valley is projected to be significantly greater than what the current transmission system can handle. With respect to the Bemidji area, the peak load by the winter of 2011/2012 is projected to be about 282 MW, which is 60 MW greater than the system's maximum load-serving capability today.

Analyses of the Bemidji area transmission system as well as the larger regional system have concluded that there is a need to address two critical issues, (1) improve the voltage stability of the transmission system in the Bemidji area to meet both current and future load demands, (2) improve the reliability of the entire Red River Valley transmission system to meet anticipated long term load demands.

A map of the area is shown following the discussion.

Alternatives. As a result of the Red River Valley/Northwest Minnesota Load-Serving Transmission Study (TIPS Update), the utilities have elected to construct a new 230 kV line between the Clay Boswell generating facility near Grand Rapids and the Wilton Substation near Bemidji, with a 230/115 kV tap proposed near Cass Lake, Minnesota. The preferred route for the new line results in a distance of approximately 70 miles. In addition, a new 345 kV line from Fargo to Monticello is also being pursued as a result of the TIPS Update study.

Upon completion of the 2006 TIPS Update, the utilities initiated additional transmission studies, namely the *Analysis of Transmission Alternatives to the Boswell – Wilton 230 kV Line Addition*, to determine if an equally effective transmission alternative was available for the Bemidji area. This study considered the following four options:

1. Winger – Wilton 230 kV line #2;
2. Badoura – Wilton 230 kV line;
3. Bemidji – Grand Rapids 230 kV line; and
4. Reconductor the two 115 kV lines into the Bemidji area.

Analysis. Analyses of various aspects of these four possible transmission options to improve the area's load-serving capability consistently pointed to the Bemidji-Grand Rapids Line as the optimal choice. The Bemidji-Grand Rapids Line exhibited the highest amount of load serving capability based on the voltage stability and thermal limits both pre- and post-contingency. The line also far outweighs the other transmission options in terms of increased loss savings and a lower total cost of ownership basis.

The addition of the proposed Bemidji-Grand Rapids Line has been shown to address three critical issues: (i) improving the voltage stability of the transmission system in the Bemidji area to meet both its current and future load demands; (ii) increasing the reliability of the entire Red River Valley transmission system to meet the anticipated long-term demand for electrical power;

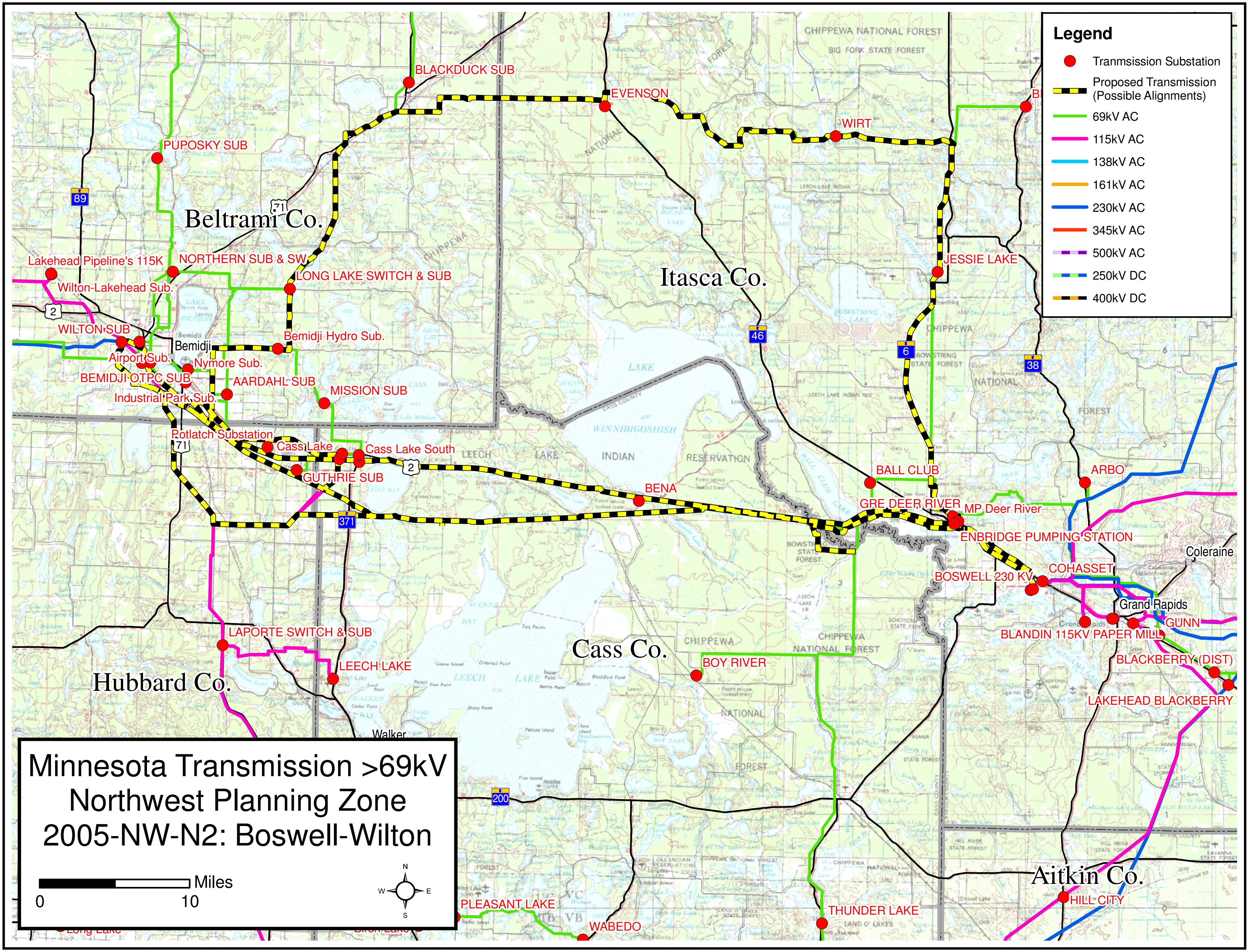
and (iii) facilitating the development of new generation resources in the region, including specifically wind energy generation.

Schedule. The Bemidji-Grand Rapids 230 kV Line requires both a Certificate of Need and a Route Permit from the Public Utilities Commission. The utilities submitted an Application for a Certificate of Need for the Project on March 17, 2008, and for a Route Permit on June 4, 2008. On July 14, 2009, the Public Utilities Commission issued a Certificate of Need for the Project.

The Minnesota Office of Energy Security (OES) is currently in the process of evaluating the routes proposed for the 230 kV transmission line. The OES established an Advisory Task Force to provide guidance on which routes should be evaluated and what impacts should be considered in the Environmental Impact Statement (EIS). The OES also held public informational meetings to obtain comments on what should be considered in the EIS. On March 31, 2009, the OES issued its Scoping Decision on the EIS and is currently in the process of preparing a Draft EIS.

The OES anticipates release of a Draft EIS in early January 2010. The utilities anticipate that the OES will hold public informational meetings on the Draft EIS in the project area at the end of January 2010, with the comment period on the Draft EIS closing in early February 2010. Contested case evidentiary hearings on the Project are expected to occur in mid-February after the close of the DEIS comment period. The utilities anticipate a decision on the route permit in June 2010. Survey and right-of-way acquisition would start soon after a Route Permit is issued. The utilities anticipate that the project would be completed and placed in service during December 2011.

PUC Docket Number. CN-07-1222 (Certificate of Need)
TL-07-1327 (Route Permit)



Minnesota Transmission >69kV
Northwest Planning Zone
2005-NW-N2: Boswell-Wilton
Legend
Tranmission Substation
Proposed Transmission (Possible Alignments)
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
Miles
0
10
Beltrami Co.
Itasca Co.
Cass Co.
Hubbard Co.
Aitkin Co.
BLACKDUCK SUB
EVENSON
WIRT
PUPOSKY SUB
Lakehead Pipeline's 115K
NORTHERN SUB & SW
LONG LAKE SWITCH & SUB
Wilton-Lakehead Sub.
WILTON SUB
Bemidji
Airport Sub.
Nymore Sub.
Bemidji Hydro Sub.
BEMIDJI OTPC SUB
AARDAHL SUB
Industrial Park Sub.
MISSION SUB
Potlatch Substation
Cass Lake
Cass Lake South
GUTHRIE SUB
BENA
JESSIE LAKE
BALL CLUB
ARBO
GRE DEER RIVER
MP Deer River
ENBRIDGE PUMPING STATION
BOSWELL 230 KV
COHASSET
Coleraine
Grand Rapids
GUNN
BLANDIN 115KV PAPER MILL
BLACKBERRY (DIST)
LAKEHEAD BLACKBERRY
LAPORTE SWITCH & SUB
LEECH LAKE
BOY RIVER
Walker
PLEASANT LAKE
WABEDO
THUNDER LAKE
HILL CITY

6.2.5 CapX 2020 Projects

Tracking Numbers. 2005-CX-1 (Fargo –Twin Cities 345 kV)
2005-CX-2 (Brookings – Southeast Twin Cities 345 kV)
2005-CX-3 (LaCrosse – Southeast Twin Cities 345 kV)
2005-NW-N2 (Bemidji-Grand Rapids 230 kV)

CapX 2020 Utilities. CapX 2020 is a joint initiative of 11 transmission-owning utilities in Minnesota and the surrounding region to expand the electric transmission grid to ensure continued reliable service. The CapX 2020 current roster consists of eleven utilities: Central Minnesota Municipal Power Agency, Dairyland Power Cooperative, Great River Energy, Minnesota Power, Minnkota Power Cooperative, Missouri River Energy Services, Otter Tail Power Company, Rochester Public Utilities, Southern Minnesota Municipal Power Agency, Wisconsin Public Power, Inc., and Xcel Energy.

More information about CapX 2020 is available in the 2005 and 2007 Biennial Reports and on the webpage maintained by the utilities: http://www.capx2020.com

CapX 2020 Transmission Projects. The CapX 2020 utilities have identified three 345 kV transmission lines and one 230 kV line as part of the Group I projects. The four lines are:

- Twin Cities – Fargo. This is an approximately 250-mile long, 345 kV project between Monticello, St. Cloud, Alexandria, and Fargo, North Dakota.

- Twin Cities – Brookings County. This is an approximately 200-mile, 345 kV project between the southeast comer of the Twin Cities and Brookings County, South Dakota, as well as a 345 kV segment from Marshall to the Granite Falls area.

- Twin Cities – LaCrosse. This is an approximately 150-mile, 345 kV project between the southeast corner of the Twin Cities, Rochester, and La Crosse, Wisconsin. This project also includes two 161 kV transmission lines from a new North Rochester Substation into Rochester.

- Bemidji-Grand Rapids. This is an approximately 68 mile long line from the 230 kV Wilton Substation located just west of Bemidji, Minnesota (jointly owned by Otter Tail Power and Minnkota Power) to Minnesota Power's 230 kV Boswell Substation in Cohasset, Minnesota, northwest of Grand Rapids, Minnesota. The Bemidji-Grand Rapids 230 kV project is reported under its own Tracking Number (2005-NW-N2).

Projects in Northwest Zone. The Fargo to Monticello 345 kV line and the Bemidji to Grand Rapids 230 kV line cross the Northwest Zone.

Status. On May 22, 2009, the Public Utilities Commission issued a Certificate of Need for the three 345 kV CapX 2020 transmission lines. The CapX 2020 utilities applied for a route permit for the Brookings County to Hampton line in December 2008. The utilities have elected to apply for permits for the Fargo – Twin Cities line in two segments, a Monticello to St. Cloud segment, and a St. Cloud to Fargo segment. An application for a route permit for the Monticello to St.

Cloud segment was submitted to the PUC in April 2009, and an application for the St. Cloud to Fargo segment was submitted in October 2009. A permit for the LaCrosse to Twin Cities line will be applied for by the end of 2009. On July 14, 2009, the Commission issued a Certificate of Need for the Bemidji to Grand Rapids line. A route permit for the Bemidji to Grand Rapids line was applied for in 2008 and a decision is expected in mid-2010.

Upsizing. During the Certificate of Need proceeding for the CapX 2020 345 kV lines, the Public Utilities Commission found that the proposed (primarily single circuit) facilities were not optimized for potential future needs. The Commission concluded that the CapX 2020 utilities should consider potential longer-term needs and not just those in the near-term for which the lines were initially proposed. As a result, the Commission, in its Order granting Certificates of Need for the lines, ordered that all segments of the three CapX 2020 345 kV lines be "upsized" i.e., constructed to double-circuit capability. The lone exception to this conclusion was a segment of the Twin Cities – Brookings 345 kV line that was initially proposed by the utilities to be double-circuited; this segment remained unchanged.

Constructing the facilities to be capable of carrying a second 345 kV circuit will help minimize future transmission corridors and optimize the use of the transmission system. At the same time, not constructing the second circuit initially will allow the utilities to defer some portion of the incremental cost until the capability provided by the second circuit could be used. By deferring some of the capital expenditures for the second circuit, the CapX 2020 utilities are able to more closely match investment with future growth. However, deferring construction also increases the overall cost of the facilities as it will require multiple deployments of crews and potentially additional materials.

The CapX 2020 utilities have begun to analyze the costs and timing of deploying the second circuit. This analysis has included consideration of whether it may be more cost-effective to construct the second circuit at the time of initial construction. Relevant factors in this analysis include but are not limited to:

- The material and labor cost of various transmission line designs depending on how many davit arms are hung during initial construction and the corresponding steel and concrete requirements;
- The material and labor cost of stringing the second circuit at the time of initial construction;
- The material and labor cost of stringing the second circuit at some later date (including mobilization of new line crews);
- The cost of additional damage to crops and wetland mitigation;
- The loss benefit created by reducing the overall impedance of the system when the second circuit is strung (including the avoided cost of replacement generation);
- The cost of generation curtailment during any line outages necessary to string the second circuit;
- The cost of capital for each of the projects; and
- The expected escalation or inflation rates for these costs.

Once this analysis is completed, a recommendation will be made regarding whether it is best for the second circuit to be strung during initial construction or at some later date. At that point, necessary regulatory approvals will be sought.

Schedule. The Brookings line is scheduled to be in-service in the Second Quarter 2013. The St. Cloud to Monticello line is scheduled to be in-service in Fourth Quarter 2011, and the Fargo to St. Cloud segment in Third Quarter 2015, although the St. Cloud - Alexandria segment will be in service in 2nd or 3rd Quarter 2013. The Twin Cities to LaCrosse 345 kV line and two 161 kV lines in the Rochester area are scheduled to go into service over the 2012-2015 timeframe. The Bemidji to Grand Rapids line is scheduled to be in-service by the end of 2011.

PUC Docket Numbers. CN-06-1115 (Certificate of Need for Three 345 kV Transmission Lines)
TL-08-1474 (Brookings County to Hampton Route Permit)
TL-09-246 (Monticello to St. Cloud Route Permit)
TL-09-1056 (Fargo to St. Cloud Route Permit)
CN-07-1222 (Bemidji to Grand Rapids Certificate of Need)
TL-07-1327 (Bemidji to Grand Rapids Route Permit)

6.2.6 Cass Lake Area

Tracking Number. 2007-NW-N2

Utility. Otter Tail Power Company and Minnkota Power Cooperative

Inadequacy. Contingency analysis performed for 2006 and 2011 winter peak conditions during the Bemidji, Minnesota Area Electric Transmission Study: Evaluation of Near-Term Transmission Needs in the Bemidji/Wilton Area have identified low voltages on the 115 kV and 69 kV systems in the Cass Lake area. These voltage issues are caused primarily by outages of the 230 kV line from the Winger Substation to the Wilton Substation or a combination of this 230 kV line with another 115 kV line in the Bemidji area. Outage of the Winger – Wilton 230 kV line disconnects the Bemidji/Wilton/Cass Lake area from the primary 230 kV source that supports the area.

Due to the inadequate margin in the existing Bemidji/Cass Lake transmission system, maintenance outages are frequently denied due to high loads because of the possibility of violating reliability criteria in the event there is a contingency during a maintenance outage. Further reinforcement of the transmission system within the Cass Lake area is needed to allow for more operating flexibility in this area.

In addition to outage of the 230 kV line into the Bemidji/Wilton area, the Cass Lake area is also prone to loading concerns on the 115/69/41.6 kV transformer at the Cass Lake Substation. The existing 115/69 kV substation at Cass Lake has a 19 MVA transformer that can be overloaded at peak load times. For this reason, Otter Tail Power has had to re-sectionalize the 69 kV system in the Cass Lake area during peak load times to rely on additional support from the Bemidji 115 kV source.

A map of the area is shown following the discussion.

Alternatives. To address these identified load-serving issues in the Cass Lake area, both short-term and long-term solutions have been developed. The short-term alternatives include: (1) the installation of two 15 MVAR capacitor banks at the Cass Lake 115 kV substations; and/or (2) the installation of Under Voltage Load Shedding protection. Long-term options include: (1) adding a new 230/115 kV substation along the planned Bemidji – Grand Rapids 230 kV line near Cass Lake; or (2) adding a second 115 kV line between Wilton and Cass Lake.

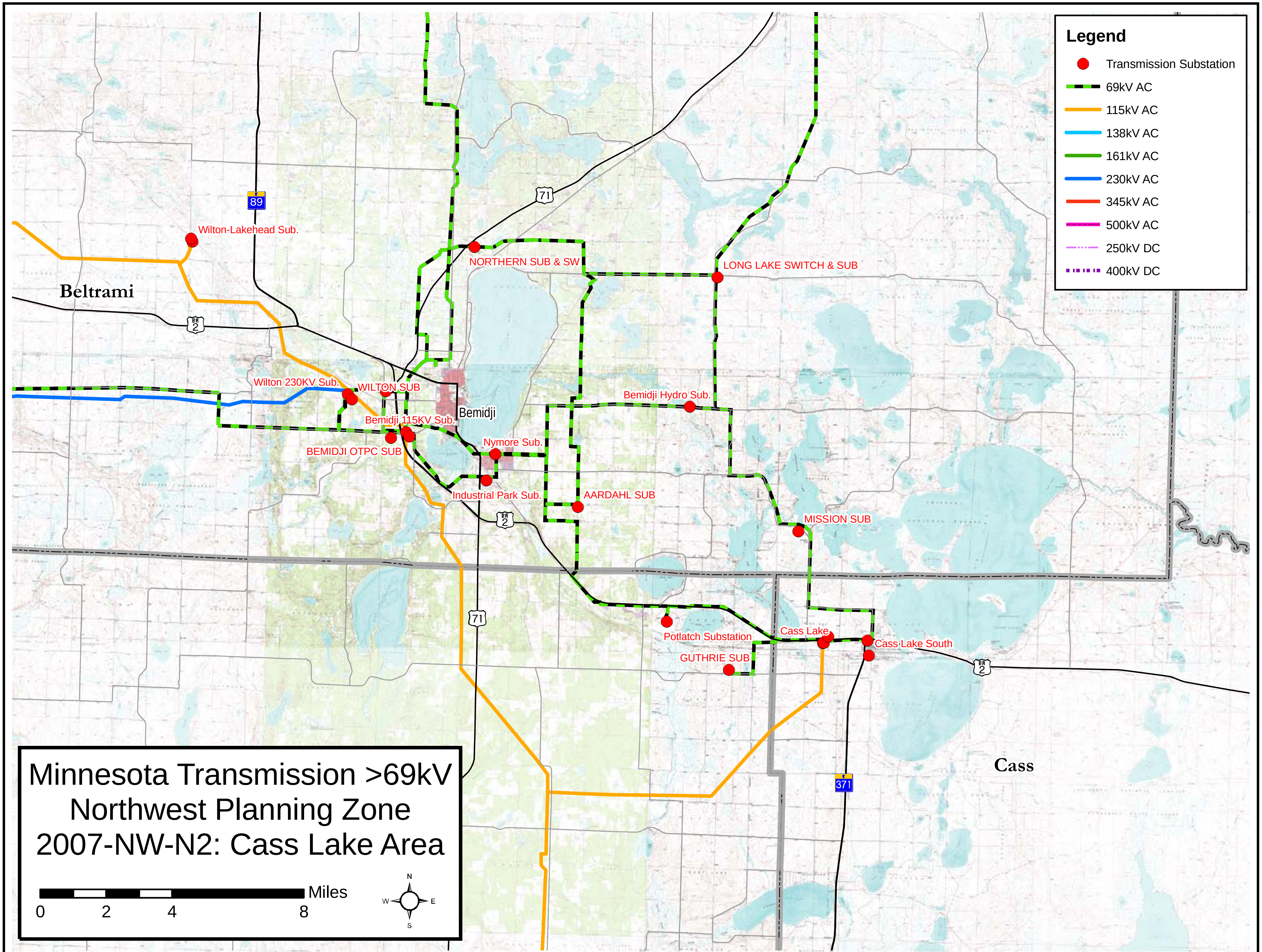
Analysis. *Bemidji Area Electric Transmission System Study: Evaluation of the Near-Term Transmission Needs in the Bemidji/Wilton Area* was completed in 2007. This study included the following objectives: (1) perform a more detailed evaluation of reactive power requirements in the Bemidji/Wilton area, (2) develop and evaluate options for providing additional voltage support, and (3) evaluate the feasibility and applicability of Under-Voltage Load Shedding (UVLS). This study was aimed at determining efficient methods to improve the load-serving capability of the existing transmission system until additional transmission (the Bemidji – Grand Rapids 230 kV line) is developed to support the Bemidji load center.

As a result of this study and the identification of severe voltage and loading concerns in the Bemidji / Cass Lake area, especially during N-2 conditions, Otter Tail Power Company and Minnkota Power Cooperative have installed Under Voltage Load Shedding (UVLS) at both the Bemidji Substation (by MPC) and the Cass Lake Substation (by OTP) as a reliability measure to arrest a wide spread voltage collapse situation if one were to arise from an extreme outage condition during a peak load time. Furthermore, Otter Tail Power is in the process of installing two 15 MVAR capacitor banks on the 115 kV system at Cass Lake. These capacitor banks will be placed in-service before the end of 2009 and will allow for adequate voltages on the transmission system between Bemidji and Badoura in the event that the Bemidji – Wilton 115 kV line is out of service. These capacitor banks will have the ability to provide more margin on the system prior to the initiation of the UVLS protection at the Bemidji and Cass Lake Substations.

Given the routing efforts currently underway for the Bemidji – Grand Rapids 230 kV project within Minnesota, the preferred long-term solution for the Cass Lake area is the addition of a new 230/115 kV substation along the new Bemidji – Grand Rapids 230 kV line near Cass Lake. This solution would: (1) improve reliability in the Cass lake area by reducing the amount of exposure currently associated with an 11-mile radial 115 kV line; (2) reduce the transmission expansion required in the future in light of increased load forecasts by Enbridge Energy; and (3) provide more operating flexibility for scheduled maintenance outages. In addition, establishing a new 230/115 kV substation near Cass Lake along the Bemidji – Grand Rapids 230 kV line would eliminate the need for permitting another 115 kV line between Wilton and Cass Lake in what is expected to be the same timeframe as the expected schedule of the Bemidji – Grand Rapids 230 kV line (2011).

Immediate load serving concerns on the Cass Lake area 69 kV system are also being addressed by Otter Tail Power's replacement of the existing 19 MVA, 115/69 kV transformer at Cass Lake with a 40 MVA transformer. This will allow more load to be served out of the Cass Lake substation for contingencies that disconnect the Wilton 115/69 kV or Bemidji 115/69 kV deliveries from loads in the Bemidji/Cass Lake area.

Schedule. Short-term solutions for the Cass Lake area (UVLS) were completed in late 2008, with additional short-term solutions being finalized in 2009 (capacitor banks and transformer replacement). The long-term solution of a 230/115 kV substation near Cass Lake in the 2011 timeframe is being pursued through the Bemidji – Grand Rapids 230 kV transmission line project (Tracking Number 2005-NW-N2).


Legend
Transmission Substation
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
Wilton-Lakehead Sub.
NORTHERN SUB & SW
LONG LAKE SWITCH & SUB
Beltrami
Wilton 230KV Sub.
WILTON SUB
Bemidji
Bemidji Hydro Sub.
Bemidji 115KV Sub.
Nymore Sub.
BEMIDJI OTPC SUB
Industrial Park Sub.
AARDAHL SUB
MISSION SUB
Potlatch Substation
Cass Lake
Cass Lake South
GUTHRIE SUB
Cass
89
71
2
371
Minnesota Transmission >69kV
Northwest Planning Zone
2007-NW-N2: Cass Lake Area
Miles
0
2
4
8
N
W
E
S

6.2.7 Load Expansions in Northwestern Minnesota

Tracking Number. 2007-NW-N3

Utility. Otter Tail Power Company and Minnkota Power Cooperative

Inadequacy. OTP has been informed that Enbridge Energy, LLC would like to increase its demand at its pumping stations in the northwestern Minnesota region. This expected increase in load will place an additional burden on the existing transmission system during peak load times of the year. Based on the load forecasts received from Enbridge Energy, it is anticipated that the existing 115 kV system will experience substantial load increases in the 2011/2012 timeframe.

Alternatives. Several different transmission alternatives were developed as part of an *Enbridge Transmission Study* currently underway within OTP to assess the ability of the transmission system to serve the anticipated load increase. These include:

- a new Oslo 230/115 kV substation developed near Oslo where the existing 230 kV line from Drayton to Prairie is closest to the existing 115 kV system,
- a new Winger – Thief River Falls 230 kV line,
- a new Winger – Clearbrook – Thief River Falls 230 kV line, or
- a capacitor bank / system rebuild alternative.

Given the geographic overlap of the region encompassed by this deficiency (2007-NW-N3) and that of the Northern Valley area (2003-NW-N2), the alternatives and/or proposed projects identified for this system deficiency are the same as those identified for the Northern Valley area. Therefore, it is possible that the recommended alternative from the *Enbridge Transmission Study* currently underway within OTP for this system deficiency, could replace the need for additional transmission improvements identified for the Northern Valley area.

Analysis. Since the 2007 Biennial Report was submitted, Otter Tail Power Company has performed transmission studies (i.e. the *Enbridge Transmission Study*) with an updated load forecast from Enbridge Energy, LLC. It appears that winter peak conditions with high Manitoba imports are the most limiting condition for the transmission system in this area. Transmission studies have indicated that capacitor banks at the Halma, Plummer, and Clearbrook Substations are necessary in order to maintain sufficient voltage with the expected load increase. Transmission studies performed by Otter Tail Power Company plan to be shared with neighboring transmission owners during November of 2009. In early 2010, it is anticipated that a joint transmission plan between Minnkota Power Cooperative and Otter Tail Power will be developed to determine the exact details (size and location) of the capacitor banks necessary to support the forecasted load increase by Enbridge Energy.

The capacitor bank option to support voltages on the transmission system in northwestern Minnesota is the least cost transmission alternative and delays the need for a much higher cost transmission build-out. However, one drawback of the capacitor bank option is that is places additional loading on the existing transmission system. One such facility that experiences higher loading is the Winger 230/115 kV transformer. Substation improvements such as the replacement of the Winger 230/115 kV transformer are still a lower cost alternative for the capacitor bank alternative as compared to any other transmission alternative included within the *Enbridge Transmission Study*. Based on the results of the current study, the Winger 230/115 kV transformer may need to be replaced as soon as 2013 depending on how the load in the region develops (not only at Enbridge pumping stations but across the northwestern Minnesota region).

Distributed generation is not a feasible alternative for addressing this system deficiency due to the relative ease in implementing the preferred transmission alternative. Capacitor banks and transformer replacements are relatively inexpensive enhancements to the transmission system that are primarily limited to construction activity within substations. The widespread area of concern encompassed by this system deficiency would require the addition of several distribution generation sites in order to adequately address the concerns identified through the Enbridge Transmission Study. For this reason, the distributed generation alternative has been rejected.

Schedule. Otter Tail Power and Minnkota Power Cooperative will be discussing how to proceed but it is likely that capacitor banks will be installed within the appropriate substations in the 2010 to 2012 timeframe depending on the outcome of the discussions and the exact timing in which Enbridge Energy's load will increase. Since capacitor bank installations and transformer replacements are limited to substation improvements, it is not expected that the Public Utilities Commission will need to review the project.

6.2.8 New 115 kV Source to Fergus Falls 12.5 kV System

Tracking Number. 2007-NW-N4

Utility. Otter Tail Power Company

Inadequacy. The load currently served by the Fergus Falls 12.5 kV distribution system is growing to a level in which the existing 115 kV delivery points are struggling to back-up one another during an outage. The local distribution system around Fergus Falls is currently served from two 115 kV sources; one at the Hoot Lake Substation and one at the Edgetown Substation. During contingencies that involve loss of one of the 115 kV sources, system voltages on the 12.5 kV system drop below acceptable levels.

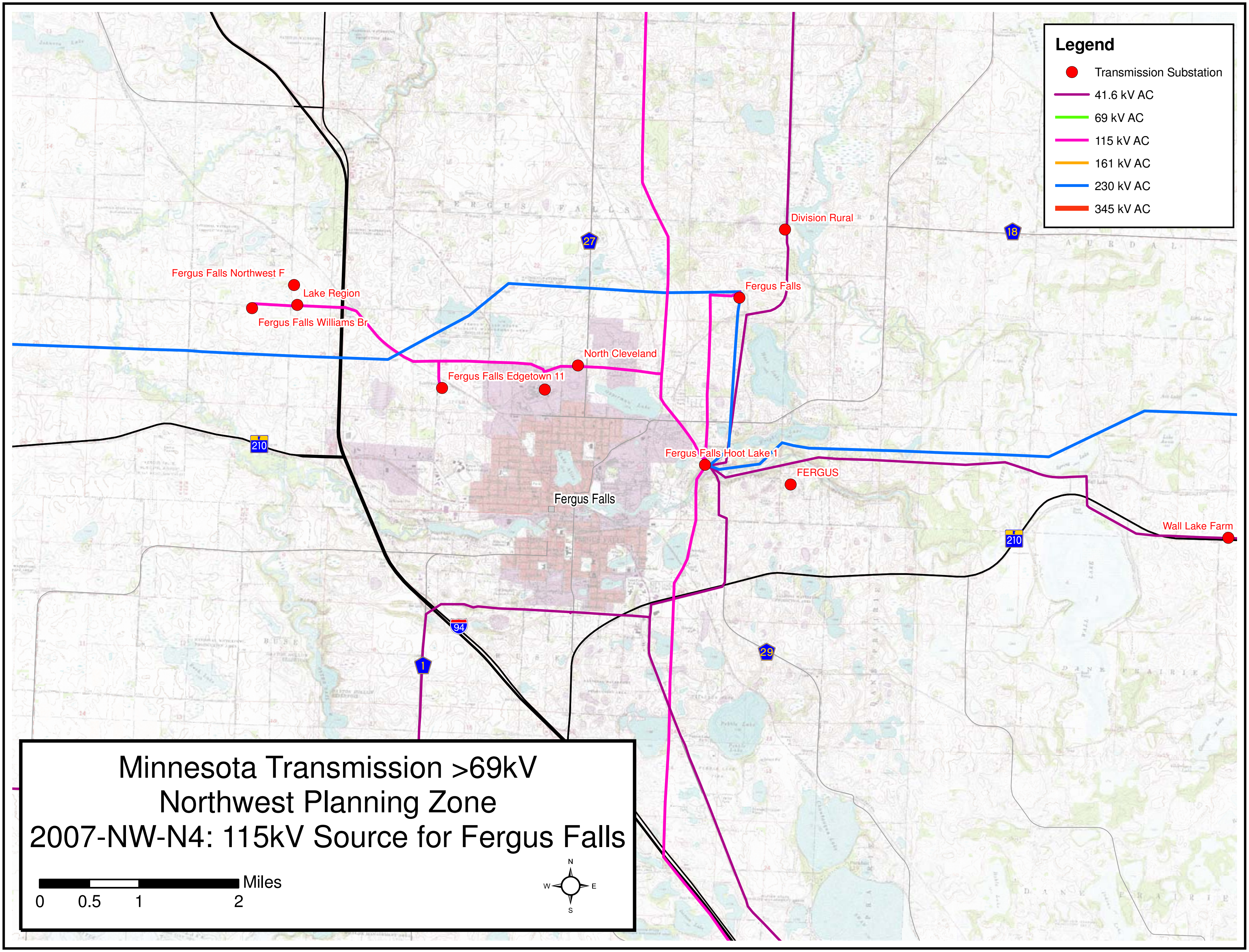
A map of the area is shown on the following page.

Alternatives. Two alternatives have been evaluated to strengthen the distribution system in Fergus Falls. One alternative involves the rebuild of an existing 12.5 kV line to 115 kV operation from the Hoot Lake substation to a distribution substation referred to as the "Buse" Substation with a new 115/12.5 kV transformer at the Buse Substation. A second alternative under consideration was to tap the Hoot Lake to Grant County 115 kV line approximately 1.5 miles south of the Hoot Lake Substation and construct a new 115 kV line to a new distribution substation in Fergus Falls (referred to as the "South Cascade" Substation) where a new 115/12.5 kV transformer would be added to assist in serving the distribution system around Fergus Falls.

Analysis. An investigation into the two possible alternatives to address this load serving deficiency has determined that while Alternative 1 (Hoot Lake – Buse 115 kV) utilizes existing right-of-way, much of this existing line is constructed near the Otter Tail River in areas that are heavily populated. This aspect led to the conclusion that construction would be very difficult in highly congested areas. Although the second alternative will require the acquisition of a new substation site and establishing a new 115 kV tap along the Hoot Lake – Grant County 115 kV line, it was determined that this alternative would have more of a long-term benefit to the Fergus Falls distribution system and be less intrusive to the highly populated areas affected by Alternative 1.

Since this system deficiency is highly dependent on the load level in this local area, distributed generation would need to be dispatchable or well correlated with the load level. Consequently, intermittent resources such as wind generation would not likely be feasible stand-alone solutions. Furthermore, more traditional gas-fired peaking units are not economic in this situation given their poor reliability as compared to an equivalent transmission solution and their consumption of expensive fuel.

Schedule. Otter Tail Power has acquired land for a new 115/12.5 kV substation along the Hoot Lake – Grant County 115 kV line. The in-service date of the new facilities is expected to be in mid-2010. This project is being permitted through the local process.



Minnesota Transmission >69kV
Northwest Planning Zone
2007-NW-N4: 115kV Source for Fergus Falls

6.2.9 Fergus Falls Area

Tracking Number. 2009-NW-N1

Utility. Great River Energy , Otter Tail Power Company, Missouri River Energy Services

Inadequacy. The 115 kV transmission system in the Fergus Falls area is primarily served from the Fergus Falls 230/115 kV source and from the Audubon 230/115 kV source. The Fergus Falls ethanol plant load and OTP's Fergus Falls town load served from the Edgetown 115/12.5 kV Substation are the largest loads in the area that are served on a 4.5 mile radial 115 kV line from Hoot Lake.

The addition of a new ethanol plant near Fergus Falls has prompted GRE to install a 20 MVAR capacitor bank at the Tamarac Substation in order to support voltages in the area. This capacitor bank keeps the voltage in the area within acceptable limits up to the 2014 timeframe. Beyond this timeframe, the Fergus Falls area will experience low voltage problems for the loss of the Fergus Falls to Edgetown Tap 115 kV line. In addition, the loss of the Audubon 230/115/41.6 kV transformer causes a loading issue on the Fergus Falls to Edgetown Tap 115 kV line.

A map of the area is shown following the discussion.

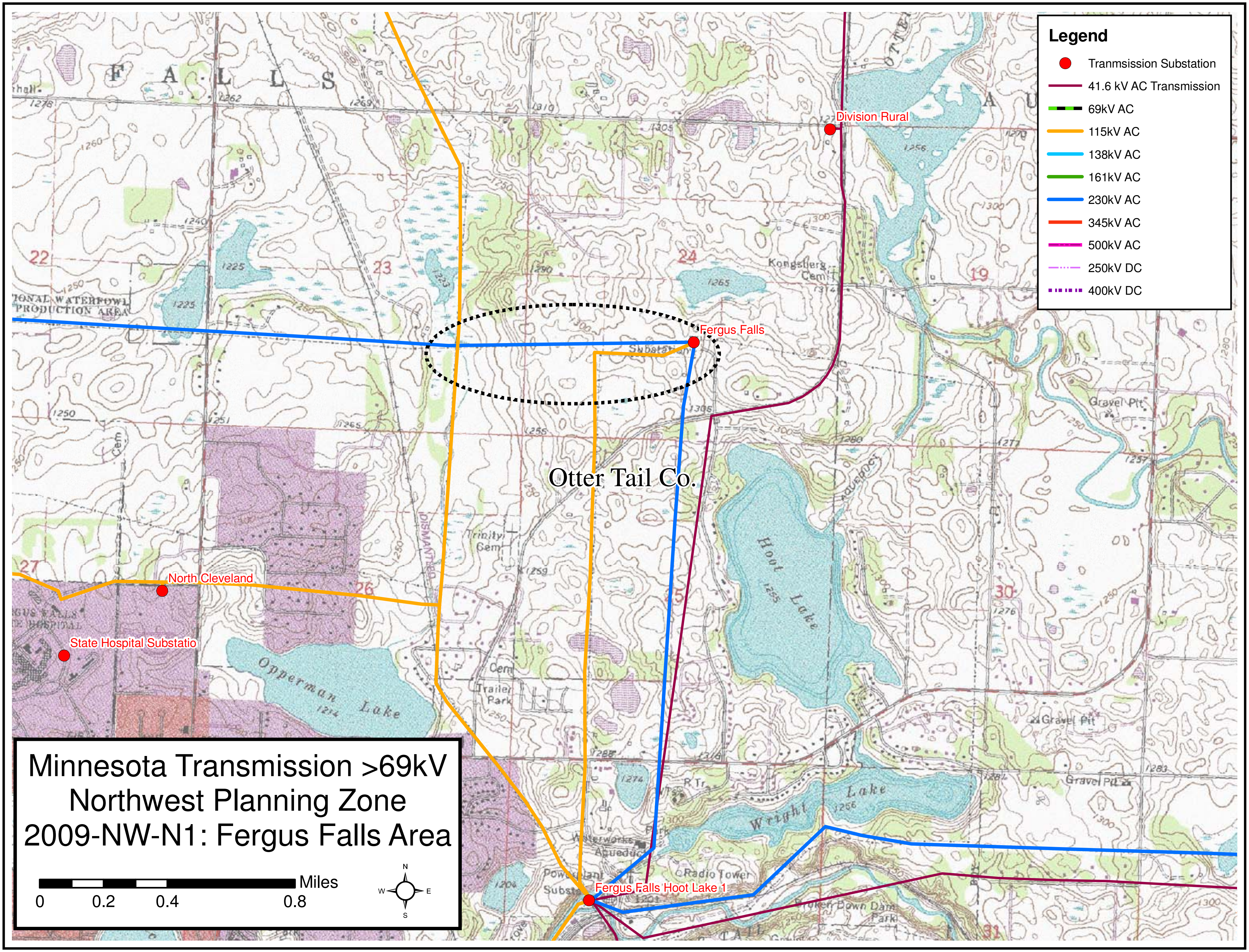
Alternatives. A study, referred to as the Fergus Falls Area Transmission Study, is currently underway at this time by Otter Tail Power Company. While this study is expected to evaluate various transmission alternatives to address the transmission deficiencies in the area, the 2008 Long Range Plan published by Great River Energy has recommended one alternative to address the concerns for this area. This alternative recommends construction of a one mile double circuit 115 kV line from the Fergus Falls 230/115 kV substation to a tap point 1.5 miles north of the Edgetown Tap along the Edgetown Tap to Pelican Rapids 115 kV line.

Analysis. The proposed double circuit 115 kV line will sectionalize the 115 kV line and significantly reduce the voltage drop across the long radial Edgetown Tap to Audubon 115 kV line during the Edgetown Tap – Hoot Lake 115 kV line outage. In addition, this project creates a mini 115 kV loop with the Fergus Falls – Hoot Lake – Edgetown Tap 115 kV line in the Fergus Falls area. This 115 kV loop will provide alternative paths to serve the Edgetown and Fergus Falls ethanol plant loads from the Fergus Falls 230/115 kV source during contingencies. This project puts the Fergus Falls area within seven miles from the nearest Fergus Falls 230/115 kV source during the loss of the Hoot Lake – Edgetown Tap 115 kV line, thus eliminating the 51 miles of exposure of the Fergus Falls area from the Audubon source that exists today when losing the Hoot Lake – Edgetown Tap 115 kV line.

Distributed generation could be used to relieve loading from the transmission system in the area, but it doesn't help to sectionalize the 115 kV line from Fergus Falls to Audubon. The preferred option, however, sectionalizes the transmission system and provides a redundant transmission line to the Fergus Falls area, which increases the reliability of area. Distributed generation is not a desirable option in comparison to the preferred alternative for this area.

Capacitor bank installations were not considered as a long term solution to the area given that the Fergus Falls to Edgetown Tap 115 kV line loading is a concern in this region and capacitor banks offer very little relief to line loading concerns.

Schedule. It is recommended that the a new one mile double circuit line from the Fergus Falls 230/115 kV Substation to a new tap along the Edgetown Tap – Pelican Rapids 115 kV line be constructed in the 2014 timeframe to keep the voltage in the Fergus Falls area within the required limits as well as relieve loading concerns on the Hoot Lake – Edgetown Tap 115 kV line. Since the proposed double circuit 115 kV line is only about one mile long, review by the Public Utilities Commission will not be required. Otter Tail Power, in coordination with Great River Energy and Missouri River Energy Services, is currently continuing to study the transmission system in this area. The study will further evaluate the alternatives included in the 2008 Long Range Plan published by Great River Energy to confirm that the proposed transmission alternative is the most effective method of alleviating the transmission deficiencies in the area.



Legend
Tranmsission Substation
41.6 kV AC Transmission
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
Division Rural
Fergus Falls
North Cleveland
State Hospital Substatio
Fergus Falls Hoot Lake 1
Otter Tail Co.
Minnesota Transmission >69kV
Northwest Planning Zone
2009-NW-N1: Fergus Falls Area
Miles
0
0.2
0.4
0.8
N
S
E
W

6.2.10 Frazee – Perham – Rush Lake Area

Tracking Number. 2009-NW-N2

Utility. Great River Energy and Otter Tail Power Company

Inadequacy. Loads in the Frazee – Perham – Rush Lake Area are served by two 115/41.6 kV substations (Frazee and Rush Lake) with normally open switches located on the 41.6 kV system at Dent Tap and North Perham Junction. There are eight Great River Energy distribution substations and three Otter Tail Power distribution substations in the area.

Studies performed through the 2008 Long Range Plan from Great River Energy have shown that the long-term system intact voltage profile of the area is good. Contingency analyses, however, show voltage violations in the area during certain conditions. The loss of the Frazee 115/41.6 kV transformer or the Frazee to Perham 41.6 kV line causes low voltage problems at the Frazee, Dora, Evergreen and Burlington Substations in the near future. These outages also overload the Rush Lake to Otto 41.6 kV line, which is rated at 28.8 MVA. This conductor along this line is capable of a 43.2 MVA rating, but it is limited to a maximum rating of 28.8 MVA by a CT (Current Transformer) and to 34.6 MVA by a RLL (Relay Load Limit); both of which are at the Rush Lake Substation.

A map of the area is shown following the discussion.

Alternatives. Three alternatives have been considered to address the short-term and long-term needs of the area. All alternatives for this area include adjusting the CT and RLL at the Rush Lake Substation so the Rush Lake to Otto 41.6 kV line is not limited by other equipment in the Rush Lake Substation.

Alternative 1: A second 115/41.6 kV, 43 MVA transformer at Frazee

This alternative recommends a second 115/41.6 kV, 43 MVA transformer at Frazee in the 2012 timeframe. This transformer eliminates the low voltage and line overload problems in the area for the loss of the existing Frazee 115/41.6 kV transformer. As this area will also experience low voltage problems in the 2015 timeframe for the loss of Frazee to Perham 41.6 kV line, this alternative recommends rebuilding the high impedance 9.8 mile radial 41.6 kV line between Dent Tap and Dent with 477 ACSS (Aluminum Conductor Steel Supported) conductor in the 2015 timeframe. The Dent Tap to Dent 41.6 kV line, currently composed of 2/0 ALUM (aluminum) conductor, contributes to high losses and a large voltage drop.

Alternative 2: North Perham Jct 115/41.6 kV Source

This alternative recommends a new 115/41.6 kV substation at North Perham Junction in the 2012 timeframe. This alternative helps to sectionalize loads in the area to be served from three substations: Frazee 115/41.6 kV Substation, North Perham 115/41.6 kV Substation and Rush Lake 115/41.6 kV Substation. This alternative is capable of addressing the long term transmission needs of the area while mitigating the near-term low voltage problems in the area.

Alternative 3: 115 kV load conversions

This alternative recommends converting GRE's Frazee, OTP's Frazee and GRE's Perham 41.6 kV distribution substations to 115 kV in the 2009, 2013 and 2020 timeframes, respectively. It also recommends a new 115/41.6 kV substation at North Perham Jct. in the 2021 timeframe to address the long-term transmission needs of the area.

Analysis. Present worth analysis was performed for all three alternatives under consideration in this area. Loss analysis has shown that none of the alternatives discussed above had significant loss savings over one another (~100 kW). Line losses for the area were evaluated with Alternative 1 being the benchmark for loss savings. The MW loss savings for each alternative is as follows:

Alternative	2011 Summer	2021 Summer
2	0.0	0.1
3	0.0	-0.1

The present worth, cumulative investment and present worth with loss savings are summarized in the following table.

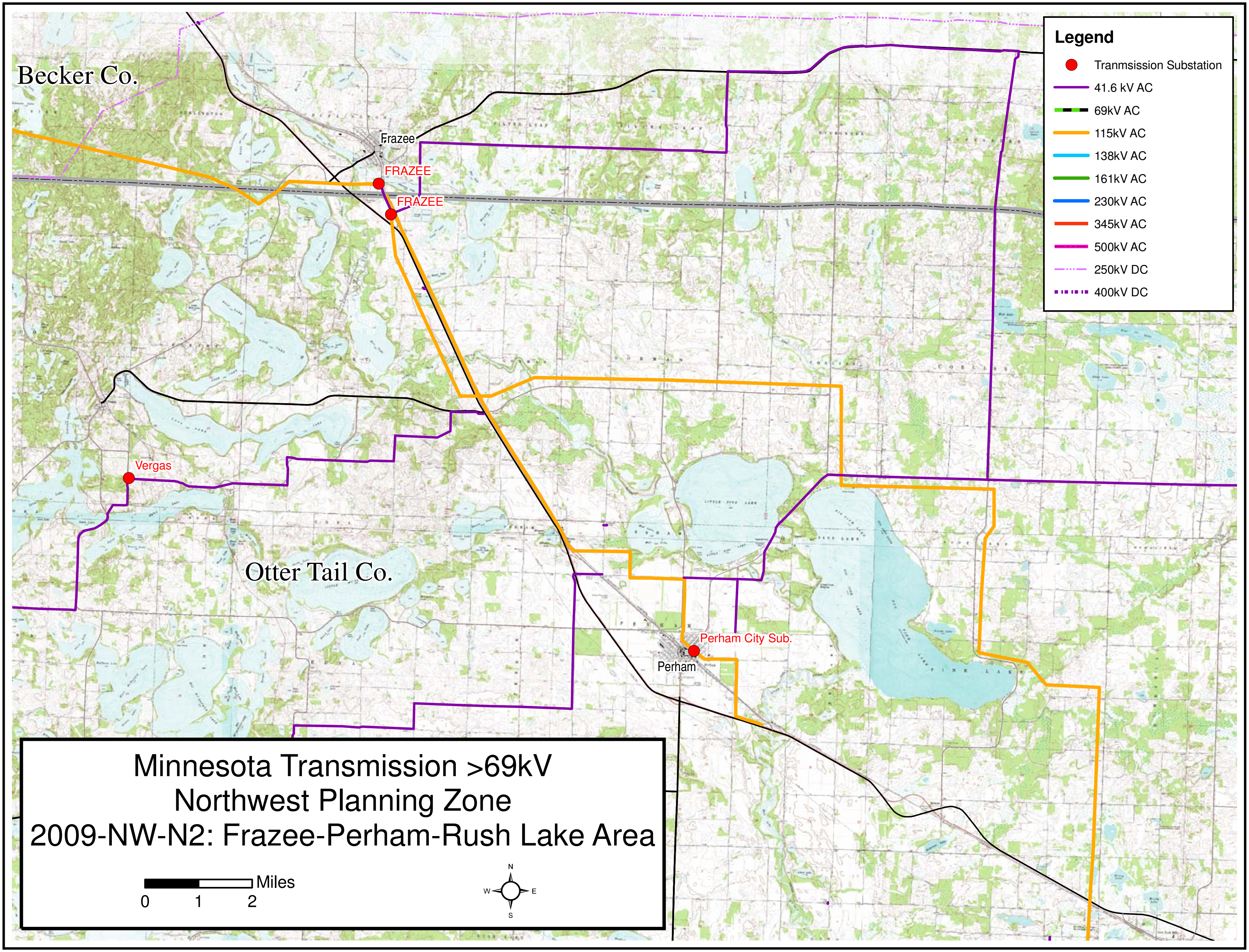
Alternative	Cumulative Investment	Present Worth	Present Worth with Loss Savings
1	$6,680,000	$10,764,000	NA
2	$5,978,000	$10,421,000	$10,631,000
3	$12,499,000	$13,368,000	$13,987,000

Alternative 2 involves the minimum cumulative investment and is the least cost plan.

All three alternatives address the long-term transmission needs of the area. However, the addition of a new 115/41.6 kV substation at North Perham Jct. in Alternative 2 allows for the loads in the area to be served almost equally from the Rush Lake, Frazee and North Perham Jct 115/41.6 kV Substations. Since a new North Perham 115/41.6 kV Substation is somewhat centrally located in the area of concern, it relieves high loadings on the 41.6 kV lines and 115/41.6 kV transformers in the area. In addition to being the least expensive plan, Alternative 2 is better positioned to serve new loads within the area for a longer term timeframe. Therefore, Alternative 2 is the recommended plan to address the long-term needs of the area.

A distributed generation alternative is not a recommended plan for this area as loads in this area continue to grow. A distributed generation alternative would require the installation of generation at multiple locations in the area and would need to be installed in such a manner as to match the load growth of the area. Though distributed generation could be used to strengthen the area, the recommended alternative is the preferred transmission alternative since it addresses the deficiencies of the area for the long-term horizon.

Schedule. It is recommended to construct a new North Perham Jct. 115/41.6 kV Substation in the 2012 timeframe to avoid low voltage and high line loading problems in the area during contingency conditions. Depending on the location of the new North Perham Jct. 115/41.6 kV Substation, a new 115 kV transmission line could be required from the existing Frazee – Perham 115 kV line to the new substation. Any new 115 kV line is expected to be less than 10 miles in length and accordingly, a Certificate of Need from the Public Utilities Commission will not be required and a route permit can be sought from local governmental bodies.



Minnesota Transmission >69kV
Northwest Planning Zone
2009-NW-N2: Frazee-Perham-Rush Lake Area

6.2.11 Brandon – Miltona – Parkers Prairie Area

Tracking Number. 2009-NW-N3

Utility. Great River Energy and Otter Tail Power Company

Inadequacy. The Brandon/Miltona/Parkers Prairie area is served by two 115/41.6 kV sources; one from Miltona and another from Brandon. These sources serve the Miltona – Brandon 41.6 kV loop in the area including the GRE and OTP Parkers Prairie distribution substations. There are a total 72 miles of 41.6 kV transmission lines in the area. There are four GRE and four OTP distribution substations in the area.

The area experiences low voltage problems for the loss of the Miltona 115/41.6 kV transformer in the near future. The loss of the Miltona transformer or Miltona to Miltona Tap 115 kV line also causes an overload problem on the Brandon 115/41.6 kV transformer and the Brandon to Garfield 41.6 kV line in the long-term. A large portion of the transmission system in this area is constructed with small, high impedance conductors, which lead to high losses and large voltage drops in the area. During the Miltona 115/41.6 kV transformer outage, loads in the area are served from the Brandon 115/41.6 kV source on radial 41.6 kV lines. For this situation, relatively large loads, such as those at the GRE Parkers Prairie 41.6/12.5 kV Substation and the OTP Parkers Prairie 41.6/12.5 kV Substation, are located at the ends of the 41.6 kV transmission lines in the area and due to this configuration, experience low voltage problems.

A map of the area is shown following the discussion.

Alternatives. The following two alternatives have been developed to address the long-term transmission needs of the area:

Alternative 1: Substation Conversion to 115 kV, Line Rebuilding and Capacitor Bank Installation

This alternative calls for converting the Parkers Prairie 41.6/12.5 kV distribution substations to 115/12.5 kV, reconductoring/rebuilding the Brandon to Garfield 41.6 kV high impedance line and installing capacitor banks in the area. OTP's Parkers Prairie 41.6/12.5 kV Substation is located directly under the existing Miltona to Elmo 115 kV line. Therefore, the conversion of this 41.6/12.5 kV substation to 115/12.5 kV would require a minimal amount of cost. Conversion of the GRE Parkers Prairie 41.6/12.5 kV Substation to 115/12.5 kV requires constructing two miles of 115 kV line from the new tap along the existing Miltona to Elmo 115 kV line to GRE's Parkers Prairie Substation. The two substation conversions from 41.6/12.5 kV to 115/12.5 kV could also be accomplished with GRE and OTP jointly establishing a larger 115/12.5 kV distribution substation near Parkers Prairie to serve both the GRE and OTP loads out of the same substation. This would minimize investment in transmission equipment and construction as compared to the conversion of each individual substation to the 115 kV system.

Alternative 1 also recommends rebuilding the Brandon to Garfield 7.6 mile line with a larger conductor in the 2020 timeframe and installing two 3 MVAR capacitor banks at Garfield and Leaf Valley in the 2022 and 2027 timeframes, respectively.

Alternative 2: Addition of a second Miltona 115/41.6 kV Transformer, Miltona – Miltona Tap 115 kV line, and 41.6 kV Line Rebuild

This alternative involves installing a second 115/41.6 kV transformer at Miltona, and constructing a second 115 kV line between Miltona and Miltona Tap, about two miles long. The critical contingencies in the area are the loss of the Miltona 115/41.6 kV transformer and the Miltona to Miltona Tap 1.2 mile 115 kV line. Since the 115/41.6 kV transformer at Miltona is connected to the networked transmission system through a 1.2 mile radial 115 kV line, this 115 kV line outage results in the same concerns as the 115/41.6 kV transformer outage. Installing a second transformer at Miltona would eliminate problems due to the first transformer outage. Similarly, construction of a new 115 kV, two mile long line from Miltona to Miltona Tap would eliminate the voltage problems for the loss of the existing Miltona to Miltona Tap 1.2 mile 115 kV line. This line would have to be built on a different right of way to avoid common structure outages. This alternative also recommends rebuilding the Brandon to Parkers Prairie 27.3 mile high impedance 41.6 kV line with a larger conductor to reduce line losses and improve voltage profiles in the area.

Analysis. A present worth analysis was performed in each option with Alternative 2 being the benchmark for loss savings. The following table shows the MW loss savings.

Option	2011 Summer	2021 Summer
1	0.0	0.11

The present worth, cumulative investment and present worth with loss savings are summarized in the following table.

Alternative	Cumulative Investment	Present Worth	Present Worth with Loss Savings
1	$6,109,000	$7,487,000	$7,731,000
2	$10,098,000	$19,466,000	NA

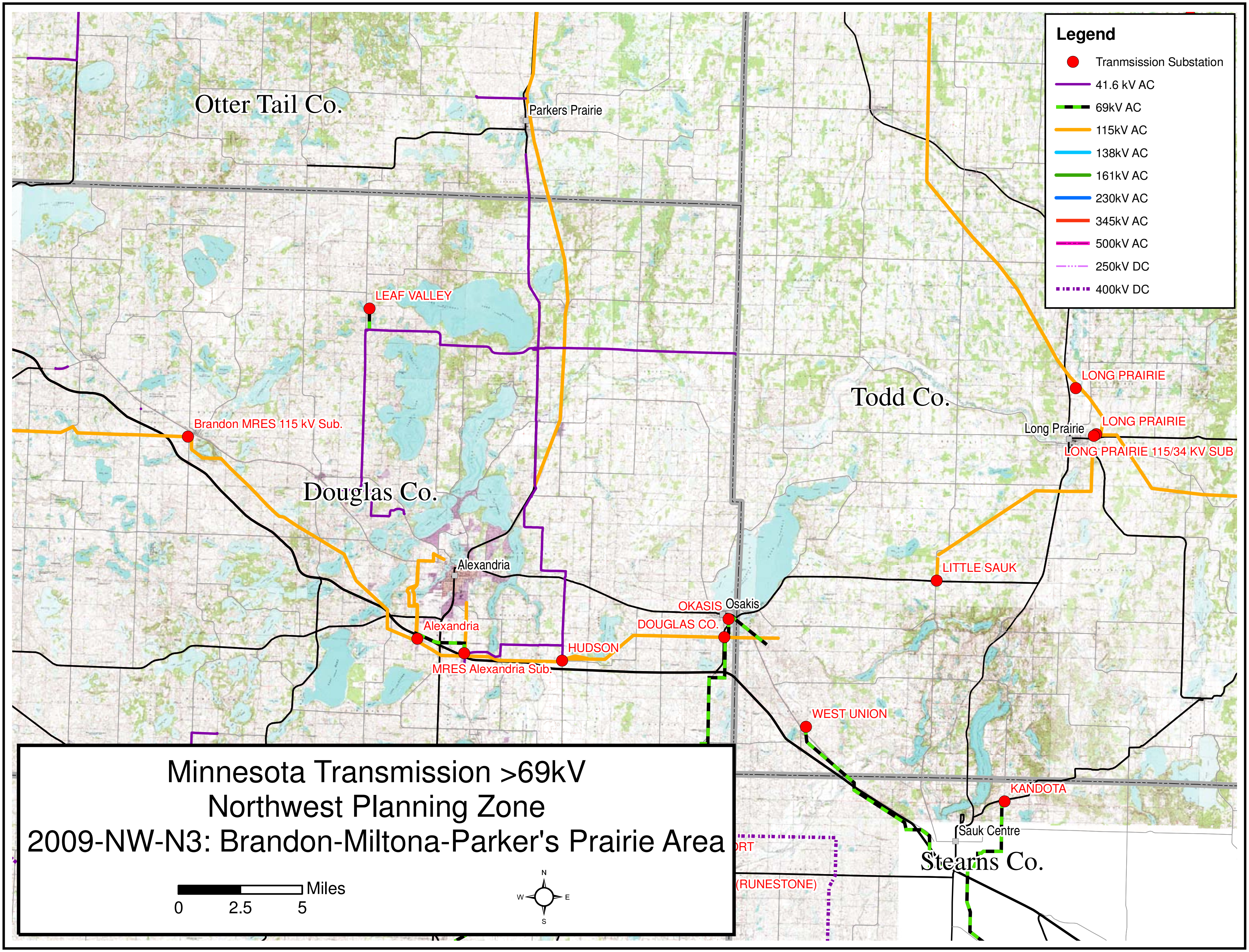
Alternative 1 is the least cost plan which involves the least cumulative investment.

Both alternatives are capable of addressing the long–term transmission needs of the area. Large loads such as those at Parkers Prairie and Leaf Valley are served on radial, high impedance 41.6 kV lines when the Miltona 115/41.6 kV transformer or Miltona to Miltona Tap 115 kV line is out of service. This configuration results in low voltage problems in the Parkers Prairie area. Converting the Parkers Prairie 41.6/12.5 kV Substations to 115/12.5 kV avoids low voltage problems in the area. Therefore, Alternative 1 is the recommended and least cost plan for this area.

Distributed generation could be a solution to the near-term transmission deficiencies of the area if there is sufficient transmission capacity to pick up loads that are served from the Parkers Prairie distribution substations. It appears that the preferred option, a joint 115/12.5 kV distribution substation, would alleviate loading concerns and improve voltages on the 41.6 kV system at an expectedly lower transmission investment than a distributed generation option. Therefore, the distributed generation option is not a preferred option for this area.

Schedule. It is recommended that a joint 115 kV distribution substation at Parkers Prairie be constructed by 2013 to serve loads that are currently served from the existing (GRE and OTP) 41.6/12.5 kV Parkers Prairie distribution substations. The development of a new 115/12.5 kV substation near Parkers Prairie should be relatively simple to implement given that the existing Miltona – Elmo 115 kV line is close to this area. Since it is likely that any new 115 kV line that is constructed in order to connect the existing 115 kV transmission line to the new Parkers Prairie 115/12.5 kV Substation will be less than ten miles in length, a Certificate of Need from the Public Utilities Commission will not be required and any route permit can be issued by the local governmental unit.

The timeline for the line rebuild and capacitor bank installation needs to be reviewed, although at the moment these projects are tentatively scheduled to be in-service between the 2020 and 2027 timeframe.



Legend
Tranmsission Substation
41.6 kV AC
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
Otter Tail Co.
Parkers Prairie
LEAF VALLEY
Douglas Co.
Todd Co.
Brandon MRES 115 kV Sub.
LONG PRAIRIE
Long Prairie
LONG PRAIRIE
LONG PRAIRIE 115/34 KV SUB
Alexandria
LITTLE SAUK
OKASIS
Osakis
DOUGLAS CO.
Alexandria
HUDSON
MRES Alexandria Sub.
WEST UNION
KANDOTA
Sauk Centre
Stearns Co.
(RUNESTONE)
Minnesota Transmission >69kV
Northwest Planning Zone
2009-NW-N3: Brandon-Miltona-Parker's Prairie Area
Miles
0
2.5
5
N
W
E
S

6.2.12 Bemidji Area 69 kV Deficiencies

Tracking Number. 2009-NW-N4

Utility. Minnkota Power Cooperative

Inadequacy. The increasing load in the Bemidji area that is served by Beltrami Electric Cooperative's Bemidji Rural 69/12.5 kV Substation and Northern 69/12.5 kV Substation is driving the need for increased load serving capability in the Bemidji area.

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

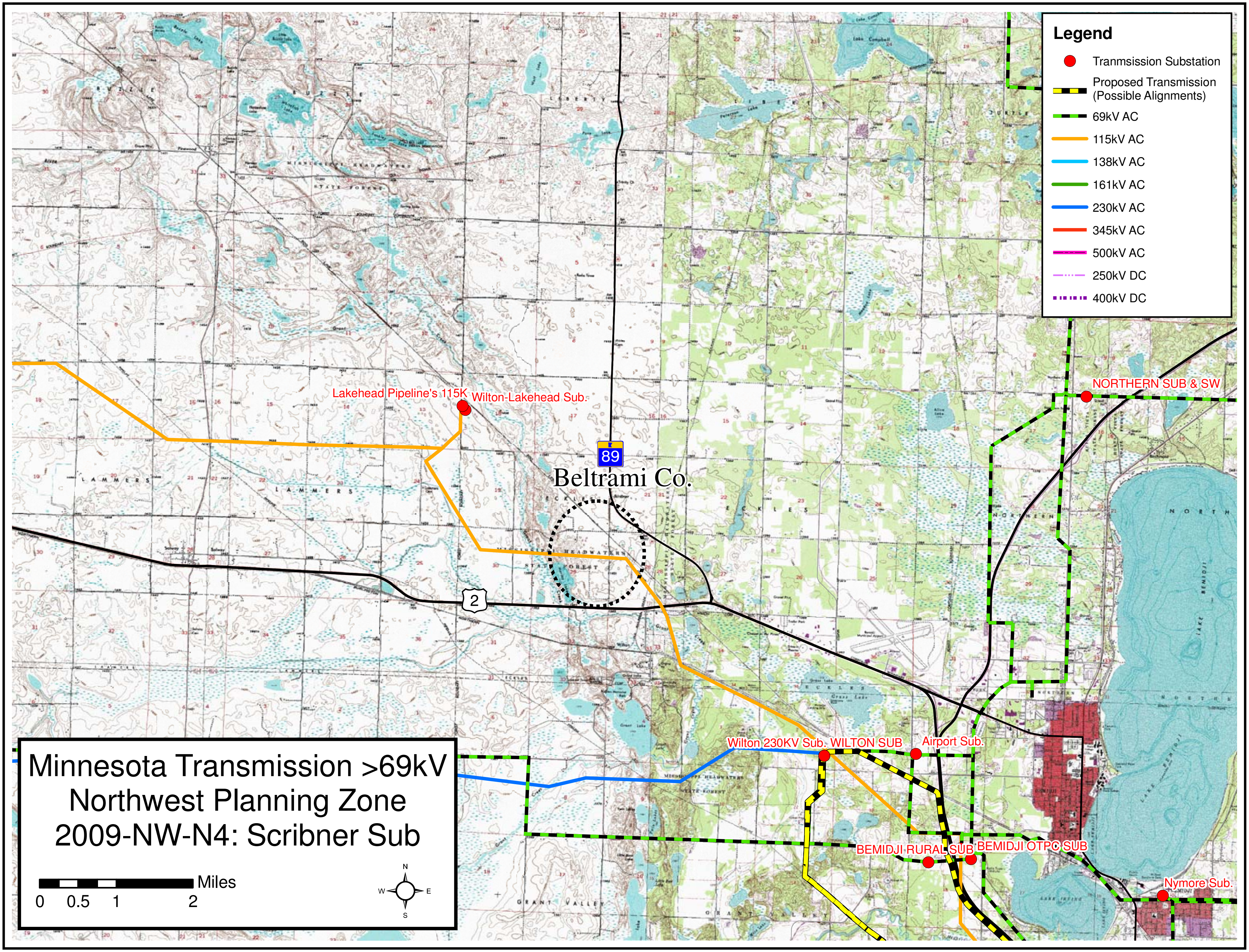
Alternatives. Two alternatives have been identified to address the load serving deficiency in this area:

Alternative 1: Construct a new 115/12.5 kV distribution substation along the existing Solway – Wilton 115 kV line near Scribner

Alternative 2. Increase the size of the 69/12.5 kV transformers at the Bemidji Rural Substation and the Northern Substation as well as increase the capacity of the distribution facilities out of each substation.

Analysis. The results of the analysis show that from both a cost and a reliability perspective, constructing a new 115/12.5 kV distribution substation near Scribner along the existing Solway – Wilton 115 kV line is the preferred alternative. The Scribner Substation is proposed to consist of a 10 MVA, 115/12.5 kV transformer. The Scribner 115/12.5 kV Substation will be located approximately three miles north and three miles west of the existing Wilton Substation and will be served from a new 115 kV two-way switch installed along the existing Solway – Wilton 115 kV line.

Schedule. The projected in-service date of the new Scribner Substation is November 1, 2010. The Public Utilities Commission is not required to review this project since it will be permitted locally and doesn't involve more than 10 miles of new 115 kV transmission line.


Legend
Tranmission Substation
Proposed Transmission (Possible Alignments)
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
Lakehead Pipeline's 115K
Wilton-Lakehead Sub.
NORTHERN SUB & SW
89
Beltrami Co.
2
Wilton 230KV Sub.
WILTON SUB
Airport Sub.
BEMIDJI RURAL SUB
BEMIDJI OTPC SUB
Nymore Sub.
Minnesota Transmission >69kV
Northwest Planning Zone
2009-NW-N4: Scribner Sub
Miles
0 0.5 1 2
N
W
E
S

6.2.13 Bemidji – Wilton 115 kV Line

Tracking Number. 2009-NW-N5

Utility. Otter Tail Power Company and Minnkota Power Cooperative

Inadequacy. The Maple River Wind Projects will result in approximately 360 MW of wind generation being delivered to the Maple River Substation by the end of 2009. Two wind farms being developed near Pillsbury, North Dakota, connect to the Maple River 230 kV Substation near Fargo through an approximately 61-mile long 230 kV line.

Through the evaluation of this wind farm through the *Maple River Wind Generation Interconnection System Impact Study* and the *System Impact Study for Long-Term Firm Transmission Service (A411)*, it has been shown that the addition of these wind farms are expected to cause additional west to east flows on the transmission system within north-central Minnesota. As a result of these increased flows, overloads on the transmission system may occur, namely along the Bemidji – Wilton 115 kV line.

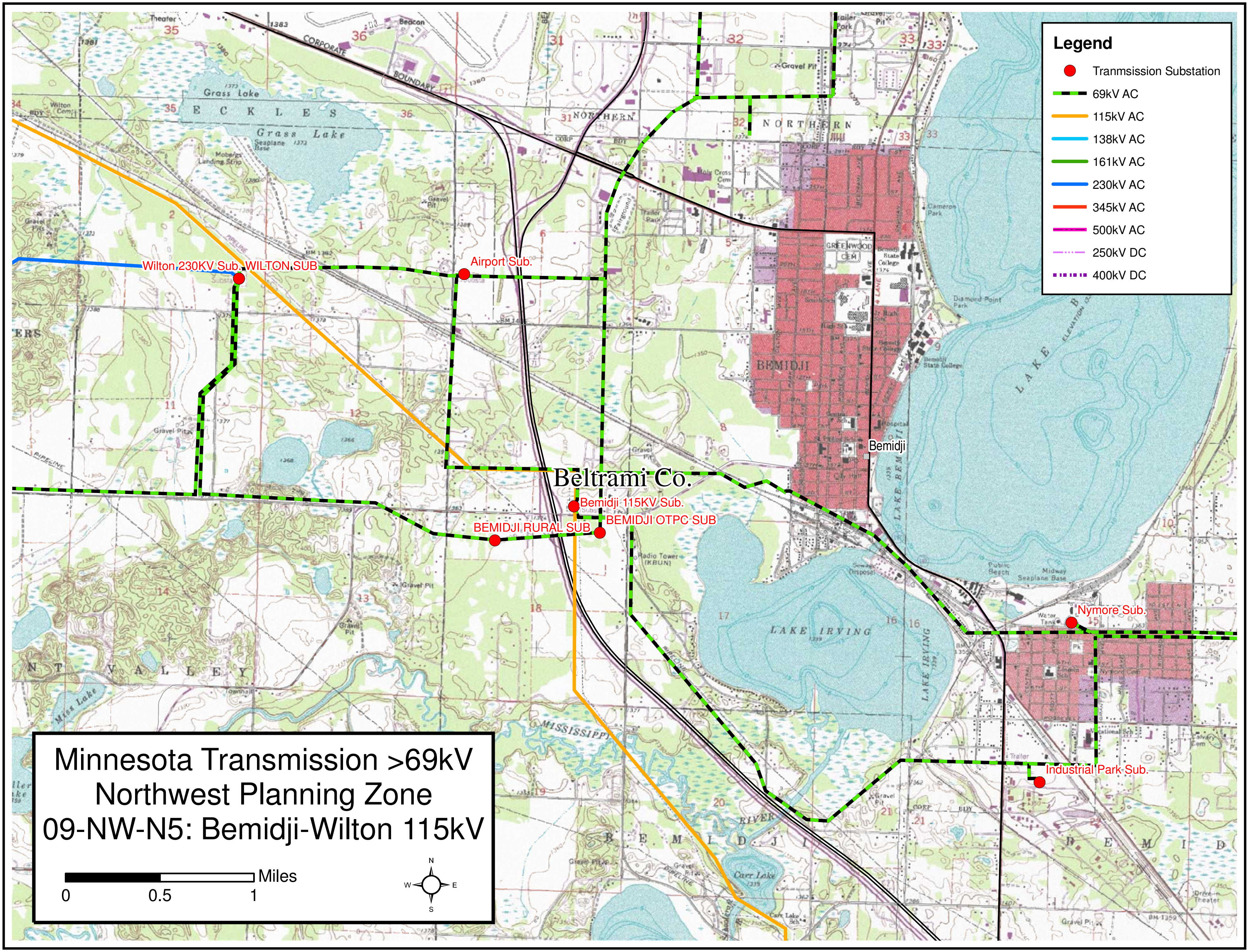
Otter Tail Power Company owns the Bemidji – Wilton 115 kV Line and the substation equipment at Bemidji, and Minnkota Power Cooperative owns the substation equipment at Wilton. If further review indicates terminal equipment at the Wilton Substation is also limiting the capability of this line, this upgrade could be a joint project between Minnkota Power Cooperative and Otter Tail Power Company.

A map of the area is shown following the discussion.

Alternatives. An investigation into this existing 115 kV transmission line by Otter Tail Power Company has indicated that terminal equipment at the Bemidji Substation and possibly the Wilton Substation are limiting the capability of this line to less than that capable of the existing conductor. Since this line overload is caused by limiting substation equipment, there is no need to consider alternatives given that the existing transmission line is adequate to handle the expected increase in flows from the Maple River Wind Projects. This upgrade is the most cost effective (and logical) alternative to achieving additional capacity along this line.

Analysis. The *Maple River Wind Generation Interconnection System Impact Study* performed by Minnkota Power Cooperative and the *System Impact Study for Long-Term Firm Transmission Service (A411)* performed by MISO have shown that an outage of the Sheyenne – Audubon 230 kV line or the Audubon – Hubbard 230 kV line causes an overload on the Bemidji – Wilton 115 kV Line. These contingencies cause the prevailing west to east flows through Minnesota to go further north through Bemidji where they encounter this limiting line.

Schedule. Otter Tail Power Company has finalized a facility study, called *Facility Study Report Prepared for Midwest ISO MISO Project #F075 (A411)*, and submitted it to MISO in August of 2009. This report documents the results of an investigation into the equipment within the Bemidji Substation as well as the Bemidji – Wilton 115 kV Line. It is expected that OTP will replace the limiting substation equipment by the end of 2010. It is possible that MPC will need to upgrade terminal equipment at the Wilton Substation in the same timeframe. Given that the capacity of this line can be increased by upgrading equipment within existing substations at each end of this line, no review of the project by the Public Utilities Commission is required.



Legend
Tranmission Substation
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
Wilton 230KV Sub.
WILTON SUB
Airport Sub.
Beltrami Co.
Bemidji 115KV Sub.
BEMIDJI OTPC SUB
BEMIDJI RURAL SUB
Bemidji
Nymore Sub.
Industrial Park Sub.
Minnesota Transmission >69kV
Northwest Planning Zone
09-NW-N5: Bemidji-Wilton 115kV
Miles
0
0.5
1
N
W
E
S

6.2.14 Sheyenne – Audubon 230 kV Line

Tracking Number. 2009-NW-N6

Utility. Xcel Energy and Otter Tail Power Company

Inadequacy. The *Maple River Wind Generation Interconnection System Impact Study* has identified that the addition of the Maple River Wind Farms in North Dakota causes an overload on the 44-mile long Sheyenne – Audubon 230 kV line. This 230 kV transmission line is jointly owned by Xcel Energy (1.5 miles) and Otter Tail Power Company (42.5 miles).

A map of the area is shown following the discussion.

Alternatives. The Sheyenne – Audubon 230 kV line has been shown to overload as a result of the Maple River Wind Projects during certain contingencies when there are 230 kV transmission line outages near the Maple River Substation. A few alternatives to upgrade this existing transmission line include:

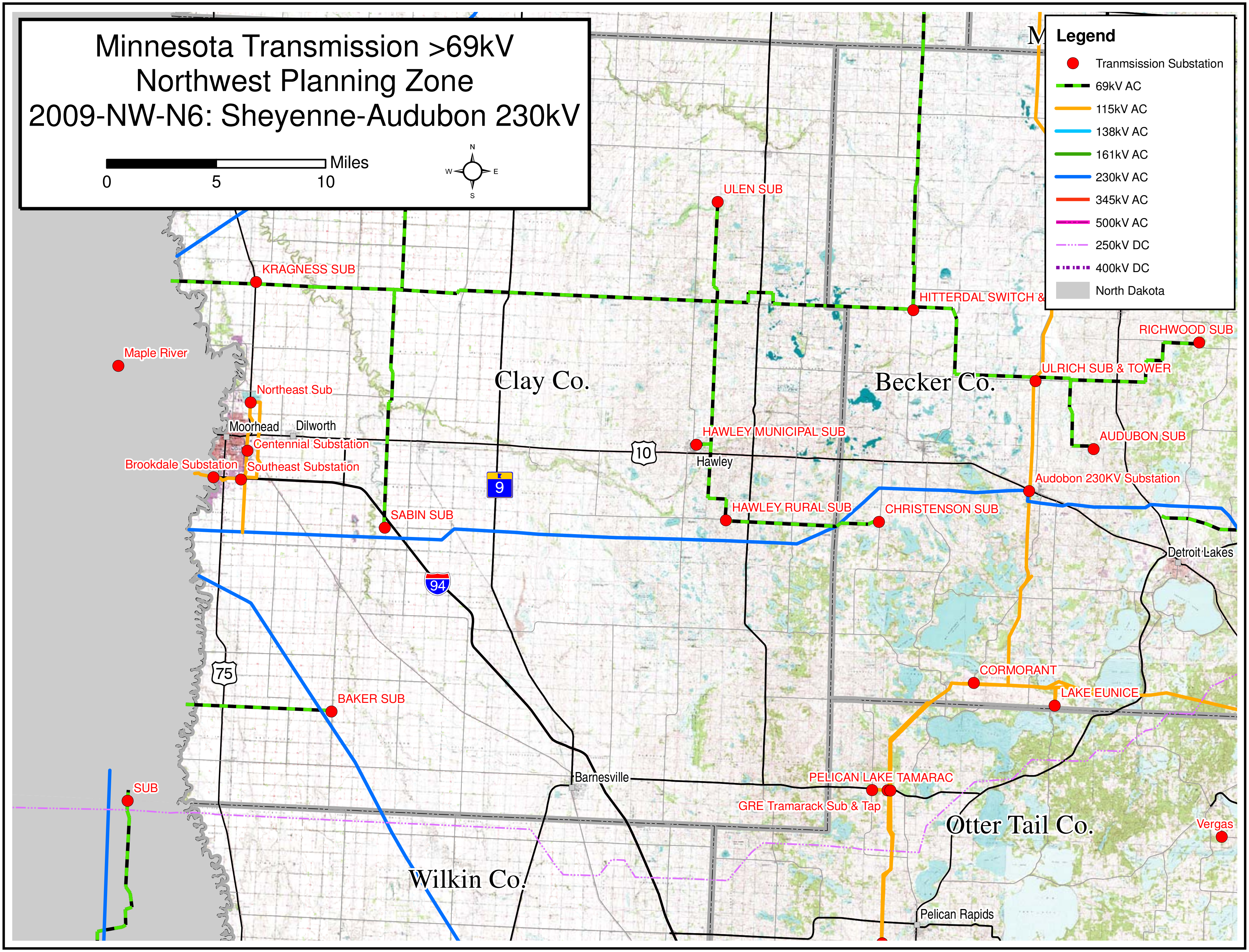
- raising structures along this existing line to achieve a higher operating temperature along this line and therefore increasing its capacity,
- reconductoring the existing transmission line (replace conductor on existing structures),
- rebuilding the existing transmission line (replace conductor and existing structures), or
- upgrading the line to a higher voltage.

Analysis. The *Maple River Wind Generation Interconnection System Impact Study* performed by Minnkota Power Cooperative has identified that, with the addition of the Maple River Wind Projects, the existing 230 kV transmission lines in the Fargo/Moorhead area become major outlet paths for the wind generation. During an outage of the Maple River – Frontier 230 kV line or the Frontier – Wahpeton 230 kV line, the wind generation flows east along the Maple River – Sheyenne 230 kV line; which ultimately results in a large portion of the power flow continuing east on the Sheyenne – Audubon 230 kV line. As a result, the Sheyenne – Audubon 230 kV line must be upgraded in order to accommodate the expected flow from the addition of the Maple River Wind Projects.

Xcel Energy has finalized a facilities study entitled *Results of Interconnection Facilities Study Following Attachment X Process for MISO F-075 (Maple River Substation and Sheyenne Substation Line Upgrade to 336.5 MVA)* related to their portion of this transmission line. Xcel Energy has determined that substation equipment within the Sheyenne Substation will need to be replaced as well as a few structure replacements along their portion of this transmission line in order to achieve the required capacity.

Otter Tail Power Company is currently performing a facilities study for their portion of this transmission line. Further investigation is needed to determine the preferred alternative in order to increase the capacity of the existing transmission line.

Schedule. The Maple River Wind Projects will result in approximately 360 MW of wind generation being delivered to the Maple River Substation by the end of 2009. Upgrades to the Sheyenne – Audubon 230 kV Line are not expected to be completed by this time; therefore, an operating procedure has been established to govern operation of the Maple River Wind Farms until the line can be upgraded. The need for a review of this project by the Public Utilities Commission is not known at this time given that the facilities study for the Otter Tail portion of this line is still underway. If extensive upgrades are required to this transmission line, it is anticipated that construction of these upgrades may not be completed until the 2013/2014 timeframe.


Minnesota Transmission >69kV
Northwest Planning Zone
2009-NW-N6: Sheyenne-Audubon 230kV
Miles
0
5
10
N
W
E
S
Legend
Tranmsission Substation
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
North Dakota
ULEN SUB
KRAGNESS SUB
HITTERDAL SWITCH &
RICHWOOD SUB
ULRICH SUB & TOWER
Maple River
Northeast Sub
Clay Co.
Becker Co.
AUDUBON SUB
HAWLEY MUNICIPAL SUB
Moorhead
Dilworth
Centennial Substation
Brookdale Substation
Southeast Substation
10
Hawley
Audubon 230KV Substation
9
HAWLEY RURAL SUB
CHRISTENSON SUB
SABIN SUB
Detroit Lakes
94
75
CORMORANT
LAKE EUNICE
BAKER SUB
SUB
Barnesville
PELICAN LAKE TAMARAC
GRE Tramarack Sub & Tap
Otter Tail Co.
Vergas
Wilkin Co.
Pelican Rapids

6.2.15 Cass Lake – Nary - Bemidji – 115 kV Line

Tracking Number. 2009-NW-N7

Utility. Otter Tail Power Company and Minnkota Power Cooperative

Inadequacy. When the new Bemidji – Grand Rapids 230 kV line is built with a new 230 kV substation near Cass Lake, the possibility exists during the winter peak season with high Manitoba imports that an outage of the new Wilton – Cass Lake 230 kV line would cause an overload of the existing 115 kV transmission line between Cass Lake – Nary – Bemidji. The Cass Lake – Nary 115 kV section appears to be limited by the conductor and the Nary – Bemidji 115 kV section appears to be limited by line switches and other related substation equipment along the line.

A map of the area is shown following the discussion.

Alternatives. A couple of alternatives are currently under consideration for addressing this inadequacy. These alternatives include:

- reconductoring the Cass Lake – Nary 115 kV line and replacing the limiting equipment along the Nary – Bemidji 115 kV line;

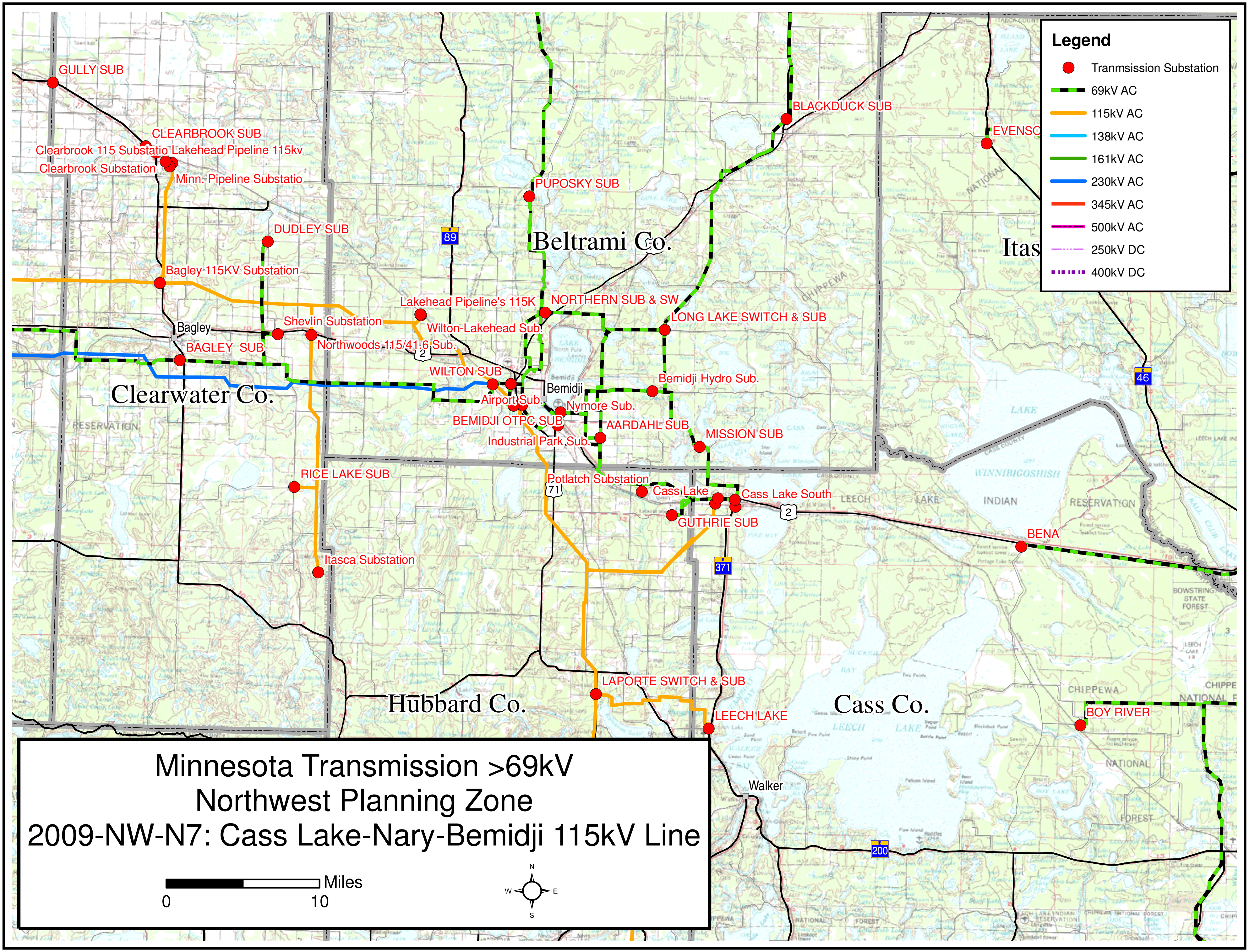
- reconfiguring the existing 115 kV system in the Bemidji area to eliminate the possibility of this overload; or

- configuring the new Bemidji – Grand Rapids line so that an outage between Cass Lake and the Wilton substation does not cause problems on the underlying system.

Analysis. Transmission studies performed for the Bemidji – Grand Rapids 230 kV project have identified a problem between Cass Lake and Bemidji in the event that a new 230/115 kV substation is established near Cass Lake. The problem arises during winter peak conditions with high power transfers into Manitoba when there is an outage of the new transmission line proposed between Cass Lake and Wilton. This overload appears to be somewhat sensitive to the condition of the Manitoba interface since summer peak or off-peak conditions (when Manitoba was assumed to be exporting) did not identify this similar issue.

An investigation of the existing 115 kV transmission lines between Cass Lake and Bemidji has shown that a line reconductor is likely required between Cass Lake and Nary while minimal structure replacements or modifications (along with replacement of substation equipment) will be needed along the Nary to Bemidji line. Reconfiguring the existing 115 kV system or configuring the new Bemidji – Grand Rapids 230 kV line to eliminate these identified loading concerns are not feasible long-term alternatives in this area given that it would not allow the new Bemidji – Grand Rapids 230 kV line to be fully optimized (utilized) with the existing transmission system.

Schedule. The Bemidji – Grand Rapids 230 kV line project is expected to be in-service by December 2011. A mitigation for this overload condition is expected in the 2012 timeframe. Depending on the determination of a Cass Lake 230/115 kV Substation along the new Bemidji – Grand Rapids 230 kV line, it is likely that the upgrade of the Cass Lake – Nary – Bemidji 115 kV line will be handled through the Minnesota routing process for the new Bemidji – Grand Rapids 230 kV Line as an "associated facility" upgrade.



Legend
Tranmission Substation
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
GULLY SUB
CLEARBROOK SUB
Clearbrook 115 Substatio
Lakehead Pipeline 115kv
Clearbrook Substation
Minn. Pipeline Substatio
DUDLEY SUB
Bagley 115KV Substation
Bagley
BAGLEY SUB
Shevlin Substation
Northwoods 115/41.6 Sub.
Lakehead Pipeline's 115K
Wilton-Lakehead Sub.
WILTON SUB
Airport Sub.
BEMIDJI OTPC SUB
Industrial Park Sub.
Nymore Sub.
AARDAHL SUB
Bemidji
Bemidji Hydro Sub.
NORTHERN SUB & SW
LONG LAKE SWITCH & SUB
PUPOSKY SUB
BLACKDUCK SUB
EVENSO
MISSION SUB
Potlatch Substation
Cass Lake
Cass Lake South
GUTHRIE SUB
BENA
RICE LAKE SUB
Itasca Substation
LAPORTE SWITCH & SUB
LEECH LAKE
BOY RIVER
Walker
Clearwater Co.
Beltrami Co.
Hubbard Co.
Cass Co.
Itas
89
2
71
371
46
200
Minnesota Transmission >69kV
Northwest Planning Zone
2009-NW-N7: Cass Lake-Nary-Bemidji 115kV Line
Miles
0
10
N
W
E
S

6.3 Northeast Zone

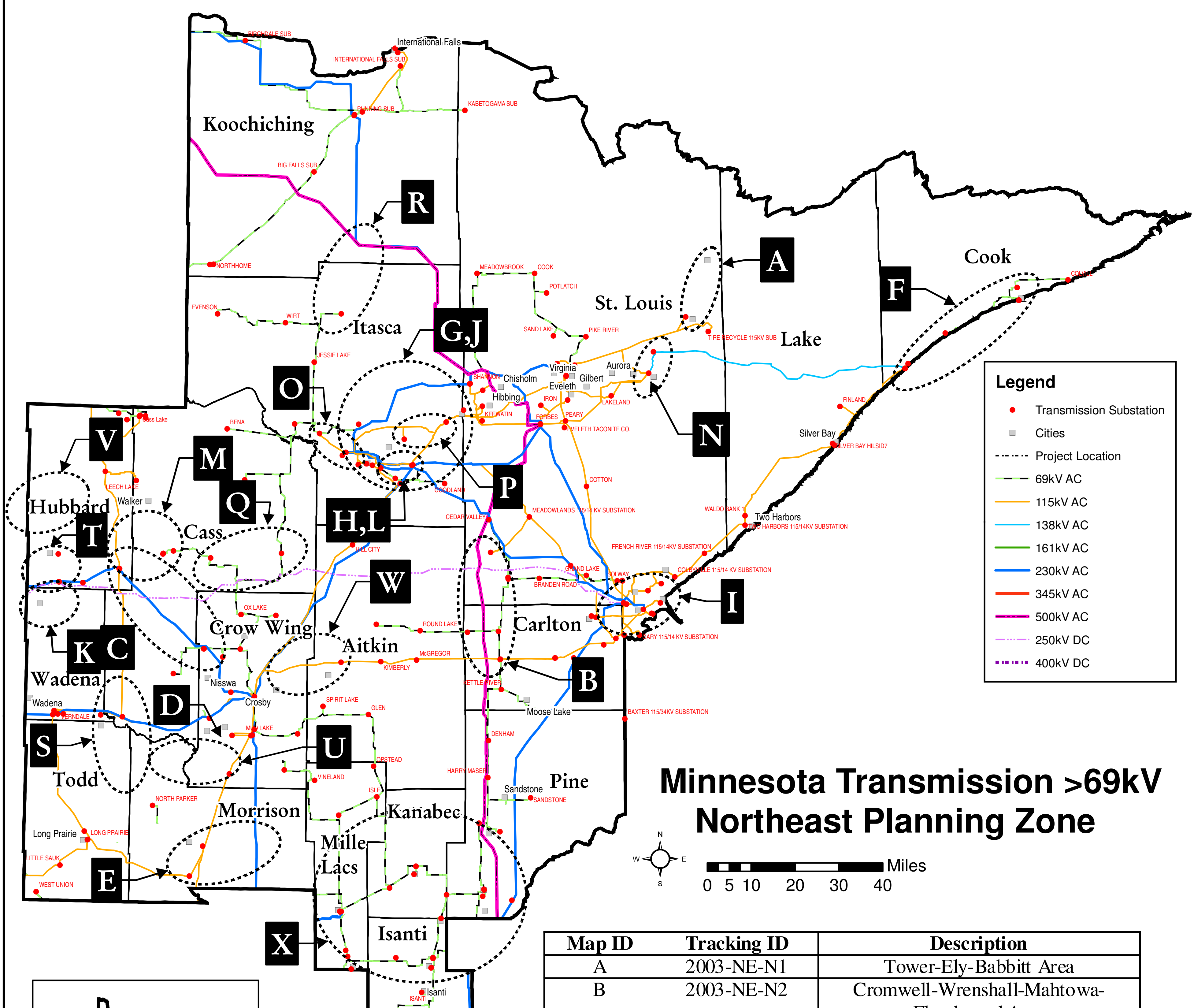
The following table provides a list of transmission needs identified in the Northeast Zone and the map following the table shows the location of each item in the table. Each transmission need is discussed in the sections following the map.

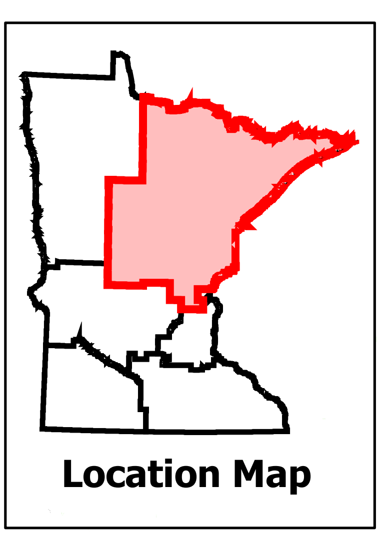
Northeast Zone

Tracking Number	Description	Projected In-Service Year	Need Driver	Section No.
2003-NE-N2	Cromwell-Wrenshall-Mahtowa-Floodwood-Area	2012-2014	Low voltage	6.3.2
2003-NE-N3	Long Lake-Badoura-Pequot Lakes Area	2009-2010	Low voltage and line overloads	6.3.3
2003-NE-N4	Central Lakes Area	2008-2009	Overloads	6.3.4
2003-NE-N5	Pierz-Genola Area	2011	Low voltage and line overloads	6.3.5
2003-NE-N6	Taconite Harbor-Grand Marais Area	2015	Low Voltage	6.3.6
2003-NE-N9	Nashwauk Area	2009-2010	Low voltage and line overloads	6.3.7
2005-NE-N2	Mesaba IGCC Generation Facility		Generation interconnection	6.3.8
2007-NE-N1	Duluth Area 230 kV	2012	Low voltage and line overloads	6.3.9
2007-NE-N2	Essar Steel Project	2012	New 300 MW load	6.3.10
2007-NE-N3	Hubbard-Menahga Area	2010	Low Voltage	6.3.11
2007-NE-N5	Pokegama Area	2012	Transmission to serve new distribution site	6.3.12
2007-NE-N6	Birch Lake – Onigum Area	2010	Low Voltage	6.3.13
2009-NE-N1	Nugget-Hoyt Lakes	2011	Reliability	6.3.14
2009-NE-N2	Deer River Tap	2012	Reliability	6.3.15
2009-NE-N3	115 kV Transmission Line #28 Reroute	2011	Line crosses mine operation	6.3.16
2009-NE-N4	Brainerd Lakes-Remer-Deer River Area	2016	Low voltage	6.3.17
2009-NE-N5	Bigfork Area	2014	Low voltage, Reliability	6.3.18

Tracking Number	Description	Projected In-Service Year	Need Driver	Section No.
2009-NE-N6	Staples-Motley-Long Prairie Area	2015	Low Voltage, Transmission for New Distribution Interconnection	6.3.19
2009-NE-N7	Park Rapids Area	Phase I – 2011 Phase II - 2020	Low Voltage Transmission for New Distribution Interconnection	6.3.20
2009-NE-N8	Barrows Area	2014	Transmission for New Distribution Interconnection	6.3.21
2009-NE-N9	Shell Lake Area	2015	Transmission for New Distribution Interconnection	6.3.22
2009-NE-N10	Aitkin Area	2014	Transmission for New Distribution Interconnection	6.3.23
2009-NE-N11	Rush City-Cambridge-Princeton-Milaca Area	2020	Low Voltage	6.3.24
	Other Zone Specific Issues			6.3.25

Minnesota Transmission >69kV Northeast Planning Zone





Map ID	Tracking ID	Description
A	2003-NE-N1	Tower-Ely-Babbitt Area
B	2003-NE-N2	Cromwell-Wrenshall-Mahtowa-Floodwood Area
C	2003-NE-N3 2005-NE-N1	Long Lake-Badoura-Pequot Lakes 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-N9	Nashwauk Area
H	2005-NE-N2	Mesaba IGCC Gen. Facility
I	2007-NE-N1	Duluth-Area 230kV
J	2007-NE-N2	Nashwauk 230 kV Transmission for Essar Steel Minnesota Project
K	2007-NE-N3	Hubbard-Menagha Area
L	2007-NE-N5	Pokegama Area
M	2007-NE-N6	Birch Lake-Onigum Area
N	2009-NE-N1	Nugget-Hoyt Lakes
O	2009-NE-N2	Deer River Tap
P	2009-NE-N3	28L Reroute
Q	2009-NE-N4	Brainerd Lakes-Rember-Deer River Area
R	2009-NE-N5	Bigfork Area
S	2009-NE-N6	Staples-Motley-Long Prairie Area
T	2009-NE-N7	Park Rapids Area
U	2009-NE-N8	Barrows Area
V	2009-NE-N9	Shell Lake Area
W	2009-NE-10	Aitkin Area
X	2009-NE-N11	Rush City-Cambridge-Princeton-Milaca Area

6.3.1 Completed Projects

There are two Tracking Numbers that were reported in the 2007 Biennial Report in the Northeast Zone that have been addressed. Information about each of the completed projects is summarized briefly in the table below, and those matters will be removed from the list of inadequacies that are discussed in the 2009 Report. More detailed information about these projects and inadequacies can be found in the 2005 and 2007 Reports and in the PUC Docket for the matter if the project fell within the jurisdiction of the Public Utilities Commission, in which case the Docket Number is shown below. Also, additional information is available by contacting the designated person for the utility that was responsible for constructing the project.

In addition, two Tracking Numbers have been combined with other Tracking Numbers and have been eliminated. Those are shown in the table below.

Tracking Number	Utility	Description	PUC Docket	Date Completed
2003-NE-N1	Minnesota Power Great River Energy	Tower-Ely-Babbitt Area A new 115 kV line	CN-05-867 TL-06-1624	October 21, 2009
2003-NE-N7	Great River Energy	Mille Lacs Area A new 115 kV line between the Mud Lake substation and the Wilson Lake substation was placed into service in January 2009.	CN-06-367 TL-07-76	2009
2003-NE-N8	Great River Energy	Floodwood Area		Combined with Tracking Number 2003-NE-N2
2005-NE-N1	Great River Energy	Hubbard-Badoura Area		Combined with Tracking Number 2003-NE-N3
2007-NE-N4	Great River Energy	Akeley-Cramer Lake Area A new 115 kV line between MP's Badoura-Akeley 115 kV line (138L) and Itasca-Mantrap's Shingobee substation was placed into service in January 2009.	Permitted locally	January 2009

6.3.2 Cromwell-Wrenshall-Mahtowa-Floodwood Area

Tracking Number. 2003-NE-N2

Utility. Minnesota Power and Great River Energy

Inadequacy. The MP and GRE customers in the Cromwell-Wrenshall-Mahtowa areas are supplied by a 90-mile 115 kV line running between 115 kV sources located at the Riverton Substation near Brainerd and the Thomson 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 areas is approaching unacceptable levels with a loss of the Thomson source. This pending inadequacy was recognized in the 2007 MAPP 10 year reliability assessment.

The Floodwood Area consists of the load served between the Cromwell and Four Corners 115/69 kV sources. GRE serves loads in the Floodwood area via a 69 kV system between Cromwell, Gowan, and Four Corners while MP serves load in the area via a 115 kV radial line sourced from the Blackberry-Cloquet 115 kV line. GRE expects voltage issues for its loads by the 2011 timeframe if either the Cromwell or the Four Corners 69 kV source is out of service. Furthermore, industrial load in the Floodwood area is forecast to increase in the 2014-2015 timeframe. The existing MP radial 115 kV source to Floodwood is not expected to be adequate to reliably serve this expected increase in electric demand.

Tracking Number 2003-NE-N8 (Floodwood Area) has been combined with this Tracking Number and 2003-NE-N8 has been eliminated.

A map of the area is shown following the discussion.

Alternatives. MP and GRE are working together to address both the short term and long term inadequacies in theses two areas.

Near term, the Gowan area is in need of a new source as this area has capacitors at almost every substation served from this system. As recommended by the 2008 GRE Long Range Plan, a new Savanna (Floodwood) 115/69 kV substation will be established in 2011 which will provide a third source into the Gowan area system. This project will address the near term needs in the Floodwood area.

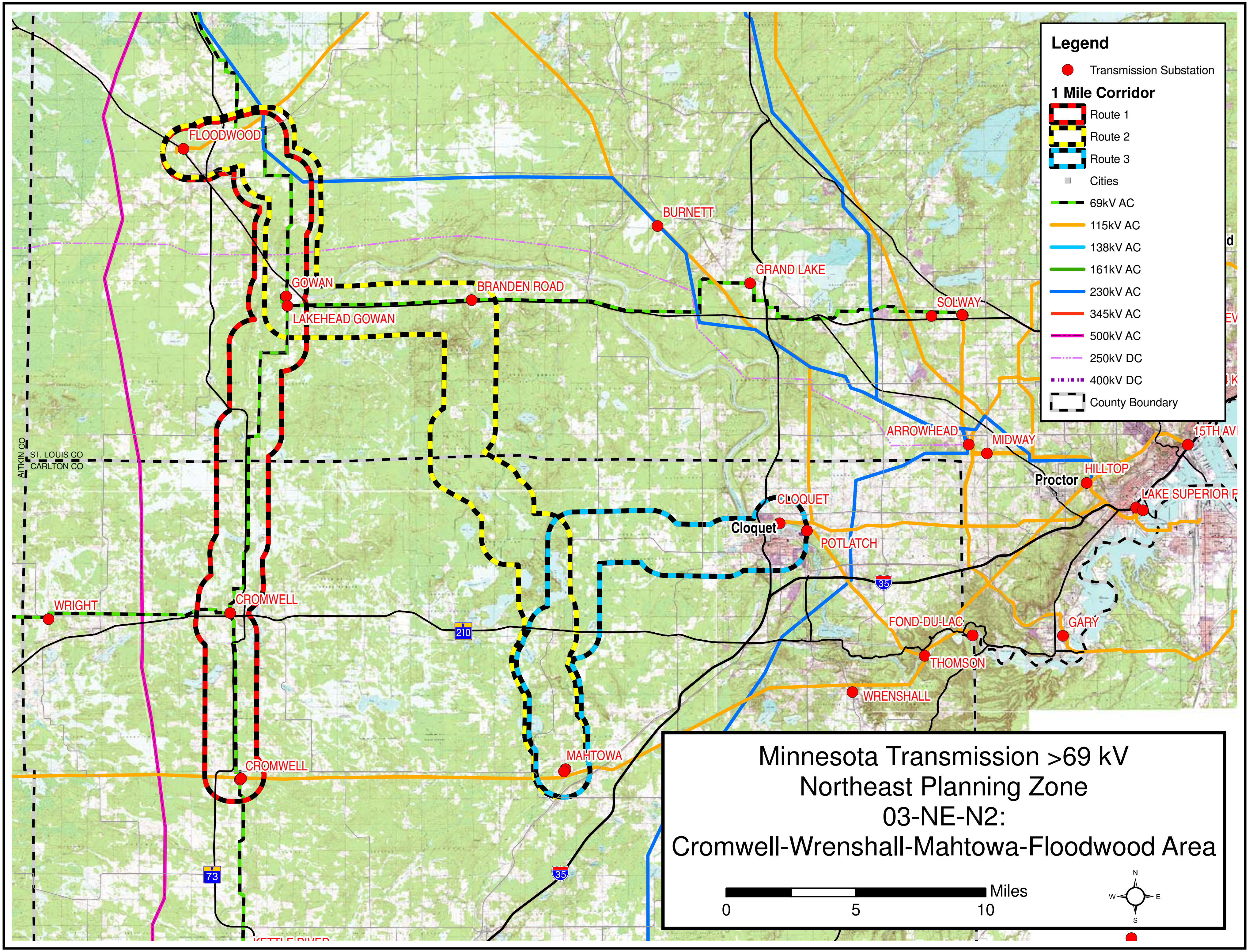
Three alternatives have been identified to address the two area's long term needs; (1) upgrade of existing lower voltage lines, (2) construction of a new 115 kV line, and (3) distributed generation. Studies to determine which alternative is the best long term solution are ongoing. One alternative being 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 MP and GRE Floodwood area need. Other transmission alternatives include new transmission lines between Cloquet and Mahtowa, Floodwood and Mahtowa or a Floodwood-Cloquet-Mahtowa line.

Analysis. A solution that solves both inadequacies (the Cromwell-Wrenshall-Mahtowa areas and the Floodwood area) 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 long term solution both electrically and economically. However, no alternatives have been ruled out.

Schedule. GRE has placed an option on land for the Savanna Substation. Substation engineering activities and right-of-way acquisition have started. The projected energization date is Fall 2011.

Because of the desire to find a solution that addresses both problem areas, and because the long term need is not critical at the moment, the schedule for a longer term solution has been extended from what was predicted in the 2007 Report. The utilities will continue to monitor the situation and evaluate options, but the present expectation is that a Certificate of Need application may be filed as soon as 2010 or as late as 2012.



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
Proctor
HILLTOP
CLOQUET
Cloquet
POTLATCH
AITKIN CO
ST. LOUIS CO
CARLTON CO
WRIGHT
CROMWELL
210
35
FOND-DU-LAC
GARY
THOMSON
WRENSHALL
MAHTOWA
CROMWELL
73
Minnesota Transmission >69 kV
Northeast Planning Zone
03-NE-N2:
Cromwell-Wrenshall-Mahtowa-Floodwood Area
Miles
0
5
10
N
W
E
S

6.3.3 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 was combined with Tracking Number 2005-NE-N1 (Long Lake – Badoura) in 2007 and Tracking Number 2005-NE-N1 has been eliminated.

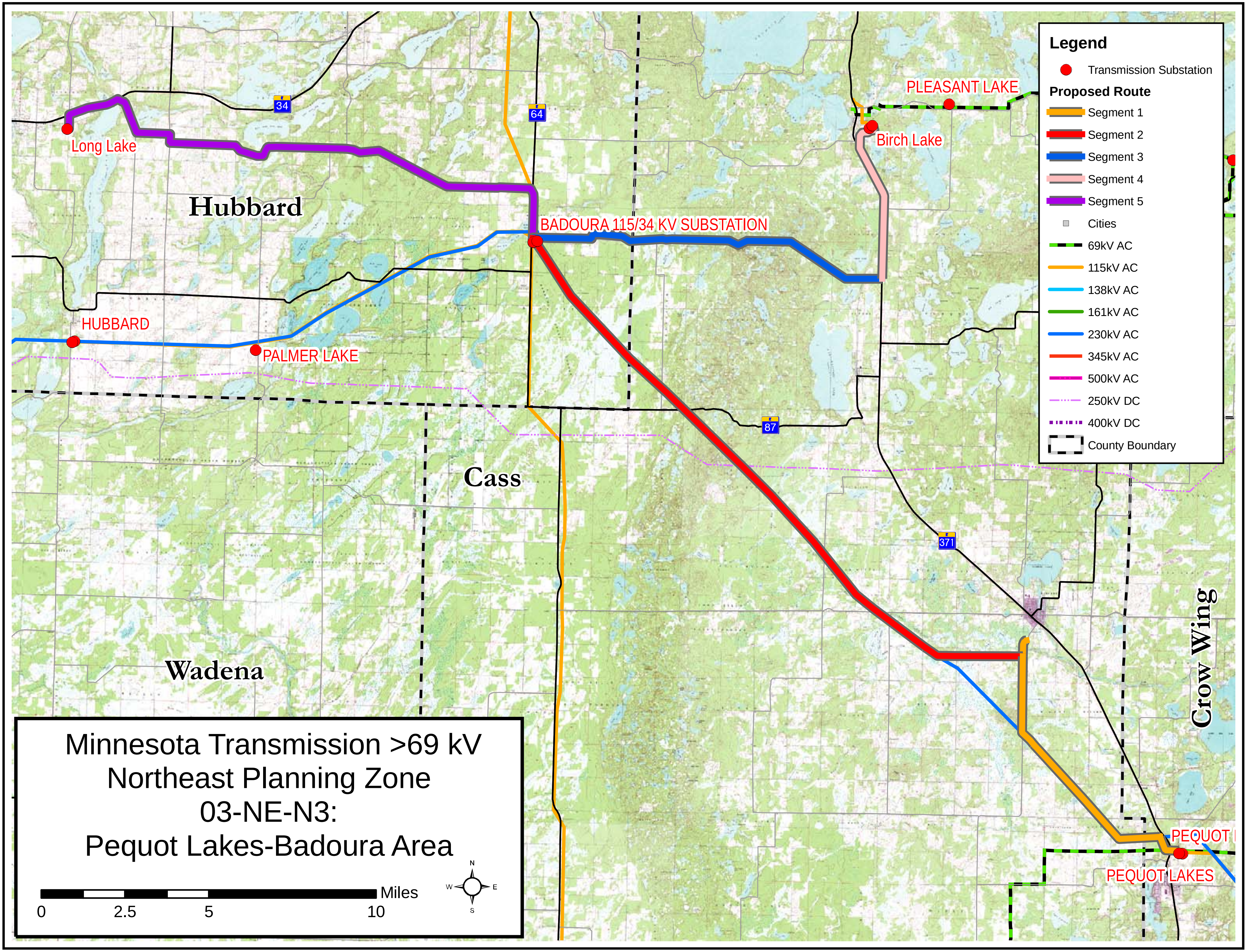
A map of the area is shown on the following page.

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 Commission issued a route permit for the project in November 2007.

Schedule. Construction activities began 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 fourth quarter 2009. Construction on the Pequot Lakes to Pine River segment is expected to begin during the first quarter of 2010 and be completed by the end of second quarter 2010 while the Badoura to Birch Lake line is anticipated to be completed by fourth quarter 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
PLEASANT LAKE
Birch Lake
BADOURA 115/34 KV SUBSTATION
HUBBARD
PALMER LAKE
PEQUOT
PEQUOT LAKES
Hubbard
Cass
Wadena
Crow Wing
34
64
87
371
Minnesota Transmission >69 kV
Northeast Planning Zone
03-NE-N3:
Pequot Lakes-Badoura Area
Miles
0
2.5
5
10
N
E
S
W

6.3.4 Central Lakes Area

Tracking Number. 2003-NE-N4

Utility. Minnesota Power and 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.

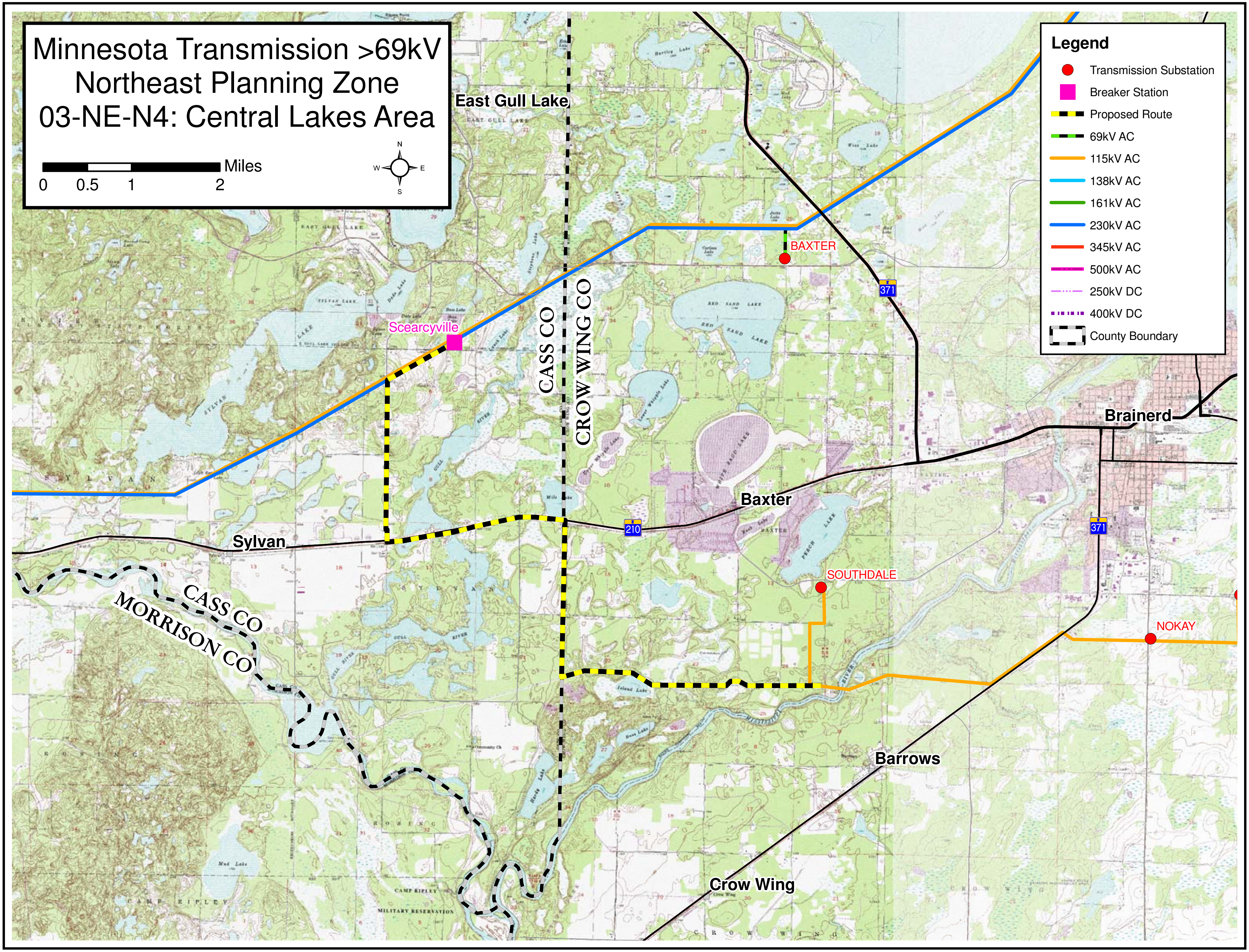
A map of the area is shown on the following page.

Alternatives. The utilities have elected to construct a 115 kV line from the Southdale Substation to Minnesota Power's Baxter-Dog Lake Tap 115 kV line (identified as 24 Line). A new 115 kV Scearcyville breaker station would be constructed at the tap point. The new line would create a looped 115 kV system with a third source being provided to the Brainerd substation from the west.

Analysis. The Commission granted a route permit for the project on March 19, 2009. Right-of-way and engineering activities are underway.

Schedule. Line construction is anticipated to begin Spring 2010 and expected to be energized by early First Quarter 2011.

PUC Docket Number. TL-08-712 (Route Permit)



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

6.3.5 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 together the 115/34.5 kV sources between Blanchard and Little Falls. GRE first reported in 2003 that load growth in the area had reached the point where the system may overload and voltage violations may occur. Additionally, Crow Wing Power (CWP) added an additional distribution point near the town of Buckman in 2009 that will add to system loading issues. Fortunately, the Platte River 115/34.5 kV source provides an emergency backup supply for the Blanchard source and has delayed the need for additional transmission investment in the area.

A map of the area is shown following the discussion.

Alternatives. The Platte River 115/34.5 kV source north of Rice was constructed in 2007 to address contingent loading and voltage issues on this system. This is expected to provide a short-term solution for the issues identified. Additional long-term solutions are required.

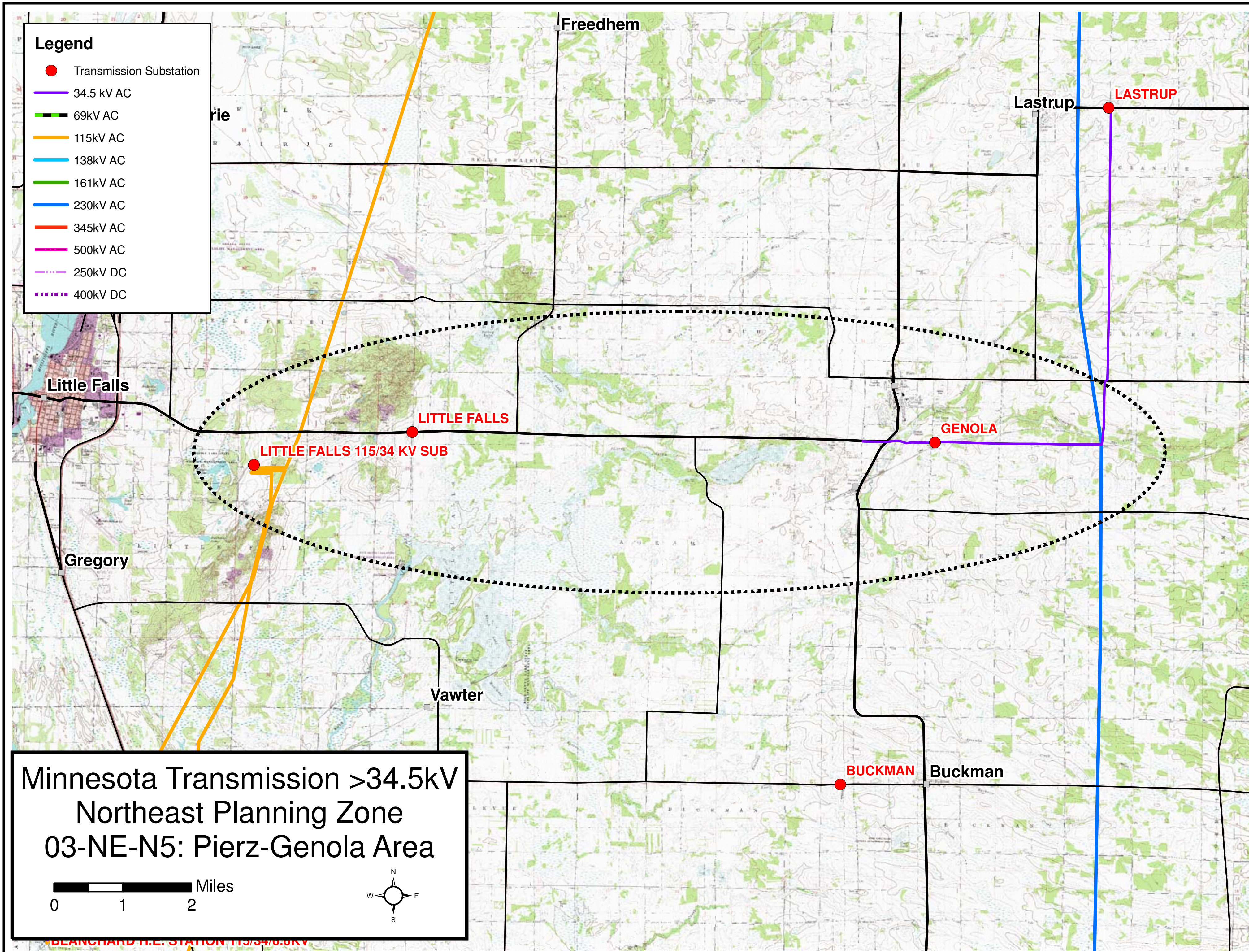
Potential long-term alternatives are:

> (1) Conversion of the Crow Wing Power (CWP) Little Falls and Lastrup substations to 115 kV service.
>
> (2) Generation in the Buckman area.

Analysis. Conversion of the Crow Wing Power Little Falls and Lastrup substations would remove the two largest loads from the 34.5 kV system and greatly extend the life of the system, while allowing for continued load growth of these Crow Wing Power substations. Since the CWP Little Falls Substation is only 3-4 miles from the Minnesota Power Little Falls 115 kV Substation and is the largest load on the 34.5 kV system, the CWP Little Falls Substation would be the first substation to be converted. Extending a 115 kV line to the Lastrup Substation would require, at a minimum, ten miles of transmission so deferring this conversion would be desirable. Also, due to voltage support considerations on the 115 kV system near Little Falls, a new 230/115 kV source near Pierz/Lastrup may be required in the future. The CWP Lastrup and Little Falls conversions would help to establish a 115 kV connection from this source to the MP Little Falls Substation.

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. GRE has been monitoring the situation in this area for several years now and will continue to do so. Installation of a new source north of the community of Rice in 2007 has provided some short term relief, but it is anticipated that a solution will need to be in place in the 2012-2014 timeframe. Extending any transmission line between the CWP Little Falls and Lastrup substations would exceed ten miles in length, so a Certificate of Need from the Public Utilities Commission and a Route Permit would be required.



Minnesota Transmission >34.5kV
Northeast Planning Zone
03-NE-N5: Pierz-Genola Area

6.3.6 Taconite Harbor-Grand Marais Area

Tracking Number. 2003-NE-N6

Utility. Great River Energy and Southern Minnesota Municipal Power Agency

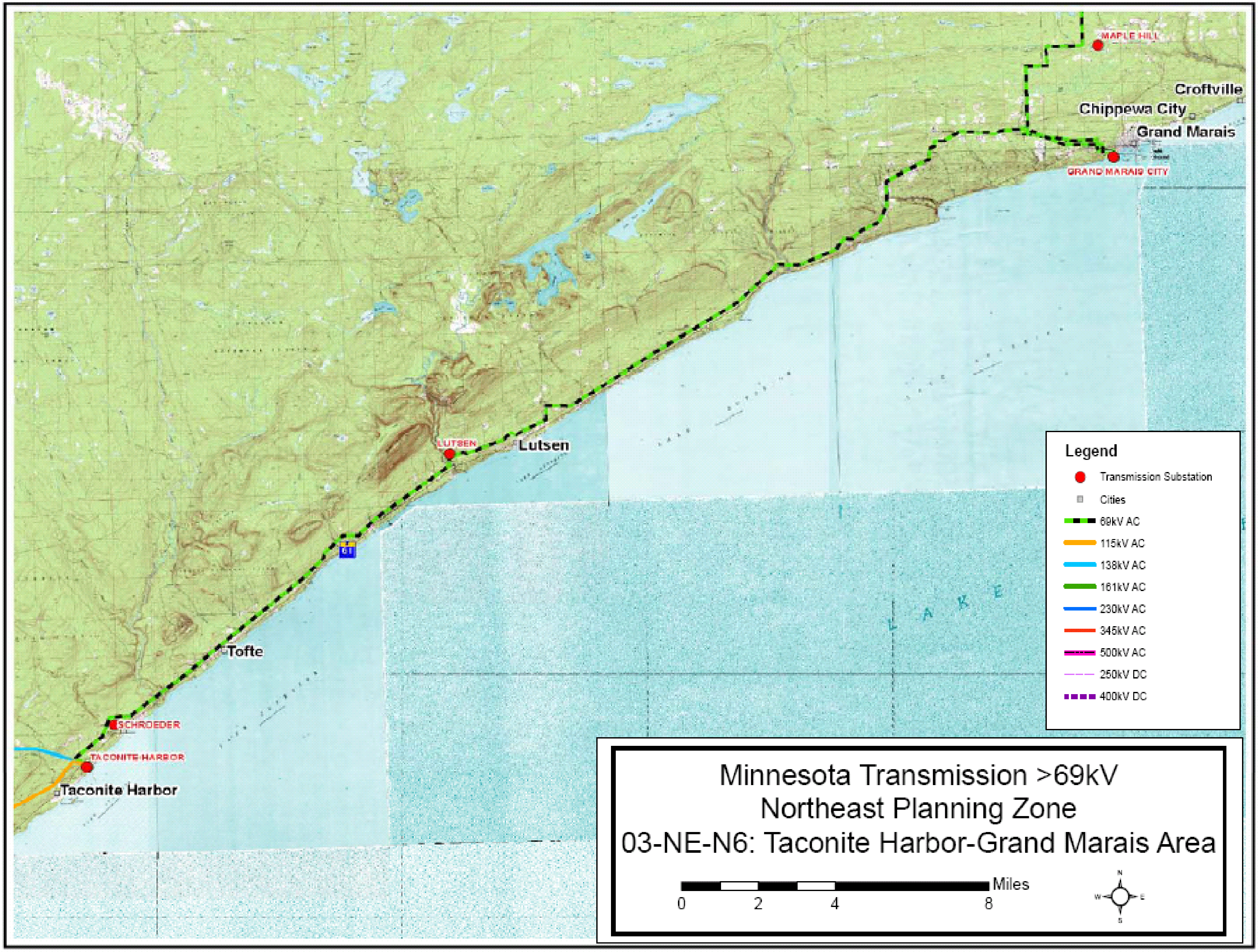
Inadequacy. The concern here is system intact low voltage on a fifty mile long 69 kV line that runs along the North Shore. The load served by this line has been growing at a rate of approximately 6% per year and includes both GRE and SMMPA load. The voltage will be below acceptable levels without an upgrade sometime between 2011 and 2015.

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 completed the installation of the Arrowhead generation station in Fall 2008 at the Colvill substation. Nine, two megawatt diesel generators were installed as an emergency source if the transmission feed from Taconite Harbor should be lost. GRE also installed two 3.5 MVAR capacitor banks at the Maple Hill substation in 2008 to help boost transmission voltages during on-peak situations.

With these capacitor and generation additions in place, GRE will pursue transmission line rebuilds to address area thermal loading and voltage concerns. Line rebuilds are warranted as the area loading is approaching the limits of the existing transmission capacity with much of the existing transmission circuit being 1950’s vintage and nearing the end of its useful life. Any rebuild would be constructed to 115 kV design standards for future conversion.

Schedule. GRE will monitor the area load growth to determine when the line rebuilds need to take place. It is anticipated that no action would be required until at least 2011.



MAPLE HILL
Croftville
Chippewa City
Grand Marais
GRAND MARAIS CITY
LUTSEN
Lutsen
61
Tofte
SCHROEDER
TACONITE HARBOR
Taconite Harbor
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

6.3.7 Nashwauk Area

Tracking Number. 2003-NE-N9

Utility. Great River Energy

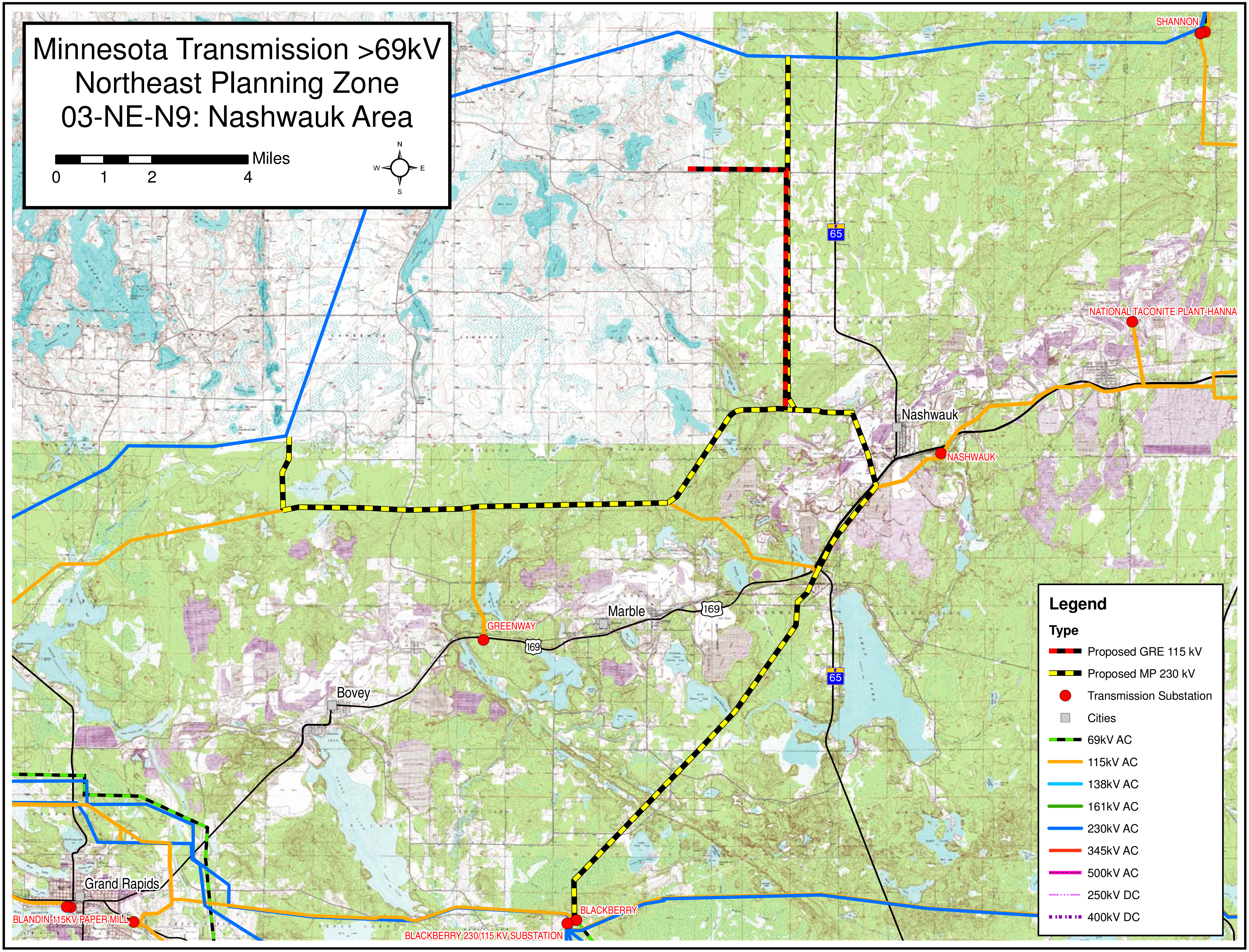
Inadequacy. The load in the Nashwauk and Crooked Lake area has been growing at an average rate of 2.8% summer and 8.4% winter per year since 2002. This load growth caused the voltage levels at the Nashwauk and Crooked Lake substations to become marginal during winter peaking load situations and has caused the voltage regulator and a portion of transmission line that serve these substations to approach their capacity.

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

Alternatives. Three alternatives were identified in the 2005 Report and have been 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.

Analysis. The new Shoal Lake substation is the preferred alternative as its development can be coordinated with the need for additional transmission to serve the proposed Essar Steel facility (Tracking Number 2007-NE-N2) and cost efficiencies can be achieved through shared transmission corridor use. However, as the Essar Steel development is still a number of years away, GRE is looking to make some incremental upgrades to the existing 23 kV feed to alleviate the regulator overloading and lessen the peak loading voltage impacts.

Schedule. GRE is seeking to make incremental upgrades to the existing 23 kV system serving this area by Fall 2009 or Spring 2010. Development of the Essar Steel transmission will be monitored to see when development of the Shoal Lake substation can be initiated.



Minnesota Transmission >69kV
Northeast Planning Zone
03-NE-N9: Nashwauk Area
Miles
0 1 2 4
N
W
E
S
SHANNON
NATIONAL TACONITE PLANT-HANNA
Nashwauk
NASHWAUK
65
Marble
169
GREENWAY
Bovey
Grand Rapids
BLANDIN 115KV PAPER MILL
BLACKBERRY
BLACKBERRY 230/115 KV SUBSTATION
Legend
Type
Proposed GRE 115 kV
Proposed MP 230 kV
Transmission Substation
Cities
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC

6.3.8 Mesaba IGCC Generation Facility

Tracking Number. 2005-NE-N2

Utility. Excelsior Energy, Inc.

Inadequacy. In 2005, Excelsior Energy Inc. ("Excelsior"), an independent energy development company, proposed 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 Project would have to 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 following the discussion.

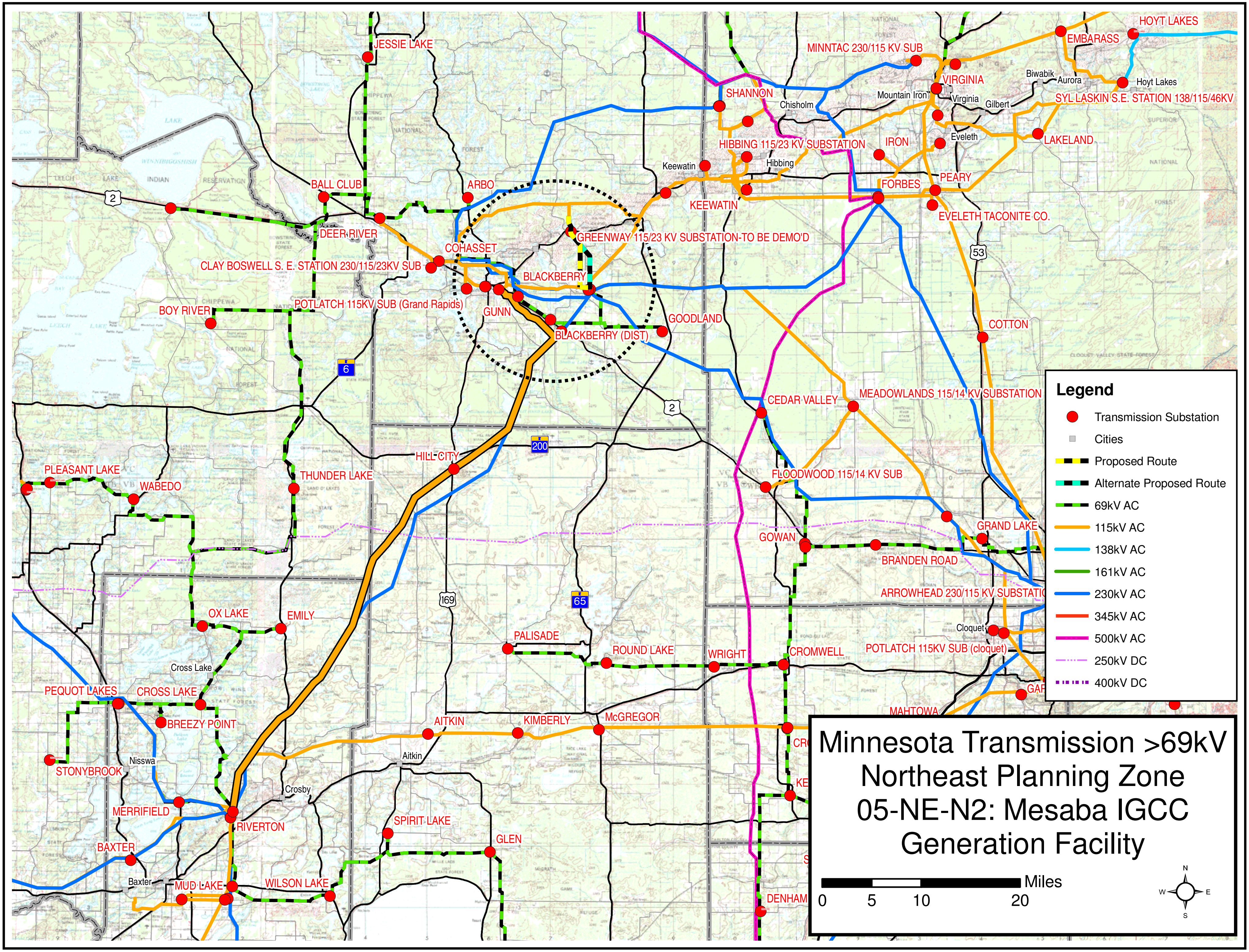
Alternatives. Excelsior has developed a number of 230 and 345 kV development concepts for the generator outlet facilities to deliver the output of both phases of generation from the Project at two alternative sites (a preferred West Range Site near Taconite, Minnesota, and an alternative East Range Site near Hoyt Lakes). To minimize the need for new right of way for the East Range site, Excelsior proposed 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. 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). The MISO generator interconnection process has been completed for both G519 and G477 (Mesaba 1).

Because of new planned facilities in the local area, including the Boswell-Wilton 230 kV line (Tracking Number 2005-NW-N2) and the Essar Steel Minnesota LLC (ESML) Project (Tracking Number 2007-NE-N2), MISO determined that a restudy of the Mesaba Energy Project was necessary. The restudy determined that the Boswell-Riverton 230 kV line was no longer required but that an existing 115 kV line between Grand Rapids and Riverton substations would need to be upgraded instead. MISO studies are pending to establish the schedule and cost for this network upgrade. MISO system studies are also pending to determine what network upgrades will be required to interconnect Mesaba 2, designated as G597 by MISO, to the grid.

Schedule. On July 7, 2009, the Public Utilities Commission issued its Order Denying Motions and Reconsideration in the matter involving Excelsior Energy's petition for approval of a Power Purchase Agreement with Xcel Energy, in which the PUC found that a proposed PPA was not in the public interest and that the facility was not a least-cost resource. Excelsior Energy has appealed that decision to the Minnesota Court of Appeals and the matter is now before the Court.

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
Proposed Route
Alternate Proposed Route
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
Miles
0
5
10
20
N
S
E
W
JESSIE LAKE
MINNTAC 230/115 KV SUB
EMBARASS
HOYT LAKES
Hoyt Lakes
VIRGINIA
Biwabik
Aurora
Mountain Iron
Virginia
Gilbert
SYL LASKIN S.E. STATION 138/115/46KV
SHANNON
Chisholm
HIBBING 115/23 KV SUBSTATION
IRON
Eveleth
LAKELAND
Keewatin
Hibbing
PEARY
FORBES
KEEWATIN
EVELETH TACONITE CO.
BALL CLUB
ARBO
DEER RIVER
GREENWAY 115/23 KV SUBSTATION-TO BE DEMO'D
COHASSET
CLAY BOSWELL S. E. STATION 230/115/23KV SUB
BLACKBERRY
POTLATCH 115KV SUB (Grand Rapids)
GUNN
BOY RIVER
GOODLAND
BLACKBERRY (DIST)
COTTON
CEDAR VALLEY
MEADOWLANDS 115/14 KV SUBSTATION
HILL CITY
PLEASANT LAKE
WABEDO
THUNDER LAKE
FLOODWOOD 115/14 KV SUB
GRAND LAKE
GOWAN
BRANDEN ROAD
ARROWHEAD 230/115 KV SUBSTATI
OX LAKE
EMILY
PALISADE
ROUND LAKE
WRIGHT
CROMWELL
Cloquet
POTLATCH 115KV SUB (cloquet)
Cross Lake
PEQUOT LAKES
CROSS LAKE
BREEZY POINT
AITKIN
KIMBERLY
McGREGOR
MAHTOWA
STONYBROOK
Nisswa
Aitkin
Crosby
MERRIFIELD
RIVERTON
SPIRIT LAKE
GLEN
BAXTER
Baxter
MUD LAKE
WILSON LAKE
DENHAM
2
6
200
169
65
53

6.3.9 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. This has been and continues to be managed by scheduling maintenance during light load periods. The addition of the Arrowhead-Weston 345 kV line (energized in January of 2008) and associated Stinson Phase Shifter operating changes has reduced the number of hours this is an issue. As Duluth area load continues to grow, this concern will reach critical levels and additional transmission will be required.

A map of the area is shown following the discussion.

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

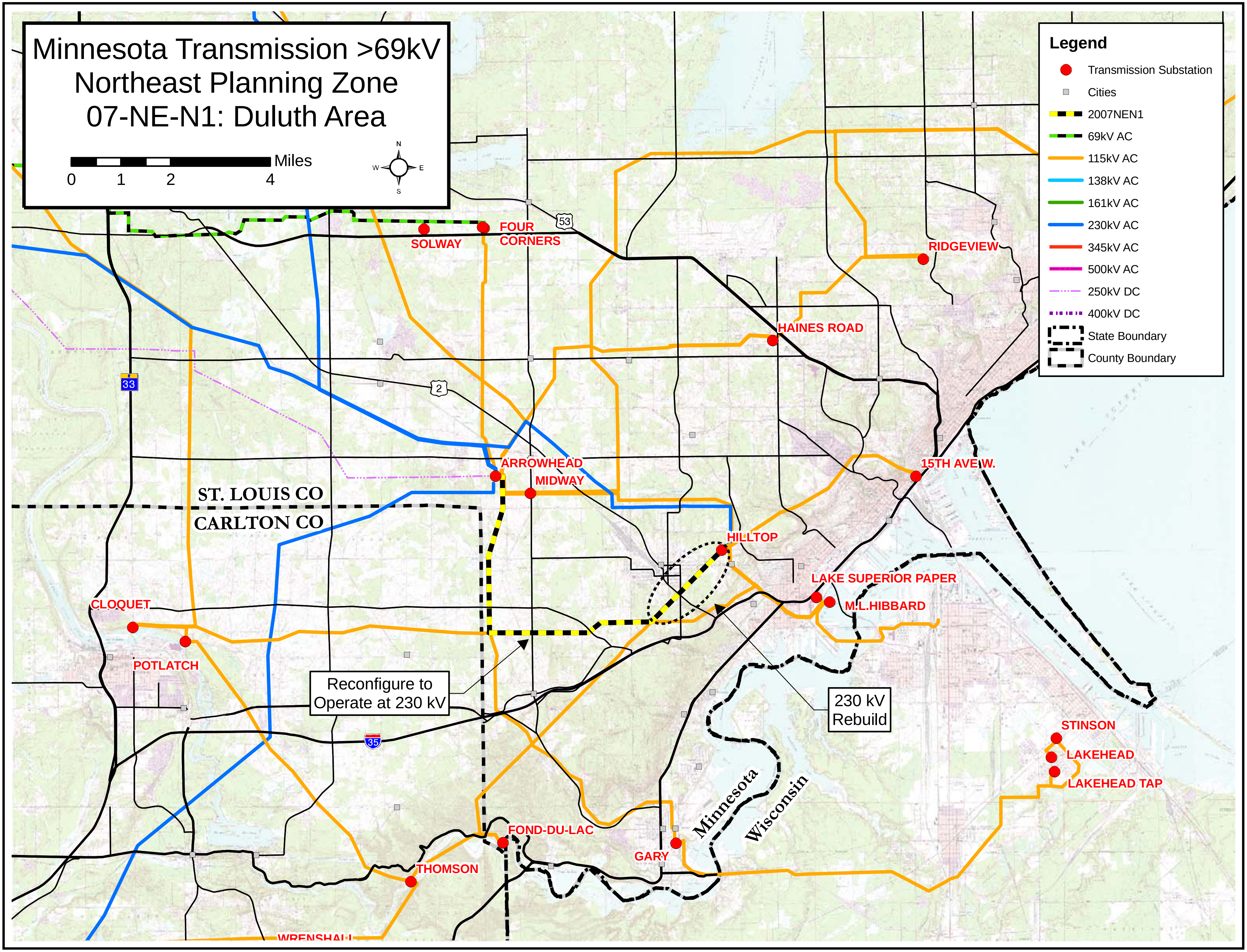
Analysis. In 1993, Minnesota Power constructed a new 230 kV substation (the Hilltop Substation) in Duluth. This project involved the rebuilding of existing 115 kV lines for 230 kV operation in order to provide a single 230 kV source to the Hilltop Substation and upgrades of several unshielded 115 kV 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 three 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. Minnesota Power is in the process of updating previous studies of the Duluth area transmission system. The addition of the Arrowhead to Weston 345 kV line allowed the flows through the Stinson Phase shifter to be reduced, which increased load serving capability in the Duluth, Minnesota, and Superior, Wisconsin, areas. This increased load serving capability has delayed the need for new 230 kV transmission and 230/115 kV transformer capacity in the

Duluth/Superior area. Based on the preliminary results of this updated analysis, a Certificate of Need application is not expected to be submitted until the 2015-2019 timeframe. 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
N
W
E
S
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
53
RIDGEVIEW
HAINES ROAD
33
2
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
35
STINSON
LAKEHEAD
LAKEHEAD TAP
Minnesota
Wisconsin
FOND-DU-LAC
GARY
THOMSON
WRENSHALL

6.3.10 Essar Steel Project

Tracking Number. 2007-NE-N2

Utility. Nashwauk Public Utilities Commission (NPUC) and Minnesota Power

Inadequacy. Essar Steel Minnesota (formerly know as Minnesota Steel Industries) is proposing the construction of an iron ore mining and steel production facility to be located near Nashwauk, Minnesota. 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 Essar (a small amount of mining related load would be supplied by Minnesota Power). In order to deliver the approximately 300 MW needed for all three phases of the Essar project, new transmission will be required and Minnesota Power will be the transmission provider.

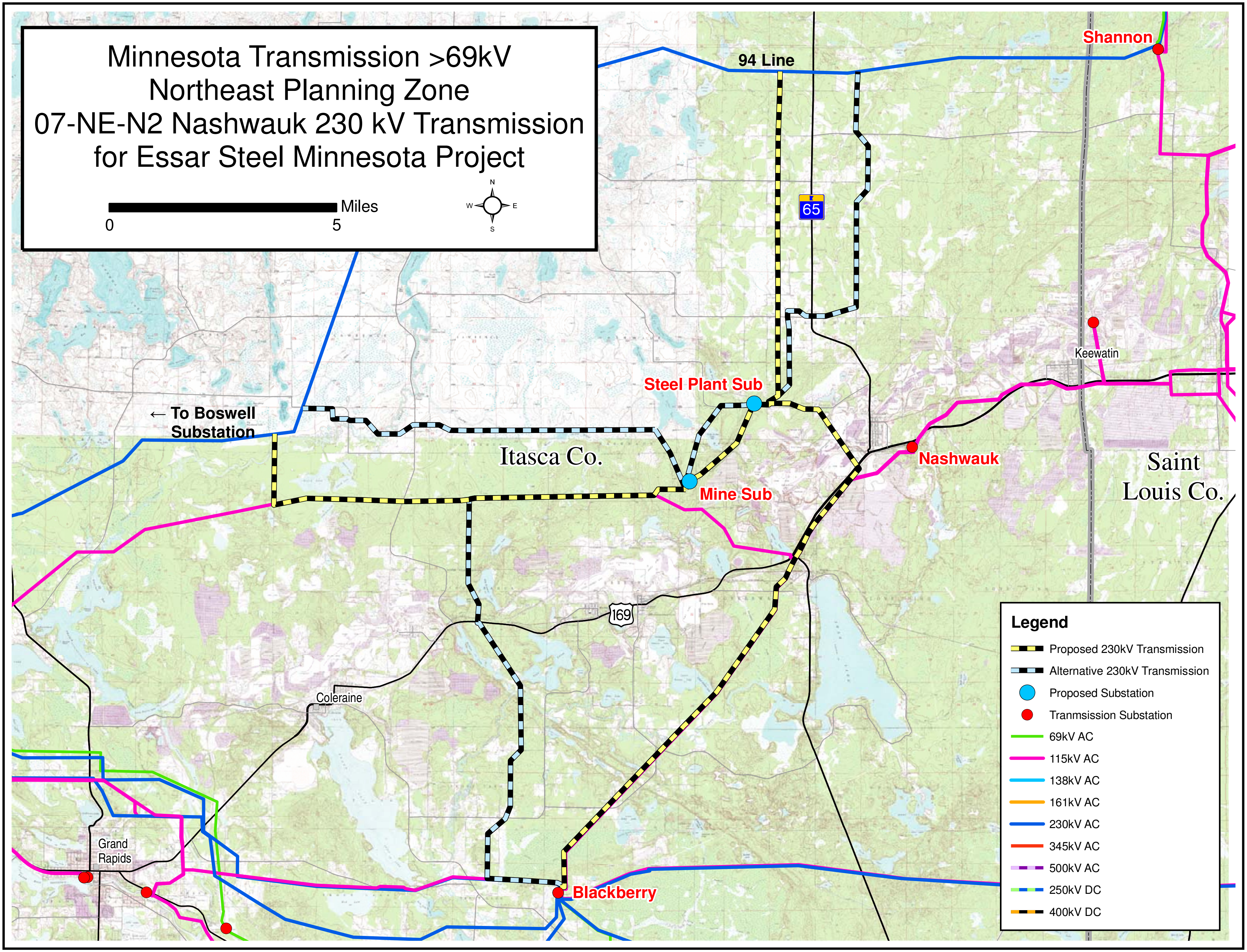
A map of the area is shown on the following page.

Alternatives. Several alternatives to connect Essar 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 four 230 kV transmission lines provide the best alternative to deliver the electric power from the Minnesota Power system to the Essar facility. See section 7.3.13 of the 2007 Minnesota Biennial Transmission Report for additional details.

Schedule. A Route Permit Application for the 230 kV transmission required to serve the Essar Project was filed with the MPUC by Nashwauk Public Utilities Commission and Minnesota Power in June 2009. It is expected that the MPUC will rule on the Route Permit Application by July 2010. The most recent schedule provided to the Applicants by Essar Steel indicates that Phase I of the Project will commence operations in October 2011. In order to meet this schedule, the Applicants would commence ROW acquisition as soon as a route permit is granted and then proceed with construction of the line.

PUC Docket Number. TL-09-512 (Route Permit).


Minnesota Transmission >69kV
Northeast Planning Zone
07-NE-N2 Nashwauk 230 kV Transmission
for Essar Steel Minnesota Project
Miles
0
5
N
W
E
S
94 Line
65
Shannon
Keewatin
Steel Plant Sub
← To Boswell Substation
Itasca Co.
Nashwauk
Mine Sub
Saint Louis Co.
169
Coleraine
Grand Rapids
Blackberry
Legend
Proposed 230kV Transmission
Alternative 230kV Transmission
Proposed Substation
Tranmission Substation
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC

6.3.11 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.

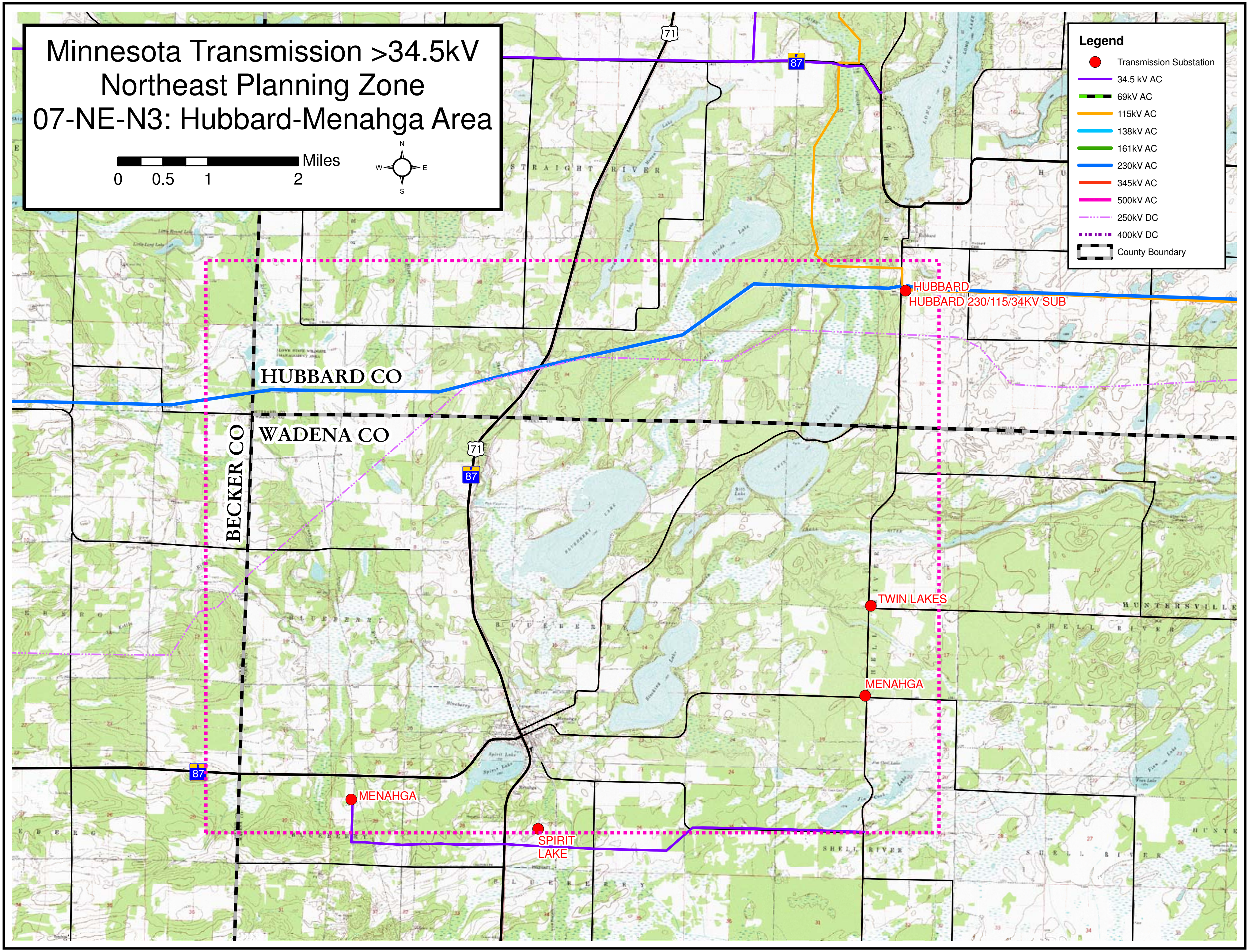
A map of the area is shown on the following page.

Alternatives. GRE is planning on constructing a 115 kV line between the radial Hubbard-Minnesota Pipeline 34.5 kV line and the Todd-Wadena Electric Cooperative Menahga substation. This line will be operated at 34.5 kV initially.

Analysis. The Menahga area sees low voltages on the loss of the Hubbard-Twin Lakes 34.5 kV line and the Leaf River area sees low voltages for loss of the Verndale source. Transferring the Menahga load from the Hubbard-Verndale system will rectify these low system voltages. Historical load levels indicate that low voltage is already a problem if this critical contingency were to occur.

115 kV transmission is proposed for this area as there is some wind potential along the corridor. The existing 34.5 kV system would not be able to serve the needs of a large wind farm in the area, due to capacity limitations on the system. The start of a 115 kV line between Hubbard and Wing River would provide the appropriate capability.

Schedule. GRE has scheduled this project for a 2013 energization. The proposed 115 kV line is not expected to exceed ten miles in length, which means that a Certificate of Need from the Public Utilities Commission will not be required.


Minnesota Transmission >34.5kV
Northeast Planning Zone
07-NE-N3: Hubbard-Menahga Area
Miles
0
0.5
1
2
N
W
E
S
Legend
Transmission Substation
34.5 kV AC
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
County Boundary
HUBBARD
HUBBARD 230/115/34KV SUB
TWIN LAKES
MENAHGA
MENAHGA
SPIRIT
LAKE
HUBBARD CO
WADENA CO
BECKER CO
71
87

6.3.12 Pokegama Area

Tracking Number. 2007-NE-N5

Utility. Great River Energy

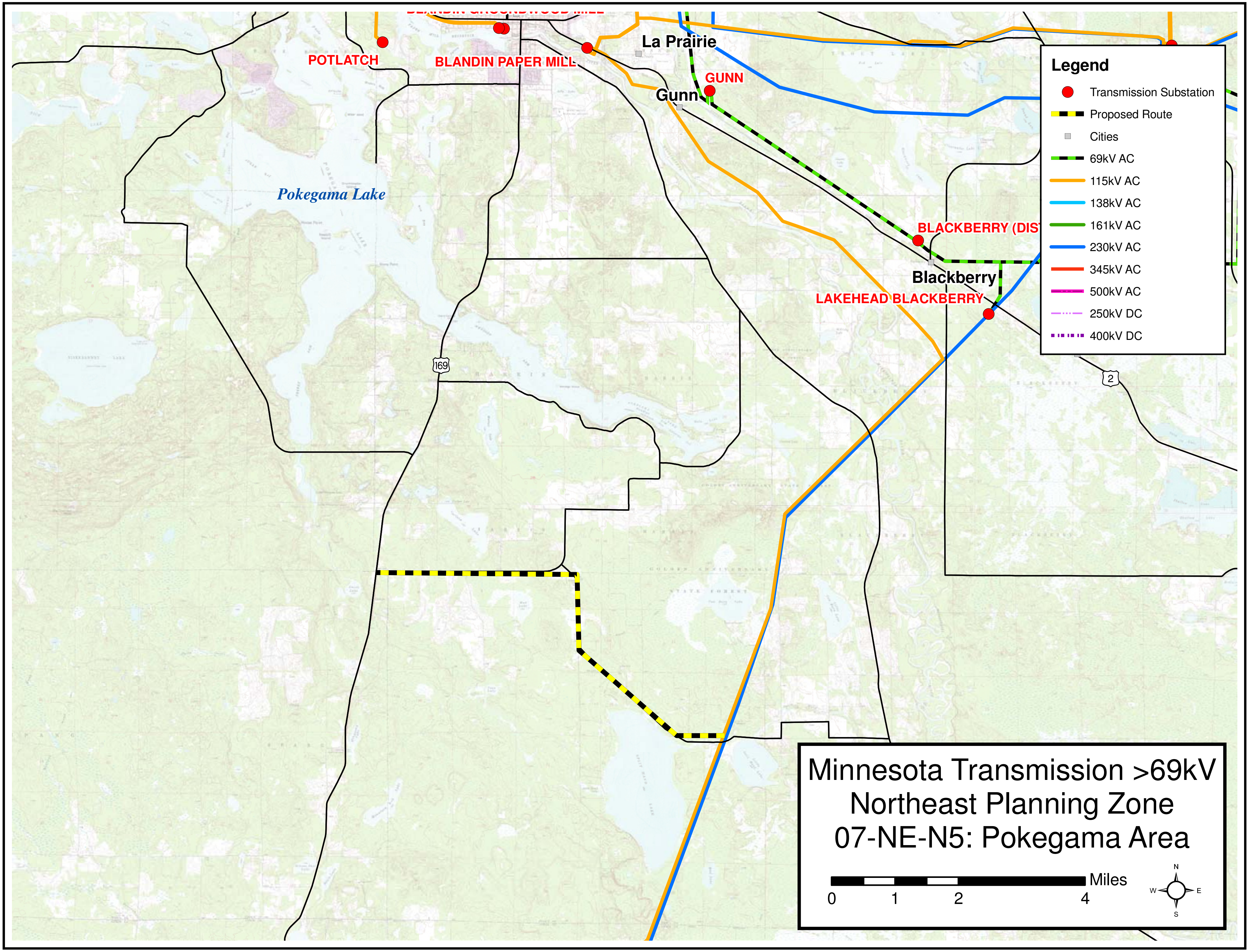
Inadequacy. Lake Country Power needs new distribution service on the south side of Pokegama Lake near Grand Rapids, MN. Existing distribution feeders cannot reliably serve the load growth.

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

Alternatives. Grand Rapids-Hill City 115 kV offers the only transmission source to the 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 2011. Preliminary right-of-way activities have commenced and the substation property has been purchased. 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

6.3.13 Birch Lake-Onigum Area

Tracking Number. 2007-NE-N6

Utility. Great River Energy

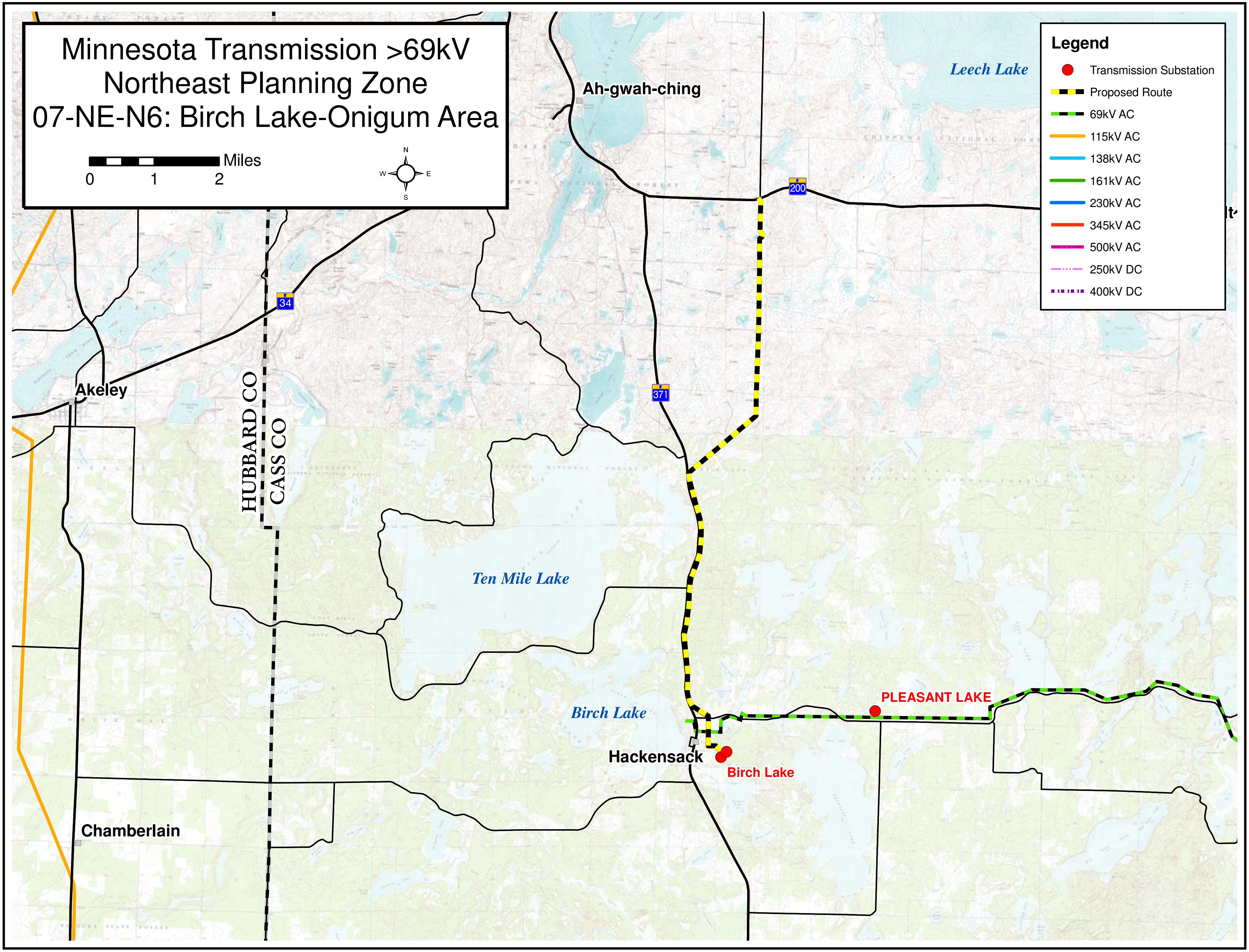
Inadequacy. The 34.5 kV system between Akeley and Birch Lake is incapable of supporting the voltage on contingency for the projected load.

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

Alternatives. The Onigum load is the largest load on this transmission loop and is out of phase with the rest of Lake Country Power loads so 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 115 kV source to Walker.

Analysis. The 2008 GRE Long Range Plan indicated that the conversion of the Onigum substation to 115 kV operation will unload the 34.5 kV service and extend the useful life of this system. MP and GRE will need to monitor the growth of the Walker area electric system to see when further conversion may be required.

Schedule. GRE has this project scheduled for a 2013 energization. A Certificate of Need will need to be filed if the proposed route for the new Onigum line exceeds 10 miles.



Minnesota Transmission >69kV
Northeast Planning Zone
07-NE-N6: Birch Lake-Onigum Area
Miles
0
1
2
N
W
E
S
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

6.3.14 Nugget-Hoyt Lakes

Tracking Number: 2009-NE-N1

Utility: Minnesota Power

Inadequacy. Mesabi Nugget Delaware, LLC is in the process of constructing a 1.5 millon ton/year iron nugget plant on the west side of the Cliffs-Erie facility site. Mesabi Nugget Phase I is expected to become operational during the fourth quarter of 2009. To serve this approximately 25 MW load, MP recently constructed a radial tap off the Hoyt Lakes to Laskin 138 kV MP Line #43 (43L). This approximately two mile radial 138 kV line terminates at the Skibo 138/13.8 Substation and was placed in service in early 2009. Phase II of the Mesabi Nugget project is expected to increase the company's peak demand to approximately 50 MW. As part of this expansion, MP is evaluating methods to improve the reliability and security of service to Mesabi Nugget.

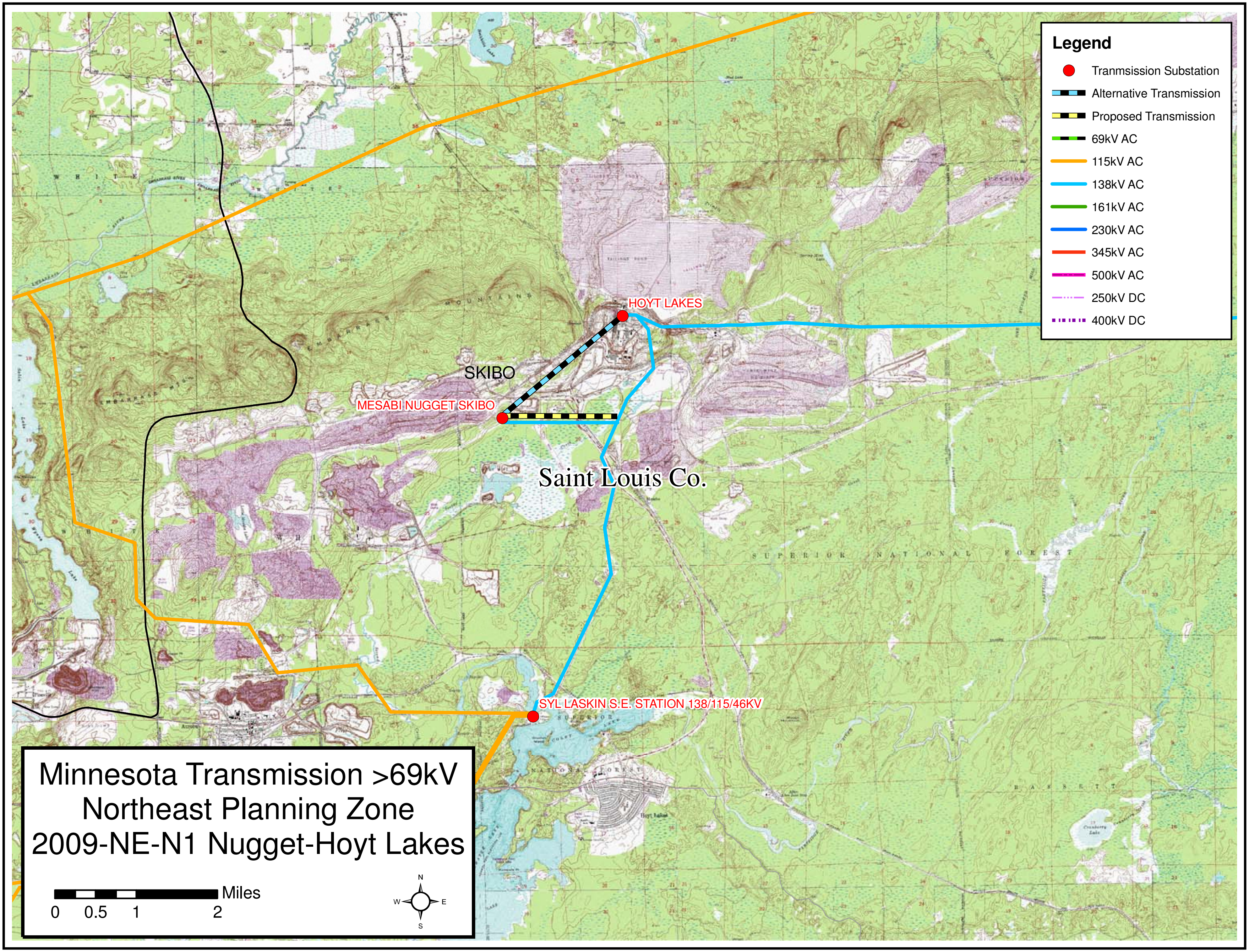
A map of the area is shown on the following page.

Alternatives. Alternatives include doing nothing, looping the #43L line into the Skibo Substation, and constructing a 138 kV transmission line between the Skibo Substation and the Hoyt Lakes Substation.

Analysis. In order to provide redundancy and improve the reliability and security of the high voltage transmission service to Mesabi Nugget, Minnesota Power is in the process of evaluating alternatives to provide a second 138 kV source to the Skibo Substation. The alternative of constructing approximately 2.5 miles of 138 kV transmission to loop the #43L line to the Skibo Substation is the least cost option. This alternative would provide two 138 kV sources to the Mesabi Nugget site, one from the Laskin Substation and one from the Hoyt Lakes Substation. The alternative of constructing approximately three miles of new 138 kV line between the Skibo and Hoyt Lakes substations would be significantly more costly because it would also involve modifications at the Hoyt Lake Substation. However, this alternative would provide additional regional benefits. Minnesota Power is in the process of determining if the benefits associated with the higher cost alternative are justified. As part of either alternative, Mesabi Nugget would add a second 138/13.8 kV transformer at the Skibo Substation.

Due to the size and operating characteristics of large industrial loads, distributed generation is typically not a viable alternative for improving reliability for these types of loads. For example, small generators are not capable of providing the in-rush current and reactive power required to start large electric motors. Mesabi Nugget's load includes large electric motors, so distributed generation is not a viable alternative to improve reliability and security of service to the site

Schedule. The project in service date is currently estimated to be no sooner than late 2010. However, this project's need and in service date are dependent on Mesabi Nugget's expansion schedule. Electric supply requirements and timing will be adjusted as required to meet Mesabi Nugget's electric requirements. A new transmission line would likely not require a Certificate of Need since it would be under ten miles in length, although a route permit from local government or the PUC would be required.



Legend
Tranmission Substation
Alternative Transmission
Proposed Transmission
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
HOYT LAKES
SKIBO
MESABI NUGGET SKIBO
Saint Louis Co.
SYL LASKIN S.E. STATION 138/115/46KV
Minnesota Transmission >69kV
Northeast Planning Zone
2009-NE-N1 Nugget-Hoyt Lakes
Miles
0 0.5 1 2
N
W
E
S

6.3.15 Deer River Tap

Tracking Number: 2009-NE-N2

Utility: Minnesota Power

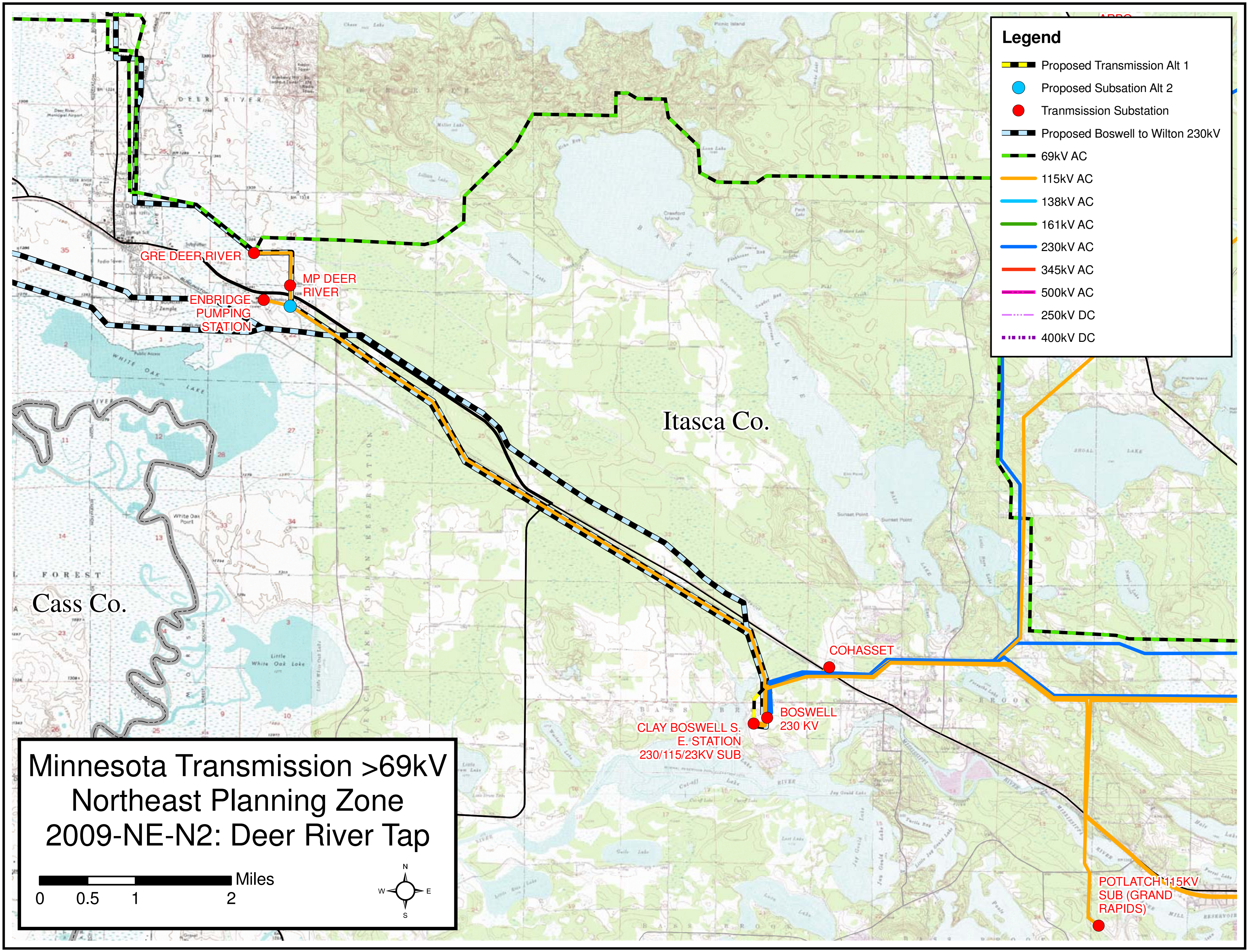
Inadequacy. The MP 115 kV Line #28 already has several taps (two at Deer River for both Minnesota Power and GRE load serving and one at GRE Cohasset) and will have additional taps with planned new GRE facilities in the Nashwauk area (see Tracking Number 2003-NE-N9). The taps reduce reliability, create operation difficulties, and make maintenance work difficult to schedule.

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

Alternatives. Alternatives include doing nothing, construction of a short line segment to split the #28 Line into two separate lines, or construction of a 230/115 kV substation in Deer River.

Analysis. In the past, MP has proposed to add a 115 kV exit to the Boswell 115 kV substation and move the 28L Deer River tap to this new position. This would require construction of less than one mile of 115 kV transmission and split 28L into two separate lines, thus improving operating performance and reducing maintenance issues. However, since the proposed Bemidji-Grand Rapids 230 kV line (see Tracking Number 2005-NW-N2) will pass through the Deer River area, an alternative involving construction of a Deer River 230/115 kV substation is now also a viable alternative. This alternative would involve constructing a 230/115 kV substation adjacent to the proposed Bemidji-Grand Rapids line, connecting the existing 115 kV line in the Deer River area into this substation, and removing the majority of the existing 7.5 mile tap between Boswell and Deer River. This alternative would significantly improve reliability in the Deer River area as it would no longer be supplied by a radial line. However, this alternative is expected to be more costly and is dependent on the route alignment and permit conditions associated with the Bemidji-Grand Rapids 230 kV line.

Schedule. A final determination of which alternative is preferred would not likely be made until late 2010.



Minnesota Transmission >69kV Northeast Planning Zone 2009-NE-N2: Deer River Tap

6.3.16 115 kV Transmission Line #28 Reroute

Tracking Number. 2009-NE-N3

Utility. Minnesota Power and Nashwauk Public Utilities Commission

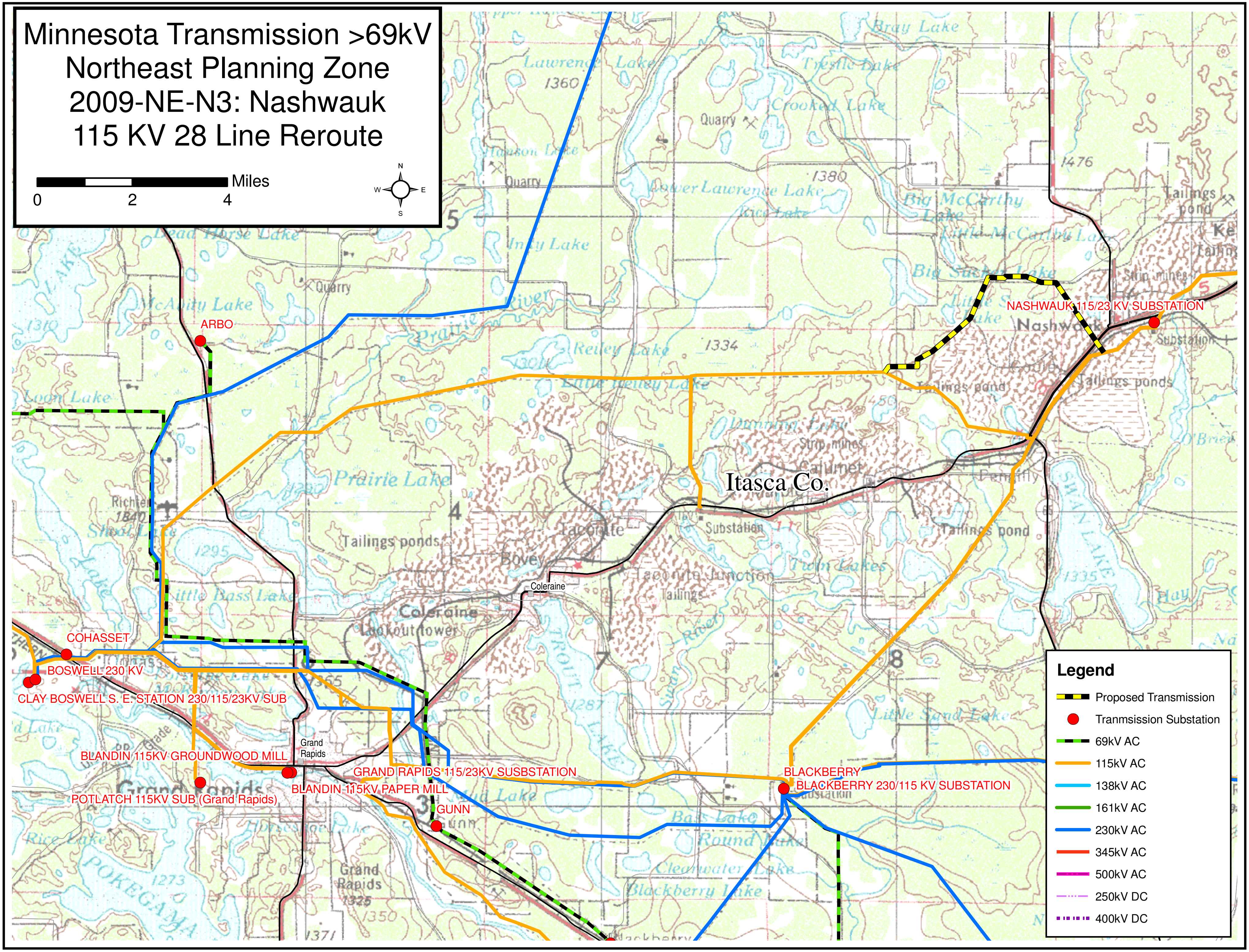
Inadequacy. Minnesota Power's 115 kV Line #28 crosses the area where Essar Steel plans to start mining operations. To prevent the line from interfering with the planned mining operations, a section of the line, about 6.5 miles long, must be relocated.

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

Alternatives. Several alternative routes for rerouting the line have been considered.

Analysis. Since this matter requires the existing line to be rerouted to avoid mining operations, it makes sense to reroute the line along the preferred corridor for one of the 230 kV transmission lines that will be constructed to serve the Essar Steel facilities (Tracking Number 2007-NE-N2). Once the preferred route for the 230 kV transmission to serve Essar Steel was selected (see PUC Docket Number. TL-09-512), Minnesota Power was able to develop a preferred route for the #28 Line reroute.

Schedule. Minnesota Power filed a Local Review Route Permit Application in August 2009 with the City of Nashwauk for the relocation of Line #28. Minnesota Power will coordinate with Essar Steel to insure the line is relocated by the time mining operations commence. At this time it is expected that this relocation will occur during 2010 or 2011.


Minnesota Transmission >69kV
Northeast Planning Zone
2009-NE-N3: Nashwauk
115 KV 28 Line Reroute
Miles
0
2
4
N
S
E
W
ARBO
COHASSET
BOSWELL 230 KV
CLAY BOSWELL S. E. STATION 230/115/23KV SUB
BLANDIN 115KV GROUNDWOOD MILL
POTLATCH 115KV SUB (Grand Rapids)
BLANDIN 115KV PAPER MILL
GRAND RAPIDS 115/23KV SUSBSTATION
GUNN
BLACKBERRY
BLACKBERRY 230/115 KV SUBSTATION
NASHWAUK 115/23 KV SUBSTATION
Itasca Co.
Coleraine
Grand Rapids
Legend
Proposed Transmission
Tranmsission Substation
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC

6.3.17 Brainerd Lakes – Remer – Deer River Area

Tracking Number: 2009-NE-N4

Utility: Great River Energy

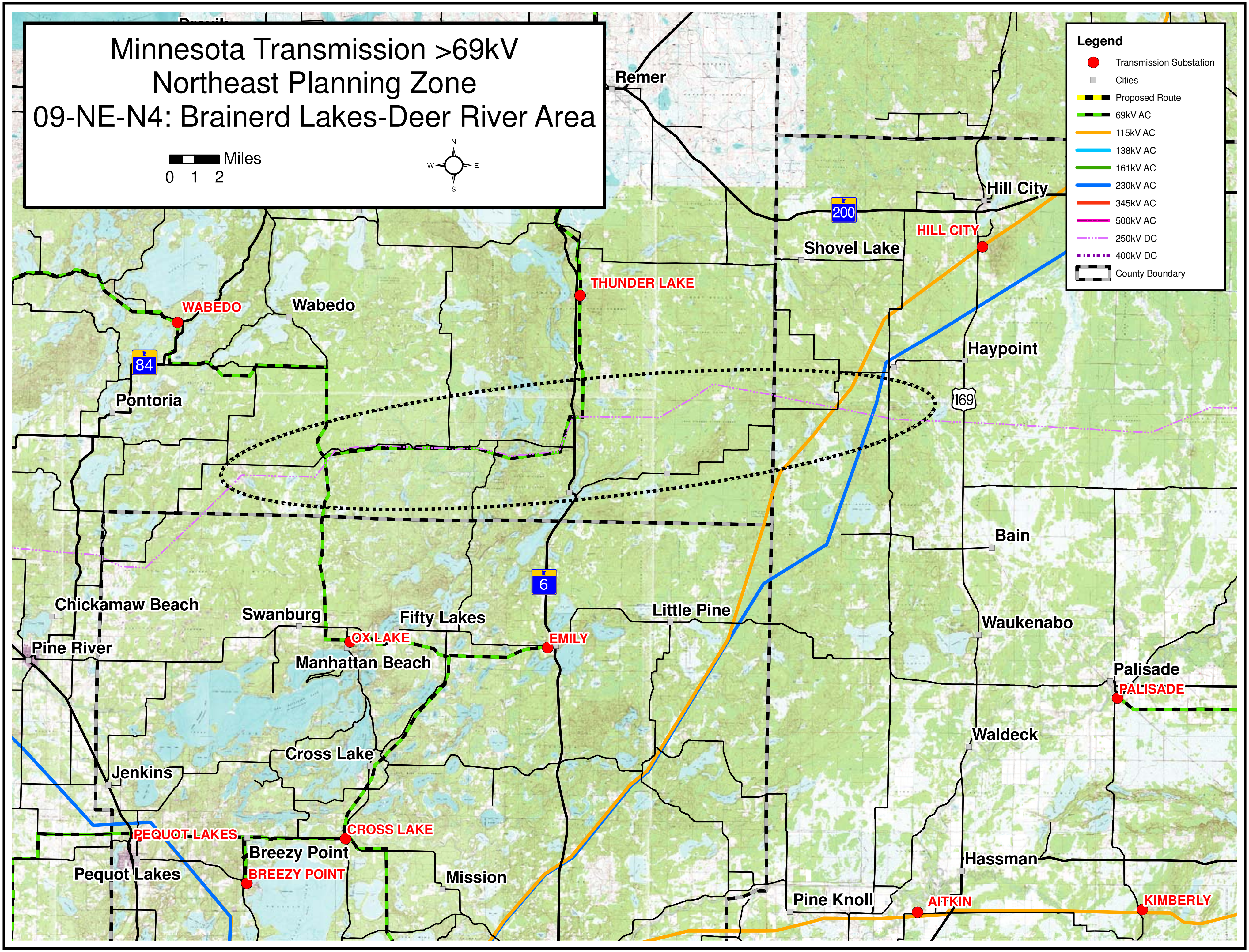
Inadequacy. The 69 kV system between the Pequot Lakes, Riverton, Birch Lake, and Deer River substations is becoming susceptible to contingent low system voltages.

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

Alternatives. A new source into the 69 kV system is needed and the 2008 GRE Long-Range Plan indicated that a new connection to the Blind Lake 69 kV Substation was the best option at this time. The alternatives examined for supplying the Blind Lake Substation involved tapping either the MP Blackberry-Riverton 230 kV line or the Grand Rapids-Riverton 115 kV line and providing a 115 kV or 69 kV line to the Blind Lake Substation.

Analysis. Various tap configurations along the 115 kV and 230 kV systems have been examined as supply options to the Blind Lake substation. The 115 kV system is capacity limited and offers inferior voltage support as compared to the 230 kV system. The 230 kV system offered adequate voltage support and would provide opportunity to expand and enhance the area 115 kV system. A Macville-Blind Lake 115 kV line with a Blind Lake 115/69 kV transformer is desired over a 69 kV line as the voltage support and line losses are less than what a Macville-Blind Lake 69 kV line can offer.

Schedule. GRE will have to monitor the load growth in the area to determine the need for the source. A Certificate of Need and a Route Permit would be required for the 115 kV line construction. GRE would likely submit a CON Application and a Route Permit Application sometime between 2011 and 2014.


Minnesota Transmission >69kV
Northeast Planning Zone
09-NE-N4: Brainerd Lakes-Deer River Area
Miles
0 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
County Boundary
Remer
Hill City
200
HILL CITY
Shovel Lake
THUNDER LAKE
WABEDO
Wabedo
84
Haypoint
169
Pontoria
Bain
6
Chickamaw Beach
Swanburg
Fifty Lakes
Little Pine
Waukenabo
Pine River
OX LAKE
EMILY
Manhattan Beach
Palisade
PALISADE
Waldeck
Cross Lake
Jenkins
PEQUOT LAKES
CROSS LAKE
Breezy Point
Hassman
Pequot Lakes
BREEZY POINT
Mission
Pine Knoll
AITKIN
KIMBERLY

6.3.18 Bigfork Area

Tracking Number: 2009-NE-N5

Utility: Great River Energy

Inadequacy: The 69 kV system serving North Itasca Electric Cooperative's service territory is a 60-mile radial line, and recent load growth has pushed the load serving capability of the system to its limits. A single contingency that removes the 115 kV source at Deer River causes marginal voltages to occur on several of the area substations during peak system loading.

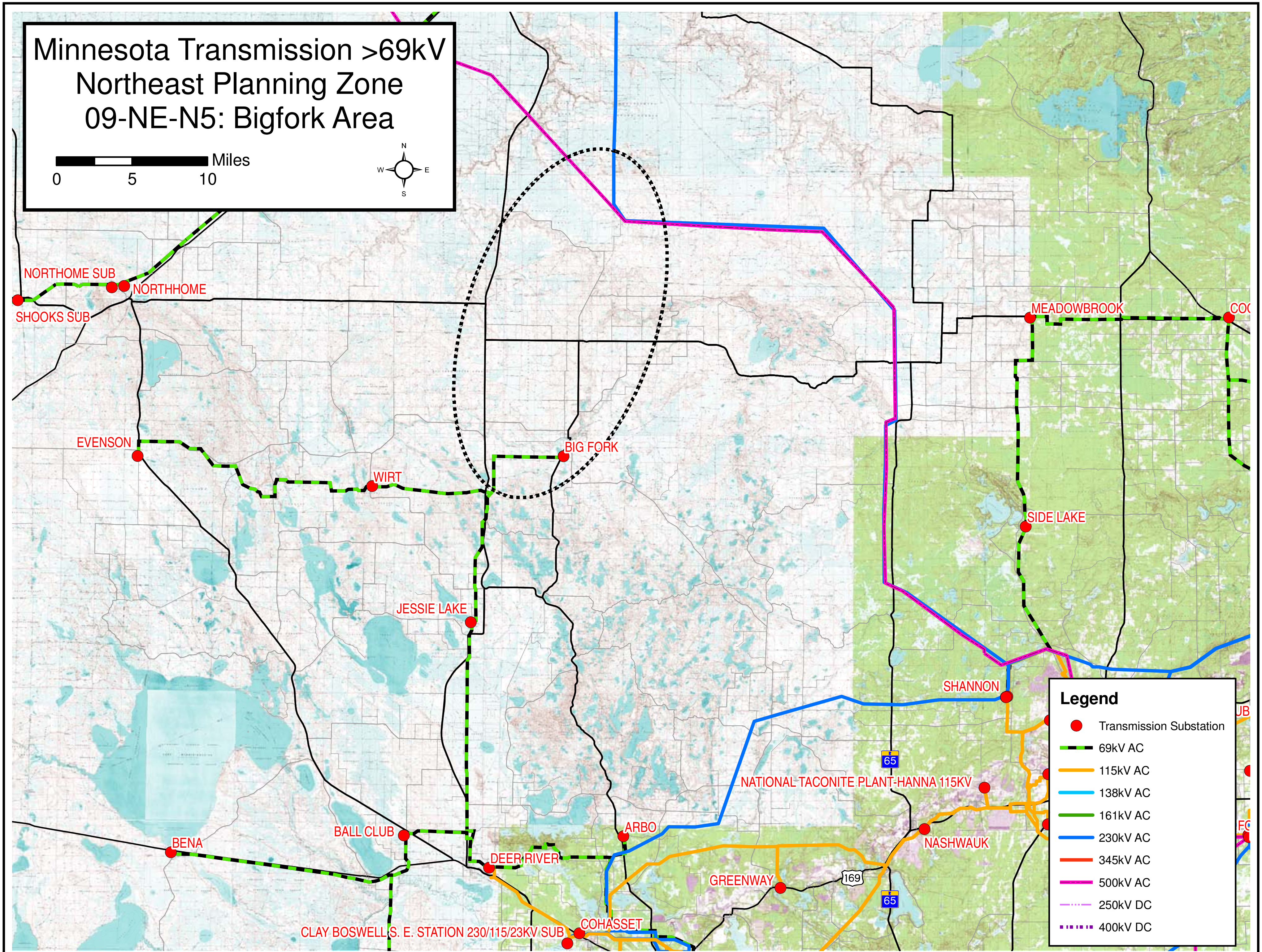
A map of the area is shown on the following page.

Alternatives. Alternatives include distributed generation or a new transmission source tapping the Little Fork-Shannon 230 kV line to loop in the 69 kV transmission system. Any transmission solution would require, at minimum, a new transmission substation and at least 20 miles of 69 kV transmission.

Analysis. A distributed generation investment would have to be continual or sized to accommodate the future load growth. A transmission solution is attractive as it would offer a redundant source to the North Itasca system (increasing electric service reliability to the area) and allow for rebuilding of the existing aging transmission infrastructure. A new transmission source would also provide a backup for loss of the Deer River transformer, which is a rather severe contingency as backup sources are many miles away.

Schedule. GRE is targeting an in-service date between 2013 and 2015 for any investment in this area. Right-of-way activities for a transmission solution could commence as early as 2010.

Minnesota Transmission >69kV
Northeast Planning Zone
09-NE-N5: Bigfork Area



6.3.19 Staples – Motley – Long Prairie Area

Tracking Number: 2009-NE-N6

Utility: Great River Energy

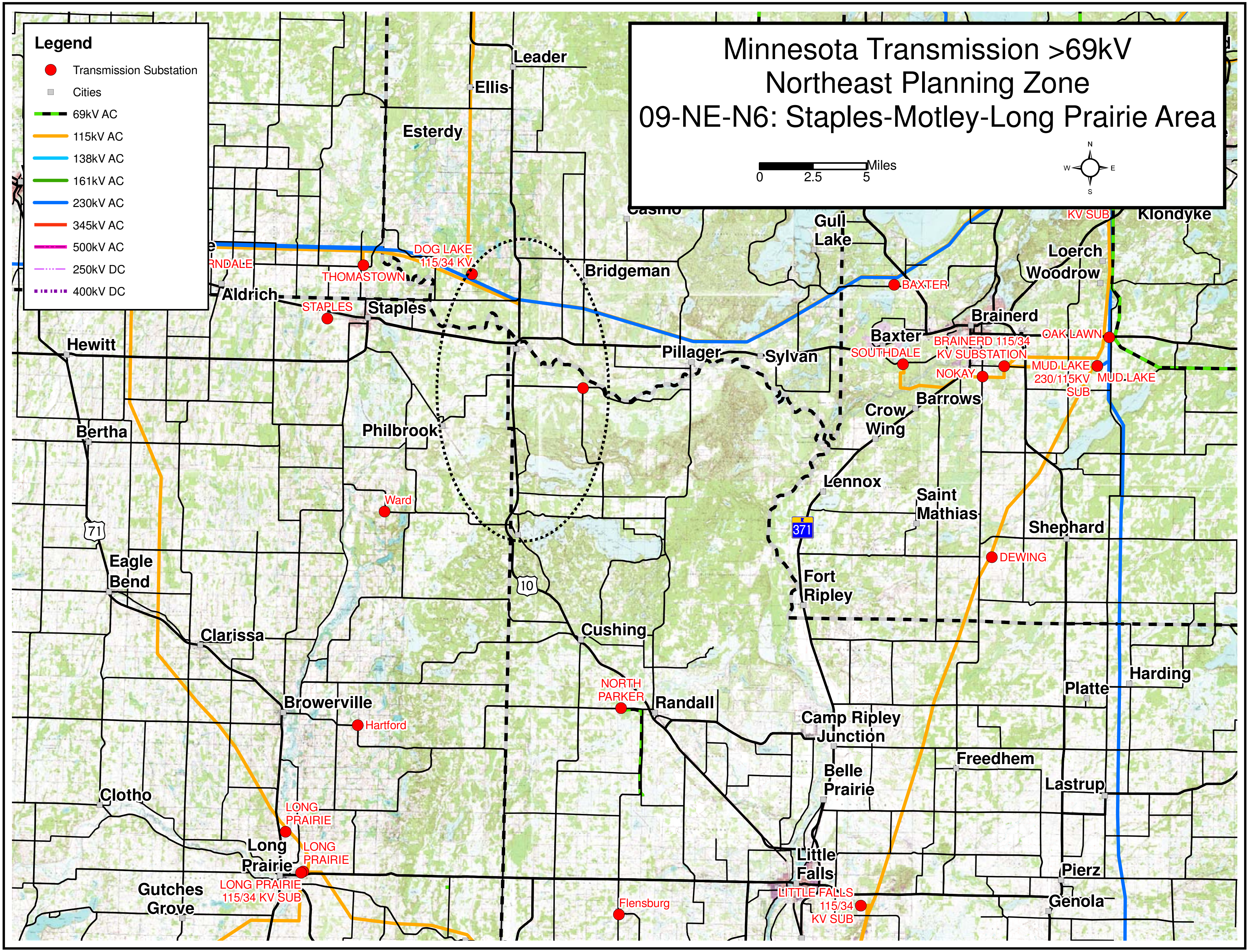
Inadequacy: The GRE member cooperative substations served from the 34.5 kV system between the Dog Lake, Baxter, Verndale, Long Prairie, and Pepin Lake sources have experienced considerable load growth over the past several years. Combined with long, radial lines feeding these substations, this growth is expected to present some low voltage situations during a number of area transmission outages. One of the most severe outages is loss of the new Pepin Lake 115/34.5 kV source as this outage requires significant reconfiguration of the 34.5 kV system to reestablish service. Additionally, Crow Wing Power is requesting interconnection of a new Shamineau Lake Substation around 2015 that will require roughly five miles of transmission to connect to the system.

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

Alternatives. Alternatives include providing looped transmission service through 115 kV conversions or providing a new source into the 34.5 kV system. Distributed generation may also be an option. The connection for the Shamineau Lake substation will likely be constructed at 115 kV design standards for future conversion considerations.

Analysis. 115 kV conversion of the GRE loads would allow for continued load growth of these substations and would help to offload the 34.5 kV system while extending its useful life. Providing a new source into the 34.5 kV system may offer the system long-term voltage support provided it can reduce the radial distance of some of the substations. However, depending on the load growth, a new source may only delay the need for 115 kV conversions. Distributed generation may be attractive at the ends of the radial lines so long as there is sufficient capacity on the 34.5 kV system to handle excess generation.

Schedule. GRE will have to monitor load growth in the area to see when a solution is required. Current estimates suggest that a solution will need to be in place in the 2014-2016 timeframe. GRE will also continue to work with Crow Wing Power to determine when the Shamineau Lake Substation will be needed.



Minnesota Transmission >69kV
Northeast Planning Zone
09-NE-N6: Staples-Motley-Long Prairie Area
Miles
0
2.5
5
N
S
E
W
Legend
Transmission Substation
Cities
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
Leader
Ellis
Esterdy
Casino
Gull Lake
Klondyke
KV SUB
Loerch
Woodrow
Bridgeman
DOG LAKE 115/34 KV
THOMASTOWN
RNDALE
Aldrich
STAPLES
Staples
BAXTER
Brainerd
Baxter
BRAINERD 115/34 KV SUBSTATION
OAK LAWN
SOUTHDALE
Hewitt
Pillager
Sylvan
NOKAY
MUD LAKE 230/115KV SUB
MUD LAKE
Barrows
Crow Wing
Bertha
Philbrook
Lennox
Saint Mathias
Ward
Shephard
71
371
DEWING
Eagle Bend
10
Fort Ripley
Clarissa
Cushing
Harding
Platte
NORTH PARKER
Randall
Browerville
Hartford
Camp Ripley Junction
Freedhem
Belle Prairie
Lastrup
Clotho
LONG PRAIRIE
Long Prairie
LONG PRAIRIE
Little Falls
Pierz
LONG PRAIRIE 115/34 KV SUB
Gutches Grove
Flensburg
LITTLE FALLS 115/34 KV SUB
Genola

6.3.20 Park Rapids Area

Tracking Number: 2009-NE-N7

Utility: Great River Energy

Inadequacy: The 34.5 kV system that serves the Park Rapids area is rapidly becoming inadequate to serve the projected system loadings as voltage support on contingency is deteriorating. The GRE member co-op substations around the Park Rapids area have experienced some of the largest growth on the GRE system over the past five years and many are on long, radial lines. Itasca-Mantrap Cooperative Electrical Association is also projecting the need for a new Potato Lake Substation in 2011.

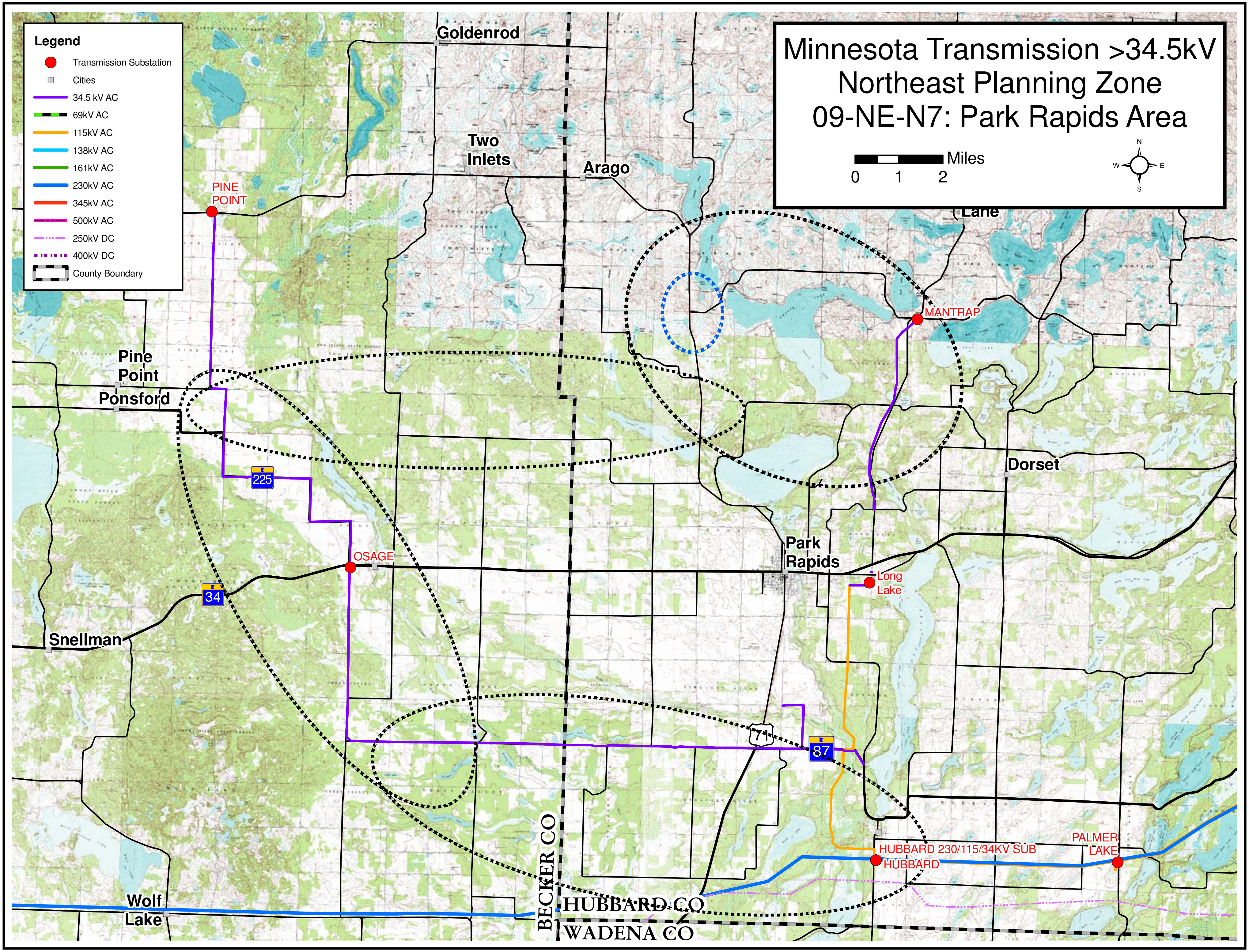
A map of the area is shown on the following page.

Alternatives. Options include conversion of the Itasca-Mantrap substations to looped 69 kV or 115 kV service between the Long Lake and Hubbard substations or installation of distributed generation facilities.

Analysis. Due to the radial nature of the Itasca-Mantrap substation feeds, generation may offer a good solution provided the generation is sized to accommodate future load growth. However, given the high growth rates and limited transmission outlet, siting large amounts of generation on these radial lines may have limited benefit.

Transmission solutions are also very attractive as they have the ability to provide redundant transmission to the Itasca-Mantrap substations and can be sized to accommodate future growth. 115 kV transmission would be better-suited for the area as this is the area's predominant transmission voltage and offers lower system losses than a 69 kV solution. A 69 kV system would require two new 69 kV switchyards with new transformers whereas only simple modifications at existing switchyards would be required for any 115 kV solution. Any transmission solution would require a relocation of the Hubbard 115/34.5 kV transformers as there are space limitations within the substation. Furthermore, any 115 kV solutions would require Certification from the PUC as the project would be over 10 miles in length. The transmission for the Potato Lake Substation will be constructed to 115 kV standards to accommodate any future conversion that may take place.

Schedule. GRE will continue to monitor load growth to see what solution is appropriate. Right-of-way activities are ongoing for interconnecting the Potato Lake Substation to the system. Based on the 2008 GRE Long-Range Plan, a transmission solution would be constructed in stages, with voltage conversions of the Mantrap and Potato Lake substations as soon as 2013. A full transmission loop project would likely not be completed until around 2020. Generation solutions would be sited as required.



Minnesota Transmission >34.5kV
Northeast Planning Zone
09-NE-N7: Park Rapids Area
Miles
0 1 2
N
S
E
W
Legend
Transmission Substation
Cities
34.5 kV AC
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
County Boundary
Goldenrod
Two Inlets
Arago
Lane
PINE POINT
Pine Point
Ponsford
225
OSAGE
34
Snellman
MANTRAP
Dorset
Park Rapids
Long Lake
71
87
HUBBARD 230/115/34KV SUB
HUBBARD
PALMER LAKE
Wolf Lake
BECKER CO
HUBBARD CO
WADENA CO

6.3.21 Barrows Area

Tracking Number: 2009-NE-N8

Utility: Great River Energy

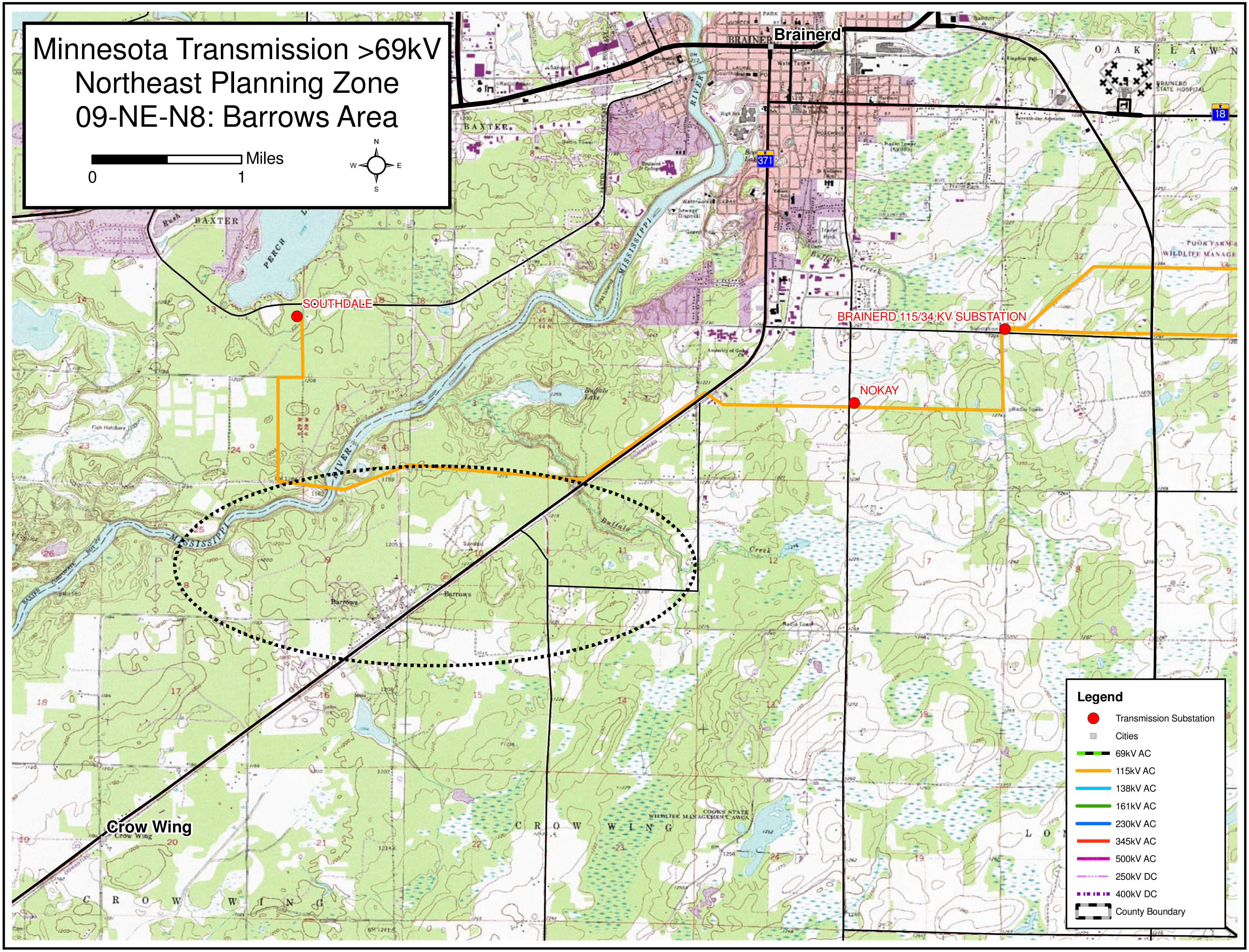
Inadequacy: GRE member cooperative Crow Wing Power has requested interconnection of a new Barrows distribution substation on the south side of the Brainerd/Baxter area. The existing distribution system cannot reliably serve the area load growth.

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

Alternatives. The Brainerd-Southdale 115 kV line offers the only transmission source to this area. A Minnesota Power 34.5 kV distribution line is underbuilt on the same structures. The load delivery point is expected to be approximately one mile from this transmission line.

Analysis. The Brainerd-Southdale 115 kV line was constructed to offload the 34.5 kV system as the 34.5 kV system cannot handle the loading of the GRE member co-op substations. Thus, a 115 kV connection will be sought.

Schedule. GRE will coordinate with Crow Wing Power to see when the new substation needs to be energized. The best estimate is that the new facilities will be required in 2014.



Minnesota Transmission >69kV
Northeast Planning Zone
09-NE-N8: Barrows Area
Miles
0
1
N
S
E
W
Brainerd
SOUTHDALE
BRAINERD 115/34 KV SUBSTATION
NOKAY
Crow Wing
Legend
Transmission Substation
Cities
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
County Boundary

6.3.22 Shell Lake Area

Tracking Number: 2009-NE-N9

Utility: Great River Energy

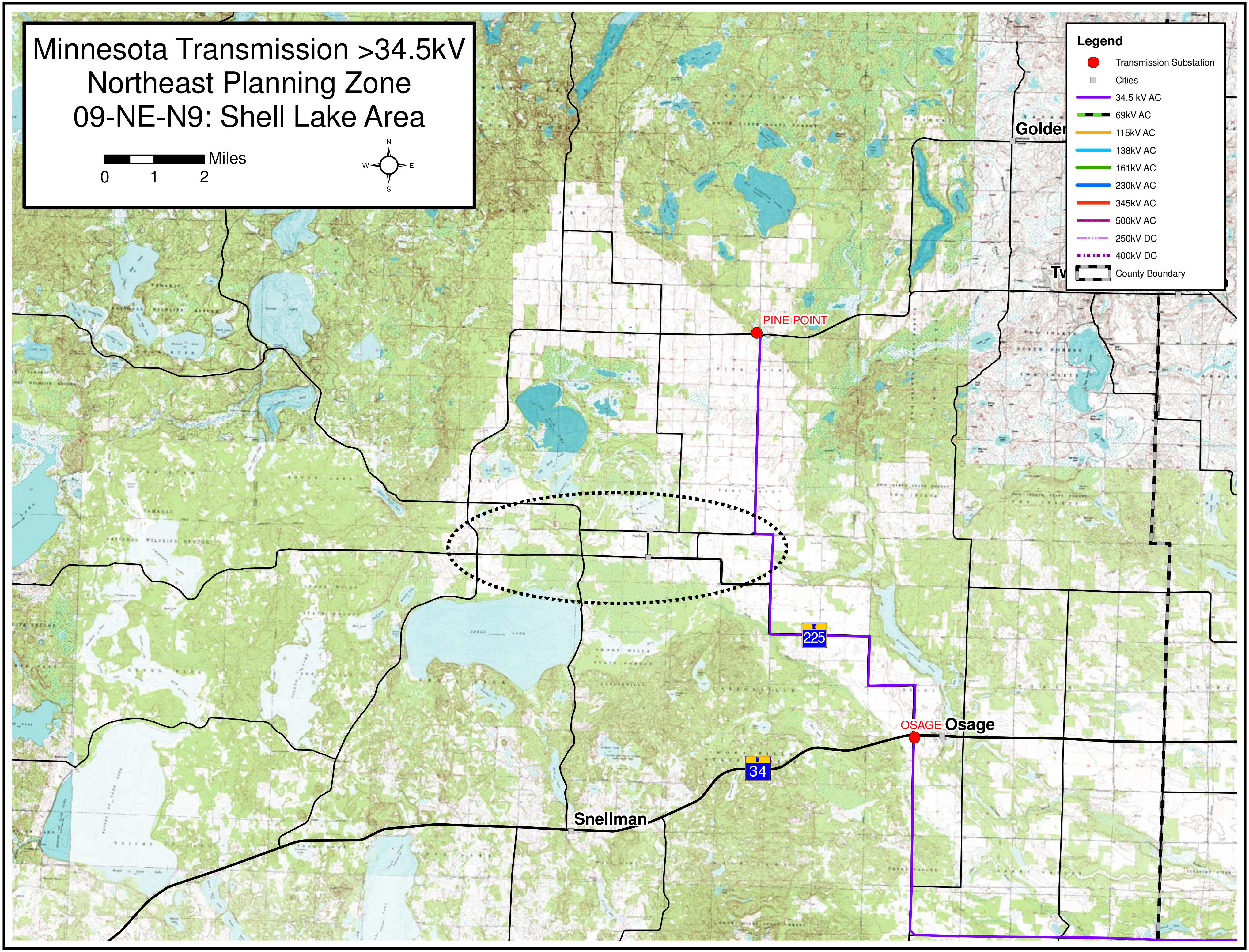
Inadequacy: GRE member cooperative Itasca-Mantrap Cooperative Electrical Association has requested interconnection of a new Shell Lake distribution substation on the west side of its service territory. The existing distribution system cannot reliably serve the area load growth.

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

Alternatives. The Osage-Pine Point 34.5 kV line offers the only source to this area. The load delivery point is expected to be between three and five miles from this facility.

Analysis. This is the least cost distribution plan in the Itasca-Mantrap analysis. GRE is obligated to provide a source to the new distribution site whereby the Osage-Pine Point line is the nearest and only viable line to interconnect the new substation. Any transmission to this area will be constructed to 115 kV standards for potential future conversion (see Park Rapids Area, Tracking Number 2009-NE-N7).

Schedule. GRE will coordinate with the Itasca-Mantrap Cooperative to see when the new substation needs to be energized. The best estimate is that the new facilities will be required in 2015.



Minnesota Transmission >34.5kV
Northeast Planning Zone
09-NE-N9: Shell Lake Area
Miles
0 1 2
N
W
E
S
Legend
Transmission Substation
Cities
34.5 kV AC
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
County Boundary
PINE POINT
OSAGE
Osage
Snellman
225
34

6.3.23 Aitkin Area

Tracking Number: 2009-NE-N10

Utility: Great River Energy

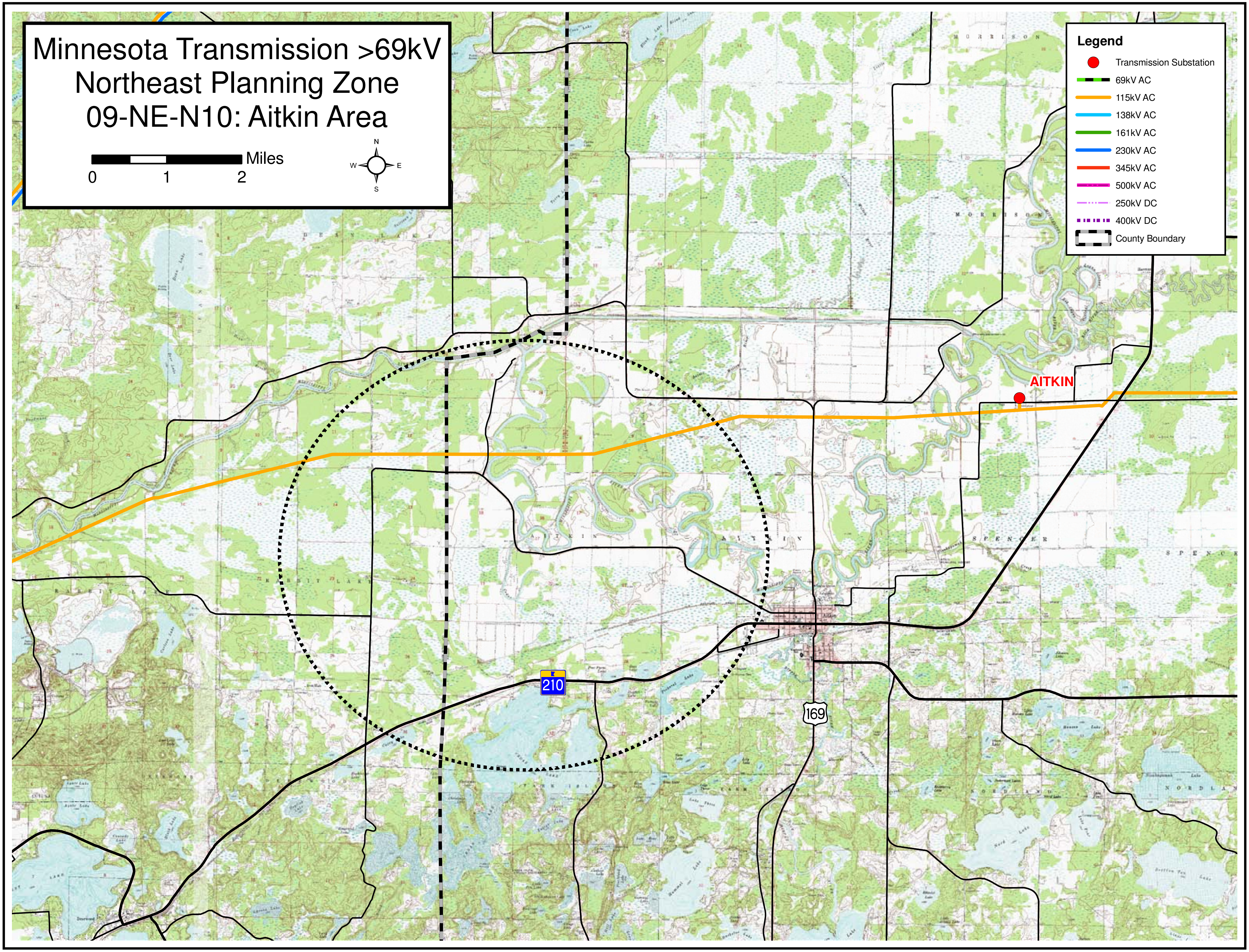
Inadequacy: GRE member cooperative Mille Lacs Energy Cooperative has requested interconnection of a new Iron Hub distribution substation on the west side of Aitkin. The existing distribution system is becoming unable to serve the area load growth.

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

Alternatives. The Riverton-Cromwell 115 kV line offers the only transmission source to this area. The load delivery point is expected to be about three miles from this transmission line.

Analysis. This is the least cost distribution plan in the Mille Lacs Energy analysis. GRE is obligated to provide a transmission line to the new distribution site whereby the Riverton-Cromwell 115 kV line is the nearest and only viable transmission line to interconnect the new substation.

Schedule. GRE will coordinate with Mille Lacs Energy to see when the new substation needs to be energized. The best estimate is that the new facilities will be required in 2014.



Minnesota Transmission >69kV
Northeast Planning Zone
09-NE-N10: Aitkin Area
Miles
0
1
2
N
S
E
W
Legend
Transmission Substation
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
County Boundary
AITKIN
210
169

6.3.24 Rush City – Cambridge –Princeton – Milaca Area

Tracking Number: 2009-NE-N11

Utility: Great River Energy

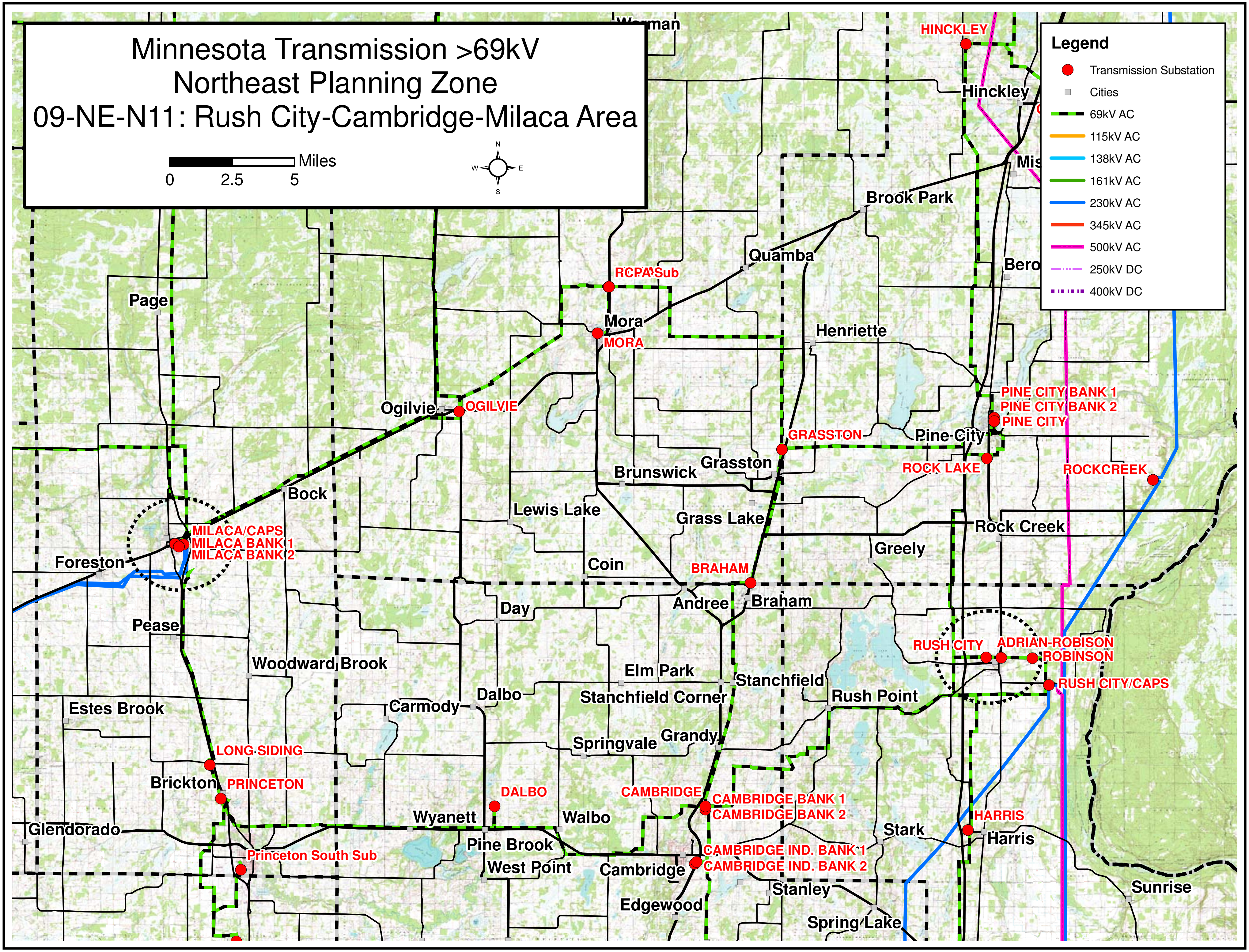
Inadequacy: The GRE 69 kV system fed by the Milaca, Elk River, Rush City, and Linwood 230 kV sources is projected to be voltage-deficient for various area contingencies by the mid- to late-2010's. The worst areas are south of Princeton and Cambridge as these locations are on the fringe of the Twin Cities metro load growth area and are farthest away from transmission sources on contingency. Additionally, the Milaca 230/69 kV substation has only a 26-mile, 230 kV radial feed serving the 69 kV system and thus a 230 kV outage significantly reduces the voltage support offered to the area.

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

Alternatives. Alternatives are still under consideration including a new Rush City-Milaca 230 kV line with a Dalbo 230/69 kV substation tap of this new facility.

Analysis. 230 kV construction is being heavily considered as there are no other reasonable load-serving voltages in the area to provide a new source into the 69 kV system. A second 230 kV feed into the Milaca substation would provide more secure service to the area. Additionally, a new Dalbo substation can help to support both the Princeton and Cambridge areas plus provide a new termination point for any 115 kV development that may occur in the area. No alternatives, however, have been ruled out yet.

Schedule. GRE is anticipating a need for a solution around 2020, although load growth in this area will dictate the need. A Certificate of Need and a Route Permit will need to be procured from the Commission for any 230 kV transmission line that would be required.


Minnesota Transmission >69kV
Northeast Planning Zone
09-NE-N11: Rush City-Cambridge-Milaca Area
Miles
0
2.5
5
N
W
E
S
Legend
Transmission Substation
Cities
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
HINCKLEY
Hinckley
Brook Park
Quamba
RCPA Sub
Bero
Page
Mora
MORA
Henriette
Ogilvie
OGILVIE
PINE CITY BANK 1
PINE CITY BANK 2
PINE CITY
GRASSTON
Pine City
ROCK LAKE
ROCKCREEK
Brunswick
Grasston
Bock
Lewis Lake
Grass Lake
Rock Creek
MILACA/CAPS
MILACA BANK 1
MILACA BANK 2
Foreston
Greely
Coin
BRAHAM
Day
Andree
Braham
Pease
RUSH CITY
ADRIAN-ROBISON
ROBINSON
Woodward Brook
Elm Park
Stanchfield
RUSH CITY/CAPS
Dalbo
Stanchfield Corner
Rush Point
Estes Brook
Carmody
Springvale
Grandy
LONG SIDING
Brickton
PRINCETON
DALBO
CAMBRIDGE
CAMBRIDGE BANK 1
CAMBRIDGE BANK 2
HARRIS
Wyanett
Walbo
Glendorado
Stark
Harris
Pine Brook
CAMBRIDGE IND. BANK 1
CAMBRIDGE IND. BANK 2
Princeton South Sub
West Point
Cambridge
Stanley
Sunrise
Edgewood
Spring Lake

6.3.25 Other Zone-Specific Issues

The addition of other large industrial loads such as Essar Steel (tracking number 2007-NE-N2) 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.

6.4 West Central Zone

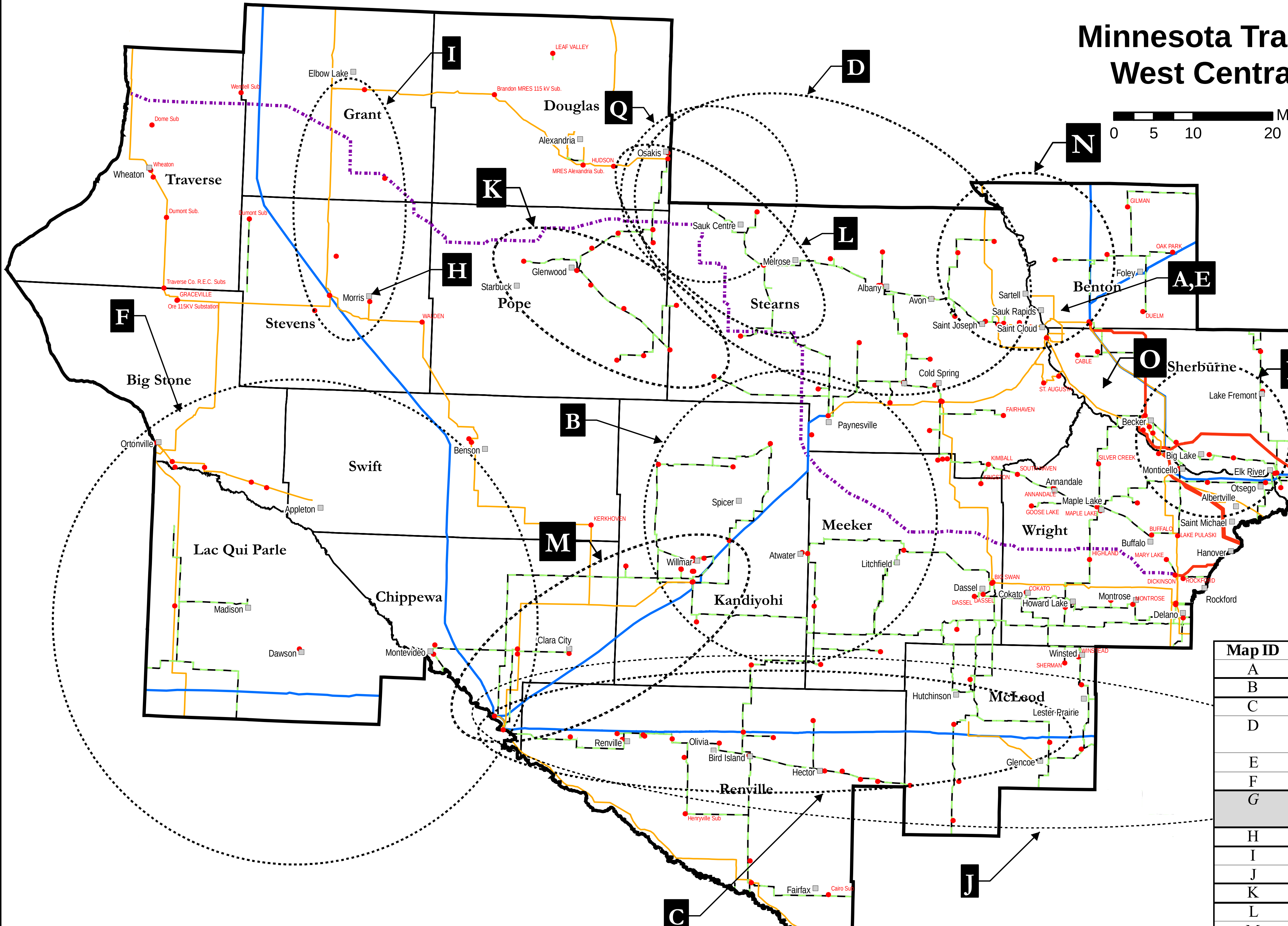
The following table provides a list of transmission needs identified in the West Central Zone and the map following the table shows the location of each item in the table. Each item is discussed in more detail in the sections following the map.

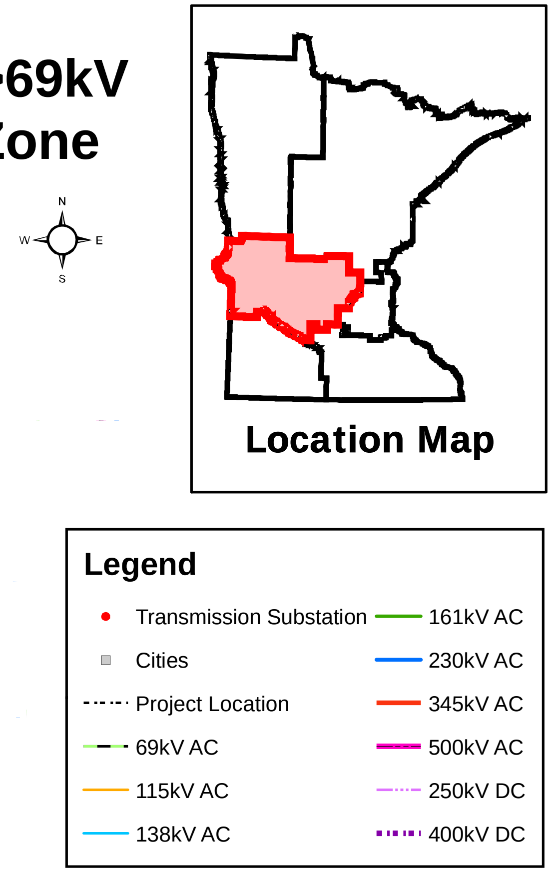
West Central Zone

Tracking Number	Description	Projected In-Service Year	Need Driver	Section No.
2003-WC-N4	St. Cloud Area	To be Determined	Benton County 230/115 kV transformer overload; Low voltages in St. Cloud and Stearns County; Monticello-St. Cloud 115 kV line overload; Sauk River – St. Cloud 115 kV line overload	6.4.2
2003-WC-N5	Willmar – Litchfield-Paynesville Area	2012	Willmar 115/69 kV transformer overload; Low voltages in Kandiyohi County	6.4.3
2003-WC-N7	Panther Area	2012	Crooks-Emmet 69 kV line overload; Olivia low voltage; Brownton low voltage; Hector low voltage	6.4.4
2003-WC-N8	Douglas County – Paynesville-Wakefield-West St. Cloud	2016	Low Voltage problems in the West St. Cloud area, transmission line loading problems on West St. Cloud to Douglas County 69 kV system	6.4.5
2003-WC-N9	West St. Cloud Area	2009	West St. Cloud 115/69 kV transformer overload and West St. Cloud area low voltage problems; Blue Heron-Wakefield line overload	6.4.6
2005-WC-N1	Big Stone II Interconnection	2013	New generation interconnection	6.4.7
2005-CX-1	CapX 2020 Projects Twin Cities – Fargo 345 kV Brookings – Twin Cities 345 kV			6.4.8
2007-WC-N2	Morris 230/115 kV Transformer	2012	Big Stone II Interconnection Upgrade	6.4.9
2007-WC-N3	Morris – Grant County 115 kV Line	2012	Big Stone II Delivery Upgrade	6.4.10
2007-WC-N4	West Central Minnesota Generation Outlet	To be Determined	Upgrade facilities that limit generation outlet	6.4.11

Tracking Number	Description	Projected In-Service Year	Need Driver	Section No.
2009-WC-N1	Osakis – Sauk Centre	2012	Low voltages at Sauk Centre Substation	6.4.12
2009-WC-N2	Douglas County Area	2010	Douglas County 115/69 kV transformer outage and resulting low voltages	6.4.13
2009-WC-N3	Maynard – Kerkhoven	2014	Maynard – Kerkhoven Tap 115 kV line overload	6.4.14
2009-WC-N4	Sartell Distribution Substation	2010	Load Growth	6.4.15
2009-WC-N5	Paynesville – Wakefield – Maple Lake area	2010	Low voltage problems in the Watkins area, Maple Lake to Annandale 69 kV line overload	6.4.16
2009-WC-N6	Elk River-Becker Area	2013	Loading concerns on the 69kV system between Elk River and Liberty substation and XFR llad at the substation	6.4.17
2009-WC-N7	Brooten – Lowrey	2012	Low voltages along Westport to Lowrey.	6.4.18

Minnesota Transmission >69kV West Central Planning Zone





Map ID	Tracking Number	Description
A	2003-WC-N4	St. Cloud Area
B	2003-WC-N5	Willmar-Litchfield-Paynesville Area
C	2003-WC-N7	Panther Area
D	2003-WC-N8	Douglas County-Paynesville-Wakefield-West St. Cloud
E	2003-WC-N9	West St. Cloud Area
F	2005-WC-N1	Big Stone II Interconnection
G	*2005-CX-1*	*CapX 2020 Projects Fargo – Twin Cities 345 kV*
H	2007-WC-N2	Morris 230/115 kV Transformer
I	2007-WC-N3	Morris – Grant County 115 kV Line
J	2007-WC-N4	West Central Minnesota Generation Outlet
K	2009-WC-N1	Osakis-Sauk Centre
L	2009-WC-N2	Douglas County Area
M	2009-WC-N3	Maynard-Kerkhoven
N	2009-WC-N4	Sartell Distribution Substation
O	2009-WC-N5	Paynesville-Wakefield-Maple Lake Area
P	2009-WC-N6	Elk River-Becker Area
Q	2009-WC-N7	Brooten-Lowry

Grey area denotes project not located on map because it encompasses too large an area.

6.4.1 Completed Projects

There are two Tracking Numbers that were reported in the 2007 Biennial Report in the West Central Zone that have been addressed. Information about each of the completed projects is summarized briefly in the table below, and those matters will be removed from the list of inadequacies that are discussed in the 2009 Report. More detailed information about these projects and inadequacies can be found in the 2005 and 2007 Reports and in the PUC Docket for the matter if the project fell within the jurisdiction of the Public Utilities Commission, in which case the Docket Number is shown below. Also, additional information is available by contacting the designated person for the utility that was responsible for constructing the project.

Tracking Number	Utility	Description	PUC Docket	Date Completed
2003-WC-N10	Otter Tail Power Company	Appleton – Canby 41.6 kV to 115 kV Line Rebuild	CN-06-677 TL-06-1265	April 2009
2005-WC-N3	Xcel Energy, Great River Energy	Buffalo Area, Wright County 5-mile 115 kV line between Mary Lake and Buffalo Substations	TL-07-1365	Early 2010
2005-WC-N4	Otter Tail Power Company, Xcel Energy	Rugby Wind Project Expansion of 115 kV capacitor at Paynesville from 20 MVAR to 30 MVAR	Not Required	Late 2007
2007-WC-N1	Great River Energy, Xcel Energy	Mayhew Lake Distribution Substation	Permitted locally – Stearns County	Mid 2008

6.4.2 St. Cloud Area

Tracking Number. 2003-WC-N4

Utility. Xcel Energy

Inadequacy. The St. Cloud area includes the City of St. Cloud and surrounding suburbs. The area is bounded by Benton County, Granite City, St. Regis, West St. Cloud to the west and Monticello, Paynesville and Sherco to the south. The entire St. Cloud area and much of central Minnesota relies on the single source of the Benton County Substation and the single 115 kV double circuit line from Benton County. The total load exceeds the capability of the 115 kV loop to supply the area during a contingency. An additional source of bulk power supply is needed into St. Cloud and central Minnesota. The St. Cloud area is in need of well over 100 MW of additional support.

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

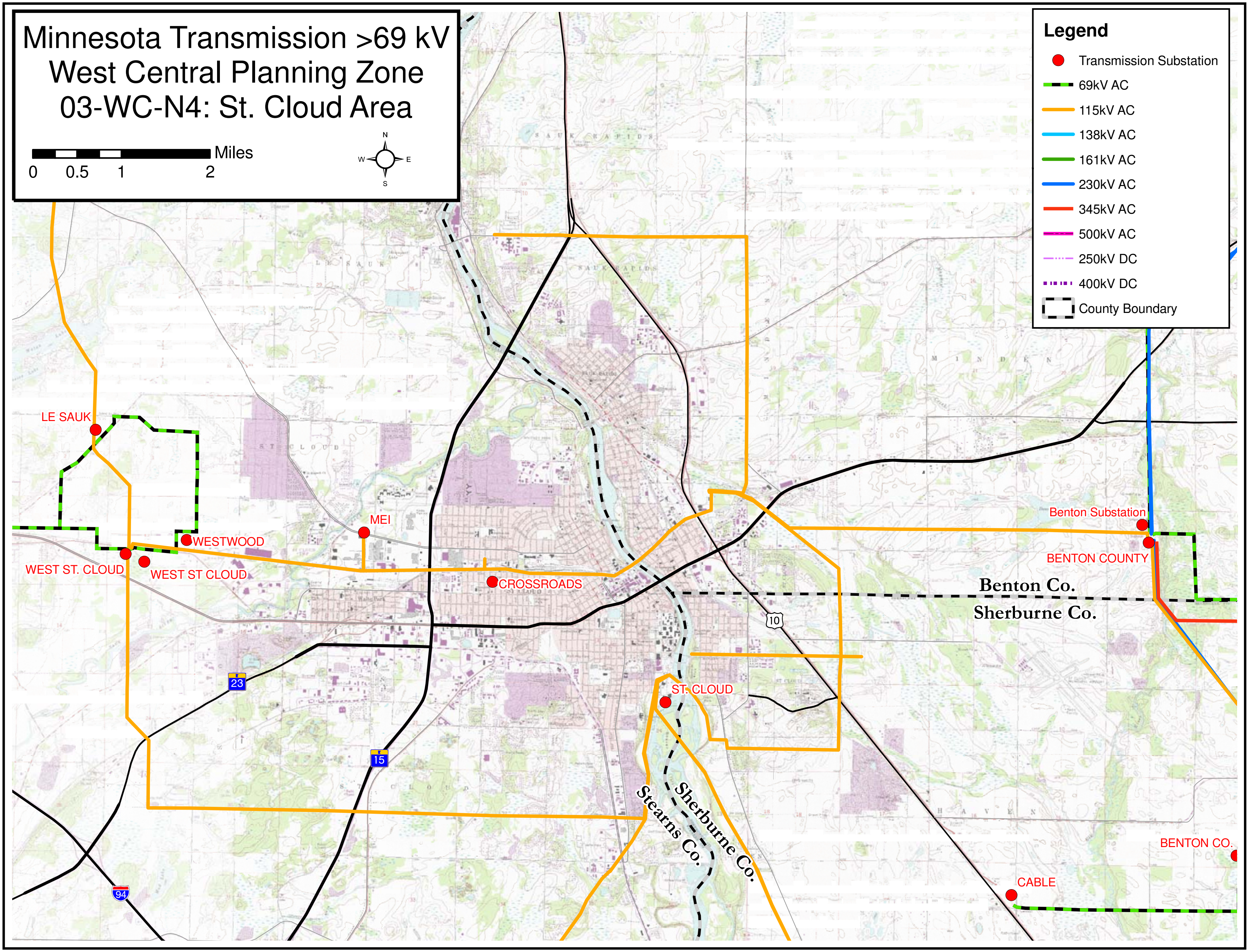
Alternatives. Currently, the St. Cloud area is fed from one bulk power source – a 345 kV line from the Xcel Energy Sherburne County Generating Station to the Benton County Substation. From there, a double-circuit 115 kV line transports a large portion of the area's power into the city. The best long-range solution to the St. Cloud area service concerns is the construction of a new bulk supply source.

Analysis. Several utilities have proposed to construct a new 345 kV transmission line from Fargo, North Dakota, to the Twin Cities area near Monticello as part of the CapX 2020 Vision Plan. This line will pass near the St. Cloud area and can be tapped to provide a source to the area. The Red River Valley Load Serving Study/TIPS Update contains the latest information on the 345 kV line.

A 2006 St. Cloud study recommended a St. Cloud-area 345 kV interconnection on the west side of town to provide a transmission source geographically diverse from the Benton County source. This substation is being planned as part of the Monticello – Fargo 345 kV line and is tentatively named Quarry Substation. The study also recommended upgrading the existing 115 kV infrastructure in St. Cloud to support the growing load in the area.

The 115 kV system upgrades required to support the new 345/115 kV substation involve upgrading the 115 kV line from Quarry to Sauk River to West St. Cloud. To improve the reliability of service to the City of Sauk Rapids and St. Regis load, a new four mile 115 kV line is proposed between Granite City and Mayhew Lake substations. This will provide a second source to the Mayhew Lake Substation and reduce the exposure of the St. Regis load to less than two miles.

Schedule. Xcel Energy is upgrading the Sauk River – St. Cloud line to higher capacity to accommodate current needs. At the time of completion of the Quarry Substation, the 115 kV line between Sauk River and West St. Cloud will be upgraded to higher capacity. The expected in-service date for the upgraded 115 kV line is mid-2013.


Minnesota Transmission >69 kV
West Central Planning Zone
03-WC-N4: St. Cloud Area
0 0.5 1 2 Miles
N
W E
S
Legend
Transmission Substation
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
County Boundary
LE SAUK
WESTWOOD
WEST ST. CLOUD
WEST ST CLOUD
MEI
CROSSROADS
ST. CLOUD
Benton Substation
BENTON COUNTY
Benton Co.
Sherburne Co.
Stearns Co.
Sherburne Co.
BENTON CO.
CABLE
10
23
15
94

6.4.3 Willmar-Litchfield-Paynesville Area

Tracking Number. 2003-WC-N5

Utility. Great River Energy

Inadequacy. Great River Energy has been reporting on a low voltage problem in the Willmar area since at least 2003. The 69 kV loop in the Willmar area and the 69 kV system from Big Swan to Panther experience low voltage problems during contingencies. In addition, a possible transformer overload contingency at Paynesville has been identified. There are currently two 115/69 kV transformers in the Paynesville Substation, and loss of one of these will overload the remaining transformer. As reported in the 2007 Biennial Report, GRE installed capacitor banks at multiple locations to improve voltage in the area.

A map of the area is shown following this section.

Alternatives. As described in the 2007 Biennial Report, several alternatives were developed to address the transmission deficiencies in this area. As part of the latest GRE long range plan, this area was re-evaluated and two alternatives were identified to address the low voltage problems on the 69 kV system.

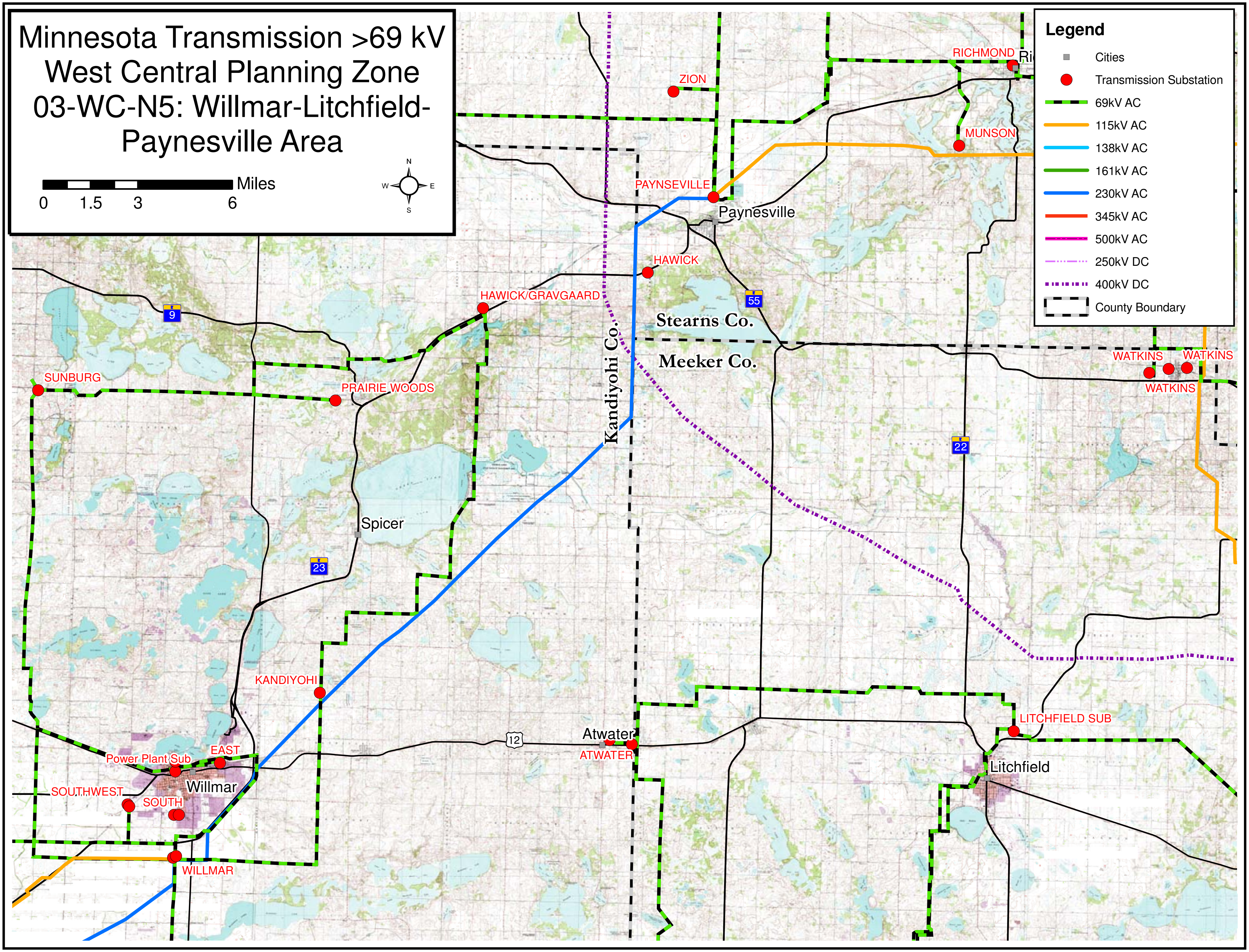
Alternative 1. The first alternative was described in the 2005 Biennial plan. It recommends establishing a 230/69 kV substation at Spicer and constructing over nine miles of 69 kV double circuit lines from Spicer to Atwater. One of the double circuited lines would be constructed to the 115 kV standard for future possible upgrade. Also, this option includes a 2.5 mile 69 kV double circuit line from Spicer to Green Lake and a nearly 10 mile 115 kV line from Big Swan to Litchfield. The Big Swan to Litchfield 115 kV line would initially be operated at 69 kV.

Alternative 2. The second alternative, which has only been identified in the last year, includes constructing a 19 mile 69 kV line from Paynesville to Grove City, constructing a ten mile 115 kV line for 69 kV operation from Big Swan to Litchfield, and establishing a 69 kV switching station at Grove City.

GRE continues to evaluate the situation and to develop other potential alternatives to address the transmission deficiencies of the 69 kV system in the area. GRE will investigate possible construction of new 230 kV lines to improve the existing 230 kV system, which will thereby strengthen the 69 kV system that it serves.

Analysis. Currently, based on cost, system improvement, and opportunities for future system upgrade, the preferred alternative to address the immediate deficiencies in the area is the first alternative. This alternative addresses the needs of the 69 kV system in the Willmar area as well as on the Big Swan to Panther 69 kV system. The second alternative is not preferable because it doesn’t address the low voltage issues in the Willmar 69 kV loop.

Schedule. The Spicer 230/69 kV source along with the Spicer to Atwater double circuit line is tentatively scheduled to be in-service in the 2012 timeframe and the Big Swan to Litchfield 115 kV is recommended to be constructed in the 2018 timeframe.



Minnesota Transmission >69 kV
West Central Planning Zone
03-WC-N5: Willmar-Litchfield-Paynesville Area
Miles
0
1.5
3
6
N
W
E
S
Legend
Cities
Transmission Substation
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
County Boundary
RICHMOND
ZION
MUNSON
PAYNESVILLE
Paynesville
HAWICK
HAWICK/GRAVGAARD
Stearns Co.
Meeker Co.
Kandiyohi Co.
SUNBURG
PRAIRIE WOODS
WATKINS
WATKINS
WATKINS
Spicer
KANDIYOHI
LITCHFIELD SUB
Atwater
ATWATER
Litchfield
EAST
Power Plant Sub
Willmar
SOUTHWEST
SOUTH
WILLMAR
9
55
22
23
12

6.4.4 Panther Area

Tracking Number. 2003-WC-N7

Utility. Great River Energy

Inadequacy. This area is characterized by long 69 kV transmission lines from remote 115/69 kV sources with one 230/69 kV source at Panther in the middle of the system. Although load growth in this area is slow, several relatively large spot loads are present near Danube and Olivia. As described in the 2007 Biennial Report, the area experiences near term low voltage problems in the Hector area for the loss of the Bird Island to Hector 69 kV line. Recently a 7.2 MVAr capacitor bank was installed at Hector. This installation pushed the need for voltage support in this area up to the 2013 timeframe. The 2003 and 2007 GRE long range plan studies of the area showed that the Panther 230/69 kV transformer overloads in the 2021 timeframe for the loss of the Birch Lake to Franklin 69 kV line.

A map of the area is shown following this section.

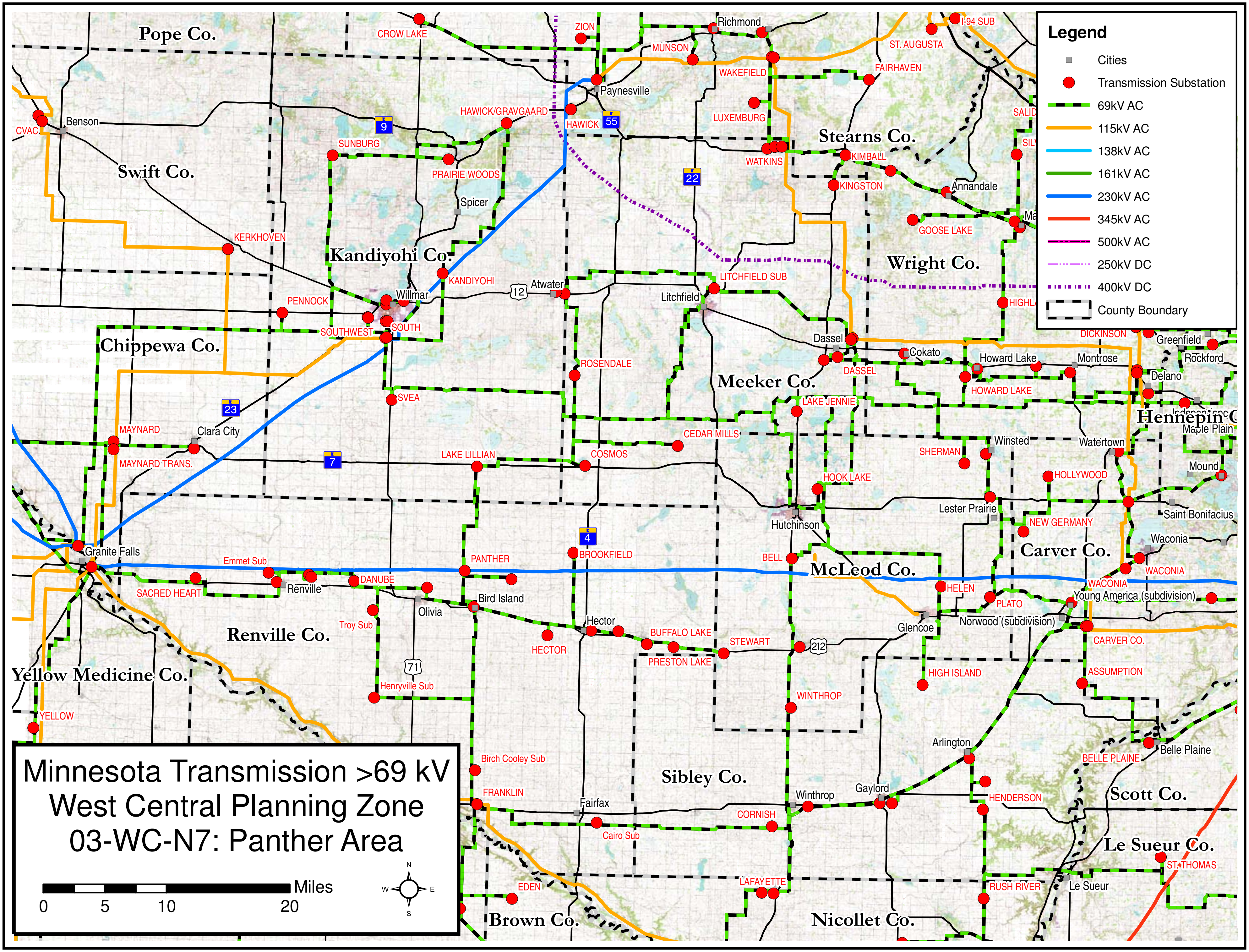
Alternatives. As described in the 2007 Biennial Report, a second 230/69 kV transformer was recommended to be installed at the Panther substation in the 2019 timeframe. The addition of a new Spicer 230/69 kV source with the addition of associated transmission lines from Spicer to Atwater (see Willmar-Litchfield-Paynesville Area Tracking Number 2003-WC-N5) relieves the Panther transformer loading and extends the need for a second transformer at Panther by a number of years from 2019.

Currently only one alternative is developed to address the low voltage issues in the Hector area. This option as described in the 2007 Biennial Report recommends constructing about ten miles of 115 kV line from McLeod to Brownton and establishing a 115/69 kV source at Brownton. This source keeps the voltage at Hector above the low voltage criteria during contingencies in the area.

Distributed generation is not a desirable alternative for this area as most of the loads in this area are at a long distance from the sources and the 69 kV system has weak voltage during contingency. The preferred alternative, unlike the distributed generation option, reduces the line exposure between the sources and puts the loads in closer distance from the sources. Distributed generation would need to be installed at a number of distribution substation sites to improve voltage and have an impact equal to the preferred solution. This would require a significant investment which makes the distributed generation option by far a more expensive option than the preferred option.

Analysis. Recent capacitor bank installation at Hector and the slower pace of load growth in the area have pushed the need for voltage support to the Hector area up to the 2013 timeframe. The McLeod to Brownton 115 kV line including the Brownton source is required in the 2013 timeframe to keep the voltage at Hector and neighboring distribution substation within the required voltage limits.

Schedule. The Brownton to McLeod 115 kV line including the Brownton 115/69 kV source is recommended to be in-service in the 2013 timeframe. Any 115 kV line over ten miles will require a Certificate of Need from the Public Utilities Commission.


Minnesota Transmission >69 kV
West Central Planning Zone
03-WC-N7: Panther Area
Legend
Cities
Transmission Substation
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
County Boundary
Miles
0 5 10 20
Pope Co.
Swift Co.
Kandiyohi Co.
Chippewa Co.
Stearns Co.
Wright Co.
Meeker Co.
Renville Co.
Yellow Medicine Co.
McLeod Co.
Carver Co.
Sibley Co.
Scott Co.
Le Sueur Co.
Brown Co.
Nicollet Co.

6.4.5 Douglas County-Paynesville-Wakefield-West St. Cloud

Tracking Number. 2003-WC-N8

Utility. Great River Energy/Xcel Energy

Inadequacy. This area includes the 69 kV system that is served from the Douglas County, West St. Cloud, Paynesville and Wakefield 115/69 kV source. As reported in past Biennial Reports including the 2007 Biennial Report, there has been significant load growth along the I-94 corridor between Douglas County and West St. Cloud, and the need for transmission improvement has been discussed in multiple studies on this area. Near term system deficiencies include low voltage problems around the West St. Cloud area for the loss of the West St. Cloud transformer and the West St. Cloud transformer overload for the loss of the Richmond tap to Big Fish Tap 69 kV line. In recent summers, utility customers have reported an increasing incidence of load management programs, including interruptions to farming irrigation activities.

A map of the area is shown following this section.

Alternatives. As a result of the immediate need for system improvements in the West St. Cloud area, GRE will upgrade Stearns Electric Association's LeSauk 69kV distribution sub to 115 kV with a tentative plan to upgrade the Westwood I distribution sub to the nearest 115 kV system. As part of the long term solution in this area, GRE evaluated two additional alternatives in addition to what was reported in the 2007 Biennial Report. The following are the alternatives:

1) New Alexandria to West St. Cloud 115 kV line with a 115 /69 kV source at Albany.

2) New Alexandria –Albany – Big Fish – Rockville 115 kV line with a 115/69 kV source at Albany

3) New Alexandria to Albany to St Stephen 115 kV line with a 115/69 kV source at Albany

4) Capacitor bank installation with new 69 kV transmission line additions in the system.

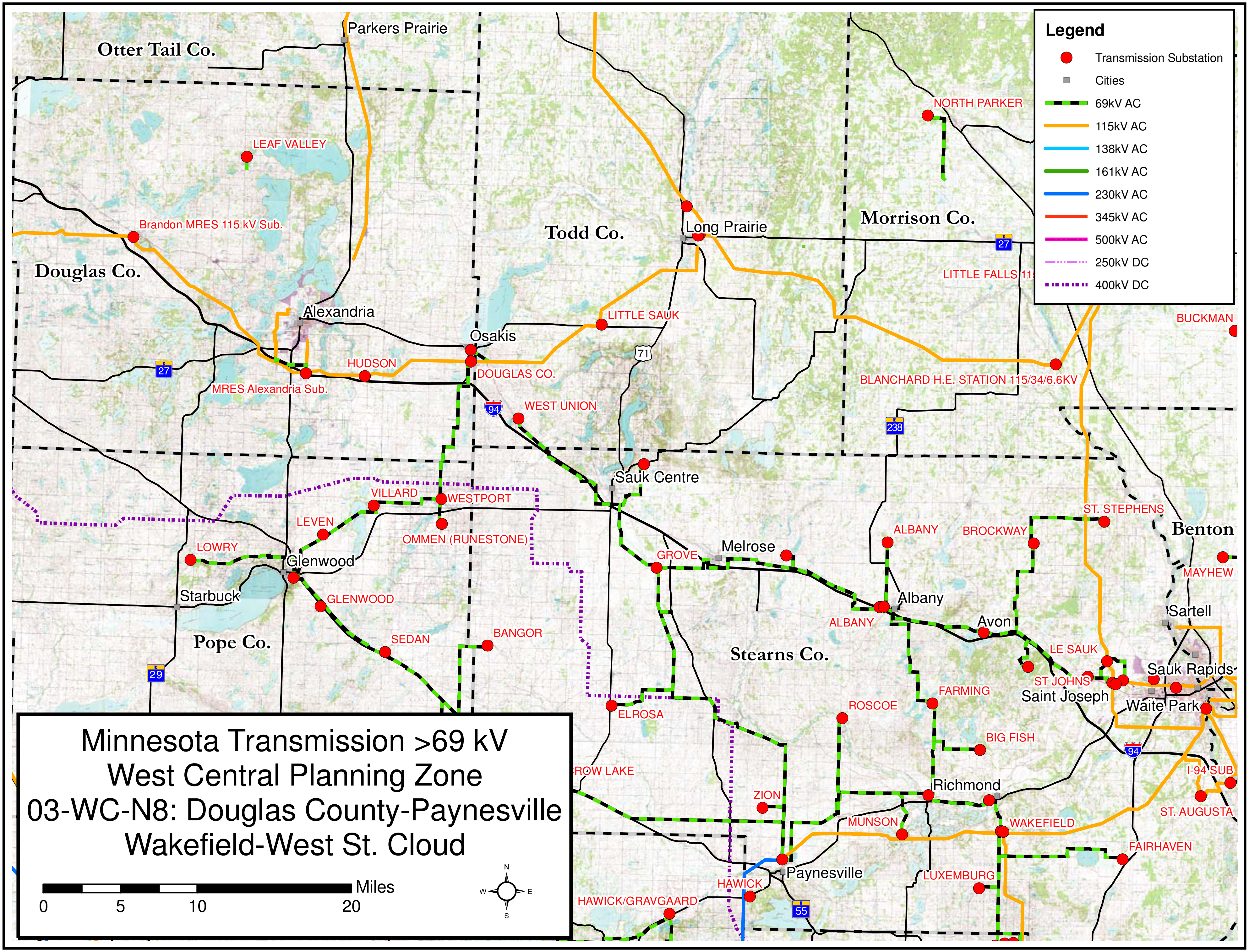
5) Distributed Generation

Most of these alternatives will parallel the Fargo to Monticello 345 kV project that is being planned by the CapX 2020 group. Stakeholders of this project – GRE, Xcel Energy and MRES – plan to further study these alternatives and produce or modify alternatives to address the long term needs of the area.

Analysis. Analyses of these options show that all the transmission alternatives except Alternative 4 are found to benefit the area equally. Alternative 4 is not capable of addressing the overload issue at the West St. Cloud transformer and the 69 kV system between West St. Cloud and Albany. Comparison of these alternatives based on their present worth values show that Alternative 1 is the least cost plan to address the system deficiencies in the area for a long term. As these alternatives may need to be coordinated with the CapX 2020 345 kV projects in the area, the preferred alternative is subject to change. Additional study of this area will kick off during fall 2009.

Distributed generation is not a desirable alternative as the geographical location of the area follows the I-94 corridor where load growth is substantial. The 69 kV system currently serves large loads, such as Melrose and Sauk Centre, which contribute to the congestion and low voltage problems in the 69 kV system. These loads need to be upgraded to 115 kV to relieve loading and improve voltage on the 69 kV system in the area. This area, moreover, has the potential to attract new large industrial loads, which would require a significant incremental cost to install distributed generation to serve such loads in the area. Thus, distributed generation is not a preferred option to address the long-term needs of the transmission system in the area.

Schedule. Construction of the preferred option is highly impacted by the CapX 2020 Fargo to Monticello 345 kV project schedule. Based on GRE's 2008 Long Range Plan, the preferred alternative is recommended to be constructed in two phases. Phase 1 of this project would involve construction of a 115 kV line from Alexandria to Albany and establishing a 115/ 69 kV source at Albany in 2016 timeframe. Phase 2 of this option would include the construction of the Albany to West St. Cloud 115 kV line in the 2021 timeframe. As mentioned above, the preferred alternative and the dates are subject to change based on the planned re-study on the area and other constraints, such as routing and scheduling of the CapX 2020 Fargo to Monticello 345 kV project


Minnesota Transmission >69 kV
West Central Planning Zone
03-WC-N8: Douglas County-Paynesville
Wakefield-West St. Cloud
Legend
Transmission Substation
Cities
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
Miles
0
5
10
20
Otter Tail Co.
Douglas Co.
Todd Co.
Morrison Co.
Pope Co.
Stearns Co.
Benton
Parkers Prairie
Alexandria
Osakis
Long Prairie
Sauk Centre
Glenwood
Starbuck
Melrose
Albany
Avon
Sartell
Sauk Rapids
Saint Joseph
Waite Park
Richmond
Paynesville
LEAF VALLEY
Brandon MRES 115 kV Sub.
MRES Alexandria Sub.
HUDSON
DOUGLAS CO.
WEST UNION
LITTLE SAUK
NORTH PARKER
LITTLE FALLS 11
BUCKMAN
BLANCHARD H.E. STATION 115/34/6.6KV
VILLARD
WESTPORT
LEVEN
OMMEN (RUNESTONE)
LOWRY
GLENWOOD
SEDAN
BANGOR
GROVE
ALBANY
BROCKWAY
ST. STEPHENS
MAYHEW
LE SAUK
ST JOHNS
FARMING
ROSCOE
BIG FISH
ELROSA
ROW LAKE
ZION
MUNSON
WAKEFIELD
I-94 SUB
ST. AUGUSTA
FAIRHAVEN
LUXEMBURG
HAWICK
HAWICK/GRAVGAARD
27
29
71
94
238
55

6.4.6 West St. Cloud Area

Tracking Number. 2003-WC-N9

Utility. Great River Energy

Inadequacy. As reported in the past two Biennial Reports and discussed above in the Douglas County-Paynesville-Wakefield-West St. Cloud section of this Biennial Report (Tracking Number 2003-WC-N8), the 69 kV system around the West St. Cloud area experiences near term low voltage problems for the loss of the West St. Cloud 115/69 kV transformer. The West St. Cloud 115/69 kV transformer also experiences overload problems in the near term for the loss of the Richmond to Big Fish Tap 69 kV line outage.

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

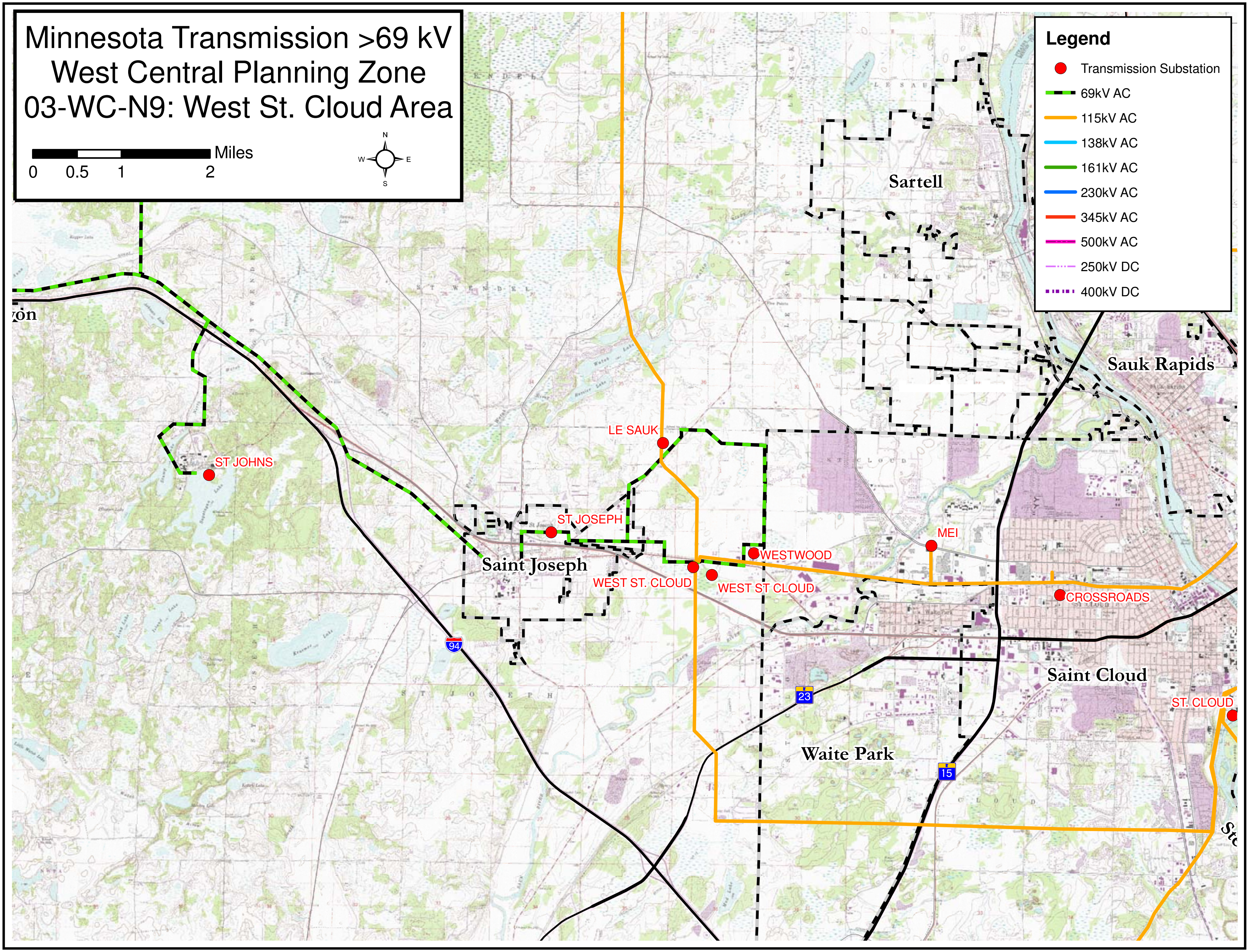
Alternatives. The recommended alternative to mitigate both the low voltage and overload problems in the short term is the upgrading of distribution substations that serve loads from the 69 kV system in the area to the 115 kV system. The LeSauk and Westwood I distribution substations are recommended to be converted to the 115 kV system in the near term. The West St. Cloud 115/69 kV, 47 MVA transformer is also recommended to be replaced with an 84 MVA transformer in near term. The long term solution to this area is included in the Douglas County – Paynesville-Wakefield-West St. Cloud area discussion (Tracking Number 2003-WC-N8).

Analysis. Stearns Electric Association serves the West St. Cloud area with two 69 kV distribution substations – LeSauk and Westwood I – and with one 115 kV distribution sub, Westwood II. The LeSauk and Westwood I distribution substations experience low voltage problems for the loss of the West St. Cloud 115/69 kV transformer outage in the short term. These substations will have better voltage profile when they are converted to the 115 kV system, which is found in a very close proximity to these substations. These conversions will relieve, but not solve the West St. Cloud transformer loading issues. It is recommended that the 47 MVA transformer at the West St. Cloud 115/69 kV substation be replaced with an 84 MVA transformer in the 2011 timeframe. The transmission system will further be improved when the preferred project from the Douglas County-Paynesville-Wakefield-West St. Cloud area study (Tracking Number 2003-WC-N8) is in-service in the area.

Distributed generation is not a desirable option as the 115 kV line where the distribution substations will be tapped is located in a very close proximity to these distribution substations. This makes the sub conversion option far less expensive than the distributed generation option.

Schedule. GRE, Stearns Electric Association, and Xcel Energy are coordinating their efforts to convert the LeSauk distribution substation to 115 kV during fall 2009. The Westwood I substation conversion and the West St Cloud 115/69 kV, 84 MVA transformer installations are tentatively scheduled for 2011.

Minnesota Transmission >69 kV
West Central Planning Zone
03-WC-N9: West St. Cloud Area



6.4.7 Big Stone II Interconnection

Tracking Number. 2005-WC-N1

Utilities. Missouri River Energy Services, Montana-Dakota Utilities, Heartland Consumers Power District, and Central Minnesota Municipal Power Agency

Inadequacy. A new coal-fired generator is being proposed at the existing Big Stone site in northeastern South Dakota. Interconnection studies performed within MISO have determined that new transmission will be required to allow for interconnection of this project.

A map of the area is shown following this section.

Alternatives. During the MISO interconnection study, two base 230 kV alternatives were evaluated. These were:

Big Stone – Johnson Jct. – Morris 230 kV line with a Big Stone – Canby – Granite Falls 230 kV line.

Big Stone – Willmar 230 kV line with a Big S tone – Canby – Granite Falls 230 kV line.

MISO interconnection studies have determined that the two base alternatives had similar system performance with the new Big Stone generator added to the system.

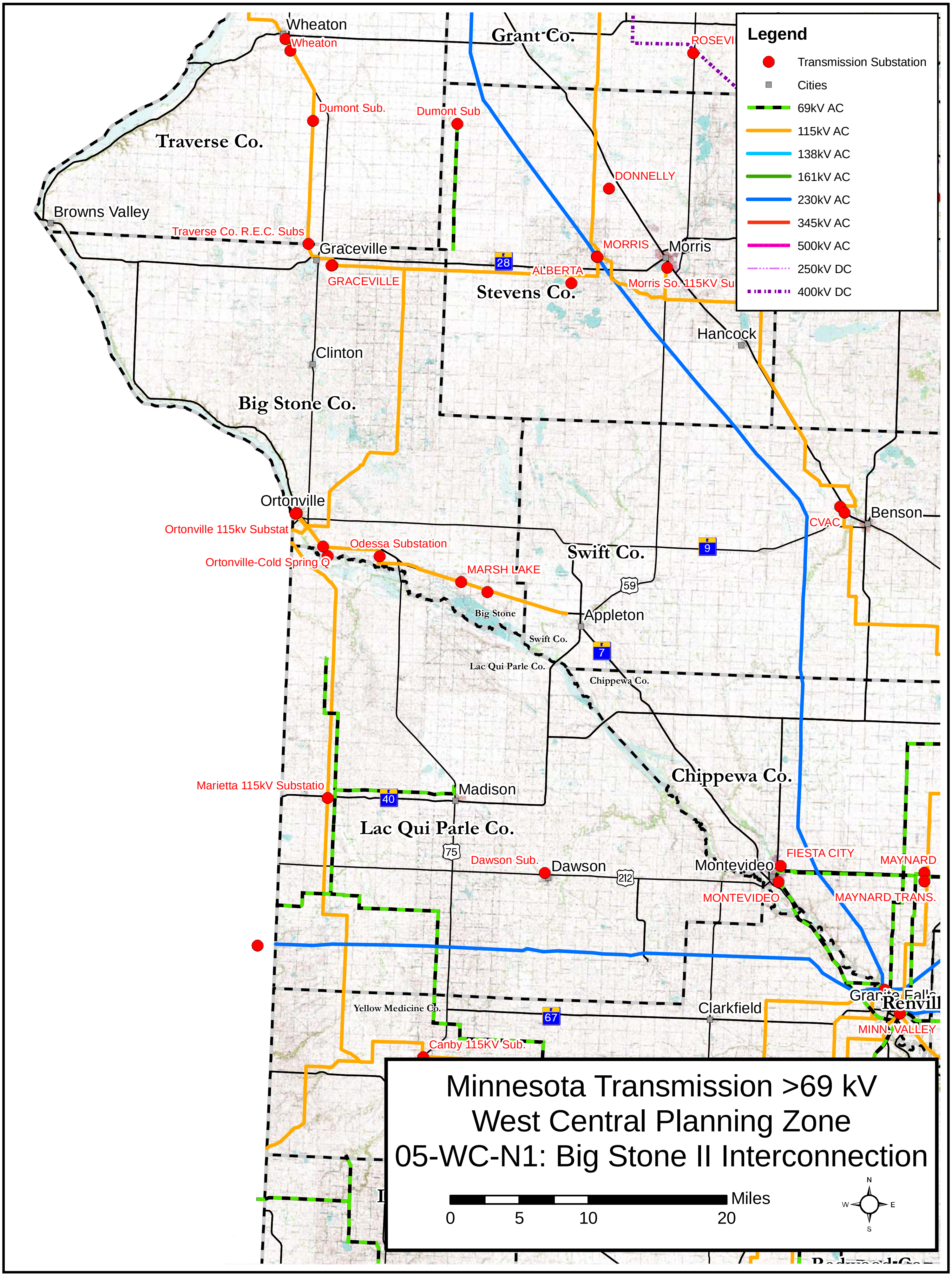
Selected Alternative. The project participants have chosen to pursue the Morris and Granite Falls transmission combination over the Willmar and Granite Falls combination for several reasons, including cost, less new transmission corridor, and better coordination with CapX 2020. This alternative involves two new transmission lines: (1) a 230 kV line from the existing Big Stone Substation in South Dakota to the Morris Substation in Minnesota, and (2) a line from a new Big Stone Substation to the Canby Substation to the Granite Falls Substation. The line to Morris will replace an existing 115 kV line from Ortonville to Johnson Jct. to Morris and will be constructed in the existing 115 kV line corridor. The line section from Big Stone to Canby will be constructed utilizing a new corridor. The line section from Canby to Granite Falls will replace an existing 115 kV line and will utilize the existing right-of-way.

The Big Stone II transmission plan has been coordinated with other regional transmission efforts by planning to construct the line section from Big Stone to Canby to the new Hazel Creek Substation (approximately 12 miles south of Granite Falls) to 345 kV standards but operated at 230 kV until the proposed CapX SW Minnesota to Twin Cities 345 kV (Brooking –Hampton) line is constructed. The line section from the Hazel Creek substation to Granite Falls will be constructed for and operated at 230 kV. Depending on the timing of these two projects (Big Stone II and CapX Brookings), it is possible that the Granite Falls line could be operated at 345 kV immediately if the Hazel Creek Substation is available through the CapX Brookings project.

Schedule. The Public Utilities Commission issued a Certificate of Need and Route Permits for the Minnesota portion of the two new transmission lines, one from the Big Stone Plant to Morris, Minnesota, and one from the plant to Granite Falls, Minnesota, on March 17, 2009. On

September 11,2009, Otter Tail Power Company, which had been a joint applicant in the project, advised the Public Utilities Commission that it was withdrawing from participation in the project. The remaining four utilities are in discussions with potential additional partners in the project and have informed the Commission that they will advise the Commission of their progress by the end of November 2009.

PUC Docket Numbers. CN-05-619 (Certificate of Need)
TL-05-1275 (Route Permit)


Minnesota Transmission >69 kV
West Central Planning Zone
05-WC-N1: Big Stone II Interconnection
Legend
Transmission Substation
Cities
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
Miles
0
5
10
20
N
S
E
W
Wheaton
Grant Co.
ROSEVI
Dumont Sub.
Dumont Sub
Traverse Co.
DONNELLY
Browns Valley
Traverse Co. R.E.C. Subs
Graceville
MORRIS
Morris
28
ALBERTA
GRACEVILLE
Morris So. 115KV Su
Stevens Co.
Hancock
Clinton
Big Stone Co.
Ortonville
Benson
CVAC
Ortonville 115kv Substat
Odessa Substation
Swift Co.
9
Ortonville-Cold Spring Q
MARSH LAKE
59
Big Stone
Appleton
Swift Co.
7
Lac Qui Parle Co.
Chippewa Co.
Chippewa Co.
Marietta 115kV Substatio
40
Madison
Lac Qui Parle Co.
75
Dawson Sub.
Dawson
212
Montevideo
FIESTA CITY
MAYNARD
MONTEVIDEO
MAYNARD TRANS.
Clarkfield
Yellow Medicine Co.
67
Canby 115KV Sub.
MINN. VALLEY

6.4.8 CapX 2020 Projects

Tracking Numbers. 2005-CX-1 (Fargo –Twin Cities 345 kV)
2005-CX-2 (Brookings – Southeast Twin Cities 345 kV)
2005-CX-3 (LaCrosse – Southeast Twin Cities 345 kV)
2005-NW-N2 (Bemidji-Grand Rapids 230 kV)

CapX 2020 Utilities. CapX 2020 is a joint initiative of 11 transmission-owning utilities in Minnesota and the surrounding region to expand the electric transmission grid to ensure continued reliable service. The CapX 2020 current roster consists of eleven utilities: Central Minnesota Municipal Power Agency, Dairyland Power Cooperative, Great River Energy, Minnesota Power, Minnkota Power Cooperative, Missouri River Energy Services, Otter Tail Power Company, Rochester Public Utilities, Southern Minnesota Municipal Power Agency, Wisconsin Public Power, Inc., and Xcel Energy.

More information about CapX 2020 is available in the 2005 and 2007 Biennial Reports and on the webpage maintained by the utilities: http://www.capx2020.com

CapX 2020 Transmission Projects. The CapX 2020 utilities have identified three 345 kV transmission lines and one 230 kV line as part of the Group I projects. The four lines are:

- Twin Cities – Fargo. This is an approximately 250-mile long, 345 kV project between Monticello, St. Cloud, Alexandria, and Fargo, North Dakota.

- Twin Cities – Brookings County. This is an approximately 200-mile, 345 kV project between the southeast comer of the Twin Cities and Brookings County, South Dakota, as well as a 345 kV segment from Marshall to the Granite Falls area.

- Twin Cities – LaCrosse. This is an approximately 150-mile, 345 kV project between the southeast corner of the Twin Cities, Rochester, and LaCrosse, Wisconsin. This project also includes two 161 kV transmission lines from a new North Rochester Substation into Rochester.

- Bemidji-Grand Rapids. This is an approximately 68 mile long line from the 230 kV Wilton Substation located just west of Bemidji, Minnesota (jointly owned by Otter Tail Power and Minnkota Power) to Minnesota Power's 230 kV Boswell Substation in Cohasset, Minnesota, northwest of Grand Rapids, Minnesota. The Bemidji-Grand Rapids 230 kV project is reported under its own Tracking Number (2005-NW-N2).

Projects in West Central Zone. The Fargo to Monticello 345 kV line and the Brookings to southeast Twin Cities 345 kV line are located in the West Central Zone.

Status. On May 22, 2009, the Public Utilities Commission issued a Certificate of Need for the three 345 kV CapX 2020 transmission lines. The CapX 2020 utilities applied for a route permit for the Brookings County to Hampton line in December 2008. The utilities have elected to apply for permits for the Fargo – Twin Cities line in two segments, a Monticello to St. Cloud segment, and a St. Cloud to Fargo segment. An application for a route permit for the Monticello to St.

Cloud segment was submitted to the PUC in April 2009, and an application for the St. Cloud to Fargo segment was submitted in October 2009. A permit for the LaCrosse to Twin Cities line will be applied for by the end of 2009. On July 14, 2009, the Commission issued a Certificate of Need for the Bemidji to Grand Rapids line. A route permit for the Bemidji to Grand Rapids line was applied for in 2008 and a decision is expected in mid-2010.

Upsizing. During the Certificate of Need proceeding for the CapX 2020 345 kV lines, the Public Utilities Commission found that the proposed (primarily single circuit) facilities were not optimized for potential future needs. The Commission concluded that the CapX 2020 utilities should consider potential longer-term needs and not just those in the near-term for which the lines were initially proposed. As a result, the Commission, in its Order granting Certificates of Need for the lines, ordered that all segments of the three CapX 2020 345 kV lines be "upsized" i.e., constructed to double-circuit capability. The lone exception to this conclusion was a segment of the Twin Cities – Brookings 345 kV line that was initially proposed by the utilities to be double-circuited; this segment remained unchanged.

Constructing the facilities to be capable of carrying a second 345 kV circuit will help minimize future transmission corridors and optimize the use of the transmission system. At the same time, not constructing the second circuit initially will allow the utilities to defer some portion of the incremental cost until the capability provided by the second circuit could be used. By deferring some of the capital expenditures for the second circuit, the CapX 2020 utilities are able to more closely match investment with future growth. However, deferring construction also increases the overall cost of the facilities as it will require multiple deployments of crews and potentially additional materials.

The CapX 2020 utilities have begun to analyze the costs and timing of deploying the second circuit. This analysis has included consideration of whether it may be more cost-effective to construct the second circuit at the time of initial construction. Relevant factors in this analysis include but are not limited to:

- The material and labor cost of various transmission line designs depending on how many davit arms are hung during initial construction and the corresponding steel and concrete requirements;
- The material and labor cost of stringing the second circuit at the time of initial construction;
- The material and labor cost of stringing the second circuit at some later date (including mobilization of new line crews);
- The cost of additional damage to crops and wetland mitigation;
- The loss benefit created by reducing the overall impedance of the system when the second circuit is strung (including the avoided cost of replacement generation);
- The cost of generation curtailment during any line outages necessary to string the second circuit;
- The cost of capital for each of the projects; and
- The expected escalation or inflation rates for these costs.

Once this analysis is completed, a recommendation will be made regarding whether it is best for the second circuit to be strung during initial construction or at some later date. At that point, necessary regulatory approvals will be sought.

Schedule. The Brookings line is scheduled to be in-service in the Second Quarter 2013. The St. Cloud to Monticello line is scheduled to be in-service in Fourth Quarter 2011, and the Fargo to St. Cloud segment in Third Quarter 2015, although the St. Cloud - Alexandria segment will be in service in 2nd or 3rd Quarter 2013. The Twin Cities to LaCrosse 345 kV line and two 161 kV lines in the Rochester area are scheduled to go into service over the 2012-2015 timeframe. The Bemidji to Grand Rapids line is scheduled to be in-service by the end of 2011.

PUC Docket Numbers. CN-06-1115 (Certificate of Need for Three 345 kV Transmission Lines)
TL-08-1474 (Brookings County to Hampton Route Permit)
TL-09-246 (Monticello to St. Cloud Route Permit)
TL-09-1056 (Fargo to St. Cloud Route Permit)
CN-07-1222 (Bemidji to Grand Rapids Certificate of Need)
TL-07-1327 (Bemidji to Grand Rapids Route Permit)

6.4.9 Morris 230/115 kV Transformer

Tracking Number. 2007-WC-N2

Utility. Western Area Power Administration

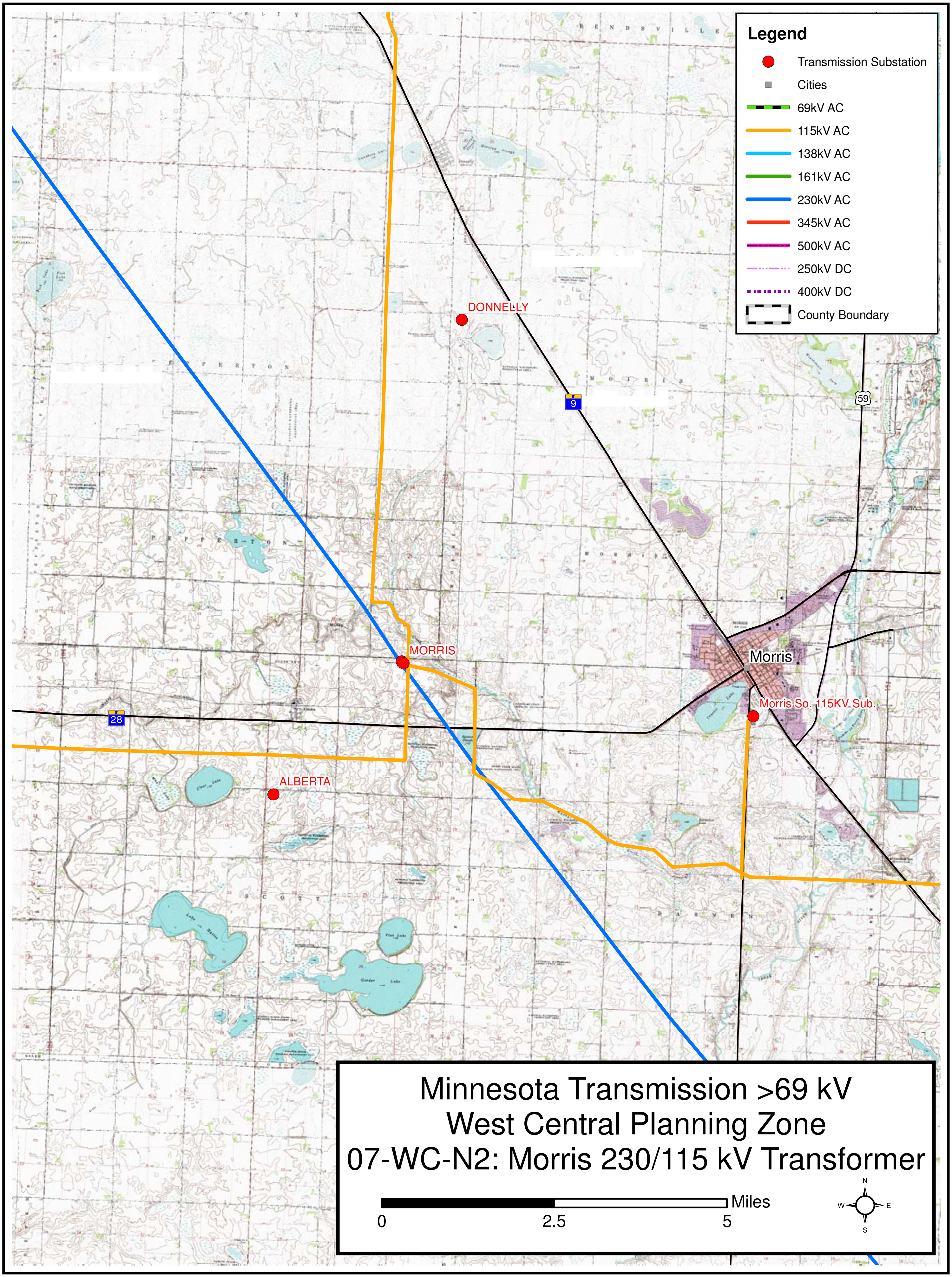
Inadequacy. Interconnection studies being performed for Big Stone II have identified an overload of the Morris 230/115 kV transformer when the proposed transmission lines are in operation (Big Stone – Johnson Jct. – Morris 230 kV with Big Stone – Canby – Granite Falls built at 345 kV and initially operated at 230 kV). This transformer is owned by Western Area Power Administration.

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

Alternatives. To address the overload of the existing 230/115 kV transformer at Morris, it is possible that either a larger transformer be installed to replace the existing 100 MVA unit or a second 230/115 kV transformer be installed in parallel with the existing transformer.

Analysis. This transformer is currently rated at 100 MVA. The pre-contingent (system intact) loading on this transformer has been shown to exceed 100 MVA once Big Stone II is in service. Contingency analysis performed as part of the Big Stone II interconnection study has shown that flows across this transformer can reach up to approximately 170 MVA. Western has completed facilities studies for the Big Stone II project recommending that the existing 100 MVA, 230/115 kV transformer be replaced with a new 336 MVA, 230/115 kV transformer as part of the Big Stone II project (assuming Alternative 1 is implemented). It is not reasonable to install a second 230/115 kV transformer in parallel with the existing transformer at Morris since it would be a much more costly option. A new transformer would be needed and the existing transformer would need to be replaced given that the existing transformer wouldn't be large enough to accommodate the expected post-contingent flow upon outage of the new transformer.

Schedule. The transformer upgrade will be necessary prior to the in-service date of the Big Stone II project. The Western Area Power Administration is responsible for replacing the transformer through coordination with the Big Stone II project (Tracking Number 2005-WC-N1).



Legend
Transmission Substation
Cities
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
County Boundary
DONNELLY
MORRIS
ALBERTA
Morris
Morris So. 115KV Sub.
9
28
59
Minnesota Transmission >69 kV
West Central Planning Zone
07-WC-N2: Morris 230/115 kV Transformer
0
2.5
5
Miles
N
S
E
W

6.4.10 Morris – Grant County 115 kV Line

Tracking Number. 2007-WC-N3

Utilities. Otter Tail Power Company and Missouri River Energy Services

Inadequacy. The Morris – Grant County 115 kV line has been shown as an impacted facility during the Big Stone II delivery studies and upgrades will be required in order to provide firm transmission service for the Big Stone II project.

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

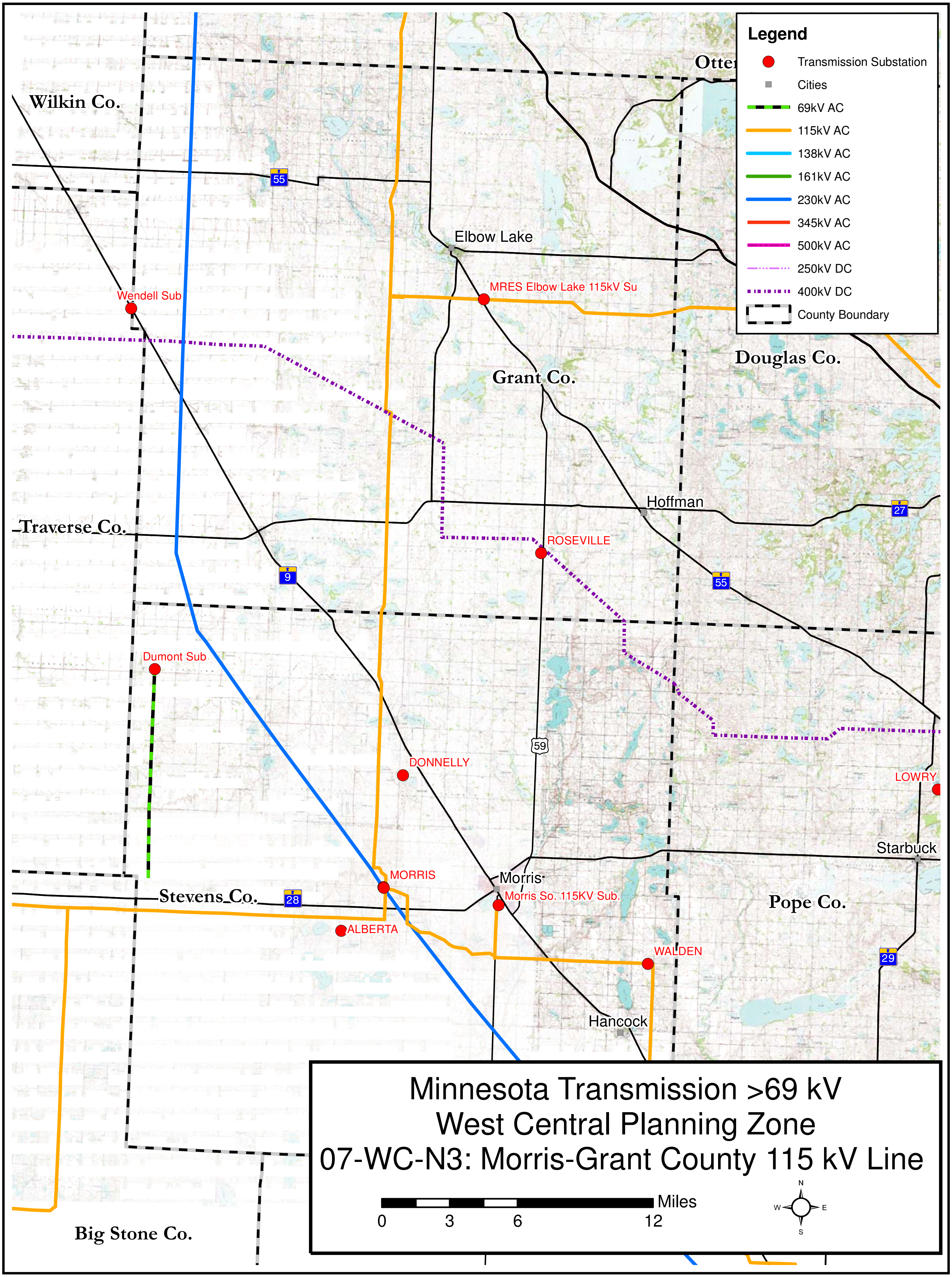
Alternatives. In order to increase the capacity of this existing transmission line, it is possible to either reconductor the existing line (replace conductor and use existing structures) or rebuild the existing line (replace conductor and the existing structures).

Analysis. Missouri River Energy Services (MRES) and Otter Tail Power Company (OTP) jointly own the Morris – Grant County 115 kV line. The line is approximately 27 miles in length and has a present summer continuous line rating of 96 MVA, which is thermally limited by its 266 ACSR conductor.

Contingency analysis performed as part of the Big Stone II delivery studies demonstrated that a minimum summer rating of 156 MVA and a winter rating of 175 MVA will be necessary to deliver the Big Stone II generation to the respective participants during seasonal peak conditions.

This line was originally constructed in 1952 of western red cedar poles and H-frame construction. Although this particular line has a history of very reliable service, the age and physical condition of the poles alone eliminate the possibility of replacing only the line's conductor (i.e. reconductoring). Therefore, significant upgrade of this facility is needed and a complete facility rebuild is the most practical alternative to achieving the required capacity increase. Although detailed engineering has not been completed yet for the rebuild, a conductor size of 795 ACSR provides the required capacity with a reasonable amount of additional capacity margin for future load growth.

Schedule. The line upgrade will be necessary prior to the in-service date of the Big Stone II project. A Certificate of Need is not required to reconstruct the line since it is proposed to remain at 115 kV operation. A Route Permit may be required, depending on whether any changes in the route or the capacity of the conductor are required. This project will have to be undertaken when construction of the Big Stone lines commences (Tracking Number 2005-WC-N1).


Minnesota Transmission >69 kV
West Central Planning Zone
07-WC-N3: Morris-Grant County 115 kV Line
Legend
Transmission Substation
Cities
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
County Boundary
Miles
0
3
6
12
N
W
E
S
Wilkin Co.
Otter
Grant Co.
Douglas Co.
Traverse Co.
Stevens Co.
Pope Co.
Big Stone Co.
Elbow Lake
Hoffman
Morris
Starbuck
Hancock
Wendell Sub
MRES Elbow Lake 115kV Su
ROSEVILLE
Dumont Sub
DONNELLY
LOWRY
MORRIS
Morris So. 115KV Sub.
ALBERTA
WALDEN
55
9
27
55
59
28
29

6.4.11 West Central Minnesota Generation Outlet

Tracking Number. 2007-WC-N4

Utilities. Various Minnesota Utilities

Inadequacy. Generation outlet studies focused on moving wind energy from the Buffalo Ridge area to the Twin Cities load center have identified the Granite Falls to Blue Lake 230 kV line as the next most limiting facility in the region. Upon installation of the Twin Cities – Brookings County 345 kV line, it will be necessary to pursue a project that will alleviate the congestion the Granite Falls – Blue Lake line causes on the transmission grid.

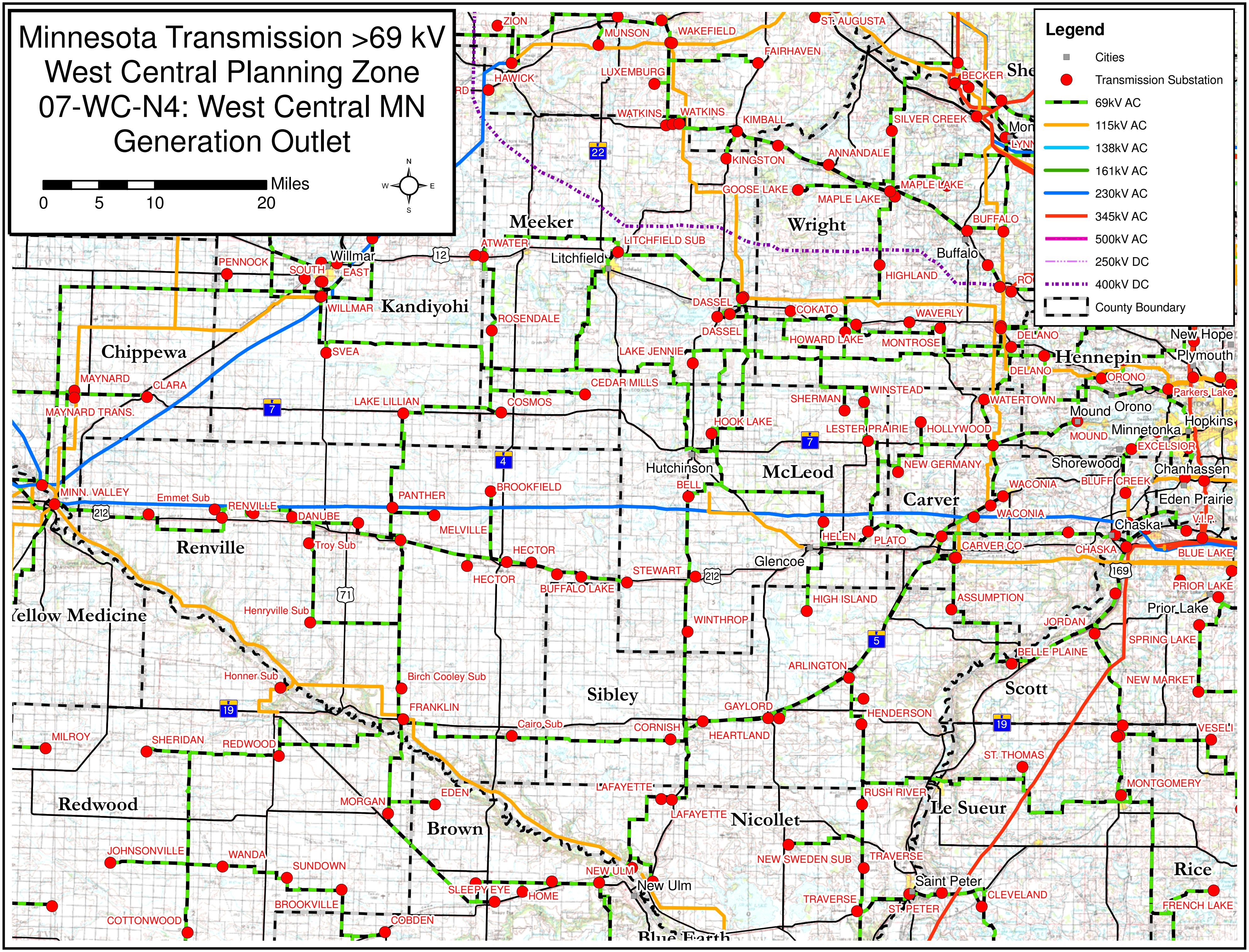
A map showing the route of the existing 230 kV line between Granite Falls and Blue Lake is shown on the following page.

Alternatives. Additional transmission in the area is required. One possibility is a rebuild of the existing line so it can transport more power. It may also be possible to build other new transmission lines to eliminate the overload condition.

Analysis. The Corridor Study, described in Section 8.6.1 of this Report, found that rebuilding the existing 230 kV line to a double-circuit 345 kV, often referred to as the Corridor Upgrade, was the preferred option.

Schedule. A rebuild of the existing 230 kV line between Granite Falls and Blue Lake will occur after the Brookings to Twin Cities 345 kV line is energized, probably in the 2019 timeframe.

Minnesota Transmission >69 kV
West Central Planning Zone
07-WC-N4: West Central MN Generation Outlet



6.4.12 Osakis – Sauk Centre

Tracking Number. 2009-WC-N1

Utilities. Xcel Energy

Inadequacy. In the summer of 2012, outage of the Black Oak – Grove 69 kV line will result in low voltage at the Sauk Centre Substation, a municipal substation served by an Xcel Energy 69 kV line.

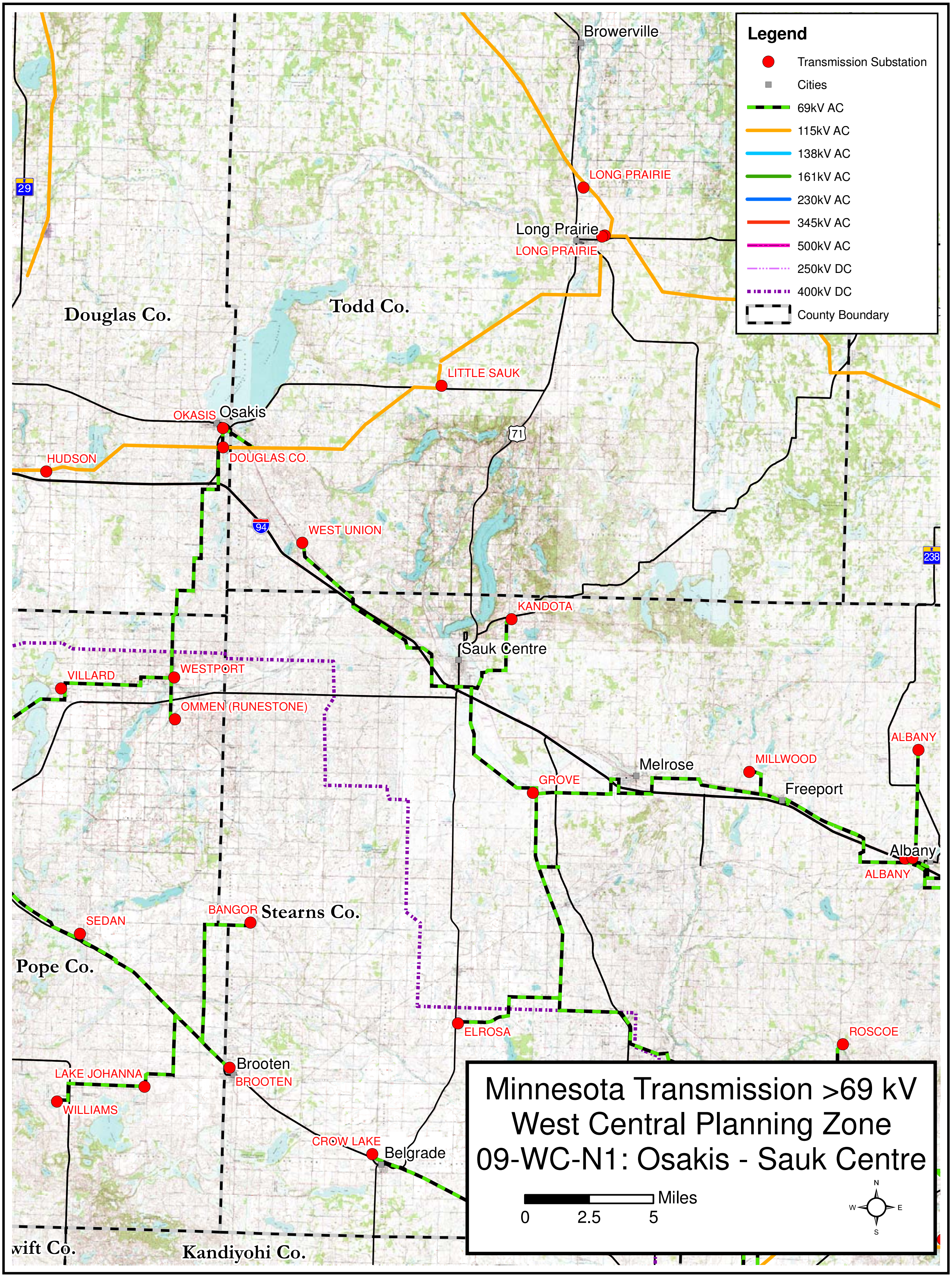
A map showing the existing 69 kV line between West Union and Black Oak is shown on the following page.

Alternatives. This situation can be helped (but not entirely resolved) by the solution to the Douglas County – Paynesville – Wakefield – West St. Cloud inadequacy (Tracking Number 2003-WC-N8). The two most logical alternatives to address this specific issue are either capacitors or a rebuild of some of the 69 kV line. The line between West Union and Sauk Centre is approximately 9 miles of older conductor that causes a large voltage drop along the line; replacing that conductor resolves the problem. Further, if the line was not rebuilt as part of this project, it would be rebuilt due to age and condition within the next several years. Installing capacitors at Sauk Centre would not resolve the age of the line and would be duplicative. New capacitors were installed within the last ten years at nearby Black Oak Substation and the critical contingency for this inadequacy merely separates Sauk Centre from that capacitance.

Distributed generation is not an adequate alternative to this project due to the age of the transmission line in question; even if distributed generation was installed, the transmission line would have to be rebuilt in the near future due to its age.

Analysis. This inadequacy was identified in Xcel Energy's 2008 NERC Compliance Assessment.

Schedule. This project will be in service prior to the need date of summer 2012. If the line is rebuilt at 69 kV capacity, review by the Public Utilities Commission will not be required.



Legend
Transmission Substation
Cities
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
County Boundary
Browerville
LONG PRAIRIE
Long Prairie
LONG PRAIRIE
Douglas Co.
Todd Co.
LITTLE SAUK
OKASIS
Osakis
HUDSON
DOUGLAS CO.
WEST UNION
KANDOTA
Sauk Centre
VILLARD
WESTPORT
OMMEN (RUNESTONE)
ALBANY
MILLWOOD
Melrose
Freeport
GROVE
Albany
ALBANY
SEDAN
BANGOR
Stearns Co.
Pope Co.
ELROSA
ROSCOE
LAKE JOHANNA
Brooten
BROOTEN
WILLIAMS
CROW LAKE
Belgrade
wift Co.
Kandiyohi Co.
Minnesota Transmission >69 kV
West Central Planning Zone
09-WC-N1: Osakis - Sauk Centre
Miles
0
2.5
5
N
W
E
S

6.4.13 Douglas County Area

Tracking Number. 2009-WC-N2

Utilities. Xcel Energy

Inadequacy. The Douglas County 115/69 kV transformer is the main source for the 69 kV lines between Paynesville and Douglas County. The loss of this transformer will result in severe low voltages in the area.

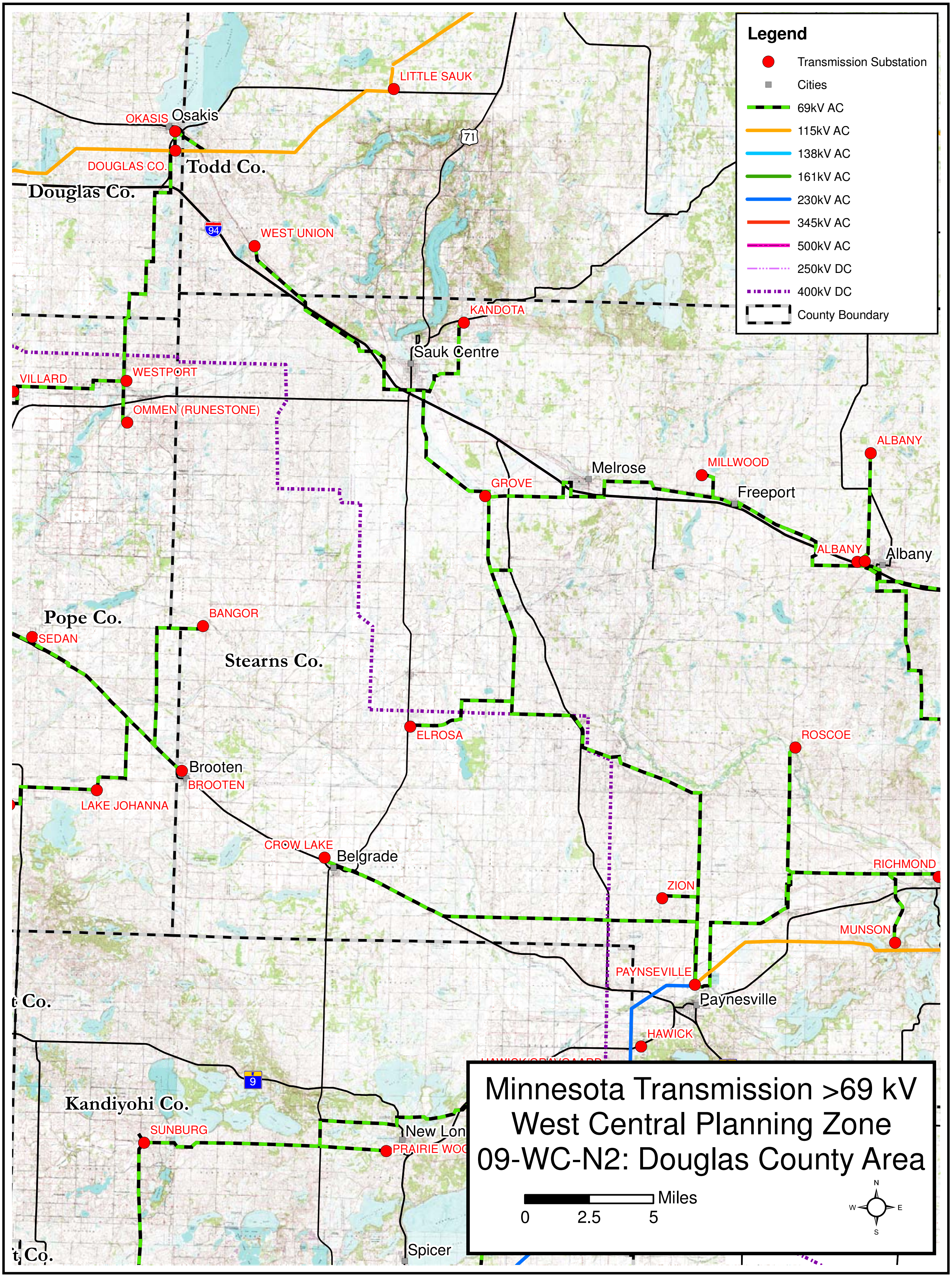
A map showing the affected area around Douglas County Substation is shown on the following page.

Alternatives. The possible alternatives are additional capacitors, a second transformer at the substation, or distributed generation.

Analysis. This inadequacy was identified in Xcel Energy's 2008 NERC Compliance Assessment. The extent of the low voltages that result from this contingency render capacitors ineffective at resolving the inadequacy. The most effective solution is adding a second 70 MVA 115/69 kV transformer at Douglas County Substation.

Distributed generation is not believed to be an adequate solution to this problem due to its cost, the extent of the low voltage problem, and the need for that generation to be online at all times in advance of the critical contingency.

Schedule. Due to the size of the need in this area, this project is being pursued to be in service prior to the summer of 2010. Review by the Public Utilities Commission will not be required if a second transformer is installed.



Minnesota Transmission >69 kV
West Central Planning Zone
09-WC-N2: Douglas County Area
Legend
Transmission Substation
Cities
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
County Boundary
Miles
0
2.5
5
N
E
S
W
Douglas Co.
Todd Co.
Pope Co.
Stearns Co.
Kandiyohi Co.
Osakis
OKASIS
DOUGLAS CO.
LITTLE SAUK
WEST UNION
KANDOTA
Sauk Centre
WESTPORT
VILLARD
OMMEN (RUNESTONE)
Melrose
GROVE
MILLWOOD
Freeport
ALBANY
Albany
BANGOR
SEDAN
ELROSA
ROSCOE
Brooten
BROOTEN
LAKE JOHANNA
CROW LAKE
Belgrade
RICHMOND
ZION
MUNSON
PAYNESVILLE
Paynesville
HAWICK
SUNBURG
PRAIRIE WOO
New Lon
Spicer

6.4.14 Maynard - Kerkhoven

Tracking Number. 2009-WC-N3

Utilities. Xcel Energy

Inadequacy. The existing Maynard – Kerkhoven Tap 115 kV line contains approximately 14 miles of low-capacity conductor that overloads during outage of the Granite Falls – Willmar 230 kV line.

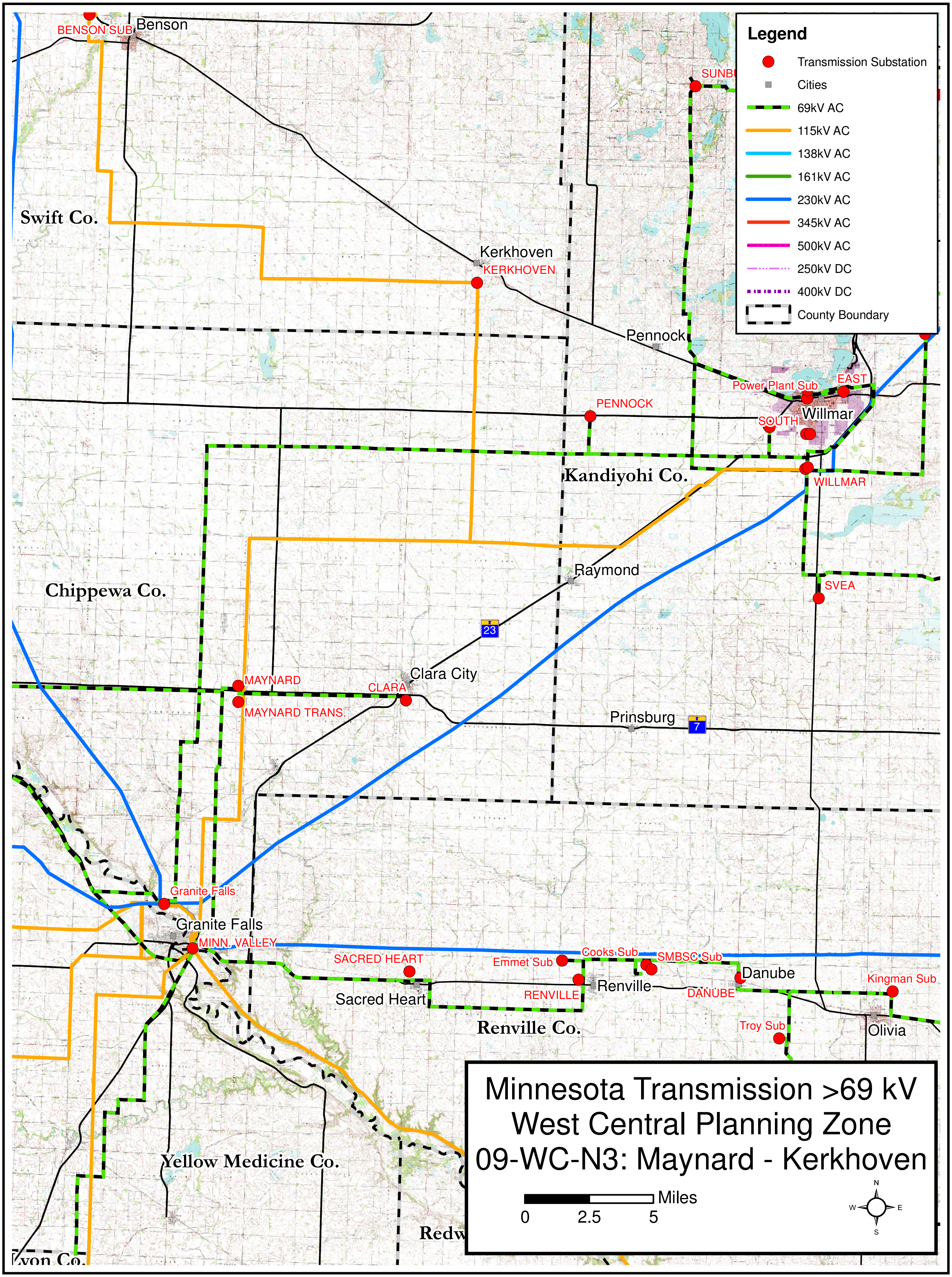
A map showing the area between Granite Falls and Kerkhoven Substations is shown on the following page.

Alternatives. Two alternatives have been considered. One alternative is to rebuild the line to a higher capacity. The other is some kind of distributed generation in the area.

Analysis. This inadequacy was identified in Xcel Energy's 2009 NERC Compliance Assessment. The conductor that overloads as a result of this contingency is an older conductor and is the most limiting conductor on the entire 115 kV line. The most effective option is to rebuild the low-capacity conductor to a higher capacity.

Distributed generation is not believed to be an adequate solution to this problem because increased generation development in southwest Minnesota is a chief contributing factor to the increased flow on this transmission line. The capacity of this line needs to be upgraded in order to enable additional generation to interconnect to the transmission system.

Schedule. Due to the size of the need in this area, this project is being pursued to be in service prior to summer 2019. Since the project is a line rebuild without any change in voltage, a Certificate of Need will not be required, and if there is no change in the right-of-way, no Route Permit will be required either.



Legend
Transmission Substation
Cities
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
County Boundary
Minnesota Transmission >69 kV
West Central Planning Zone
09-WC-N3: Maynard - Kerkhoven
Miles
0
2.5
5
N
W
E
S
Benson
BENSON SUB
Swift Co.
Kerkhoven
KERKHOVEN
Pennock
PENNOCK
Power Plant Sub
EAST
Willmar
SOUTH
WILLMAR
Kandiyohi Co.
Raymond
SVEA
Chippewa Co.
23
Clara City
MAYNARD
CLARA
MAYNARD TRANS.
Prinsburg
7
Granite Falls
Granite Falls
MINN. VALLEY
SACRED HEART
Sacred Heart
Emmet Sub
Cooks Sub
SMBSC Sub
Renville
RENVILLE
Danube
DANUBE
Kingman Sub
Troy Sub
Olivia
Renville Co.
Yellow Medicine Co.

6.4.15 Sartell Distribution Substation

Tracking Number: 2009-WC-N4

Utility: Great River Energy

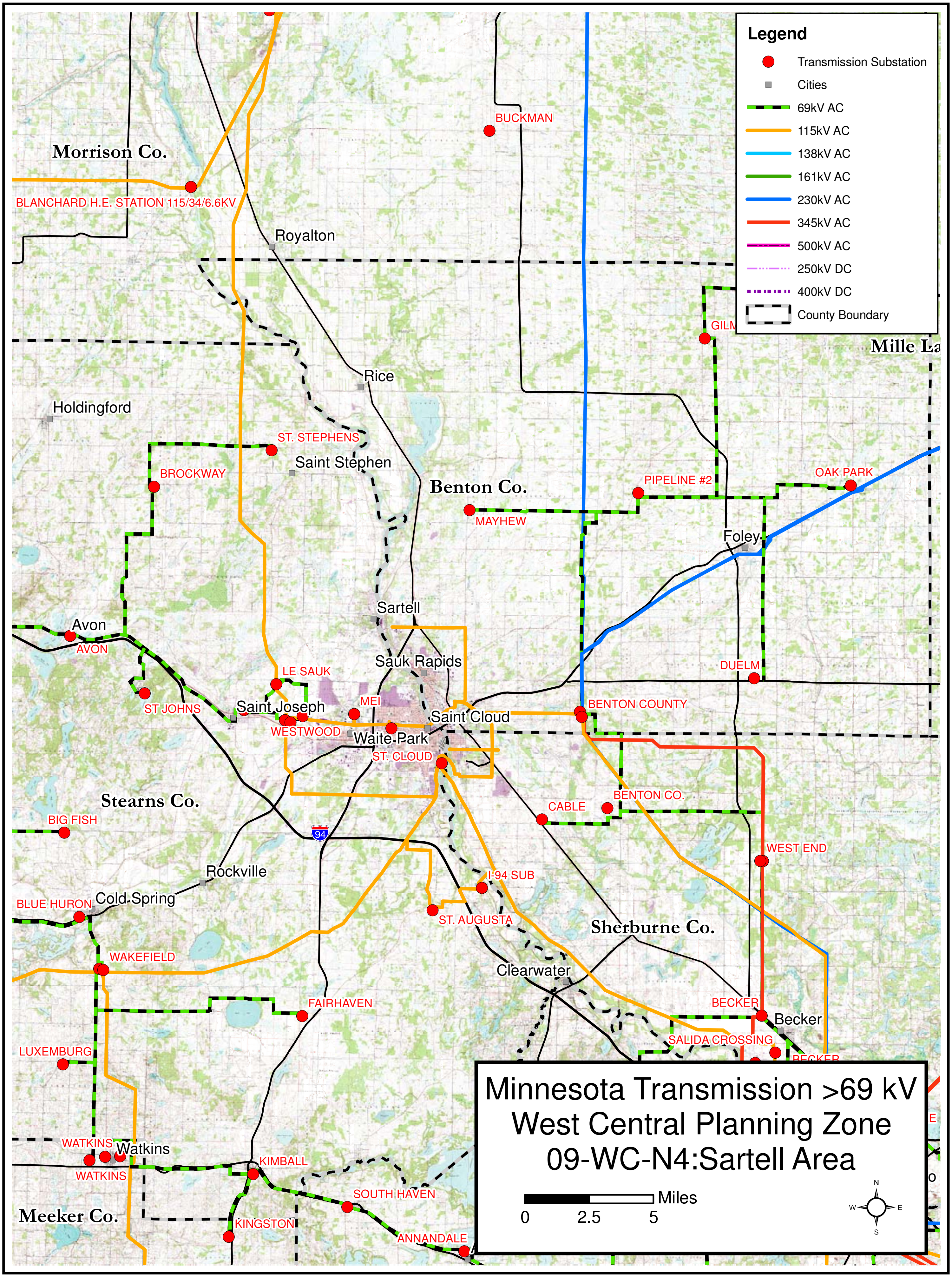
Inadequacy: Load has continued to grow in the Sartell Area, and additional resources are necessary. The distribution transformer at LeSauk and the feeder that serves the Sartell area will be overloaded in the short term due to load growth in the area. Most of the load growth is coming from increased residential and commercial demand.

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

Alternatives: The alternatives for this area include rebuilding/reconductoring of overloaded equipment and establishing a new distribution substation. Stearns Electric Association recommended that the best value alternative for serving growing loads in the area is to establish a new distribution substation. This new Sartell distribution substation will be established on a radial 2.5 mile 115 kV line that will tap the 0.5 mile 115 kV line between LeSauk Tap and LeSauk distribution sub.

Analysis: As described in this Biennial Report under the West St. Cloud area section (Tracking Number 2003-WC-N9), GRE, Stearns Electric Association and Xcel Energy are planning to covert the LeSauk distribution substation to 115 kV in late 2009. Conversion of LeSauk will require construction of under ½ mile of 115 kV line tapping the West St. Cloud to Fisher Hills 115 kV line.

Schedule: Stearns Electric Association plans to energize the Sartell distribution substation in the 2010 timeframe.



Legend
Transmission Substation
Cities
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
County Boundary
Minnesota Transmission >69 kV
West Central Planning Zone
09-WC-N4:Sartell Area
Miles
0
2.5
5
Morrison Co.
Benton Co.
Stearns Co.
Sherburne Co.
Meeker Co.
BUCKMAN
BLANCHARD H.E. STATION 115/34/6.6KV
Royalton
Rice
Holdingford
ST. STEPHENS
Saint Stephen
BROCKWAY
MAYHEW
PIPELINE #2
OAK PARK
Foley
Sartell
Avon
AVON
Sauk Rapids
LE SAUK
DUELM
ST JOHNS
Saint Joseph
MEI
Saint Cloud
BENTON COUNTY
WESTWOOD
Waite Park
ST. CLOUD
BENTON CO.
CABLE
BIG FISH
WEST END
Rockville
I-94 SUB
BLUE HURON
Cold Spring
ST. AUGUSTA
WAKEFIELD
Clearwater
FAIRHAVEN
BECKER
Becker
SALIDA CROSSING
LUXEMBURG
WATKINS
Watkins
WATKINS
KIMBALL
SOUTH HAVEN
KINGSTON
ANNANDALE

6.4.16 Wakefield –Paynesville—Maple Lake Area

Tracking Number. 2009-WC-N5

Utility. Great River Energy

Inadequacies: The Wakefield – Paynesville – Maple Lake area includes a 34.5 kV and 69 kV transmission system that serves the area from the Wakefield and Dickinson 115/69 kV sources and Paynesville 115/34.5 kV source.

Studies including GRE's latest long range plan show that this area will experience low voltage problems around Watkins and transmission line loading issues on the Maple Lake to Watkins 69 kV system. The area between Wakefield and Watkins experiences low voltage problems for the loss of the Wakefield 115/69 kV transformer or the Wakefield Fairhaven Tap 69 kV line. These outages also cause the Maple Lake to Annandale 69 kV line to overload in the short term. The Maple Lake to Watkins 69 kV system is also known to have reliability problems due to age.

A map of this area is shown following the discussion.

Alternatives: Four alternatives were considered to address the low voltage and line overload problems in this area. The following are the alternatives:

1) Establish a 115/69 kV, 70 MVA source at Watkins

2) Construct a new 69 kV line from Paynesville to Watkins

3) Rebuild the Maple Lake to Watkins 69 kV line with 477 ACSR conductor

4) Distributed Generation

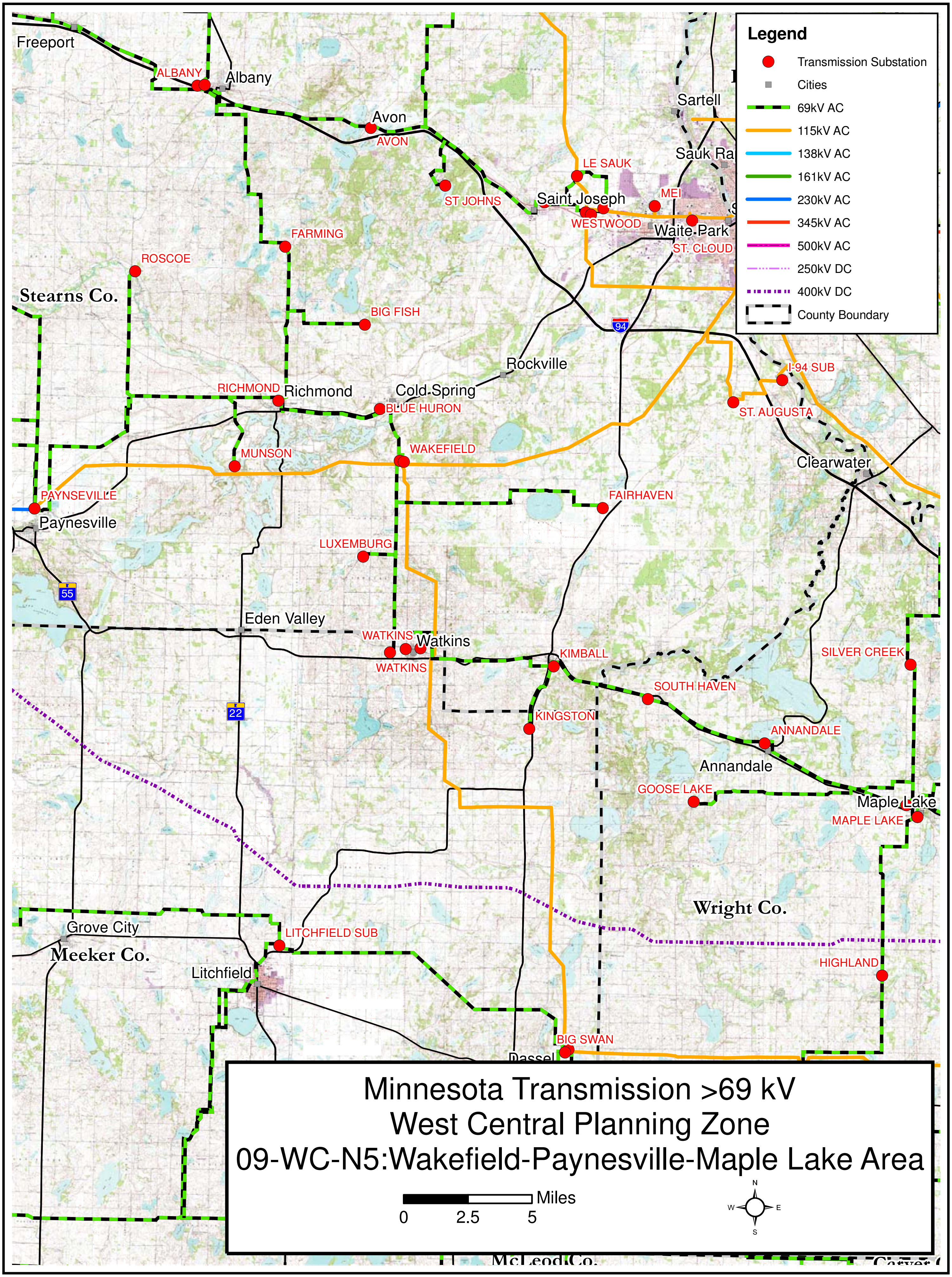
Analysis: All three alternatives were evaluated and were found to alleviate the low voltage and line loading issues in the area. Alternative 1 establishes a 115/69 kV source at Watkins, tapping the Wakefield to Big Swan 115 kV line. While this source addresses the low voltage problems in the Watkins area, it will not address the low voltage problems in the Kingston area that will arise in the long term for the loss of the Watkins to Kingston Tap 69 kV line.

Alternative 2, construction a new 69 kV line from Paynesville to Watkins, introduces the Paynesville source to the Watkins area and provides opportunities for 34.5 kV radial distribution substations, such as the Meeker Electric Cooperative (MEC) Paynesville Substation and Xcel Energy's Eden Valley Substation, to be upgraded to 69 kV when an upgrade is required. Similar to Alternative 1, this alternative doesn't address the long term voltage problems in the Kingston area that will be caused by the loss of the Watkins to Kingston Tap 69 kV line.

The Maple Lake to Watkins 69 kV system is old, has high impedance conductors, and has had reliability concerns. The high impedance conductors on this line cause a considerable voltage drop along the line. Alternative 3 includes rebuilding this line with a 477 ACSR conductor in multiple phases with Phase I being the rebuild of the Maple Lake to Annandale 69 kV line portion. Unlike the other two alternatives, this option improves the reliability of the Maple Lake to Watkins 69 kV line and provides a better voltage profile for the Kingston area during the loss of the Watkins to Kingston Tap 69 kV line. This option, however, doesn't address the long term reactive power needs of the Watkins area. Thus, as these options have different benefits to the area, a combination of the above alternatives is preferred to address the transmission deficiencies of the area.

Distributed generation is not a desirable option in this area since the existing 69 kV system from Maple Lake to Watkins is aging and has reliability concerns. This line needs to be rebuilt to improve reliability and voltage of the 69 kV system regardless.

Schedule: Xcel Energy plans to reconductor the Maple Lake to Watkins line starting in 2010. The work will occur in different phases. Phase 1 of this project rebuilds the Maple Lake to Annandale 69 kV line. Reconductoring of the rest of the line from Annandale to Watkins will be carried on based on budget availability and need for voltage improvement in the area. GRE will start building a new 69 kV line from Paynesville to Meeker Electric Cooperative's new 69 kV distribution substation called Rice Lake. The existing 34.5 kV Paynesville distribution substation will be moved about 1 mile north in the 2012 timeframe and will be called Rice Lake distribution substation. This substation will serve all loads that are currently served from the Paynesville 34.5 kV substation. GRE anticipates that the rest of the 69 kV line from Rice Lake to Watkins will be constructed in the 2020 timeframe. According to GRE's latest long range plan, the Watkins 115/69 kV source will be required in the area in the 2030 timeframe. Re-study of the long term 69 kV constructions, including need for the Watkins 115/69 source, may be needed depending on changes in the load growth of the area.


Legend
Transmission Substation
Cities
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
County Boundary
Freeport
ALBANY
Albany
Avon
AVON
Sartell
Sauk Ra
LE SAUK
ST JOHNS
Saint Joseph
MEI
WESTWOOD
Waite Park
ST. CLOUD
FARMING
ROSCOE
Stearns Co.
BIG FISH
94
Rockville
I-94 SUB
RICHMOND
Richmond
Cold Spring
BLUE HURON
ST. AUGUSTA
WAKEFIELD
MUNSON
Clearwater
PAYNSEVILLE
Paynesville
FAIRHAVEN
LUXEMBURG
55
Eden Valley
WATKINS
Watkins
WATKINS
KIMBALL
SILVER CREEK
SOUTH HAVEN
KINGSTON
22
ANNANDALE
Annandale
GOOSE LAKE
Maple Lake
MAPLE LAKE
Wright Co.
Grove City
Meeker Co.
LITCHFIELD SUB
Litchfield
HIGHLAND
BIG SWAN
Dassel
McLeod Co.
Minnesota Transmission >69 kV
West Central Planning Zone
09-WC-N5:Wakefield-Paynesville-Maple Lake Area
Miles
0
2.5
5
N
W
E
S

6.4.17 Elk River-Becker Area

Tracking Number: 2009-WC-N6

Utility: Great River Energy

Inadequacy. This area is served by the Elk River 230/69 kV source and the Liberty 115/69 kV source. Load growth is causing loading concerns on the 69 kV system between the Elk River and Liberty substations and on the Elk River and Liberty transformers. This transmission system serves the Highway 10 corridor between Elk River, Big Lake, and Becker and has the potential to experience significant growth.

Transformer loading issues can be eased by the addition of a second Liberty 115/69 kV transformer. GRE had planned for this transformer addition when the Liberty substation was constructed and this will be pursued as an option when the remaining Liberty transformer capacity diminishes. However, area loads will eventually grow to the point that a loss of one transformer bank at Elk River or Liberty will cause the second bank at either location to exceed safe operating limits.

A map of the area is shown following the discussion.

Alternatives. GRE is focusing on reconductoring and temperature upgrades of existing lines to address near-term 69 kV line loading issues. Otherwise, two options have been considered as future solutions.

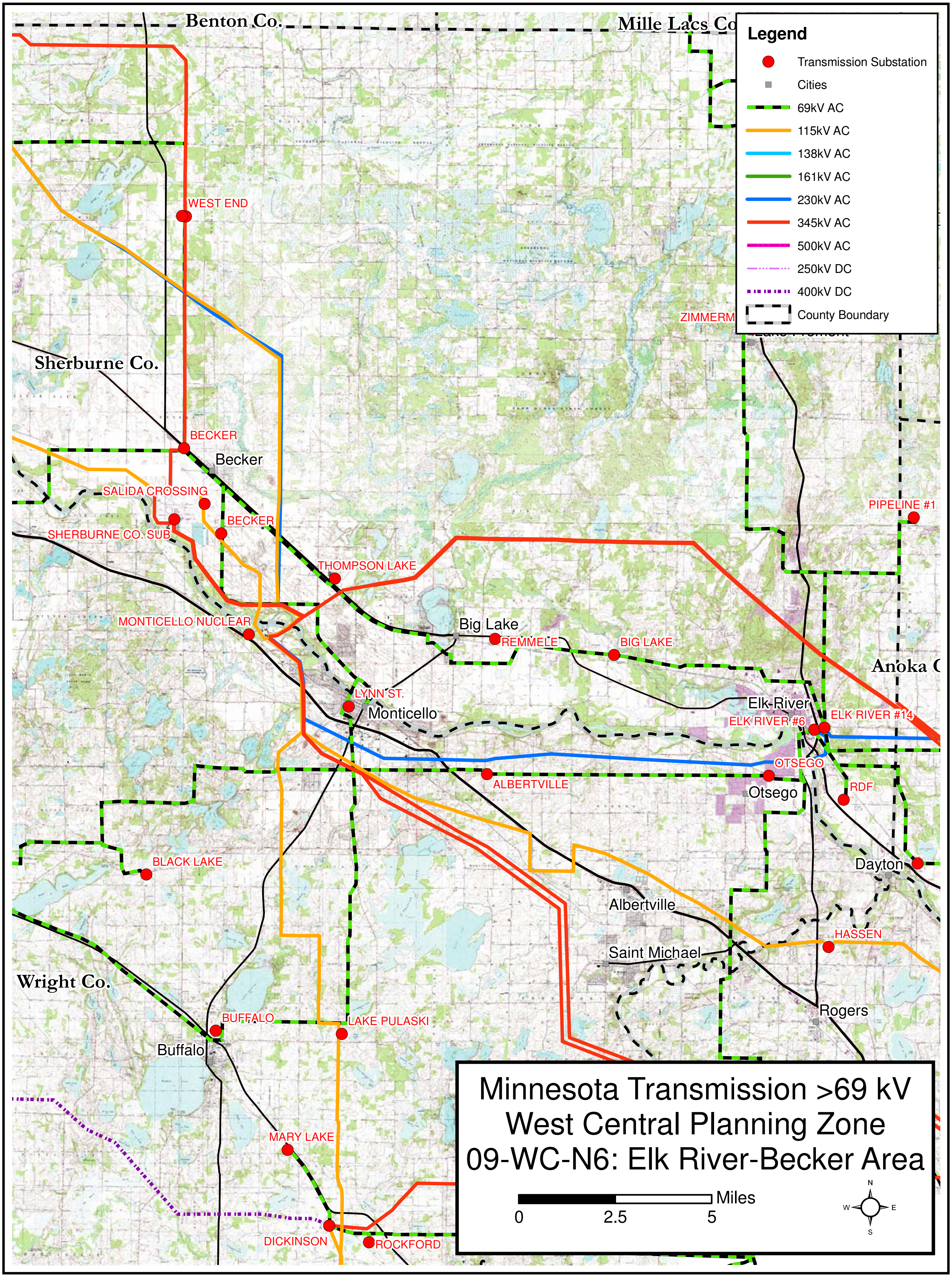
Alternative 1: New Elk River Area 345/115 kV source and Elk River-Waco-Liberty 115-69 kV double circuit line.

Alternative 2: New Foley 230/69 kV source and various Elk River-Liberty 69 kV line rebuilds.

Analysis. Alternative 1 would be attractive from the standpoint that a double circuit 115/69 kV line would provide more capacity to a narrow transmission corridor than either a single circuit 115 or 69 kV line could offer. Furthermore, the Waco breaker station was designed to accept a 115/69 kV transformation and such a transformer would offload the Elk River 230/69 kV transformers. An Elk River Area 345/115 kV source would also offer a termination point for a 115 kV line going east towards the Crooked Lake substation (See Twin Cities Zone Tracking Number 2003-TC-N12).

Alternative 2 would require much less up-front investment and would provide sectionalizing capability to a part of the GRE 69 kV system with a lot of line exposure. The Foley source would also provide backup to the Benton County 230/69 kV transformer. It is unknown, however, if Alternative 2 would totally eliminate the need for a 115 kV solution in the area as the source is somewhat distant from the load pocket along Hwy. 10.

Schedule. GRE is still evaluating options for this area. Depending on load growth, a new Liberty 115/69 kV transformer could be needed as soon as 2013. The need for either Alternative 1 or Alternative 2 is not expected to occur until at least 2017-2018. GRE will carefully monitor the area load growth to see when a solution needs to be implemented.



Minnesota Transmission >69 kV West Central Planning Zone 09-WC-N6: Elk River-Becker Area

6.4.18 Brooten – Lowry area

Tracking Number. 2009-WC-N7

Utilities. Xcel Energy

Inadequacy: This study area has a relatively low load growth, and is served by very low capacity lines with high impedance. The loss of the Douglas Co source towards Lowry would result in low voltages along the 69 kV line from Brooten to Lowery to Westport. The age of the lines in this area is also identified as a source of poor reliability of service in this region.

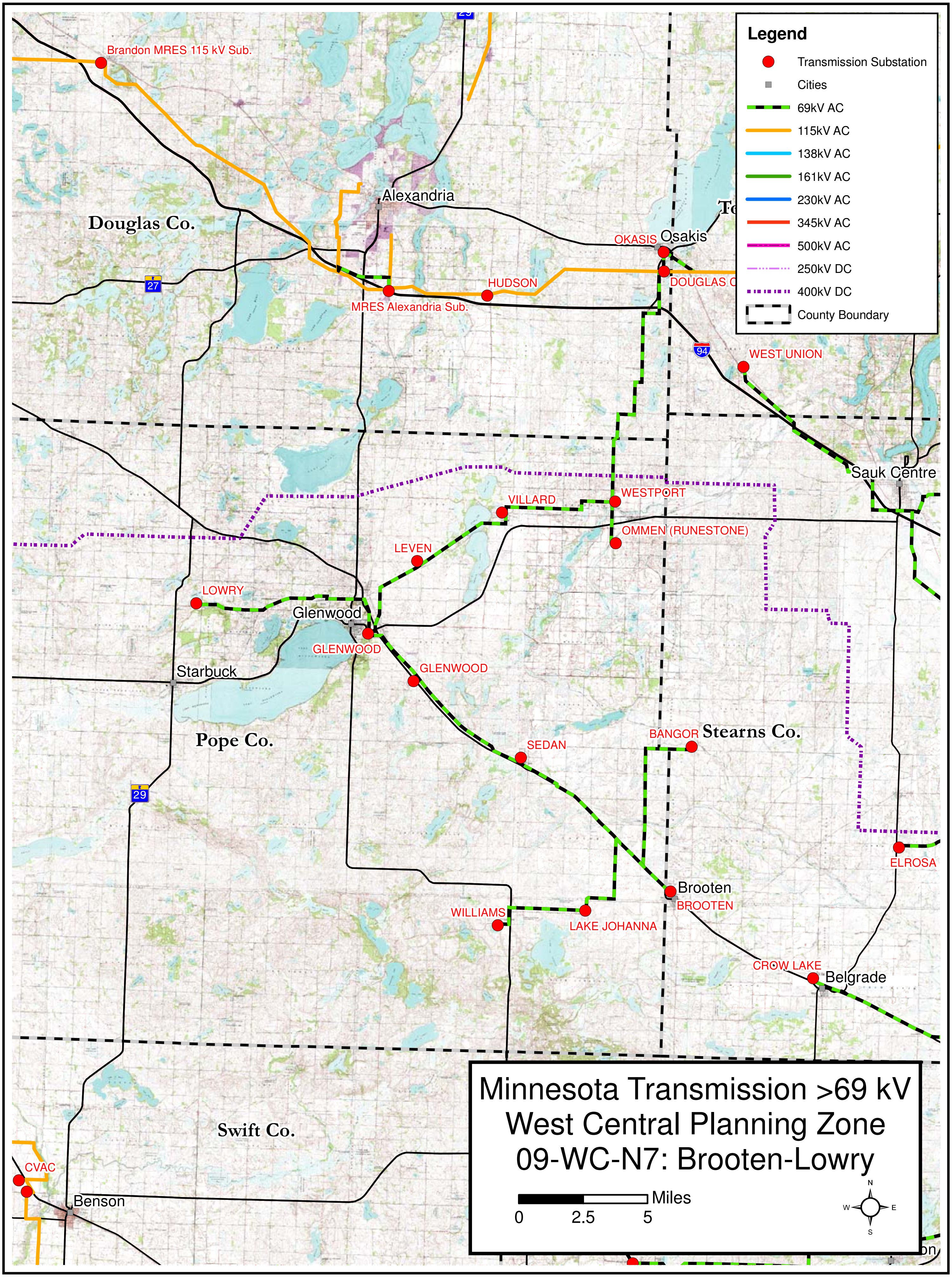
The completion of the Grove Lake switching station and conversion of the Benson – Gilchrist 41.6 kV line to 69 kV help in improving the voltages, but these are not adequate to improve the voltages at Lowery loads north of Lowery.

Alternatives: Two alternatives have been investigated – reconductoring the line to the Grove Lake switching station and distributed generation.

Analysis. Analysis indicates that reconductoring the line from the Grove Lake switching station to Lowery will result in reducing the impedance sufficiently to improve the voltages in the area. Recondutoring the line will also replace the aging lines in the study area thereby improving the reliability.

Distributed generation is not believed to be an adequate solution to this problem due to its cost, the extent of the low voltage problem, and the need for that generation to be online at all times in advance of the critical contingency.

***Schedule*:** This project is expected to be inservice between 2011 and 2012



Legend
Transmission Substation
Cities
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
County Boundary
Brandon MRES 115 kV Sub.
Alexandria
Douglas Co.
OKASIS
Osakis
HUDSON
DOUGLAS C
MRES Alexandria Sub.
WEST UNION
Sauk Centre
VILLARD
WESTPORT
OMMEN (RUNESTONE)
LEVEN
LOWRY
Glenwood
GLENWOOD
Starbuck
GLENWOOD
Pope Co.
SEDAN
BANGOR
Stearns Co.
ELROSA
Brooten
BROOTEN
WILLIAMS
LAKE JOHANNA
CROW LAKE
Belgrade
Swift Co.
CVAC
Benson
27
29
94
Minnesota Transmission >69 kV
West Central Planning Zone
09-WC-N7: Brooten-Lowry
Miles
0
2.5
5
N
W
E
S

6.5 Twin Cities Zone

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

Twin Cities Zone

Tracking Number	Description	Projected In-Service Year	Need Driver	Section No.
2003-TC-N1	Aldrich to St. Louis Park	Phase 1 Completed March 2006 Phase 2 by 2018	Overloads during contingencies	6.5.2
2003-TC-N4	Chisago – Apple River	2010	Overloads and low voltages	6.5.3
2003-TC-N8	Long Lake – Oakdale – Tanners Lake-Woodbury 115 kV line	Completed & 2009	Thermal overloads from transmission outages	6.5.4
2003-TC-N10	Twin Cities 345/115 kV Transformer Capacity	To be Determined	Approaching emergency loading levels	6.5.5
2003-TC-N12	Elk River – Ramsey – Bunker Lake Area (Enterprise Park)	2009	Low voltage and line overloads	6.5.6
2003-TC-N13	Minnesota-Wisconsin Export Interface	To be Determined	Regional constraint	6.5.7
2005-TC-N6	Yankee Doodle 115 kV substation conversion	2010	Load growth	6.5.8
2005-TC-N7	Twin Cities Fault Current Issue	To be Determined	Load growth	6.5.9
2005-CX-2 2005-CX-3	CapX 2020 Projects Brookings – Twin Cities 345 kV Twin Cities – LaCrosse 345 kV	2014		6.5.10
2007-TC-N1	Southwest Metro 115 kV Development	2013	Load serving infrastructure investments needed to meet growth in area demand	6.5.11
2007-TC-N3	South Minneapolis Distribution Study	2010	Load serving; infrastructure investments needed to meet growth in area demand	6.5.12
2007-TC-N4	Arsenal Development and Load-Serving	To be Determined	Load serving infrastructure investments needed to meet growth in area demand	6.5.13

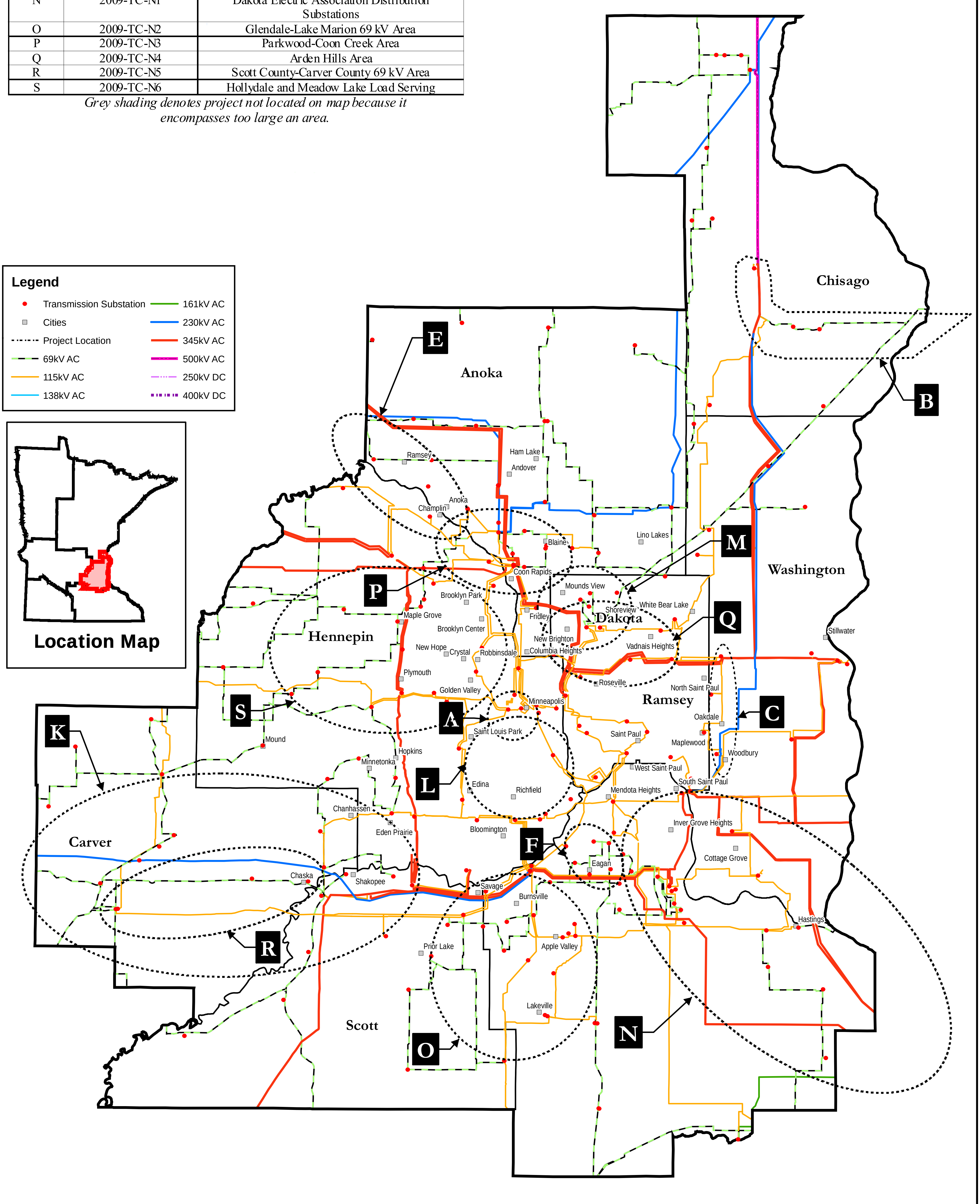
Tracking Number	Description	Projected In-Service Year	Need Driver	Section No.
2009-TC-N1	Dakota Electric Association Distribution Substations	2010 to 2013	Load growth	6.5.14
2009-TC-N2	Glendale – Lake Marion 69 kV Area a	2010 to 2026	Load growth	6.5.15
2009-TC-N3	Parkwood – Coon Creek Area	2012 to 2013	Load growth	6.5.16
2009-TC-N4	Arden Hills Load Serving	2011	Load growth	6.5.17
2009-TC-N5	Scott County – Carver County – New Prague	2014 to 2016	Load growth	6.5.18
2009-TC-N6	Hollydale and Meadow Lake Load Serving	2013 and 2015	Load growth	6.5.19

Minnesota Transmission >69kV
Twin Cities Planning Zone

Miles
0 10 20

Map ID	Tracking Number	Description
A	2003-TC-N1	Aldrich to St. Louis Park
B	2003-TC-N4	Chisago-Apple River
C	2003-TC-N8	Long Lake-Oakdale-Tanners Lake-Woodbury 115 kV line
D	*2003-TC-N10*	*Twin Cities 345/115 kV Transformer Capacity*
E	2003-TC-N12	Elk River – Ramsey – Bunker Lake Area (Enterprise Park)
F	2005-TC-N6	Yankee Doodle 115 kV substation conversion
G	*2005-TC-N7*	*Twin Cities Fault Current Issue*
H	*2005-TC-N12*	*Dakota County generation*
I	*2005-CX-2*	*CapX 2020 Vision Plan Brookings – Twin Cities 345 kV*
J	*2005-CX-3*	*CapX 2020 Vision Plan Prairie Island – LaCrosse 345 kV*
K	2007-TC-N1	Outer Metro 115 kV Development
L	2007-TC-N3	South Minneapolis Distribution Study
M	2007-TC-N4	Arsenal Development and Load-Serving
N	2009-TC-N1	Dakota Electric Association Distribution Substations
O	2009-TC-N2	Glendale-Lake Marion 69 kV Area
P	2009-TC-N3	Parkwood-Coon Creek Area
Q	2009-TC-N4	Arden Hills Area
R	2009-TC-N5	Scott County-Carver County 69 kV Area
S	2009-TC-N6	Hollydale and Meadow Lake Load Serving

Grey shading denotes project not located on map because it encompasses too large an area.



6.5.1 Completed Projects

Some inadequacies in the Twin Cities Zone that were identified in earlier Biennial Reports were alleviated through the construction and completion of specific projects over the last two years. Information about each of the completed projects is summarized briefly in the table below, and those matters will be removed from the list of inadequacies that are discussed in the 2009 Report. More detailed information about these projects and inadequacies can be found in the 2005 and 2007 Reports and in the PUC Docket for the matter if the project fell within the jurisdiction of the Public Utilities Commission, in which case the Docket Number is shown below. Also, additional information is available by contacting the designated person for the utility that was responsible for constructing the project.

Tracking Number	Utility	Description	PUC Docket	Date Completed
2003-TC-N2	Xcel Energy and Great River Energy	The Eden Prairie – Minnetonka Area has been folded in to Southwest Metro 115 kV Development Tracking Number 2007-TC-N1		2009
2003-TC-N3	Xcel Energy and Great River Energy	The Carver County – Waconia Area has been folded in to southwest Metro 115 kV Development Tracking Number 2007-TC-N1		2009
2003-TC-N5	Xcel Energy	Rebuild 115 kV line between the new High Bridge generating plant and Rogers Lake	TL-05-1448 High Bridge Upgrade M-02-633	2008
2003-TC-N9	Great River Energy	Linwood 230/69 kV substation was added		Mid-2008
2005-TC-N3	Xcel Energy	Rebuild 115 kV line between Champlin Tap and Crooked Lake		Mid-2008
2005-TC-N8	City of Chaska Minnesota River Generation substation interconnection	Substation upgrades for expansion of Minnesota River Generating Station expansion		Mid-2008
2005-TC-N12	Great River Energy Xcel Energy	Dakota County Generation The project was withdrawn from the MISO queue.	None	2009
2007-TC-N2	Xcel Energy Hyland Lake – Dean Lake Line Reconductor	Reconductor of Hyland Lake to Dean Lake 115 kV line		Mid-2008

6.5.2 Aldrich to St. Louis Park

Tracking Number. 2003-TC-N1

Utility. Xcel Energy

Inadequacy**.** The Aldrich – St. Louis Park 115 kV line is subject to overload if another line in the area were to be out of service.

Alternatives**.** Two alternatives were identified – both alternatives involve the reconductoring of a 3.7 mile long portion of the Aldrich line to a higher capacity. Alternative 1 called for upgrading the line to an intermediate level in 2006 (310 MVA) and to a higher level by 2018 (348 MVA). Alternative 2 called for rebuilding the line to a higher level in 2006 (348 MVA). The alternatives differ in that Alternative 1 defers rebuilding of the line until more capacity is required.

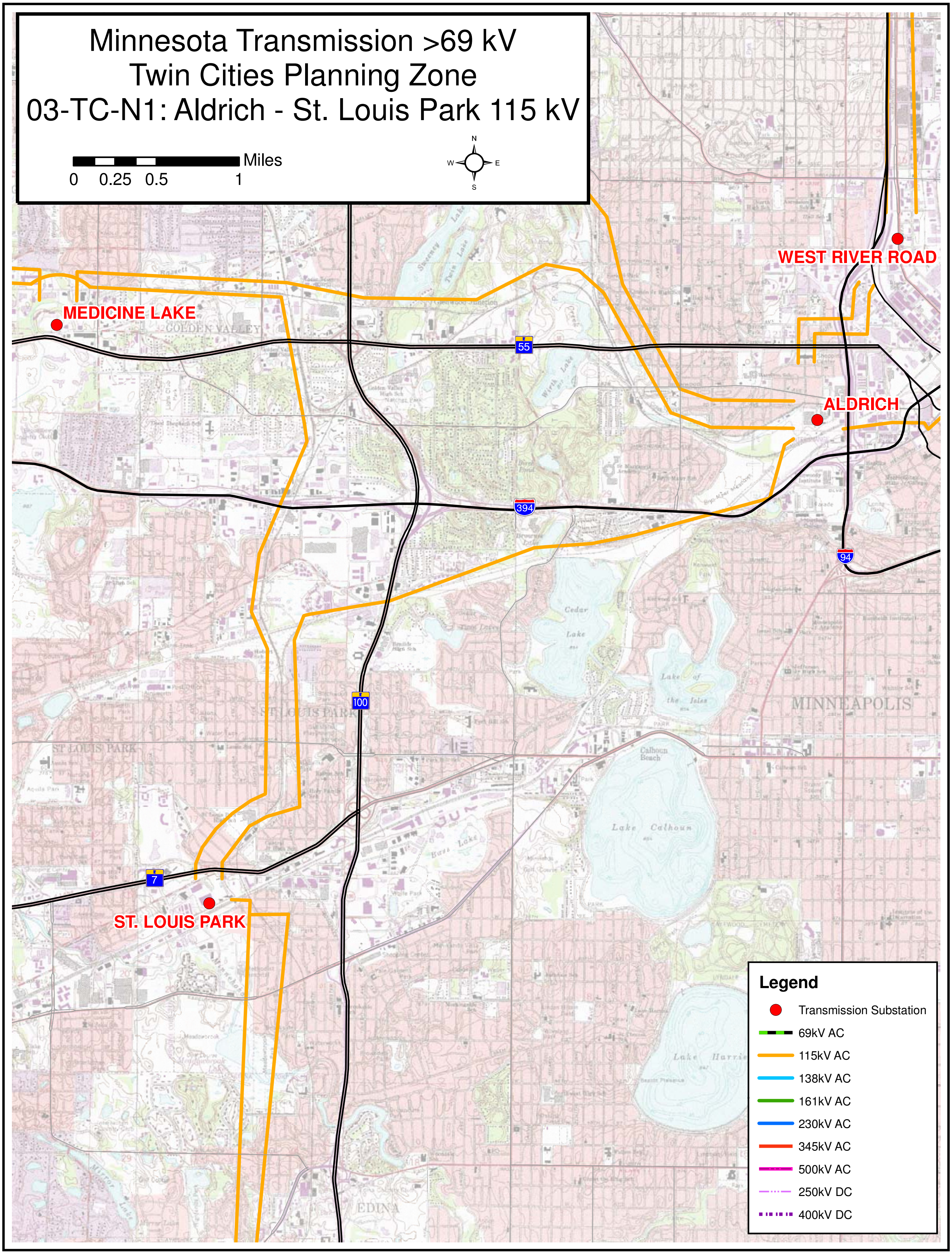
A map of the area is shown on the following page.

Analysis**.** The need to upgrade the Aldrich/St. Louis Park line is documented in the Report of Study of Aldrich-St. Louis Park 115kV and Edina-Eden Prairie 115kV Transmission Line Upgrades (2005). The Aldrich/St. Louis Park line has been shown to overload when other system elements are out of service.

Schedule**.** Xcel Energy completed an upgrade of the line to a 310 MVA rating in March 2006. Approval from the Public Utilities Commission was not required to upgrade the line. The second phase of the plan – reconductoring the line to a higher capacity – will be further investigated when system planning studies demonstrate a need.

2009 Update. Xcel Energy continues to monitor the situation. The need to upgrade the line to an even higher MVA rating is not necessary at this time.

Minnesota Transmission >69 kV
Twin Cities Planning Zone
03-TC-N1: Aldrich - St. Louis Park 115 kV



6.5.3 Chisago – Apple River

Tracking Number. 2003-TC-N4

Utility. Xcel Energy and Dairyland Power Cooperative

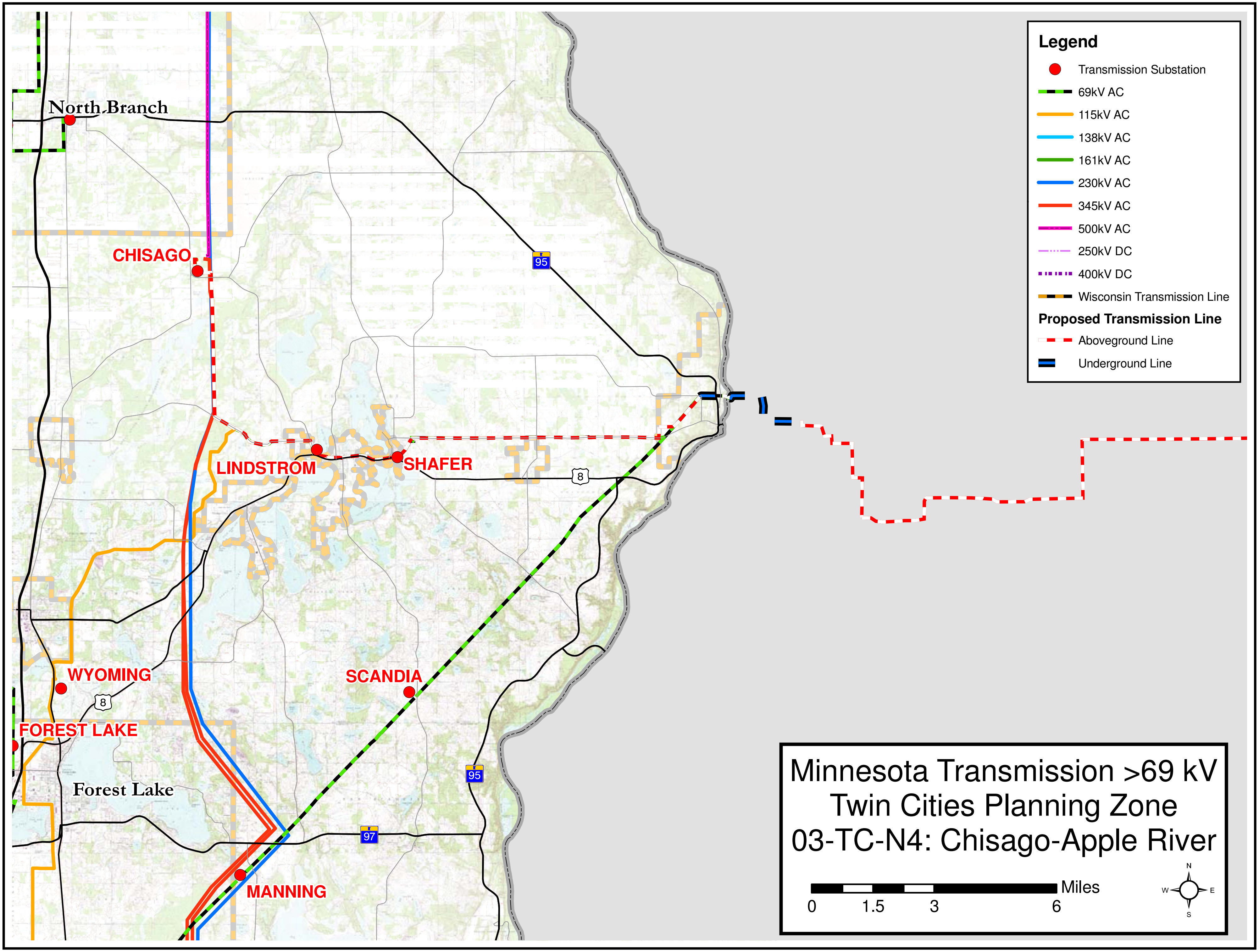
Inadequacy. The Chisago County – Apple River area includes Chisago County and parts of northwestern Wisconsin. The area is served by a 69 kV line running between Arden Hills and St. Croix Falls, by a 69 kV tap from the Chisago County substation to Scandia, and by the Apple River – St. Croix Falls 69 kV line from the east. Demand in the Chisago County area has increased over the past few years and is expected to continue to grow in the future. The present system cannot serve the existing demand with the loss of the Apple River – St. Croix Falls 69 kV. The loss of the Apple River – St. Croix Falls 69 kV line during times of peak loading can result in low voltage at several substations in western Wisconsin, overloading of surviving lines, and even loss of power for certain areas.

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

Alternatives. Four alternatives were identified in the Chisago Electric Reliability Project – East Central Minnesota and Northwestern Wisconsin Transmission Load Serving Analysis conducted in 2003. The preferred option is a rebuild of the existing 69 kV line between the Chisago County substation and the new Lawrence Creek substation to 115 kV and to 161 kV (with the majority of the section of line being a 161/69 kV double circuit) from Lawrence Creek to Apple River. This option was identified as Alternative 1 in the 2005 Report.

Schedule. On February 24, 2008, the PUC issued its written Order Granting Certificate of Need, Granting Route Permit, and Deferring Action on Portion of Route Permit Application Pending Negotiations and Further Filings. Construction of the line is presently underway and is expected to be in operation in 2010.

PUC Docket Number. TL-06-1677 (Route Permit)
CN-04-1176 (Certificate of Need)



Legend
Transmission Substation
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
Wisconsin Transmission Line
Proposed Transmission Line
Aboveground Line
Underground Line
North Branch
CHISAGO
LINDSTROM
SHAFER
WYOMING
SCANDIA
FOREST LAKE
Forest Lake
MANNING
95
8
97
Minnesota Transmission >69 kV
Twin Cities Planning Zone
03-TC-N4: Chisago-Apple River
0
1.5
3
6
Miles
N
E
S
W

6.5.4 Long Lake-Oakdale-Tanners Lake-Woodbury 115 kV Line

Tracking Number. 2003-TC-N8

Utility. Xcel Energy

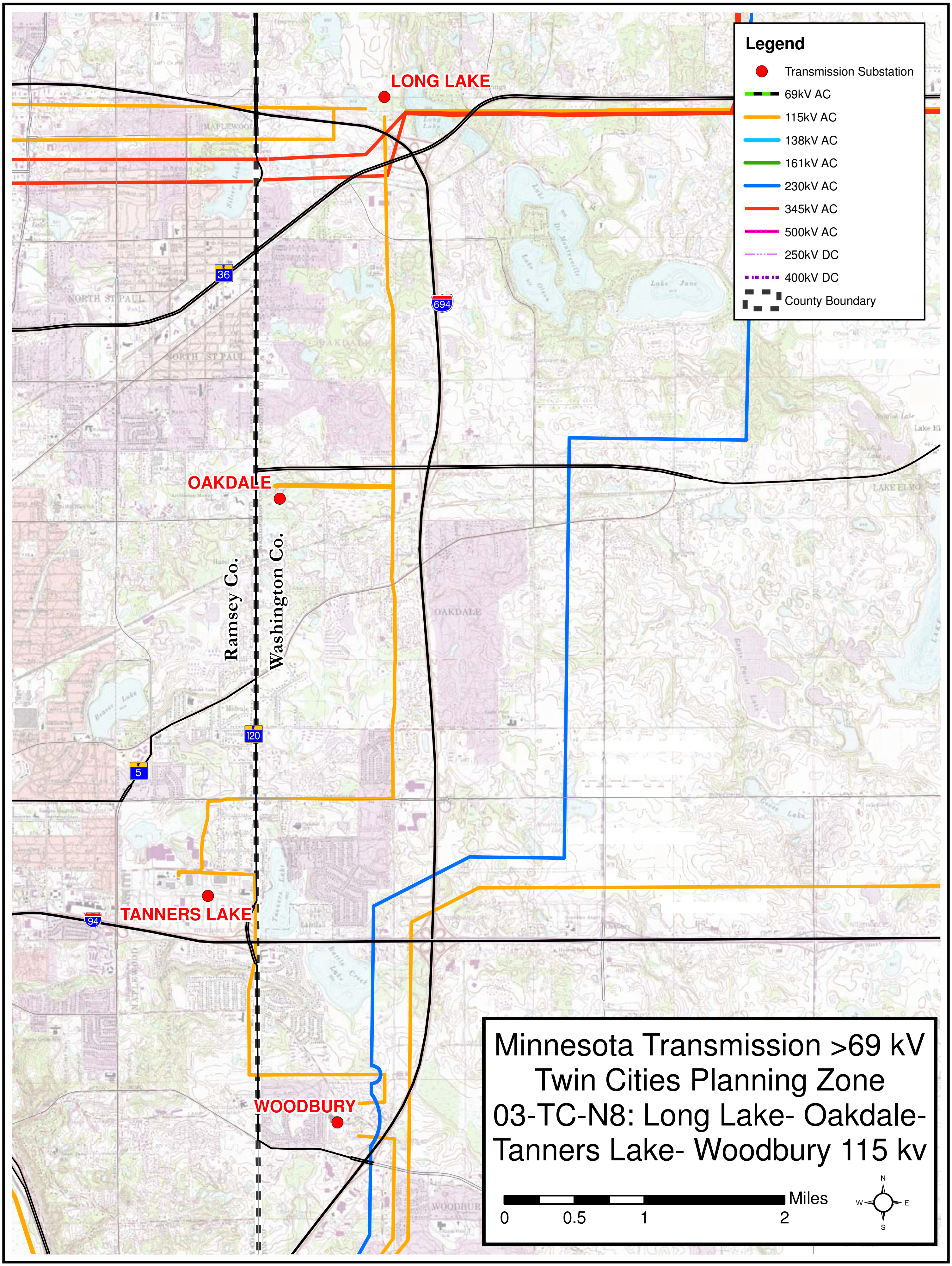
Inadequacy. There is a 115 kV line located in the suburbs just east of St. Paul that runs from the Long Lake Substation on the north to the Oakdale Substation to the Tanners Lake Substation to the Woodbury Substation on the south. The loss of a separate 115 kV line from the Baytown Substation feeding the Long Lake Substation results in a significant overload of the line between Tanners Lake and Woodbury, and the loss of a 115 kV line from the Red Rock Substation feeding the Woodbury Substation causes an overload of the segments between Tanners Lake and Long Lake.

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

Alternatives. There are two possible alternatives: (1) Upgrade the conductors to handle a higher capacity, and (2) Install a second 115 kV line in the area.

Analysis. Xcel Energy decided an upgrade was preferable to construction of a new line because an upgrade was less expensive and did not require additional right-of-way. The upgrade could also be completed more expeditiously. Xcel Energy decided to upgrade the lines in two phases, first upgrading the Oakdale-Tanners Lake segment and then the Woodbury-Tanner Lake segment. This approach was acceptable from a technical standpoint and allowed the utility to spread the work and the costs out over a two year-period.

Schedule. The Oakdale – Tanners Lake 115 kV line upgrade was completed in mid – 2007. The 2.5 miles of line between Woodbury and Tanners Lake is expected to be completed by the end of 2009.



Legend
Transmission Substation
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
County Boundary
LONG LAKE
OAKDALE
TANNERS LAKE
WOODBURY
Ramsey Co.
Washington Co.
36
694
120
5
94
Minnesota Transmission >69 kV
Twin Cities Planning Zone
03-TC-N8: Long Lake- Oakdale-
Tanners Lake- Woodbury 115 kv
Miles
0
0.5
1
2
N
W
E
S

6.5.5 Twin Cities 345/115 kV Transformer Capacity

Tracking Number. 2003-TC-N10

Utility. Xcel Energy and Great River Energy

***Inadequacy*.** There are nineteen 345/115 kV or 230/115 kV transformers in the Twin Cities area. These transformers serve a majority of the Twin Cities load from remote generation from Xcel Energy's Allen S. King, Monticello, Prairie Island and Sherburne County plants, from Great River Energy's plants in North Dakota, and by hydropower from Manitoba.

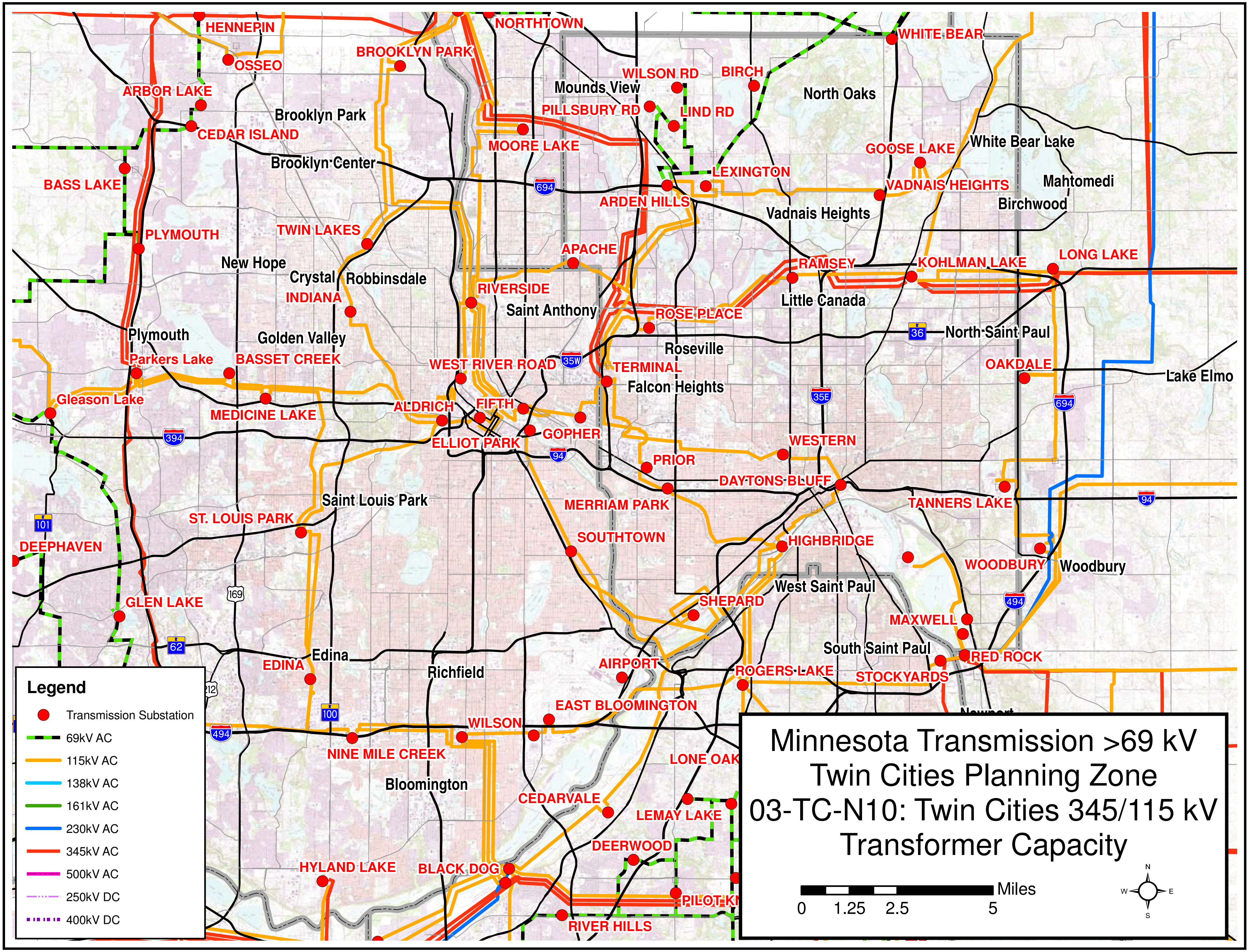
Xcel Energy has made an initial assessment of the loading on these transformers. A number of the transformers are near their emergency loading criteria. However, this is very dependent on Twin City generation schedules.

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

***Alternatives*.** The two alternatives are (1) to replace existing transformers with larger capacity units or (2) install additional units at the affected substations.

***Analysis*.** This is an ongoing situation that Xcel Energy and Great River Energy continuously monitor.

***Schedule*.** Transformer capacity will continue to be studied on an ongoing basis and new projects will be identified as needed.


Minnesota Transmission >69 kV
Twin Cities Planning Zone
03-TC-N10: Twin Cities 345/115 kV
Transformer Capacity
Legend
Transmission Substation
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
Miles
0
1.25
2.5
5
N
S
E
W
HENNEPIN
NORTHTOWN
WHITE BEAR
BROOKLYN PARK
OSSEO
WILSON RD
BIRCH
ARBOR LAKE
Mounds View
North Oaks
PILLSBURY RD
LIND RD
Brooklyn Park
CEDAR ISLAND
MOORE LAKE
GOOSE LAKE
White Bear Lake
Brooklyn Center
LEXINGTON
BASS LAKE
VADNAIS HEIGHTS
Mahtomedi
ARDEN HILLS
Birchwood
Vadnais Heights
PLYMOUTH
TWIN LAKES
APACHE
LONG LAKE
New Hope
RAMSEY
KOHLMAN LAKE
Crystal
Robbinsdale
RIVERSIDE
INDIANA
Little Canada
Saint Anthony
ROSE PLACE
Plymouth
Golden Valley
North Saint Paul
Roseville
Parkers Lake
BASSET CREEK
WEST RIVER ROAD
OAKDALE
TERMINAL
Lake Elmo
Falcon Heights
Gleason Lake
MEDICINE LAKE
ALDRICH
FIFTH
GOPHER
WESTERN
ELLIOT PARK
PRIOR
DAYTONS BLUFF
Saint Louis Park
MERRIAM PARK
TANNERS LAKE
ST. LOUIS PARK
SOUTHTOWN
DEEPHAVEN
HIGHBRIDGE
WOODBURY
Woodbury
West Saint Paul
GLEN LAKE
SHEPARD
MAXWELL
Edina
South Saint Paul
RED ROCK
EDINA
AIRPORT
Richfield
ROGERS LAKE
STOCKYARDS
EAST BLOOMINGTON
WILSON
Newport
NINE MILE CREEK
LONE OAK
Bloomington
CEDARVALE
LEMAY LAKE
DEERWOOD
HYLAND LAKE
BLACK DOG
PILOT KN
RIVER HILLS
694
35W
35E
36
394
94
101
169
62
100
494
212

6.5.6 Elk River – Ramsey – Bunker Lake Area (Enterprise Park)

Tracking Number. 2003-TC-N12

Utility. Great River Energy

Inadequacy. The following description of the situation is identical to what was included in the 2007 Report. This area is served by two 230/69 kV sources, one from the Elk River substation and one from the Bunker Lake substation. The Enterprise Park substation, between the two sources, is a radial-fed substation, which means it has only one line (source) leading to it. The loss of one of the 230/69 kV sources on either end results in an overload situation on the other 69 kV line. The growth potential in this area is high because of undeveloped land along Highway 10 in Ramsey, and the problem is expected to become worse.

A map of the area is shown following the discussion.

Alternatives. Three long-term alternatives have been under consideration for several years, since first identified in the 2003 Report. These alternatives include the following:

Alternative 1: A new 115/69 kV source at Enterprise Park.

Alternative 2: Converting the 69 kV system between Elk River and Bunker Lake to 115 kV.

Alternative 3: Rebuild the 69 kV system between Elk River and Bunker Lake.

GRE has now identified two different options for a new line to serve Enterprise Park. These include the following:

Alternative 1a: A new Crooked Lake-Enterprise Park 115 kV line and Enterprise Park 115/69 kV source.

Alternative 1b: A new Crooked Lake-Enterprise Park 115 kV line and conversion of the Enterprise Park substation to 115 kV operation.

Finally, a fourth option is distributed generation.

Alternative 4: Distributed generation.

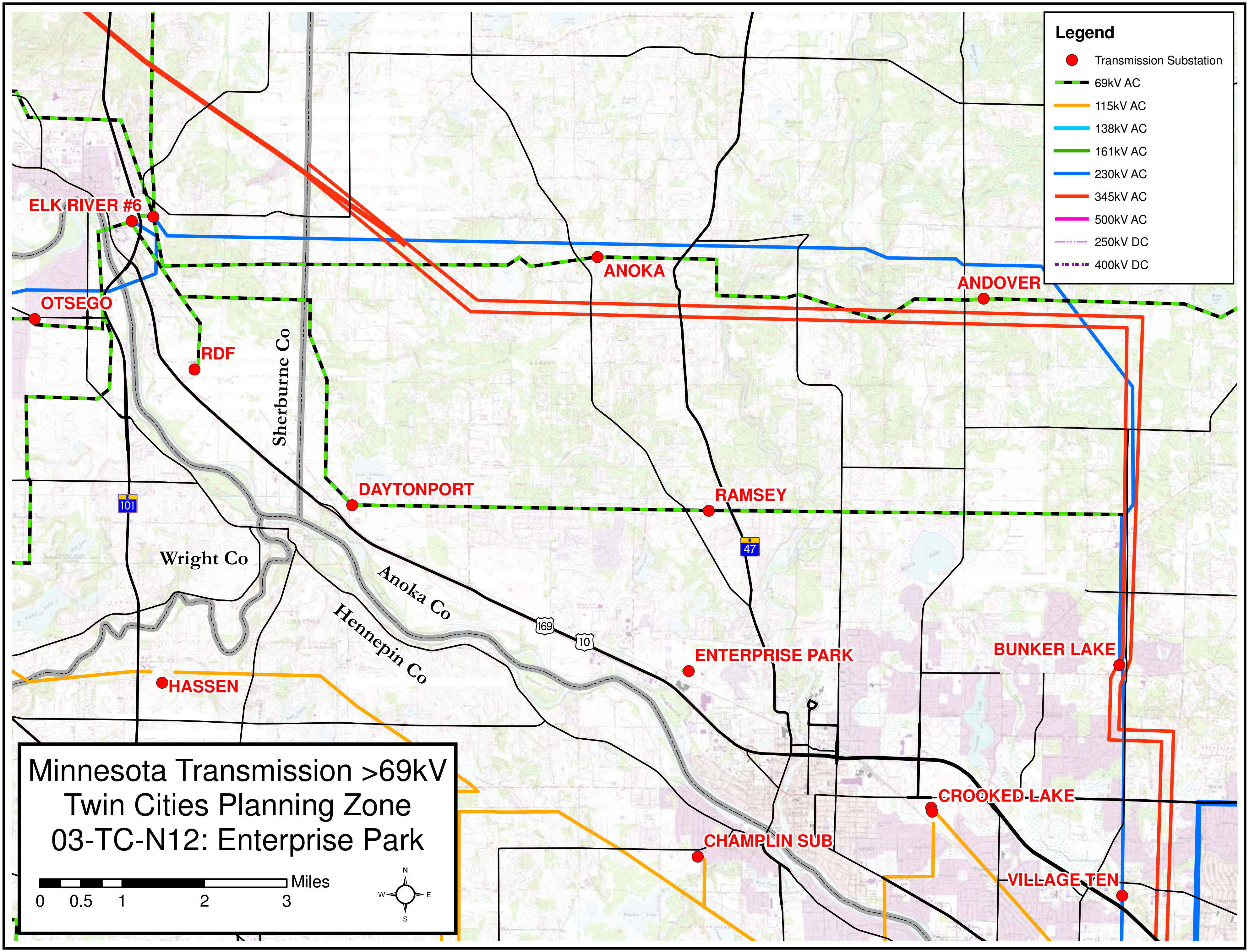
Analysis. Great River Energy constructed a new 175 MW natural gas fired peaking generator in Elk River in 2009. This required GRE to rebuild the existing 69 kV line between the Elk River and RDF substations which has provided some additional capacity for the system. However, a new transmission line to the Enterprise Park Substation is still required.

Alternative 1b is desired over Alternative 1a because the long-term plan is to continue distribution substation conversions to 115 kV as load growth will cause area 230/69 kV transformer loadings to become a concern in addition to the area voltage support and line overload concerns. This project would be a start of a 115 kV system between Coon Rapids and the Elk River area (see West Central Region Project 2009-WC-N6).

Distributed generation is not desirable in this area because this system serves the Highway 10 corridor where load growth has been high in recent years and significant development potential still exists. Any generation added to this system would need to be sized to meet the future load growth or continually added as the system load grows. Furthermore, any such generation would need to be distribution-connected and/or added near the Enterprise Park substation to be effective in reducing the 69 kV line flows. The Elk River peaking generator was installed as capacity resource to meet GRE member demand and not as a distributed generation resource to alleviate area line flows and thus tends to exacerbate any transformer and line loading issues on the 69 kV system in question.

Schedule. GRE is currently reviewing corridor options for a new 115 kV line. Any new line would be less than ten miles in length so a Certificate of Need from the Commission is not required. GRE anticipates that a route permit will be sought in 2010, probably from local government. GRE has a scheduled energization date of 2012 for this project.

PUC Docket Numbers. CN-07-678 (Certificate of Need for the Elk River Peaking Plant)
GS-07-715 (Site Permit for the Elk River Peaking Plant)



Legend
Transmission Substation
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
ELK RIVER #6
OTSEGO
RDF
ANOKA
ANDOVER
DAYTONPORT
RAMSEY
ENTERPRISE PARK
BUNKER LAKE
HASSEN
CROOKED LAKE
CHAMPLIN SUB
VILLAGE TEN
Sherburne Co
Wright Co
Anoka Co
Hennepin Co
101
47
169
10
Minnesota Transmission >69kV
Twin Cities Planning Zone
03-TC-N12: Enterprise Park
Miles
0
0.5
1
2
3
N
S
E
W

6.5.7 Minnesota – Wisconsin Export Interface

Tracking Number. 2003-TC-N13

Utility. Several

Inadequacy. The Minnesota-Wisconsin Export interface (MWEX) is a measure of the power flowing from or through the Twin Cities area into Wisconsin. Prior to the installation of the Arrowhead – Gardner Park 345 kV line in January 2008, flow between Minnesota and areas south and east was governed by the Minnesota-Wisconsin Stability Interface (MWSI). MWEX is presently a regional constraint that limits the delivery of power in MAPP and MISO and limits the implementation of new wholesale transactions and the construction of new generation within Minnesota. The Minnesota-Wisconsin Export interface (MWEX) is a measure of the power flowing from or through the Twin Cities area into Wisconsin.

Alternatives. A number of projects being considered for various purposes will help increase MWEX and thus alleviate the present constraint. Chief among these is the 345 kV CapX line from the southeast Twin Cities to Rochester and on to LaCrosse (Tracking No. 2005-CX-3). Another line that was studied Minnesota utilities and is also the subject of a separate study by ATC is a line from LaCrosse to Madison. The RES Update Study, completed in March 2009, identified that this line would help facilitate additional generation interconnections in southeast Minnesota and help absorb fluctuations in generation levels.

Analysis. Just as the MWSI constraint was a factor that all utilities considered in regional transmission planning studies, the MWEX constraint continues to be examined as utilities conduct studies and determine appropriate transmission infrastructure to construct.

Schedule. There is no schedule specifically for the MWEX constraint but other projects affect the ability of the transmission grid to transfer power between the Twin Cities and areas to the south and east. Upon completion of the Arrowhead – Gardner Park 345 kV line, the MWSI constraint was replaced by MWEX. Generally speaking, MWEX is a simpler mechanism for measuring regional transmission flows and will be examined going forward for its continued appropriateness.

6.5.8 Yankee Doodle 115 kV Substation Conversion

Tracking Number. 2005-TC-N6

Utility. Great River Energy, Xcel Energy, and Dakota Electric Association

Inadequacy. The Yankee Doodle Substation, located in Eagan, is part of the Dakota Electric Cooperative system. (Dakota Electric is a member of Great River Energy). As reported in the 2007 Report, because of load growth in the area, the Yankee Doodle Substation was converted to 115 kV in the 2006 timeframe. While this conversion resolved many of the long range issues of the 69 kV system by reducing load supplied from it, the Yankee Doodle Substation is now served from a single source on a radial 115 kV line. A second source is required to provide a reliable service to the Yankee Doodle Substation.

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

Alternatives: As explained in the 2007 and 2005 Biennial Reports, three alternatives were developed to provide a second source to the Yankee Doodle double ended distribution substation. The following are the alternatives:

Alternative 1. A Rogers Lake-Lone Oak-Yankee Doodle-Rogers Lake 115 kV loop

Alternative 2. A Pilot Knob to Yankee Doodle 115 kV line

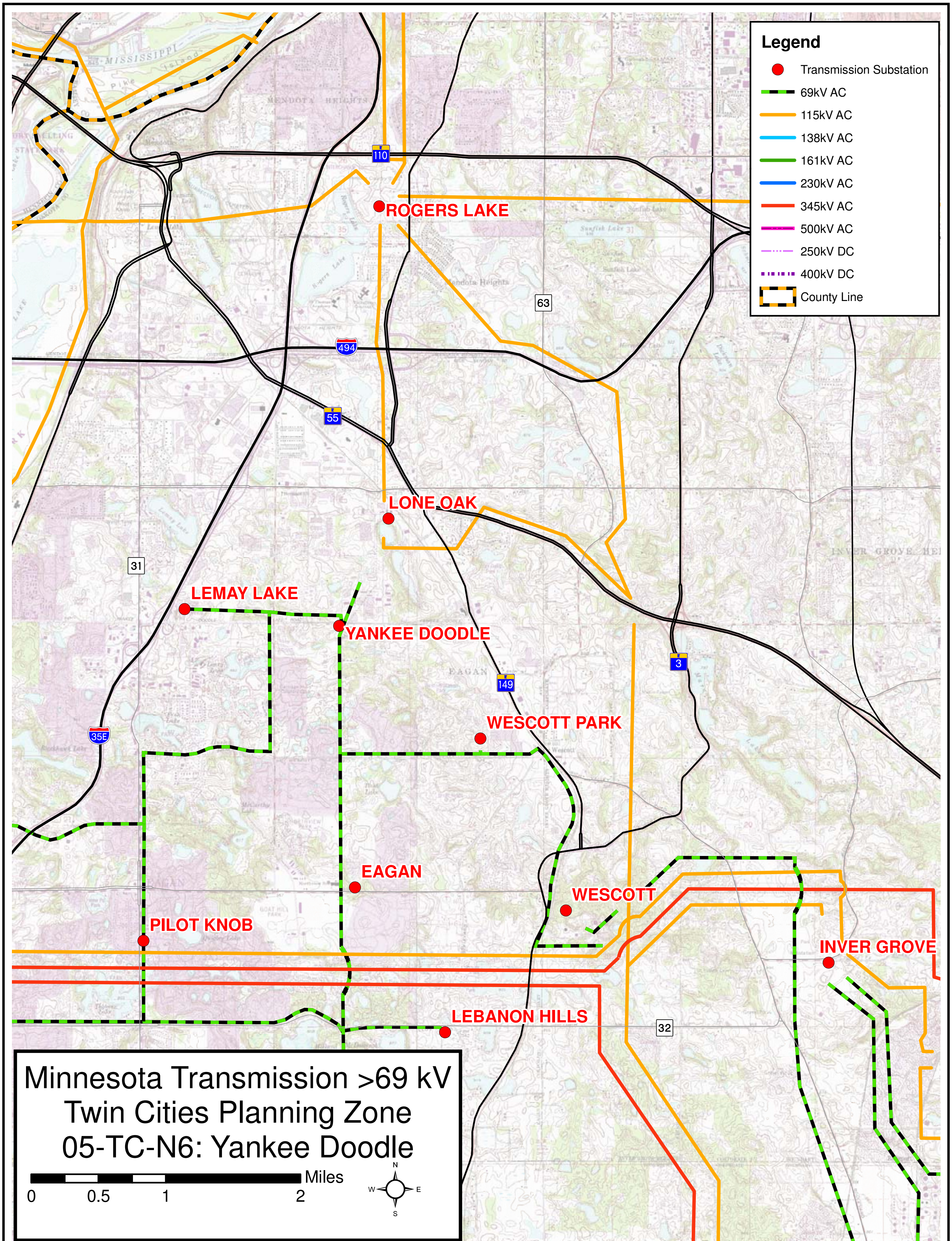
Alternative 3. An Inver Grove to Yankee Doodle 115 kV line

A distributed generation alternative was also considered.

Analysis: The second alternative calling for the construction of a 115 kV line from Pilot Knob to Yankee Doodle is the best alternative to provide the second source to the Yankee Doodle Substations. The other two alternatives are more costly than Alternative 2. The Pilot Knob to Yankee Doodle 115 kV line will be constructed by double circuiting with the Inver Grove to Pilot Knob 115 kV line and the Eagan to Lemay Lake 69 kV line. Dakota Electric Association plans to upgrade the Eagan distribution substation to 115 kV in conjunction with the Pilot Knob to Yankee Doodle 115 kV line project.

The Yankee Doodle Substation serves the metro area where there are land constraints to establish distributed generation for load serving needs in the area. Any distributed generation in that area needs to match the growing loads that are served from the Yankee Doodle, Eagan and other neighboring distribution substations in the area. Thus, from the reliability and feasibility standpoint, distributed generation is not a desirable option for this area.

Schedule: The Pilot Knob to Yankee Doodle 115 kV project is expected to be in-service in the 2010 timeframe. No certificate of need is required from the Public Utilities Commission because the line will be under ten miles in length and a permit will be obtained from local governmental bodies.



Legend
Transmission Substation
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
County Line
ROGERS LAKE
LONE OAK
LEMAY LAKE
YANKEE DOODLE
WESCOTT PARK
EAGAN
WESCOTT
PILOT KNOB
INVER GROVE
LEBANON HILLS
110
63
494
55
31
149
3
35E
32
Minnesota Transmission >69 kV
Twin Cities Planning Zone
05-TC-N6: Yankee Doodle
Miles
0
0.5
1
2
N
S
E
W

6.5.9 Twin Cities Fault Current Issue

Tracking Number. 2005-TC-N7

Utility. Xcel Energy and Great River Energy

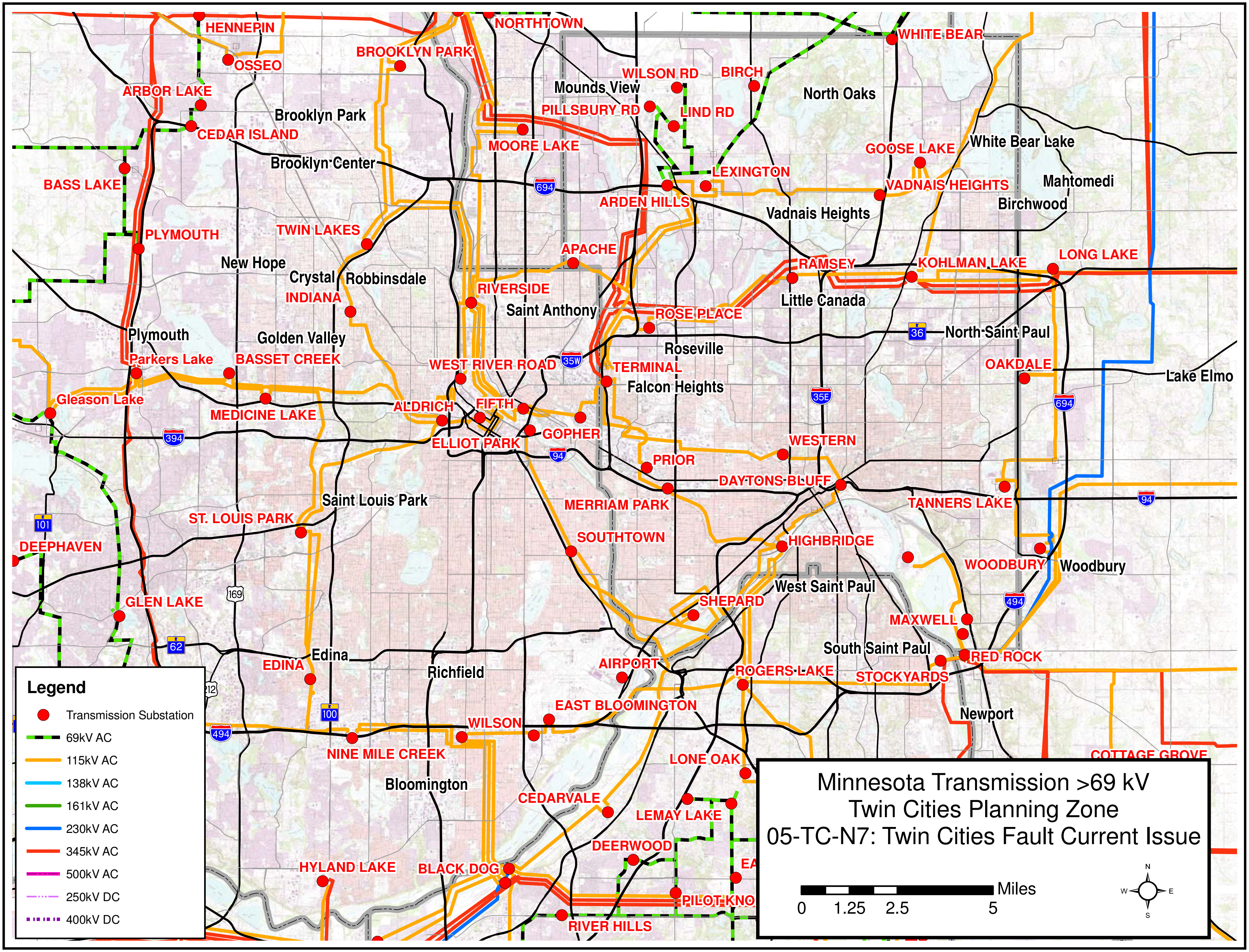
Inadequacy. General fault current levels on the system in the Twin Cities are increasing as transmission lines and generation are added to the transmission system. The grounding capability in the inner Twin Cities substations may be exceeded as loads continue to increase. At present there is no immediate need to address this concern. As transmission and generation facilities are added to the transmission grid, planning engineers will continue to monitor the fault currents that will result. When a potential problem is detected, a specific study will be launched to address the need.

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

Alternatives. Sectionalizing the system may be needed to decrease the fault current levels, but no alternatives have been identified or evaluated.

Analysis. These issues have not yet been evaluated at this early stage of the planning process. Until possible solutions are identified, it is not possible to determine the possible environmental impacts.

Schedule. Since the 2007 Biennial Transmission Projects Report was submitted two years ago, no specific needs for fault current mitigation have been identified, though fault current levels at some substations continue to creep closer to their limits. This issue continues to be monitored and will be addressed as needs are identified.


Minnesota Transmission >69 kV
Twin Cities Planning Zone
05-TC-N7: Twin Cities Fault Current Issue
Legend
Transmission Substation
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
Miles
0
1.25
2.5
5
N
S
E
W
HENNEPIN
NORTHTOWN
WHITE BEAR
OSSEO
BROOKLYN PARK
WILSON RD
BIRCH
ARBOR LAKE
Mounds View
North Oaks
PILLSBURY RD
LIND RD
Brooklyn Park
CEDAR ISLAND
MOORE LAKE
GOOSE LAKE
White Bear Lake
Brooklyn Center
LEXINGTON
BASS LAKE
VADNAIS HEIGHTS
Mahtomedi
ARDEN HILLS
Birchwood
Vadnais Heights
PLYMOUTH
TWIN LAKES
APACHE
LONG LAKE
New Hope
RAMSEY
KOHLMAN LAKE
Crystal
Robbinsdale
RIVERSIDE
INDIANA
Little Canada
Saint Anthony
ROSE PLACE
Plymouth
Golden Valley
North Saint Paul
Roseville
Parkers Lake
BASSET CREEK
WEST RIVER ROAD
TERMINAL
OAKDALE
Lake Elmo
Falcon Heights
Gleason Lake
MEDICINE LAKE
ALDRICH
FIFTH
GOPHER
ELLIOT PARK
WESTERN
PRIOR
DAYTONS BLUFF
MERRIAM PARK
TANNERS LAKE
Saint Louis Park
ST. LOUIS PARK
SOUTHTOWN
HIGHBRIDGE
DEEPHAVEN
WOODBURY
Woodbury
West Saint Paul
GLEN LAKE
SHEPARD
MAXWELL
South Saint Paul
RED ROCK
Edina
EDINA
AIRPORT
Richfield
ROGERS LAKE
STOCKYARDS
EAST BLOOMINGTON
Newport
WILSON
NINE MILE CREEK
LONE OAK
COTTAGE GROVE
Bloomington
CEDARVALE
LEMAY LAKE
DEERWOOD
HYLAND LAKE
BLACK DOG
PILOT KNO
RIVER HILLS
694
35W
36
35E
394
94
101
169
62
494
100
212

6.5.10 CapX 2020 Projects

Tracking Numbers. 2005-CX-1 (Fargo –Twin Cities 345 kV)
2005-CX-2 (Brookings – Southeast Twin Cities 345 kV)
2005-CX-3 (LaCrosse – Southeast Twin Cities 345 kV)
2005-NW-N2 (Bemidji-Grand Rapids 230 kV)

CapX 2020 Utilities. CapX 2020 is a joint initiative of 11 transmission-owning utilities in Minnesota and the surrounding region to expand the electric transmission grid to ensure continued reliable service. The CapX 2020 current roster consists of eleven utilities: Central Minnesota Municipal Power Agency, Dairyland Power Cooperative, Great River Energy, Minnesota Power, Minnkota Power Cooperative, Missouri River Energy Services, Otter Tail Power Company, Rochester Public Utilities, Southern Minnesota Municipal Power Agency, Wisconsin Public Power, Inc., and Xcel Energy.

More information about CapX 2020 is available in the 2005 and 2007 Biennial Reports and on the webpage maintained by the utilities: http://www.capx2020.com

CapX 2020 Transmission Projects. The CapX 2020 utilities have identified three 345 kV transmission lines and one 230 kV line as part of the Group I projects. The four lines are:

- Twin Cities – Fargo. This is an approximately 250-mile long, 345 kV project between Monticello, St. Cloud, Alexandria, and Fargo, North Dakota.

- Twin Cities – Brookings County. This is an approximately 200-mile, 345 kV project between the southeast comer of the Twin Cities and Brookings County, South Dakota, as well as a 345 kV segment from Marshall to the Granite Falls area.

- Twin Cities – LaCrosse. This is an approximately 150-mile, 345 kV project between the southeast corner of the Twin Cities, Rochester, and LaCrosse, Wisconsin. This project also includes two 161 kV transmission lines from a new North Rochester Substation into Rochester.

- Bemidji-Grand Rapids. This is an approximately 68 mile long line from the 230 kV Wilton Substation located just west of Bemidji, Minnesota (jointly owned by Otter Tail Power and Minnkota Power) to Minnesota Power's 230 kV Boswell Substation in Cohasset, Minnesota, northwest of Grand Rapids, Minnesota. The Bemidji-Grand Rapids 230 kV project is reported under its own Tracking Number (2005-NW-N2).

Projects in Twin Cities Zone. The Brookings to Southeast Twin Cities line and the Twin Cities to LaCrosse line enter the Twin Cities Zone.

Status. On May 22, 2009, the Public Utilities Commission issued a Certificate of Need for the three 345 kV CapX 2020 transmission lines. The CapX 2020 utilities applied for a route permit for the Brookings County to Hampton line in December 2008. The utilities have elected to apply for permits for the Fargo – Twin Cities line in two segments, a Monticello to St. Cloud segment, and a St. Cloud to Fargo segment. An application for a route permit for the Monticello to St.

Cloud segment was submitted to the PUC in April 2009, and an application for the St. Cloud to Fargo segment was submitted in October 2009. A permit for the LaCrosse to Twin Cities line will be applied for by the end of 2009. On July 14, 2009, the Commission issued a Certificate of Need for the Bemidji to Grand Rapids line. A route permit for the Bemidji to Grand Rapids line was applied for in 2008 and a decision is expected in mid-2010.

Upsizing. During the Certificate of Need proceeding for the CapX 2020 345 kV lines, the Public Utilities Commission found that the proposed (primarily single circuit) facilities were not optimized for potential future needs. The Commission concluded that the CapX 2020 utilities should consider potential longer-term needs and not just those in the near-term for which the lines were initially proposed. As a result, the Commission, in its Order granting Certificates of Need for the lines, ordered that all segments of the three CapX 2020 345 kV lines be "upsized" i.e., constructed to double-circuit capability. The lone exception to this conclusion was a segment of the Twin Cities – Brookings 345 kV line that was initially proposed by the utilities to be double-circuited; this segment remained unchanged.

Constructing the facilities to be capable of carrying a second 345 kV circuit will help minimize future transmission corridors and optimize the use of the transmission system. At the same time, not constructing the second circuit initially will allow the utilities to defer some portion of the incremental cost until the capability provided by the second circuit could be used. By deferring some of the capital expenditures for the second circuit, the CapX 2020 utilities are able to more closely match investment with future growth. However, deferring construction also increases the overall cost of the facilities as it will require multiple deployments of crews and potentially additional materials.

The CapX 2020 utilities have begun to analyze the costs and timing of deploying the second circuit. This analysis has included consideration of whether it may be more cost-effective to construct the second circuit at the time of initial construction. Relevant factors in this analysis include but are not limited to:

- The material and labor cost of various transmission line designs depending on how many davit arms are hung during initial construction and the corresponding steel and concrete requirements;
- The material and labor cost of stringing the second circuit at the time of initial construction;
- The material and labor cost of stringing the second circuit at some later date (including mobilization of new line crews);
- The cost of additional damage to crops and wetland mitigation;
- The loss benefit created by reducing the overall impedance of the system when the second circuit is strung (including the avoided cost of replacement generation);
- The cost of generation curtailment during any line outages necessary to string the second circuit;
- The cost of capital for each of the projects; and
- The expected escalation or inflation rates for these costs.

Once this analysis is completed, a recommendation will be made regarding whether it is best for the second circuit to be strung during initial construction or at some later date. At that point, necessary regulatory approvals will be sought.

Schedule. The Brookings line is scheduled to be in-service in the Second Quarter 2013. The St. Cloud to Monticello line is scheduled to be in-service in Fourth Quarter 2011, and the Fargo to St. Cloud segment in Third Quarter 2015, although the St. Cloud - Alexandria segment will be in service in 2nd or 3rd Quarter 2013. The Twin Cities to LaCrosse 345 kV line and two 161 kV lines in the Rochester area are scheduled to go into service over the 2012-2015 timeframe. The Bemidji to Grand Rapids line is scheduled to be in-service by the end of 2011.

PUC Docket Numbers. CN-06-1115 (Certificate of Need for Three 345 kV Transmission Lines)
TL-08-1474 (Brookings County to Hampton Route Permit)
TL-09-246 (Monticello to St. Cloud Route Permit)
TL-09-1056 (Fargo to St. Cloud Route Permit)
CN-07-1222 (Bemidji to Grand Rapids Certificate of Need)
TL-07-1327 (Bemidji to Grand Rapids Route Permit)

6.5.11 Southwest Metro 115 kV Development (Hennepin, Scott and Carver counties)

Tracking Number. 2007-TC-N1

Utility. Great River Energy and Xcel Energy

Inadequacy. The study region has been subdivided into three areas:

Area 1 – between the City of Glencoe and West Waconia. Based on the study results, the City of Glencoe would experience low voltages during the loss of its primary 115 kV source from McLeod. The loss of the 115 kV source from the Carver County Substation also results in a number of thermal and voltage problems in the area. Due to the age of the system in the region, the 69 kV lines in this area have been a source of poor reliability in the past. Due to load growth in this area, the City of Glencoe is planning to build a new distribution substation to the East side of the City.

Area 2 – between West Waconia and Scott County. This area is found to be a high load growth corridor. Minnesota Valley Electric Co-op built the new Victoria distribution in this area to meet the load demand. The proposed Chaska Bio Technology Park could potentially increase the transmission demand in this region.

Area 3 – between Scott County and Westgate. This area is found to experience thermal overloads on the 115 and 69 kV lines between Scott County and Westgate under certain contingencies.

A map showing the area is found following the discussion.

Alternatives. Two transmission alternatives have been studied as a long-term solution to the inadequacies in the region. Both alternatives consist of the construction of several sections of 115 kV lines.

Preferred Plan: The preferred alternative involves three sections of 115 kV lines.

(1) Build a new 115 kV line from the existing Glencoe 115 kV substation to the proposed new distribution substation east of the City of Glencoe. Rebuild the 69 kV line from Glencoe East to Lester Prairie tap to a 115 kV and 69 kV double circuit. Relocate the distribution load from the Plato Substation to the Glencoe East Substation. Convert the 69 kV line from the Lester Prairie tap to Young America to West Waconia to 115 kV. Extend the 69 kV line from Waconia towards the Carver Co – Augusta 69 kV line with a 3 way tap switch. This option also requires installing a capacitor at the existing Plato Substation.

(2) Rebuild the 69 kV line from the 3 way tap switch on the Carver Co – Augusta 69 kV line towards Augusta to 115 kV standards with a bigger conductor. Serve Chaska, Augusta and Victoria from the Carver Co Substation by opening the line between Chaska and Scott Co.

(3) Convert the 69 kV line connecting Scott County, Excelsior, Deephaven, and Westgate to 115 kV.

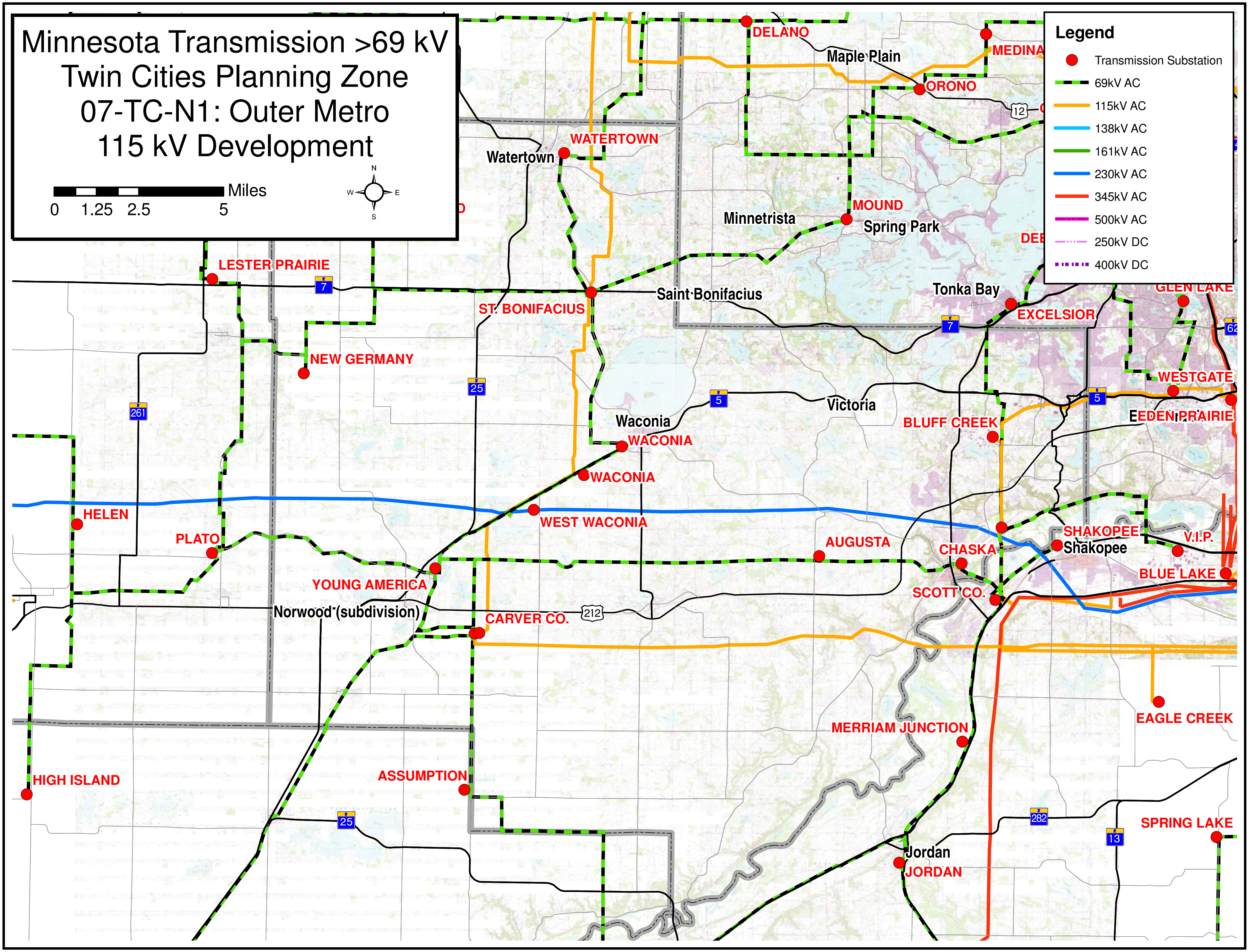
Alternative Plan: This alternative also involves three sections of 115 kV lines, including the first two described under the Preferred Plan. The third action is different under the Alternative Plan.

(3) Rebuild the existing 115 kV line from Scott County to Minnesota River to Bluff Creek to a higher capacity and upgrade some of the 69 kV facilities between Scott County and Westgate along with the Westgate 115/69 kV transformer.

Distributed Generation. Distributed generation was studied as an alternative to the transmission option. However, due to the cost and size of generators required at various locations to mitigate the violations, it was determined that distributed generation is not a viable solution to problems in the study area.

Analysis. As the study region is close to the Twin Cities Metropolitan Area, the analysis to date has focused on various transmission options to address the situation in this high-growth area. Initial results show that a 115 kV system should be adequate to address the need for more energy. The economic and environmental analysis and impacts of any new transmission lines are yet to be determined. The proposed facilities in the preferred plan are sufficient to meet the load serving needs in the study region in the near term and any future needs can be addressed as incremental upgrades near Chaska and Scott Co as required.

Schedule. Xcel Energy is planning on filing for a Certificate of Need for the 115 kV lines from Glencoe to West Waconia and Scott Co to Westgate in late 2009 or early 2010. The expected in-service date for the projects is between 2012 and 2013.


Minnesota Transmission >69 kV
Twin Cities Planning Zone
07-TC-N1: Outer Metro
115 kV Development
Miles
0 1.25 2.5 5
Legend
Transmission Substation
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
DELANO
MEDINA
Maple Plain
ORONO
WATERTOWN
Watertown
MOUND
Minnetrista
Spring Park
LESTER PRAIRIE
Saint Bonifacius
ST. BONIFACIUS
Tonka Bay
GLEN LAKE
EXCELSIOR
NEW GERMANY
WESTGATE
Victoria
EDEN PRAIRIE
Waconia
WACONIA
BLUFF CREEK
WACONIA
HELEN
WEST WACONIA
PLATO
AUGUSTA
SHAKOPEE
Shakopee
V.I.P.
CHASKA
BLUE LAKE
YOUNG AMERICA
SCOTT CO.
Norwood (subdivision)
CARVER CO.
EAGLE CREEK
MERRIAM JUNCTION
HIGH ISLAND
ASSUMPTION
SPRING LAKE
Jordan
JORDAN

6.5.12 South Minneapolis Distribution Study

Tracking Number. 2007-TC-N3

Utility. Xcel Energy

Inadequacy. Customer electricity usage has grown significantly over the past decade in south Minneapolis and is expected to continue to grow. This growth has been particularly dramatic along and around Lake Street and Hiawatha Avenue due to revitalization and redevelopment efforts. In response to an increasing number of feeder circuit overloads and service interruptions on the distribution delivery system in south Minneapolis over the past decade, Xcel Energy's Distribution Planning engineers conducted a long-term study of the south Minneapolis distribution delivery system and identified an existing deficit of approximately 55 MW.

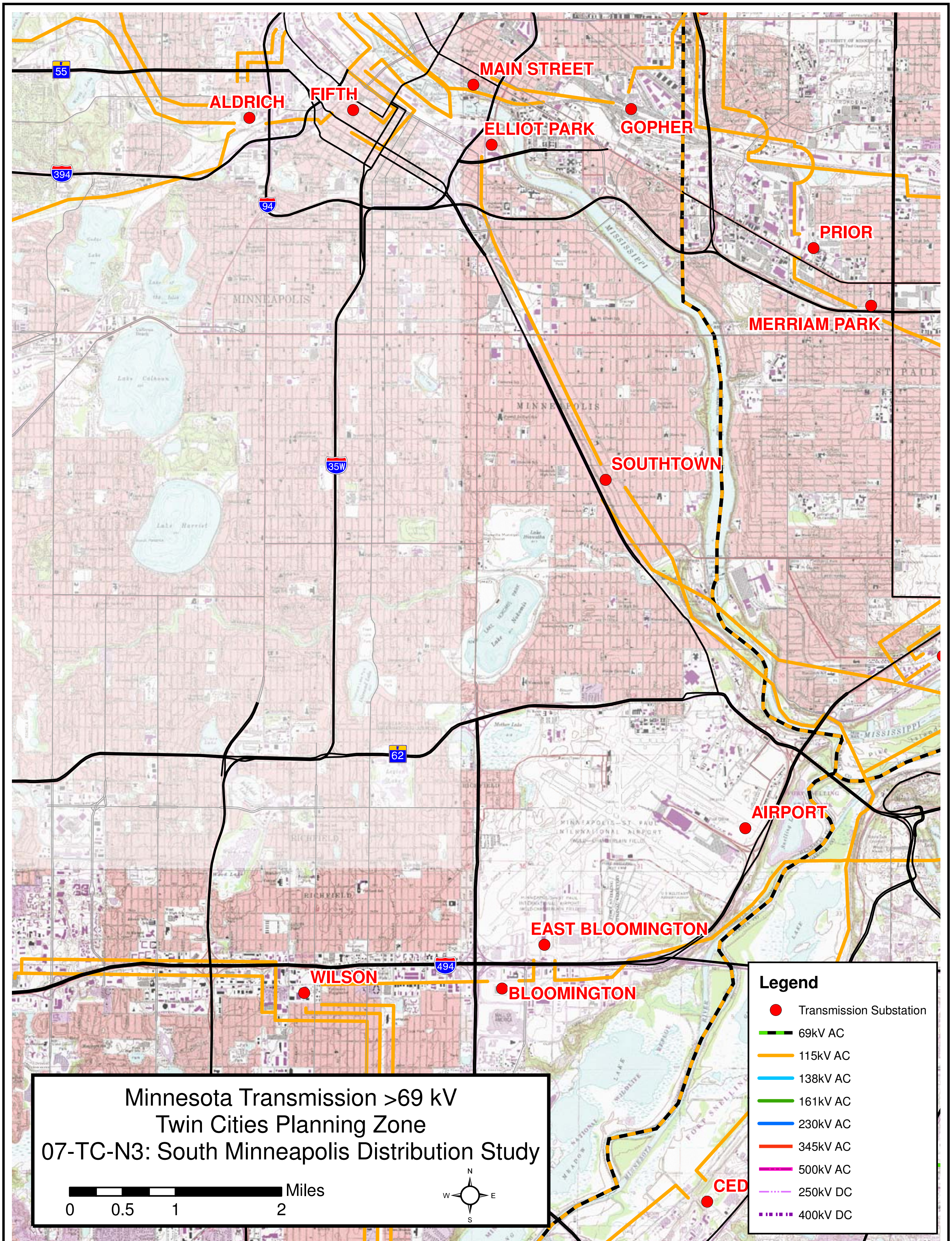
A map of the area is shown on the following page.

Alternatives. Xcel Energy's Distribution Planning Department, in coordination with Xcel Energy's Transmission Planning Department, developed three electrical system options that would provide additional distribution substation transformers in the area. Common to all three options were the addition of two new distribution substations, one in the vicinity of the former Hiawatha Substation site near Hiawatha Avenue and Lake Street, and a second new substation in the area west of Chicago Avenue and east of Interstate 35W in the Midtown area. Both substations would tap the existing Elliot Park – Southtown 115 kV transmission line, and two new looped 115 kV transmission lines would connect the substations. The options also included various connections to the southwest.

Analysis. In 2008, planning engineers determined that the common facilities should be constructed first to meet the growing demand for power in the South Minneapolis area. These facilities are expected to provide an additional 120 MW of capacity and are the necessary building block for additional transmission facility improvements in the South Minneapolis area when conditions warrant. There are no current identified transmission needs that would require construction of a Penn Lake Substation, a Highway 62 Substation, or transmission lines from the Oakland Substation to the southwest.

Schedule. Construction of the Hiawatha Project is expected to begin in the second quarter of 2010 and is anticipated to be completed by third quarter 2011. Xcel Energy filed a route permit application for the two new 115 kV lines and associated substations with the Minnesota PUC on April 24, 2009.

PUC Docket Number. TL-09-38 (Route Permit)



Minnesota Transmission >69 kV
Twin Cities Planning Zone
07-TC-N3: South Minneapolis Distribution Study

6.5.13 Arsenal Development and Load-Serving

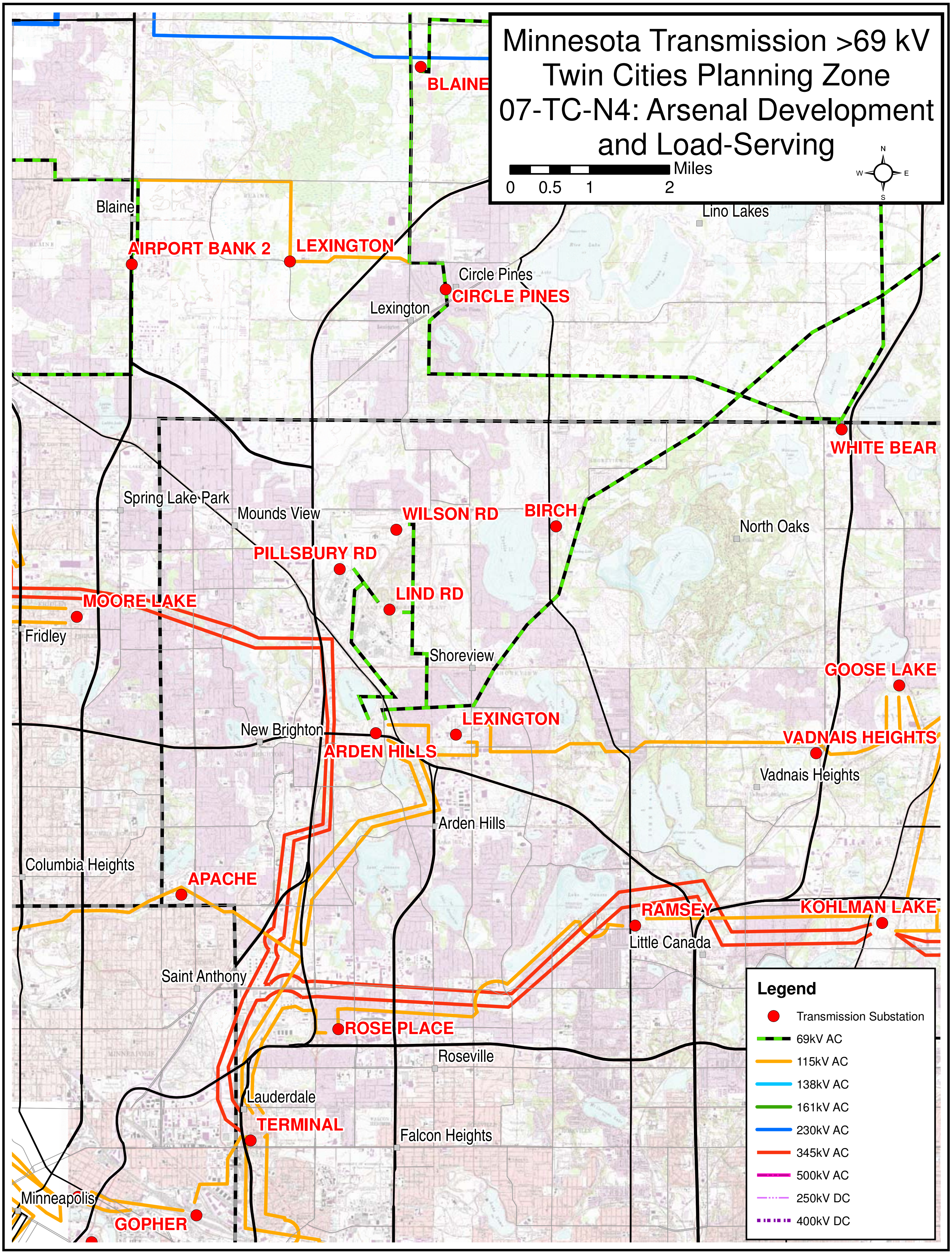
Tracking Number 2007-TC-N4

Utility. Xcel Energy

Inadequacy. Xcel Energy has received notification from a private developer of an intent to develop the land formerly occupied by the Twin Cities Ordnance Plant in Arden Hills. Details of this potential development are still coming forward, so the size of the new load is unknown. However, given the operational history and loading on transmission lines in the area, it is anticipated that a development of significant size will require new infrastructure to reliably serve a new load.

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

Schedule. There is no current request to increase power delivery to the area. When a request is made to provide power for redevelopment in the area, a 115 kV line will most likely be brought up to the property from the Arden Hills Substation to Lexington. Until such time that a request to increase power delivery capability to the area is made, this issue will not be reported on further.



Minnesota Transmission >69 kV
Twin Cities Planning Zone
07-TC-N4: Arsenal Development
and Load-Serving
Miles
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E
S
BLAINE
Blaine
AIRPORT BANK 2
LEXINGTON
Lino Lakes
Circle Pines
CIRCLE PINES
Lexington
WHITE BEAR
Spring Lake Park
Mounds View
WILSON RD
BIRCH
North Oaks
PILLSBURY RD
LIND RD
MOORE LAKE
Fridley
Shoreview
GOOSE LAKE
LEXINGTON
VADNAIS HEIGHTS
New Brighton
ARDEN HILLS
Vadnais Heights
Arden Hills
Columbia Heights
APACHE
RAMSEY
KOHLMAN LAKE
Little Canada
Saint Anthony
ROSE PLACE
Roseville
Lauderdale
TERMINAL
Falcon Heights
Minneapolis
GOPHER
Legend
Transmission Substation
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC

6.5.14 Dakota Electric Association Distribution Substation

Tracking Number: 2009-TC-N1

Utility: Great River Energy

Inadequacy: Dakota Electric Association has identified the need for additional sources in its service territory to cope with projected load growth and to improve reliability.

A map of the approximate area where this load growth has occurred and is anticipated to continue to occur is shown on the following page.

Alternatives: Dakota Electric Association looked at multiple alternatives as part of its 2006 Long Range System Planning Study. These alternatives include new distribution substation additions, double ending existing distribution substations, reconductoring /rebuilding existing feeders, and building new feeders.

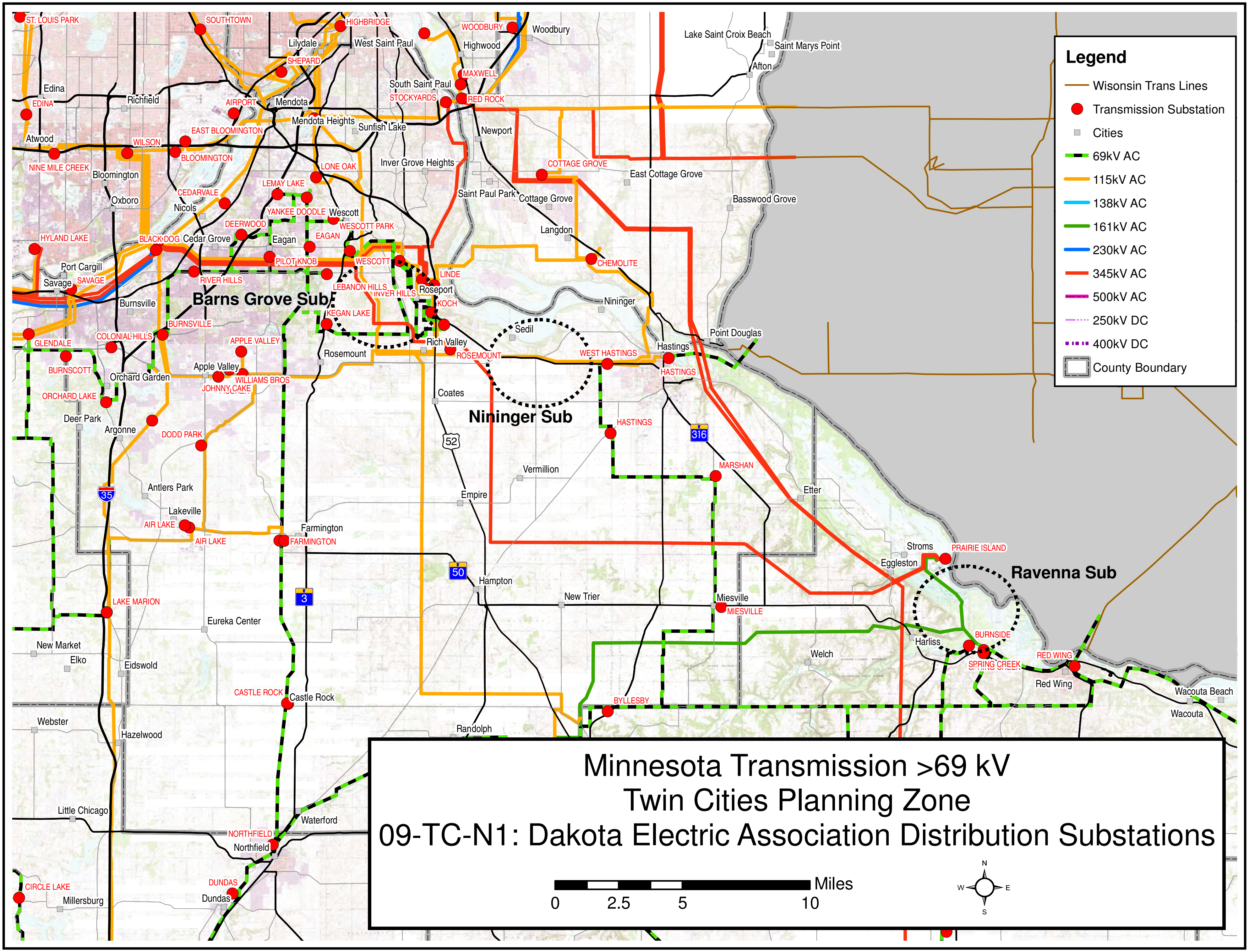
Analysis: Dakota Electric Association has determined that installation of several new distribution substations in the area is the most expeditious and economical approach to the need for additional power. The following specific installations have been selected:

(1) Ritter Park Substation: This distribution substation will tap Xcel's Dakota Heights to Kenrick 115 kV line. It is planned to be in-service in spring 2010

(2) Nininger substation: This distribution substation will tap Xcel's Rosemount to West Hasting 115 kV line. It is planned to be in-service in spring 2011

(3) Ravenna Substation: This distribution substation will tap GRE's Prairie Island to Spring Creek 161 kV line. The in-service date for this substation is dependent upon the load growth in the area. Dakota Electric Association will continue to monitor the load growth of the area around Prairie Island and will determine the time when this substation is required to be in-service.

Schedule: Ritter Park and Nininger distribution substations are scheduled for spring 2010 and 2011, respectively. Dakota Electric Association will monitor load growth in the Prairie Island area to determine the in-service date for Revenna distribution substation.



Minnesota Transmission >69 kV
Twin Cities Planning Zone
09-TC-N1: Dakota Electric Association Distribution Substations
Legend
Wisonsin Trans Lines
Transmission Substation
Cities
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
County Boundary
Miles
0
2.5
5
10
N
S
E
W
Barns Grove Sub
Nininger Sub
Ravenna Sub
ST. LOUIS PARK
SOUTHTOWN
HIGHBRIDGE
WOODBURY
Woodbury
Lilydale
West Saint Paul
Highwood
SHEPARD
MAXWELL
South Saint Paul
STOCKYARDS
RED ROCK
Edina
EDINA
Richfield
AIRPORT
Mendota
Mendota Heights
Sunfish Lake
Newport
EAST BLOOMINGTON
Atwood
WILSON
BLOOMINGTON
NINE MILE CREEK
Bloomington
LONE OAK
Inver Grove Heights
COTTAGE GROVE
East Cottage Grove
LEMAY LAKE
Saint Paul Park
Cottage Grove
CEDARVALE
Oxboro
Nicols
YANKEE DOODLE
Wescott
DEERWOOD
WESCOTT PARK
Langdon
HYLAND LAKE
BLACK DOG
Cedar Grove
Eagan
EAGAN
CHEMOLITE
PILOT KNOB
WESCOTT
Port Cargill
Savage
SAVAGE
RIVER HILLS
LINDE
LEBANON HILLS
INVER HILLS
Rosemount
KOCH
Burnsville
Nininger
KEGAN LAKE
BURNSVILLE
Sedil
Rich Valley
Point Douglas
COLONIAL HILLS
APPLE VALLEY
Hastings
GLENDALE
Rosemount
ROSEMOUNT
WEST HASTINGS
BURNSCOTT
Apple Valley
HASTINGS
Orchard Garden
WILLIAMS BROS
JOHNNY CAKE
ORCHARD LAKE
Coates
Deer Park
Argonne
HASTINGS
DODD PARK
52
316
MARSHAN
Vermillion
Antlers Park
Etter
Empire
35
Lakeville
AIR LAKE
AIR LAKE
Farmington
FARMINGTON
Stroms
PRAIRIE ISLAND
Eggleston
50
Hampton
3
New Trier
Miesville
MIESVILLE
LAKE MARION
Eureka Center
Harliss
BURNSIDE
New Market
Welch
RED WING
Elko
SPRING CREEK
Eidswold
Red Wing
CASTLE ROCK
Castle Rock
BYLLESBY
Wacouta Beach
Wacouta
Webster
Randolph
Hazelwood
Little Chicago
Waterford
NORTHFIELD
Northfield
DUNDAS
CIRCLE LAKE
Dundas
Millersburg
Lake Saint Croix Beach
Saint Marys Point
Afton
Basswood Grove

6.5.15 Glendale-Lake Marion Area

Tracking Number: 2009-TC-N2

Utility: Great River Energy

Inadequacy: The Glendale-Lake Marion area is experiencing high growth resulting in significant deficiencies with the present lines and equipment. Each of the 115/69 kV transformers and nearly all of the 69 kV lines in this area would be overloaded during contingencies at long-range load levels projected by GRE. Several facilities would overload for system intact loads as well. An analysis of reliability indices shows that the transmission facilities serving this area have poor reliability due primarily to the high number of consumers in the area and the large load impacted by the outages.

The Glendale-Lake Marion area includes the 69 kV system that is supplied from the Glendale and Lake Marion 115/69 kV substations, but does not include the Glendale-Burnsville 69 kV line and the Lake Marion-Farmington 69 kV line.

The following table summarizes the facilities, the cause of the criteria violation, and the estimated year the planning criteria are exceeded.

Facility	**Contingency/Cause**	**Estimated Year**
Credit River Tap-Cleary Lake 69 kV Line	Lake Marion Tap-Elko Out	2010
Cleary Lake-Credit River 69 kV Line	Lake Marion Tap-Elko Out	2013
Glendale 115/69 kV Transformers	Burnsville-Col. Hills Out	2014
Glendale 115/69 kV Transformers	2nd Transformer Out	2015
Glendale 115/69 kV Transformers	Lake Marion-LM Tap Out	2018
Glendale 115/69 kV Transformers	Black Dog-Riverwood Out	2018
Lake Marion 115/69 kV Transformer	System Intact	2015
Lake Marion 115/69 kV Transformer	Glendale-PL Jct.-CR Tap Out	2015
Lake Marion-Lake Marion Tap 69 kV Line	Glendale-PL Jct.-CR Tap Out	2016
Lake Marion Tap-Elko 69 kV Line	Credit River Tap-Cleary Lake Out	2016
Prior Lake Jct.-Credit River Tap 69 kV Line	Lake Marion-LM Tap Out	2016
Credit River-Spring Lake 69 kV Line	Lake Marion Tap-Elko Out	2018
Elko-New Market 69 kV Line	Credit River Tap-Cleary Lake Out	2026

A map of the area is shown following the discussion.

Alternatives: Two basic alternate options have been developed to resolve the deficiencies in this area.

Option 1. The first option utilizes load conversion to 115 kV and the addition of a 115/69 kV source at New Market to minimize the need for 69 kV facility upgrades.

Option 2. The second option includes the replacement of the Glendale 115/69 kV transformers to defer the need for load conversion to 115 kV.

Both options plan for development of 115 kV facilities and conversion of load to the 115 kV system, but one defers the load conversions. Both options require the Lake Marion 115/69 kV transformer to be replaced with a larger unit in conjunction with the Lake Marion 345/115 kV source. The Lake Marion source delays the loading problem of the Glendale transformers.

Option 3. Distributed generation was also considered.

Analysis: Each of the options has been analyzed.

Option 1: Convert Loads to 115 kV

This option minimizes investments on the 69 kV system by converting load to 115 kV. In 2010 and 2013, successive segments of the Credit River Tap-Cleary Lake-Credit River 69 kV line need to be upgraded. The plan is to rebuild this line to 115 kV, with continued operation at 69 kV. In 2014, in conjunction with the CapX 2020 installation of a 345/115 kV source at Lake Marion, the Lake Marion 115/69 kV transformer will be upgraded to 140MVA.

Load conversion to 115 kV will start in 2016 timeframe with the addition of a 115 kV line from Lake Marion to Helena. This option uses the route of the existing Lake Marion Tap-Elko-New Market 69 kV line for a single circuit 115 kV line requiring the Elko 69 kV distribution substation to be converted to 115 kV. This option also adds a 115/69 kV substation at New Market to supply the remaining load on the 69 kV circuit in the area. The Prior Lake and New Market 69 kV distribution subtations are recommended for 115 kV conversion in the 2018 and 2026 timeframes respectively.

Option 2: Upgrade Glendale 115-69kV Transformers

Similar to Option 1, this option also recommends rebuilding the Credit River Tap-Cleary Lake-Credit River 69 kV line and upgrading the Lake Marion 115/69 kV transformer. It also recommends building a 115 kV line from Lake Marion to Helena double circuiting the Lake Marion to Elko to New Market 69 kV line. This option in addition recommends replacing the Glendale 115/69 kV transformers and converting the Elko and New Market 69 kV subs to the 115 kV system.

The following table summarizes the estimated timeline and construction costs for the various facilities under Option 1 and Option 2:

Estimated Year	Facilities	Cost	Option 1	Option 2
2010	Credit River Tap-Cleary Lake 1.3 mile rebuild to 477 ACSS 115 kV (operate at 69kV)	$440,700	Yes	Yes
2013	Cleary Lake-Credit River 1 mile rebuild to 477 ACSS 115kV (operate at 69 kV)	$322,050	Yes	Yes
2014	Lake Marion 115/69 kV transformer replace with 140 MVA	$1,939,900	Yes	Yes
2016	Lake Marion-Lk Marion Tap 2.43 mile rebuild to 115 kV double circuit	$1,297,600	Yes	Yes
2016	Lake Marion Tap-Elko-New Market 5.6 mile rebuild to 795ACSS 115 kV	$2,178,400	Yes	Yes
2016	New Market-Helena 15 mile new 795 ACSS 115 kV line	$6,320,000	Yes	Yes
2016	New Market 115/69 kV, 70 MVA new substation	$3,395,000	Yes	No
2016	Elko (MVEC) substation conversion to 115 kV	$350,000	Yes	Yes
2016	Lk Marion Tap – Helena 15 miles new 795 ACSS 115 kV Line	$6,320,000	No	Yes
2018	Prior Lake load (MVEC) conversion to 115 kV (new site)	$2,000,000	Yes	No
2018	Glendale 115/69 kV transformers replace with two 70 MVA	$2,599,000	No	Yes
2026	New Market load (MVEC) conversion to 115 kV (new location)	$650,000	Yes	Yes
	Total Costs		$19,000,000	$17,500,000

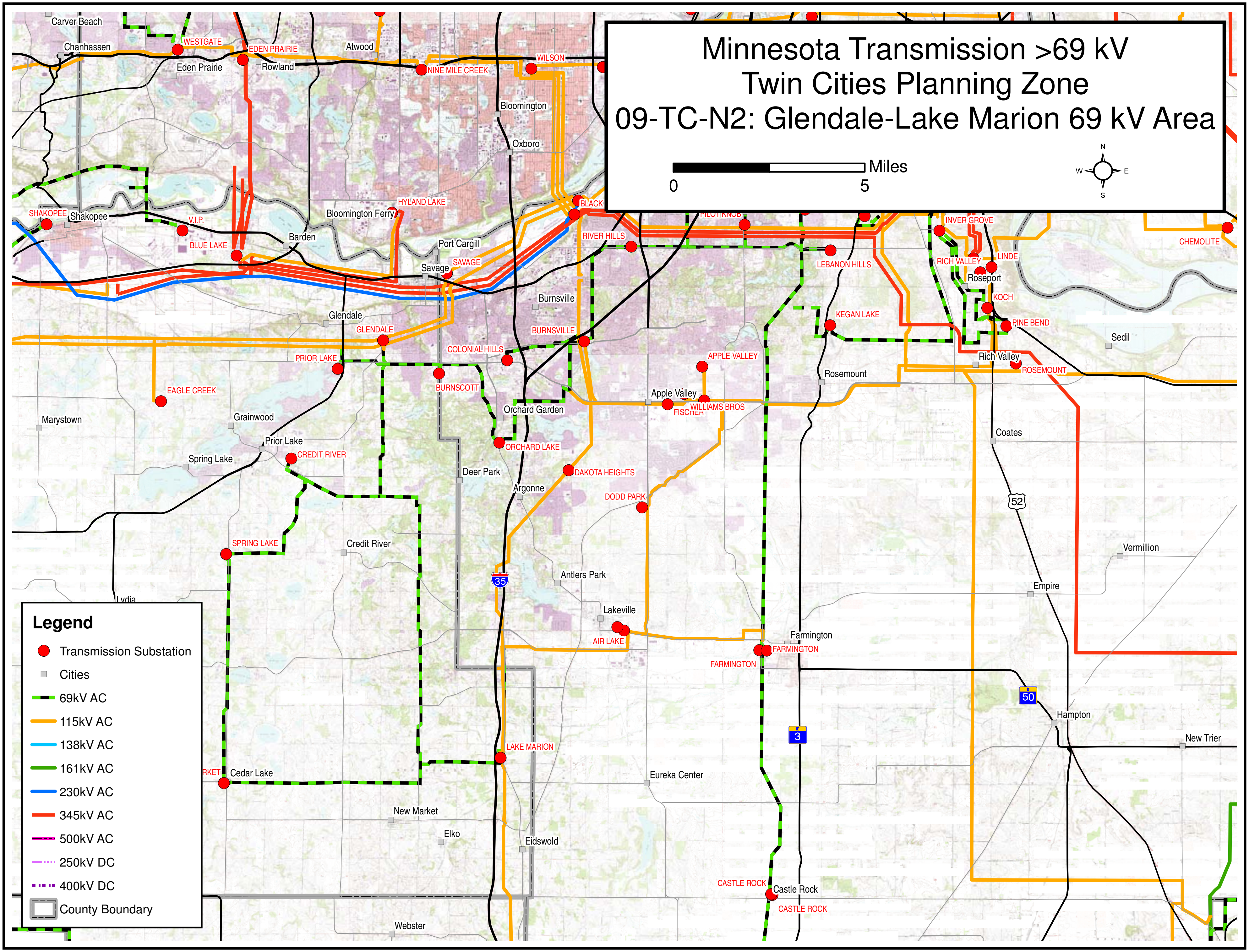
Cost analyses showed that Option 1 is the least cost plan. Option 1 is best suited to accommodate future load growth in the area as more loads will be converted to 115 kV in this option than in Option 2. Option 2 was found to have higher losses than Option 1, *i.e.*, Option 1 saves nearly two MW of power in the 2021 timeframe over Option 2. Thus Option 1 is the preferred option for this area.

Option 3. Distributed Generation

In comparison to the preferred option for this area, a distribution generation option is not desirable to address deficiencies in this area for the long term. A distributed generation option would have to be sufficient enough to serve the present loads that cause the deficiencies as well as the growing loads in the area. It would require several generating facilities at multiple locations to address transmission loading problems during contingencies. This would require a significant investment which wouldn't be a least cost plan in comparison with the preferred plan. The preferred option, unlike the distributed generation option, helps to address the Carver County – Scott County – New Prague area deficiencies (Tracking Number 2009-TC-N5). Thus, distributed generation is not a desirable option for this area.

Schedule: Refer to the above tables

Minnesota Transmission >69 kV
Twin Cities Planning Zone
09-TC-N2: Glendale-Lake Marion 69 kV Area



6.5.16 Parkwood-Coon Creek Area

Tracking Number: 2009-TC-N3

Utility: Great River Energy and Xcel Energy

Inadequacy. This area is served by the 115 kV loop connecting the Coon Creek, Parkwood, and Crooked Lake substations. System loading is becoming such that the loss of the Crooked Lake-Champlin Tap 115 kV line causes the Coon Creek-Parkwood 115 kV line to overload. As reported elsewhere in this Report, at Tracking Number 2005-TC-N3, Xcel Energy just in 2008 rebuilt the 115 kV line from Crooked Lake substation to the Champlin Tap.

A map of the area is shown following the discussion.

Alternatives. Several alternatives are being examined to correct the area deficiencies:

Alternative 1: Rebuild the Parkwood-Woodcrest-Coon Creek 69 kV line to a double circuit 115-69 kV circuit.

Alternative 2: Rebuild the Parkwood-Woodcrest-Coon Creek 69 kV line to 115 kV operation and add a new Coon Creek 115/69 kV source.

Alternative 3: Rebuild the Parkwood-Hennepin 69 kV line to 115 kV operation and construct a new breaker station near the existing Champlin 115 kV tap switches.

Alternative 4: Distributed generation.

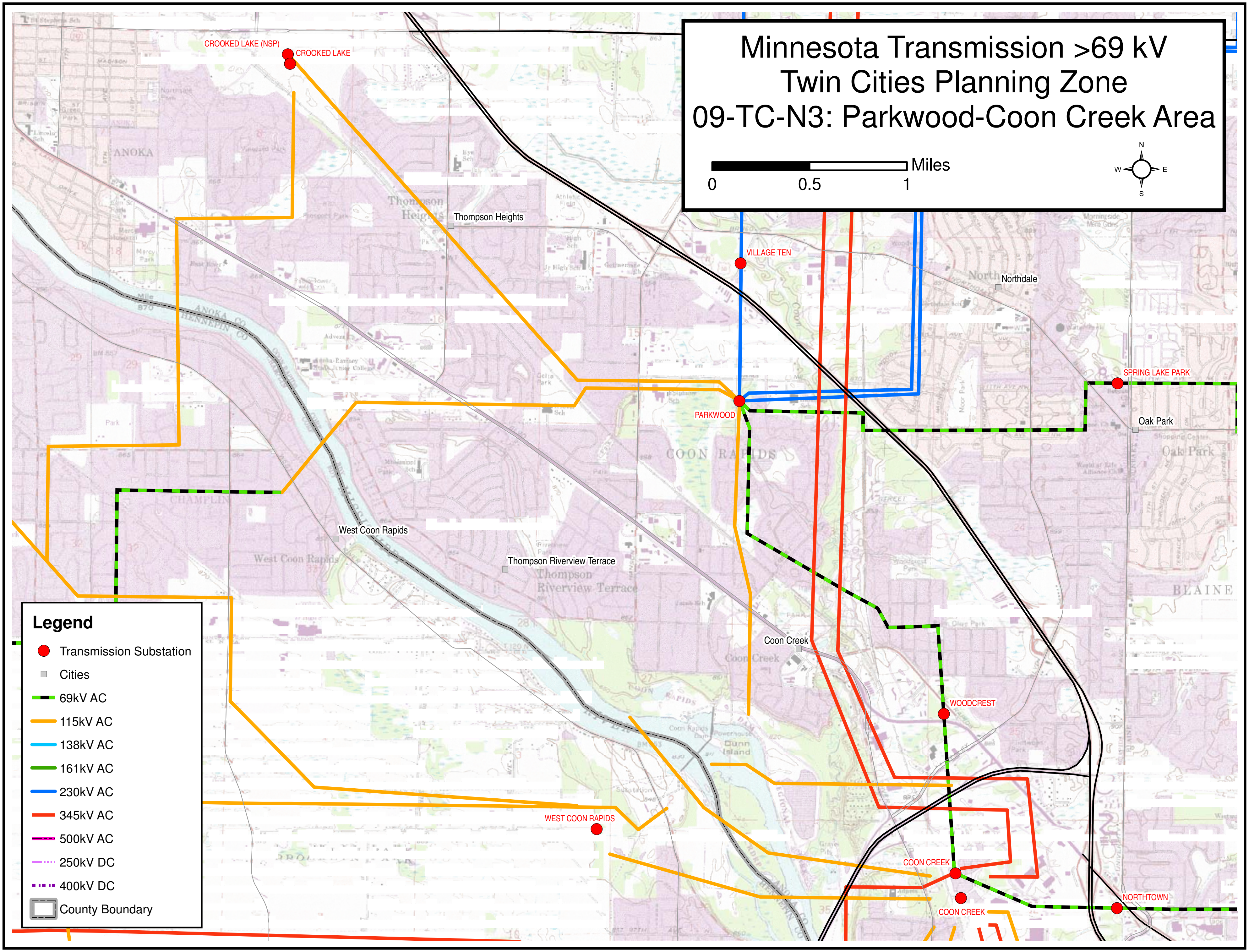
Analysis. Alternatives are currently under review. Alternative 1 is attractive from the standpoint that it is the shortest line route and utilizes mostly separate right-of-way from the existing Coon Creek-Parkwood 115 kV circuit. The existing 69 kV circuit is also of 1960's vintage and growing load is causing loading concerns on this circuit. Thus, it could be rebuilt to a higher capacity with this option.

Alternative 2 is also attractive as this would provide an additional source into the 69 kV system (currently the Blaine and Parkwood Substations provide the support for this area) and provide risk mitigation for a Parkwood Substation failure.

Alternative 3 is beneficial as this route would utilize an entirely separate corridor from the existing Coon Creek-Parkwood 115 kV circuit. The breaker station provided with Alternative 3 would also provide better service to the Crooked Lake Substation as faults occurring on the West Coon Rapids-Champlin-Elm Creek 115 kV line would not interrupt looped service to the Crooked Lake Substation.

Distributed generation is not desirable in this area as this system serves both the Highway 10 and Highway 65 corridors where load growth has been high in recent years and significant development potential still exists. Any generation added to this system would need to be sized to meet the future load growth or continually added as the system load grows.

Schedule. GRE and Xcel Energy are still evaluating options for this area. Estimates at this time indicate that a solution is necessary in the 2012-2013 timeframe. None of the alternatives requires a transmission line of more than 10 miles in length so a Certificate of Need from the Commission will not be required.



Minnesota Transmission >69 kV
Twin Cities Planning Zone
09-TC-N3: Parkwood-Coon Creek Area
Miles
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Legend
Transmission Substation
Cities
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
County Boundary
CROOKED LAKE (NSP)
CROOKED LAKE
Thompson Heights
VILLAGE TEN
Northdale
SPRING LAKE PARK
Oak Park
PARKWOOD
West Coon Rapids
Thompson Riverview Terrace
Coon Creek
WOODCREST
WEST COON RAPIDS
COON CREEK
COON CREEK
NORTHTOWN
ANOKA
COON RAPIDS
CHAMPLIN
BLAINE

6.5.17 Arden Hills Area Load Serving

Tracking Number. 2009-TC-N4

Utility. Xcel Energy

Inadequacy. Existing 115 kV transmission infrastructure in the northern Twin Cities has become inadequate to serve load in the area under various contingencies. There are also other deficiencies that will occur later in the 10-year planning horizon, including overloads on Apache Tap – Arden Hills and overloads on the Kohlman Lake 345/115 kV transformers.

Alternatives. Three alternatives were developed to address this inadequacy:

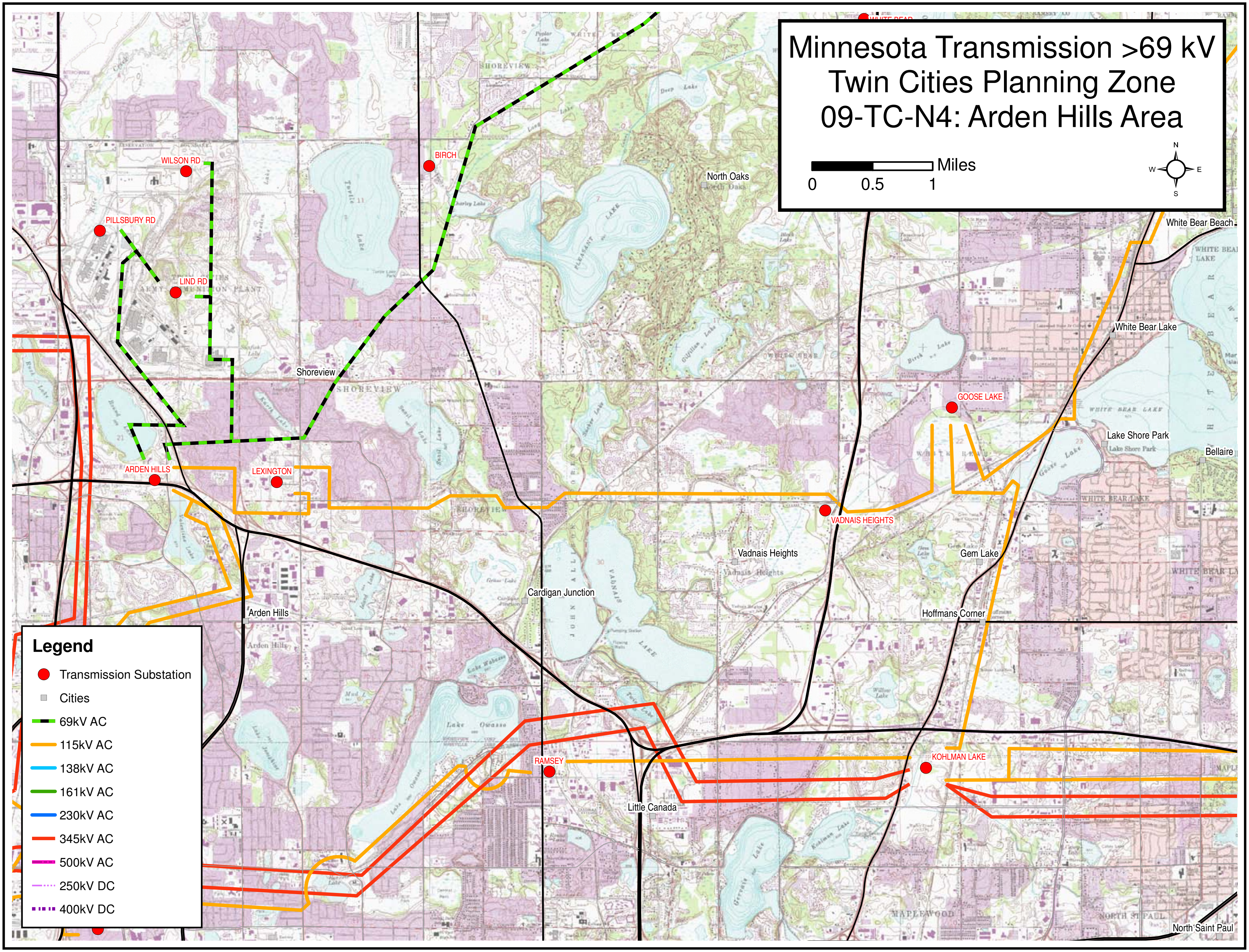
Alternative 1: Construct a new 345/115 kV substation in the Arden Hills area. From this substation, a high capacity 115 kV line would be built to a re-configured Lexington substation.

Alternative 2: Rebuild the line from Goose Lake – Lexington to 795 ACSS and rebuild/replace facilities as they become overloaded.

Alternative 3: Install distributed generation in the Arden Hills area to offset the power injection needs that cause the overloads.

Analysis. The new 345/115 kV substation is the most cost effective option that provides a large source for the area, but the need is too urgent to implement this option. Distributed generation was ruled out due to its cost and the fact that Alternative Two does not require any new right-of-way. To mitigate the 115 kV line overload from Goose Lake to Lexington, the rebuild to 795 ACSS was chosen.

Schedule. The selected option will be in service prior to the summer of 2010. The other overloads that were identified will continue to be monitored in annual assessments and plans will be formalized as needed.



Minnesota Transmission >69 kV
Twin Cities Planning Zone
09-TC-N4: Arden Hills Area
Miles
0
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S
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Legend
Transmission Substation
Cities
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
WILSON RD
PILLSBURY RD
LIND RD
BIRCH
ARDEN HILLS
LEXINGTON
GOOSE LAKE
VADNAIS HEIGHTS
RAMSEY
KOHLMAN LAKE
North Oaks
Shoreview
White Bear Beach
White Bear Lake
Lake Shore Park
Bellaire
Vadnais Heights
Gem Lake
Cardigan Junction
Arden Hills
Hoffmans Corner
Little Canada
North Saint Paul

6.5.18 Scott County-Carver County Area

Tracking Number. 2009-TC-N5

Utility.: Great River Energy

Inadequacy. This area includes the 69 kV system that runs south from the Carver County and Scott County substations toward the New Prague area. The Carver County to Belle Plaine 69 kV line was found to experience thermal loading problems during contingencies in the area in the 2014 timeframe. The New Prague area will also experience low voltage problems during contingencies.

A map of the area is shown following the discussion.

Alternative. Two options were considered for this area. The first option recommends installation of capacitor banks and using local generation to address the deficiencies of the area. The second alternative builds on the first option and recommends rebuilding overloaded transmission lines and establishing new sources in the area. The options are discussed below.

Option 1: Capacitor banks installation and local generation

This option involves installing capacitor banks at Veseli and Merriam Junction along with running local generation for improving voltage and line loading in the area. While this option is capable of supporting the voltage in the area, it is not sufficient to address the Carver County to Assumption 69 kV line overload problems in the area.

Option 2: 69 kV to 115 kV upgrades

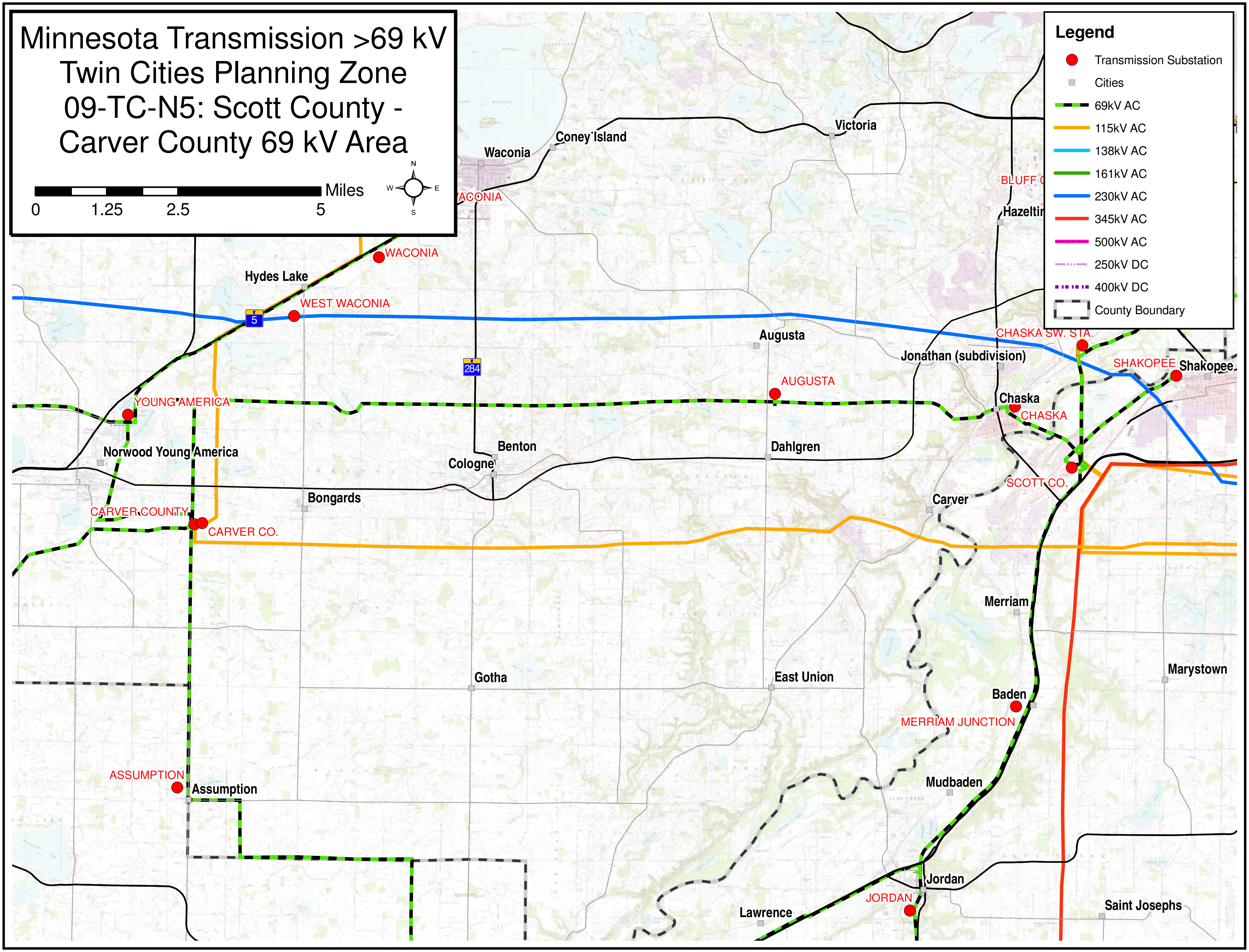
This option recommends implementing Option 1 in addition to rebuilding overloaded lines and establishing a new source in the area. In addition to rebuilding the Carver County-Assumption 69 kV line to 115 kV standards for continued 69 kV operation, this option recommends rebuilding the remaining 69 kV facilities including the Assumption to Belle Plaine 69 kV line to the 115 kV standard to complete the Carver County-Helena-New Prague 115 kV line. A 115/69 kV substation is recommended at New Prague in the 2016 timeframe when the 69 kV lines are upgraded to 115 kV.

Analysis. Option 2 addresses both the voltage and line loading problem of the area for the long term. The CapX 2020 projects include a 345 kV Helena Substation. This plan proposes a 345/115 kV substation at Helena, which will serve the 115 kV system from Carver County and Lake Marion. Note that the Glendale-Lake Marion area study proposes a 115 kV circuit from Lake Marion-Helena, which would connect with the Carver County-Helena 115 kV line in this plan.

Distributed generation is not a desirable option to address the deficiencies in this area. The deficiencies constitute a geographically large area and the recommended option helps craft a long term solution for the Glendale – Lake Marion area transmission deficiencies (see Tracking

Number 2009-TC-N2). Distributed generation would require significant investment and involve a considerable incremental cost to keep up with the load growth in this and neighboring areas.

Schedule. This project is tentatively scheduled to be in-service between the 2014 and 2016 timeframes.



Minnesota Transmission >69 kV
Twin Cities Planning Zone
09-TC-N5: Scott County -
Carver County 69 kV Area
0
1.25
2.5
5
Miles
N
W
E
S
Legend
Transmission Substation
Cities
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
County Boundary
Waconia
Coney Island
Victoria
WACONIA
Hydes Lake
WEST WACONIA
Augusta
AUGUSTA
Jonathan (subdivision)
CHASKA SW. STA.
SHAKOPEE
Shakopee
Hazeltin
BLUFF C
Chaska
CHASKA
YOUNG AMERICA
Norwood Young America
Benton
Cologne
Dahlgren
SCOTT CO.
Bongards
Carver
CARVER COUNTY
CARVER CO.
Merriam
Gotha
East Union
Marystown
Baden
MERRIAM JUNCTION
ASSUMPTION
Assumption
Mudbaden
Jordan
JORDAN
Lawrence
Saint Josephs
5
284

6.5.19 Hollydale and Meadow Lake Load Serving

Tracking Number. 2009-TC-N6

Utility. Xcel Energy

Inadequacy. Xcel Energy has experienced load growth in the western Twin Cities Metro area, north of Interstate 394 and south of Bass Lake Road, and has identified a need for additional load serving capability in several communities. Xcel Energy Transmission Planning has received a request from Xcel Energy Capacity Planning for two substations in this area to handle this increasing load. Hollydale is currently a 34.5/13.8 kV distribution substation in Plymouth. Capacity Planning has requested that Hollydale be converted to 115/13.8 kV with an initial transformer and planned to accommodate multiple 50 MVA transformers in the future. Capacity Planning has also identified deficiencies in the distribution system serving the area, including Brooklyn Center, Plymouth and New Hope and neighboring communities, and is requesting a new substation (Meadow Lake) near the intersection of Bass Lake Rd. and Hwy 169. The initial substation would include one 50 MVA 115/13.8 kV transformer with room for expansion.

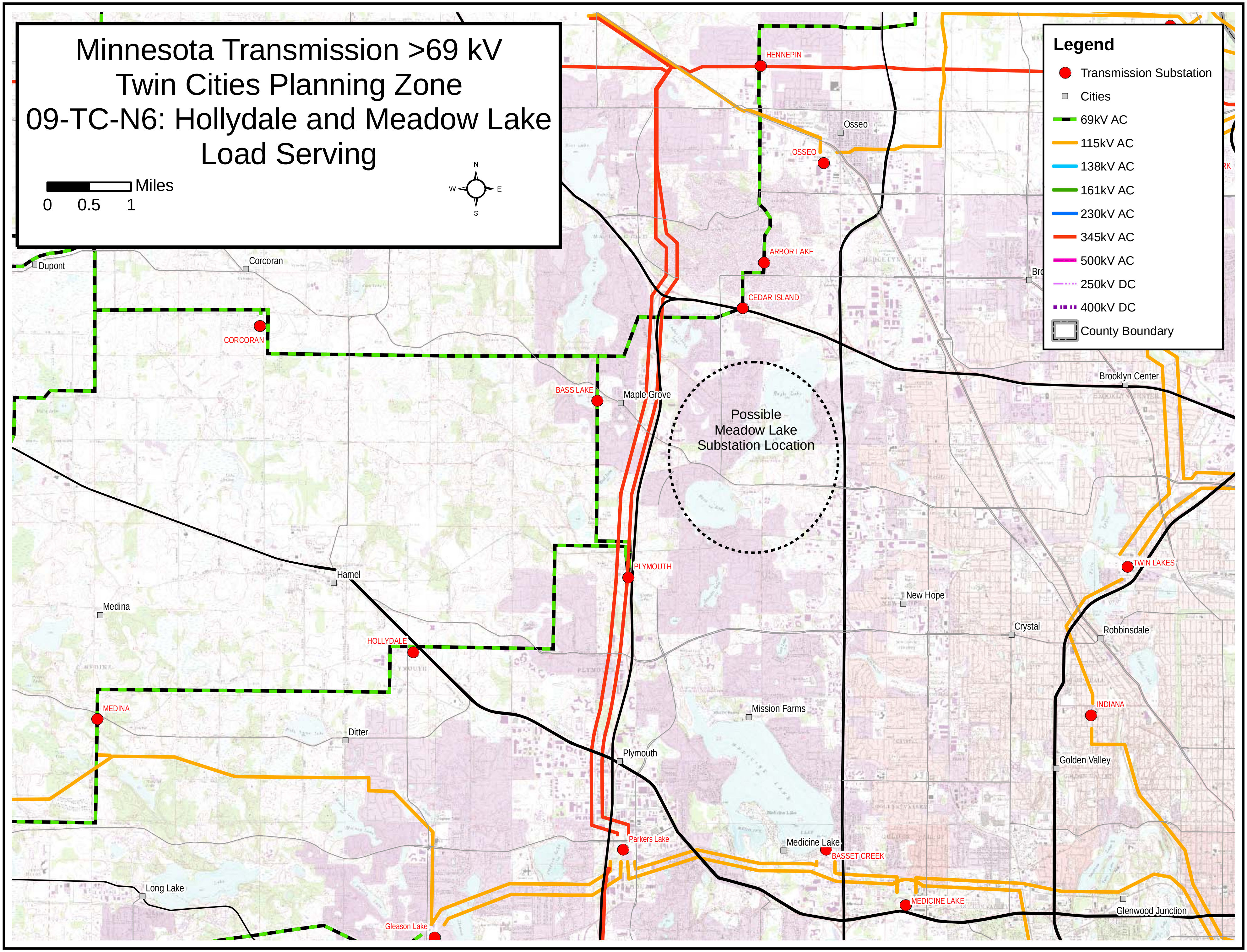
Alternatives. These interconnections are still under review and several alternatives have been identified to address these inadequacy:

Due to the continuing review of this interconnection, the proposed alternative is subject to change. Hollydale is situated adjacent to a 69 kV line between Medina and Plymouth Substations. To support the increase in load for the substation the leading option is to convert the existing 69 kV line to 115 kV and construct a 115 kV switching station between Great River Energy's Plymouth and Bass Lake Substations on the connecting 115 kV line. The analysis area for Meadow Lake is bounded by four substations (Osseo, Twin Lakes, Basset Creek, and Plymouth). All combinations of looped and double-circuit service were investigated for Meadow Lake (approximately ten alternatives). The leading alternative is a line between the new Plymouth Substation and Twin Lakes Substation to support the new Meadow Lake Substation. One initial concept would have this line following an existing rail corridor.

Due to the density of load in this area, the amount of load serving support needed, and the cost of distributed generation resources, distributed generation was not deemed to be a feasible alternative for addressing this inadequacy.

Analysis. The leading option to interconnect both of the substations is to convert the 69 kV Medina - Plymouth line to 115 kV and construct a 115 kV switching station on Great River Energy's line between Plymouth and Bass Lake. The Meadow Lake Substation would be connected to the new Plymouth Switching Station and Twin Lakes Substation by a new 115 kV line.

Schedule. The present schedule calls for upgrading the Hollydale Substation by June 2013, and to place the new Meadow Lake Substation into service by June 2015.


Minnesota Transmission >69 kV
Twin Cities Planning Zone
09-TC-N6: Hollydale and Meadow Lake
Load Serving
Miles
0
0.5
1
N
W
E
S
Legend
Transmission Substation
Cities
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
County Boundary
HENNEPIN
Osseo
OSSEO
ARBOR LAKE
CEDAR ISLAND
Dupont
Corcoran
CORCORAN
BASS LAKE
Maple Grove
Possible
Meadow Lake
Substation Location
Brooklyn Center
PLYMOUTH
Hamel
TWIN LAKES
New Hope
Medina
Crystal
Robbinsdale
HOLLYDALE
MEDINA
Mission Farms
INDIANA
Ditter
Plymouth
Golden Valley
Parkers Lake
Medicine Lake
BASSET CREEK
MEDICINE LAKE
Long Lake
Glenwood Junction
Gleason Lake

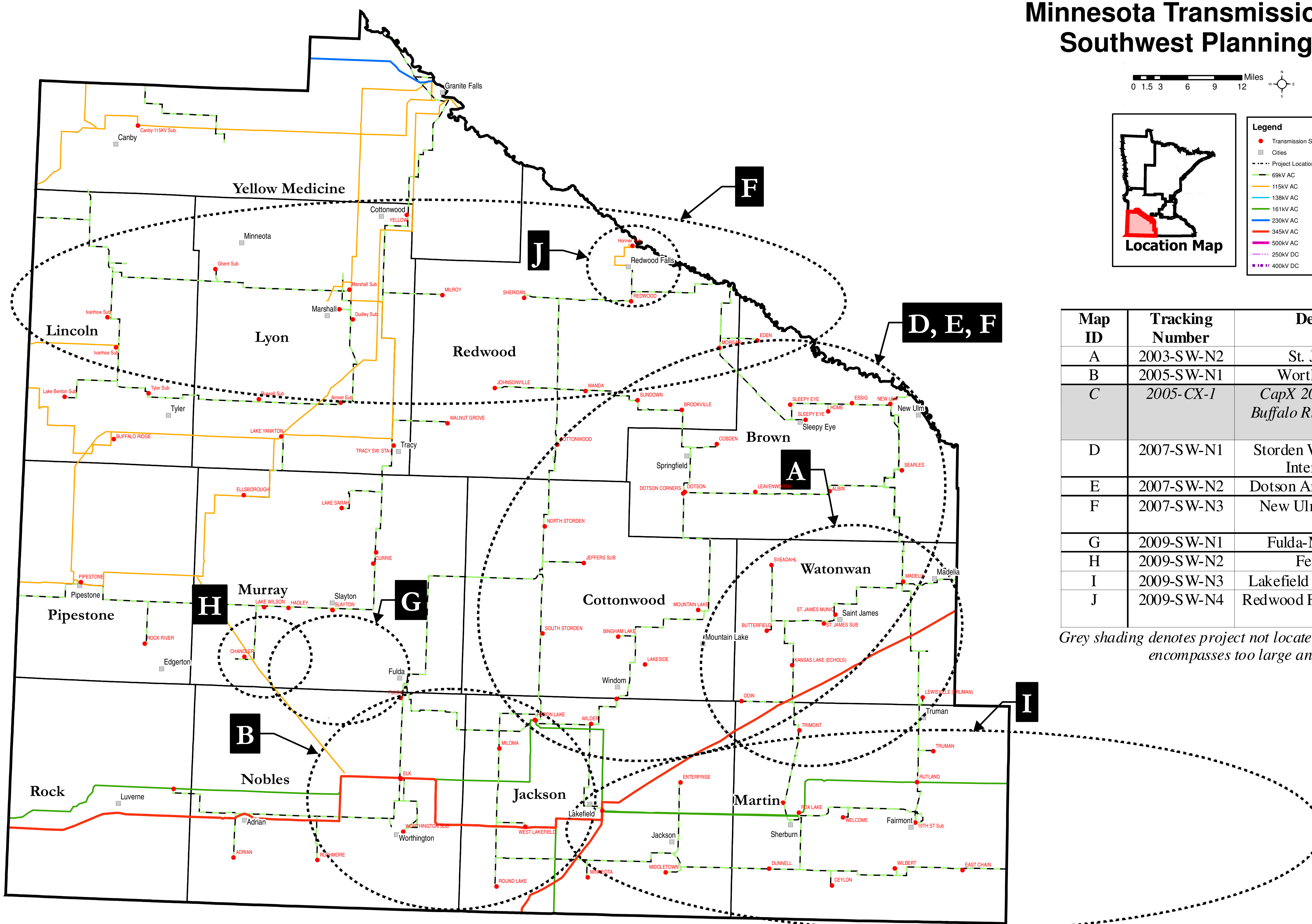
6.6 Southwest Zone

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

Southwest Zone

Tracking Number	Description	Projected In-Service Year	Need Driver	Section No.
2003-SW-N2	St. James Area	2009	St. James low voltage	6.6.2
2005-SW-N1	Worthington Area	2007	Reliability; Line overloads	6.6.3
2005-CX-1	CapX 2020 Vision Plan Buffalo Ridge – Twin Cities 345 kV			6.6.4
2007-SW-N1	Storden Wind Generation Interconnection	2010	130 MW IPP wind interconnection	6.6.5
2007-SW-N2	Dotson Area Load Serving	2010	Load growth and new ethanol plants	6.6.6
2007-SW-N3	New Ulm Transmission Service	2010	Request firm network transmission service	6.6.7
2009-SW-N1	Fenton 69 kV Interconnection	2012	Low voltage along 69 kV system	6.6.8
2009-SW-N2	Fulda-Magnolia		Load Serving	6.6.9
2009-SW-N3	Lakefield – Adams 345 kV System Upgrade		System Upgrade Generation Outlet	6.6.10
2009-SW-N4	Redwood Falls Load Serving Substation	2011	Load Growth	6.6.11

Minnesota Transmission >69kV
Southwest Planning Zone



Map ID	Tracking Number	Description
A	2003-SW-N2	St. James Area
B	2005-SW-N1	Worthington Area
C	*2005-CX-1*	*CapX 2020 Vision Plan Buffalo Ridge – Metro 345 kV*
D	2007-SW-N1	Storden Wind Generation Interconnection
E	2007-SW-N2	Dotson Area Load Serving
F	2007-SW-N3	New Ulm Transmission Service
G	2009-SW-N1	Fulda-Magnolia Area
H	2009-SW-N2	Fenton Area
I	2009-SW-N3	Lakefield to Adams 345kV
J	2009-SW-N4	Redwood Falls Load Serving Sub

Grey shading denotes project not located on map because it encompasses too large an area.

6.6.1 Completed Projects

Some inadequacies in the Southwest Zone that were identified in the 2007 Biennial Report were alleviated through the construction and completion of specific projects over the last two years. Information about each of the completed projects is summarized briefly in the table below, and those matters will be removed from the list of inadequacies that are discussed in the 2009 Report. More detailed information about these projects and inadequacies can be found in the 2007 Report and in the PUC Docket for the matter if the project fell within the jurisdiction of the Public Utilities Commission, in which case the Docket Number is shown below. Also, additional information is available by contacting the designated person for the utility that was responsible for constructing the project.

Tracking Number	Utility	Description	PUC Docket	Date Completed
2003-SW-N4	Xcel Energy	Wind Generation Outlet Four new transmission lines in the Buffalo Ridge area	CN-01-1958 Routes permitted by Environmental Quality Board	2008 Three 115kV lines complete, 345kV line was energized in mid-2008.
2003-SW-N1	Xcel Energy	Jackson Area New 161 kV substation in Jackson	None	September 2009
2003-SW-N3	Xcel Energy	Marshall Area A new 115 kV line from Lake Yankton to a new Marshall Southwest sub	CN-06-154	July 2009
2005-SW-N2	Xcel Energy	BRIGO Three new 115 kV lines for Buffalo Ridge generation outlet	CN-06-154	2009

6.6.2 St. James Area

Tracking Number. 2003-SW-N2

Utility. Great River Energy

Inadequacy. The St. James area is characterized by a relatively large municipal load located a long distance (electrically) from the 69 kV lines that serve the area. There are two concerns: (1) low voltages, even with the system intact, and (2) line overloads, which are exacerbated in contingency situations. Future ethanol plant loads would have aggravated problems in the area, but plans for future ethanol plants have not moved forward.

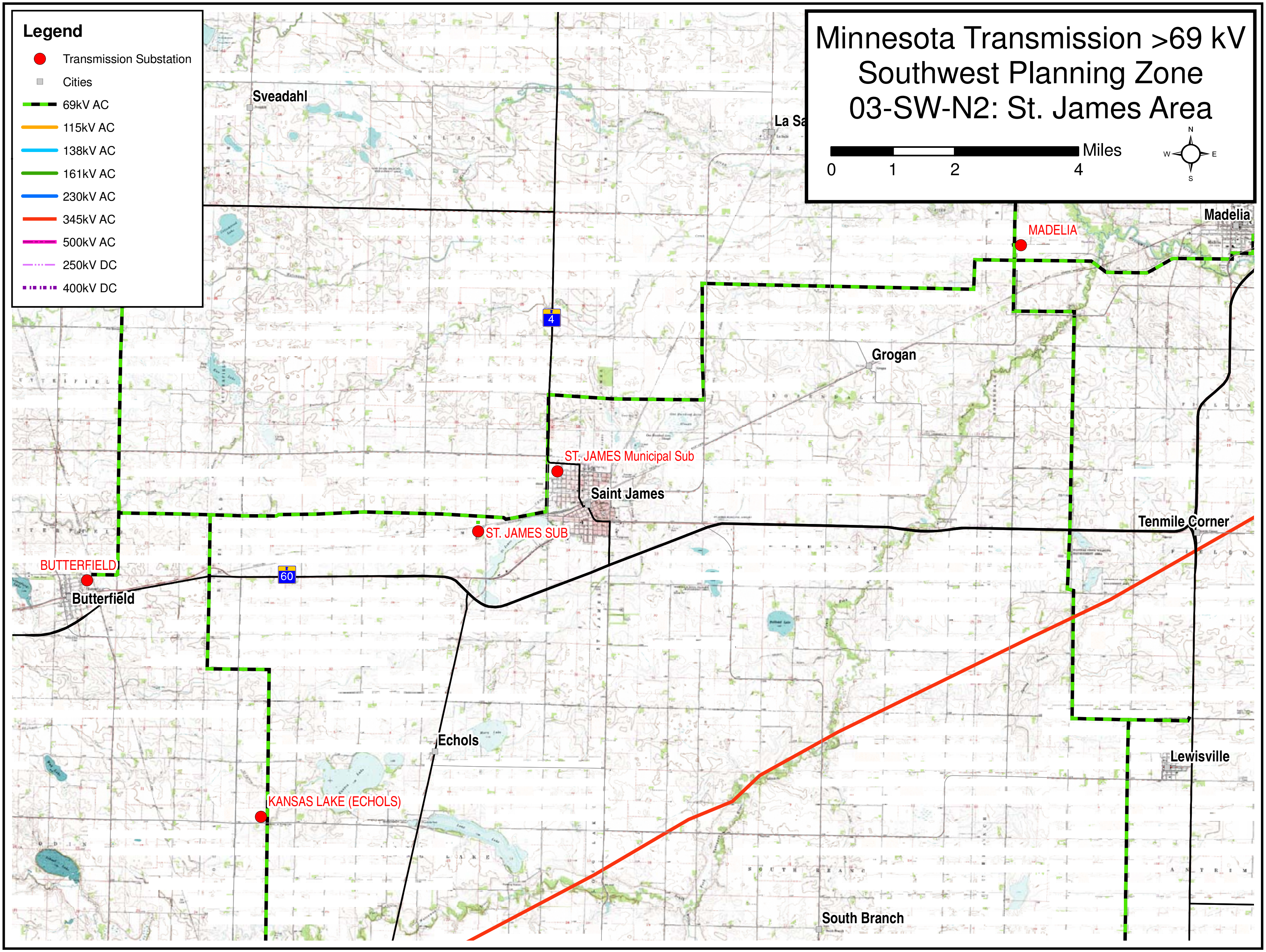
A map of the area is shown on the following page.

Alternatives. Eleven alternatives were presented in the 2005 Report. Most involved construction of a new 115 kV line into the area. Distributed generation was also one of the alternatives. It now appears that a broader solution must be identified, one that not only addresses the St. James' voltage concerns but also takes into account other developments in the area, including new ethanol plants and wind projects. A possible solution for the St. James area and the additional needs in the Dotson, Storden, and New Ulm areas is a new Heron Lake – Storden – Dotson – New Ulm 161 kV line and associated substation upgrades. See Tracking Numbers 2007-SW-N1 and 2007-SW-N2 and 2007-SW-N3.

Analysis. In 2005 and 2006 GRE implemented certain operational changes that made St. James less susceptible to low voltage under certain contingencies. While there is still a need to determine a long-term solution for St. James, identifying an appropriate solution will require additional study that takes into account these other possible developments in the area.

Schedule. Delayed or canceled plans for ethanol plant development have impacted the need for projects associated with load growth. Additional study will be required.

Minnesota Transmission >69 kV
Southwest Planning Zone
03-SW-N2: St. James Area



6.6.3 Worthington Area

Tracking Number. 2005-SW-N1

Utility. ITC Midwest, Missouri River Energy Services, and Xcel Energy

Inadequacy. Worthington is located in southwestern Minnesota, about 42 miles from the South Dakota – Minnesota border. The city is served from the Elk 161/69 substation north of the city. During an outage of either of two transformers at the Elk substation, or of the 161 kV lines leading to the Elk substation, switching can be performed to serve Worthington from a 69 kV system through Fulda, but low voltage has been observed when that occurs. Voltage issues also arise due to outages on the neighboring 69 kV system. These issues impact reliability for serving the City of Worthington load and other loads around the Worthington area.

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

Alternatives. Various combinations of the system upgrades listed below are being considered alleviate reliability concerns.

- Upgrade the 161/69 kV transformers at Elk

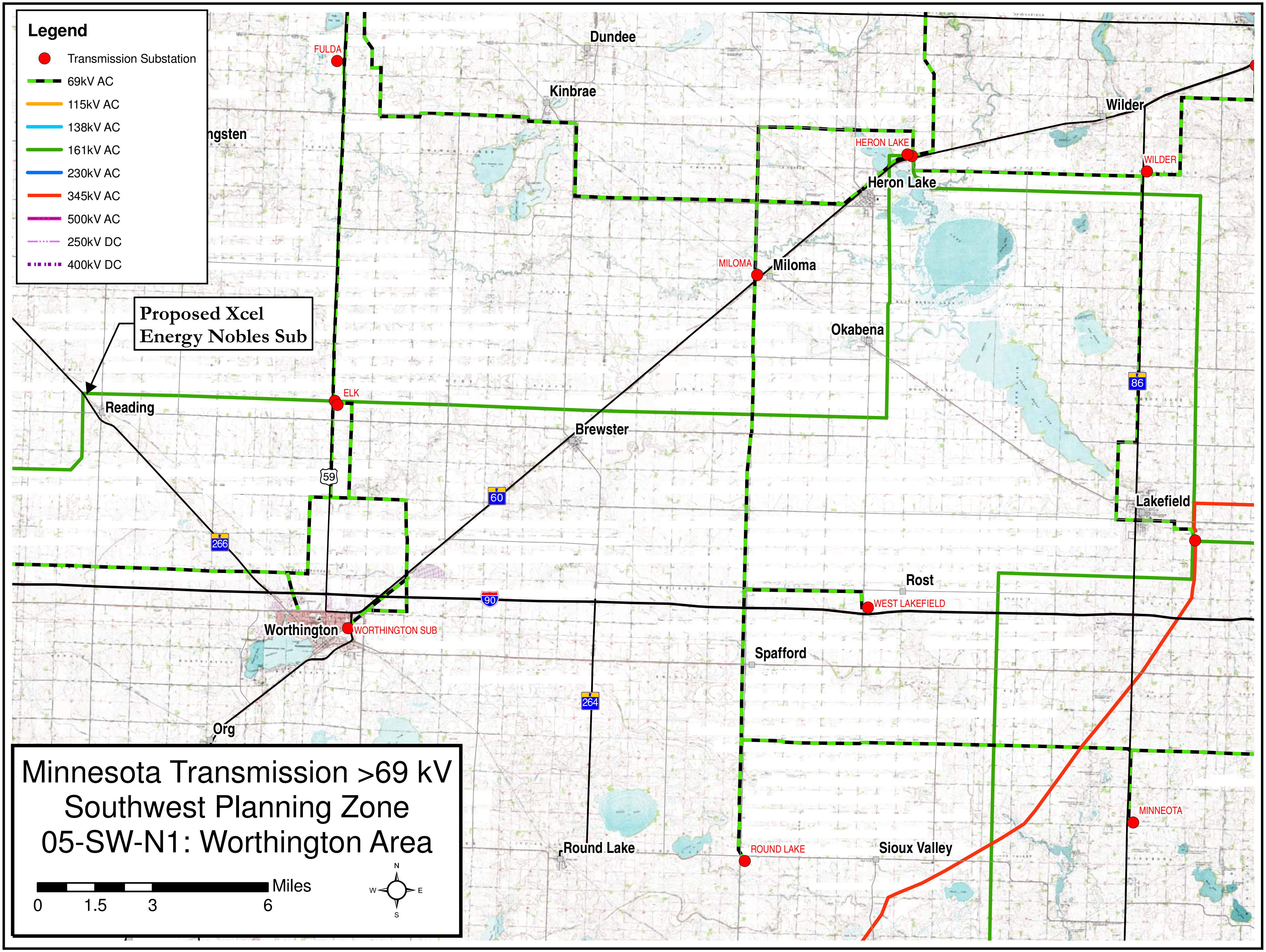
- Upgrade existing Elk – Worthington 69 kV lines

- Addition of new 69 kV, 115 kV, or 161 kV circuit from Nobles County, Elk or Worthington

- Addition of a new 69 kV tie-line between the east side and west side of Worthington if Worthington continues to be served from a 69 kV source

Analysis. The load serving study is still in progress. The study has identified potential problems in staying with the existing system and studied possible system enhancements that can help solve long term reliability problems in the Worthington area.

Schedule. The Worthington load serving study remains open, as a permanent preferred solution has not been identified. Capacitor banks were recently installed on the Worthington Distribution System to provide voltage support. The two transformers at Elk serving the city of Worthington are scheduled for replacement with 2 new, larger transformers in 2011. The transformer replacement will help alleviate voltage concerns on the 69 kV system that currently serves the city. All activities will be coordinated with regional utilities, the Midwest ISO, and the Northern MAPP sub-regional planning group.



Legend
Transmission Substation
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
Proposed Xcel Energy Nobles Sub
FULDA
Dundee
Kinbrae
HERON LAKE
Heron Lake
WILDER
Wilder
MILOMA
Miloma
Okabena
ELK
Reading
Brewster
Lakefield
Rost
WEST LAKEFIELD
Worthington
WORTHINGTON SUB
Spafford
Org
Round Lake
ROUND LAKE
Sioux Valley
MINNEOTA
Minnesota Transmission >69 kV
Southwest Planning Zone
05-SW-N1: Worthington Area
Miles
0
1.5
3
6
N
W
E
S

6.6.4 CapX 2020 Projects

Tracking Numbers. 2005-CX-1 (Fargo –Twin Cities 345 kV)
2005-CX-2 (Brookings – Southeast Twin Cities 345 kV)
2005-CX-3 (LaCrosse – Southeast Twin Cities 345 kV)
2005-NW-N2 (Bemidji-Grand Rapids 230 kV)

CapX 2020 Utilities. CapX 2020 is a joint initiative of 11 transmission-owning utilities in Minnesota and the surrounding region to expand the electric transmission grid to ensure continued reliable service. The CapX 2020 current roster consists of eleven utilities: Central Minnesota Municipal Power Agency, Dairyland Power Cooperative, Great River Energy, Minnesota Power, Minnkota Power Cooperative, Missouri River Energy Services, Otter Tail Power Company, Rochester Public Utilities, Southern Minnesota Municipal Power Agency, Wisconsin Public Power, Inc., and Xcel Energy.

More information about CapX 2020 is available in the 2005 and 2007 Biennial Reports and on the webpage maintained by the utilities: http://www.capx2020.com

CapX 2020 Transmission Projects. The CapX 2020 utilities have identified three 345 kV transmission lines and one 230 kV line as part of the Group I projects. The four lines are:

- Twin Cities – Fargo. This is an approximately 250-mile long, 345 kV project between Monticello, St. Cloud, Alexandria, and Fargo, North Dakota.

- Twin Cities – Brookings County. This is an approximately 200-mile, 345 kV project between the southeast comer of the Twin Cities and Brookings County, South Dakota, as well as a 345 kV segment from Marshall to the Granite Falls area.

- Twin Cities – LaCrosse. This is an approximately 150-mile, 345 kV project between the southeast corner of the Twin Cities, Rochester, and La Crosse, Wisconsin. This project also includes two 161 kV transmission lines from a new North Rochester Substation into Rochester.

- Bemidji-Grand Rapids. This is an approximately 68 mile long line from the 230 kV Wilton Substation located just west of Bemidji, Minnesota (jointly owned by Otter Tail Power and Minnkota Power) to Minnesota Power's 230 kV Boswell Substation in Cohasset, Minnesota, northwest of Grand Rapids, Minnesota. The Bemidji-Grand Rapids 230 kV project is reported under its own Tracking Number (2005-NW-N2).

Projects in Southwest Zone. The Brookings to Southeast Twin Cities line crosses the Southwest Zone.

Status. On May 22, 2009, the Public Utilities Commission issued a Certificate of Need for the three 345 kV CapX 2020 transmission lines. The CapX 2020 utilities applied for a route permit for the Brookings County to Hampton line in December 2008. The utilities have elected to apply for permits for the Fargo – Twin Cities line in two segments, a Monticello to St. Cloud segment, and a St. Cloud to Fargo segment. An application for a route permit for the Monticello to St.

Cloud segment was submitted to the PUC in April 2009, and an application for the St. Cloud to Fargo segment was submitted in October 2009. A permit for the LaCrosse to Twin Cities line will be applied for by the end of 2009. On July 14, 2009, the Commission issued a Certificate of Need for the Bemidji to Grand Rapids line. A route permit for the Bemidji to Grand Rapids line was applied for in 2008 and a decision is expected in mid-2010.

Upsizing. During the Certificate of Need proceeding for the CapX 2020 345 kV lines, the Public Utilities Commission found that the proposed (primarily single circuit) facilities were not optimized for potential future needs. The Commission concluded that the CapX 2020 utilities should consider potential longer-term needs and not just those in the near-term for which the lines were initially proposed. As a result, the Commission, in its Order granting Certificates of Need for the lines, ordered that all segments of the three CapX 2020 345 kV lines be "upsized" i.e., constructed to double-circuit capability. The lone exception to this conclusion was a segment of the Twin Cities – Brookings 345 kV line that was initially proposed by the utilities to be double-circuited; this segment remained unchanged.

Constructing the facilities to be capable of carrying a second 345 kV circuit will help minimize future transmission corridors and optimize the use of the transmission system. At the same time, not constructing the second circuit initially will allow the utilities to defer some portion of the incremental cost until the capability provided by the second circuit could be used. By deferring some of the capital expenditures for the second circuit, the CapX 2020 utilities are able to more closely match investment with future growth. However, deferring construction also increases the overall cost of the facilities as it will require multiple deployments of crews and potentially additional materials.

The CapX 2020 utilities have begun to analyze the costs and timing of deploying the second circuit. This analysis has included consideration of whether it may be more cost-effective to construct the second circuit at the time of initial construction. Relevant factors in this analysis include but are not limited to:

- The material and labor cost of various transmission line designs depending on how many davit arms are hung during initial construction and the corresponding steel and concrete requirements;
- The material and labor cost of stringing the second circuit at the time of initial construction;
- The material and labor cost of stringing the second circuit at some later date (including mobilization of new line crews);
- The cost of additional damage to crops and wetland mitigation;
- The loss benefit created by reducing the overall impedance of the system when the second circuit is strung (including the avoided cost of replacement generation);
- The cost of generation curtailment during any line outages necessary to string the second circuit;
- The cost of capital for each of the projects; and
- The expected escalation or inflation rates for these costs.

Once this analysis is completed, a recommendation will be made regarding whether it is best for the second circuit to be strung during initial construction or at some later date. At that point, necessary regulatory approvals will be sought.

Schedule. The Brookings line is scheduled to be in-service in the Second Quarter 2013. The St. Cloud to Monticello line is scheduled to be in-service in Fourth Quarter 2011, and the Fargo to St. Cloud segment in Third Quarter 2015, although the St. Cloud - Alexandria segment will be in service in 2nd or 3rd Quarter 2013. The Twin Cities to LaCrosse 345 kV line and two 161 kV lines in the Rochester area are scheduled to go into service over the 2012-2015 timeframe. The Bemidji to Grand Rapids line is scheduled to be in-service by the end of 2011.

PUC Docket Numbers. CN-06-1115 (Certificate of Need for Three 345 kV Transmission Lines)
TL-08-1474 (Brookings County to Hampton Route Permit)
TL-09-246 (Monticello to St. Cloud Route Permit)
TL-09-1056 (Fargo to St. Cloud Route Permit)
CN-07-1222 (Bemidji to Grand Rapids Certificate of Need)
TL-07-1327 (Bemidji to Grand Rapids Route Permit)

6.6.5 Storden Wind Interconnection

Tracking Number. 2007-SW-N1

Utility. ITC Midwest

Inadequacy. An interconnection request to the MISO queue (MISO queue #38474-01) was made in May, 2005, for the addition of 130 MW of new wind generation near the Storden substation. The existing 69 kV transmission system is inadequate for any additional generation at this location. A previously queued 50 MW generation project significantly reduced the existing interconnection capacity at Storden.

A map of the area is shown following the discussion.

Alternatives. Two alternatives have been identified.

The initially proposed alternative for interconnection of this project was identified in the MISO Group 4 System Impact Study. The MISO study pointed to conversion of the existing, 50 year old 69 kV line between Heron Lake and Storden to 161 kV operation and also identified construction of a second 161 kV line from Storden to Lakefield Junction as upgrades necessary for the interconnection of the project.

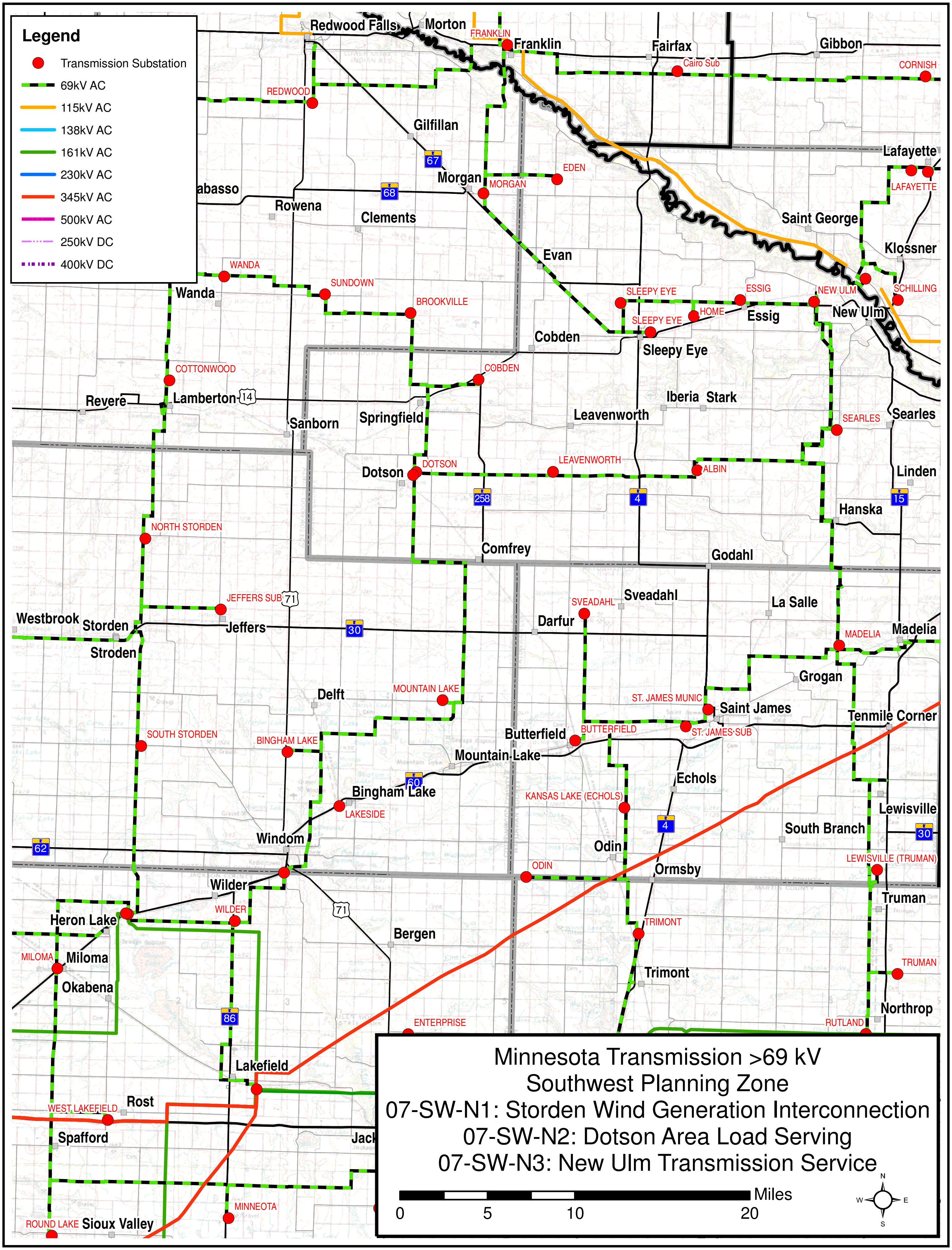
A second alternative was identified in the Dotson Area Load Serving and Generation Outlet Study. This Study identified a new 161 kV line from Storden to Dotson to New Ulm with an interconnection at the Fort Ridgely Substation as a possible solution. This alternative also requires the construction of a 161 kV line from Heron Lake to Storden, requiring a complete rebuilding of the existing line along that route.

Analysis. The first alternative addressed only the needs of the interconnecting generation and required a greater number of miles of new 161 kV line construction. Additionally, providing a second 161 kV line from Storden to Lakefield Junction was not as effective in addressing other needs in the area.

The second alternative provides interconnection service for the Storden generation request (Tracking Number 2007-SW-N1) and also provides for load serving needs in the Dotson area (Tracking Number 2007-SW-N2) and transmission service needs in the New Ulm area (Tracking Number 2007-SW-N3).

Schedule. The estimated in-service date for the Heron Lake – Storden – Dotson – New Ulm 161 kV project was initially expected to be in 2010. In conjunction with the filing of the Large Generator Interconnection Agreement ("LGIA"), the Interconnection Customer suspended the project and filed protest with the FERC for the project. Settlement terms were negotiated among the Parties to the LGIA, and in a recent settlement filing with the FERC for Docket No. ER07-1375-000, the Interconnection Customer indicated an intent to unsuspend and move the project forward. The Interconnection Customer has also indicated a desire to retain its right to suspend the project for the remainder of the three year period allowed under the MISO Tariff.

Currently, the project has been cancelled due to the delays by the wind developer and the elimination of load growth due to the cancellation of plans to build ethanol plants near Cobden and St. James. MISO continues to work with the various generation developers in the area, and additional generator interconnection requests have been submitted for the area. As those requests proceed, restudy of the transmission needs will determine whether this project should be reinstated or whether a different project is more appropriate for the area needs.



Minnesota Transmission >69 kV
Southwest Planning Zone
07-SW-N1: Storden Wind Generation Interconnection
07-SW-N2: Dotson Area Load Serving
07-SW-N3: New Ulm Transmission Service

6.6.6 Dotson Area Load Serving Needs

Tracking Number. 2007-SW-N2

Utility. Great River Energy

Inadequacy. The deficiencies have subsided due to slower than anticipated load growth in the area. Previous reports indicated new ethanol loads in the area. However, those future ethanol loads have not developed, and new wind generation in the area has been postponed. If the wind generation and ethanol projects move forward, low voltages can occur at the Springfield and Cobden busses during outage of the Dotson—Springfield 69 kV line. A recently constructed Milroy-Sheridan 69 kV line has helped improve area voltage. he

A map of the area is part of the discussion for Tracking Number 2007-SW-N1 Storden Wind Interconnection.

Alternatives. The most preferable alternative is the one identified to address the Storden wind interconnection request in Tracking Number 2007-SW-N1. If the wind developer does not proceed with the project, other alternatives will have to be developed and analyzed.

If the wind development does not proceed, it may be possible to construct some other distributed generation facility, but that alternative is not being pursued at the present time.

Analysis. See discussion for Tracking Number 2007-SW-N1 (Storden Wind Interconnection).

Schedule. A restudy of the area is necessary.

6.6.7 New Ulm Transmission Service

Tracking Number. 2007-SW-N3

Utility. Xcel Energy

Inadequacy. The City of New Ulm has requested firm transmission service to serve the City's native load. The existing transmission network is not capable of providing firm service.

A map of the area is part of the discussion for Tracking Number 2007-SW-N1 Storden Wind Interconnection.

Alternatives. The most preferable alternative is the one identified to address the Storden wind interconnection request in Tracking Number 2007-SW-N1, however, the wind developer has delayed the interconnection, and there is continued uncertainty with the project. If the wind developer does not proceed with the project, other alternatives will have to be developed and analyzed.

If the wind development does not proceed, it may be possible to construct some other distributed generation facility, but that alternative is not being pursued at the present time. Also, New Ulm has not identified any potential distributed generation facility.

Analysis. See discussion for Tracking Number 2007-SW-N1 (Storden Wind Interconnection).

Schedule. Due to uncertainty regarding the Storden wind project, a restudy of the area will be required. It is expected that the transmission service needs of the city of New Ulm can be addressed as part of the future upgrades for the Storden wind project.

6.6.8 Fenton 69 kV Interconnection

Tracking Number. 2009-SW-N1

Utility. Xcel Energy

Inadequacy. The Fenton Substation is a significant source of wind interconnections in the southwest Minnesota area. Just north of the substation, there is a 69 kV line that serves several towns between the cities of Pipestone and Marshall. The load served by this line has grown to the point where loss of the Pipestone end of the line (Pipestone – Rock Tap 69 kV line) results in low voltages to several substations along the line.

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

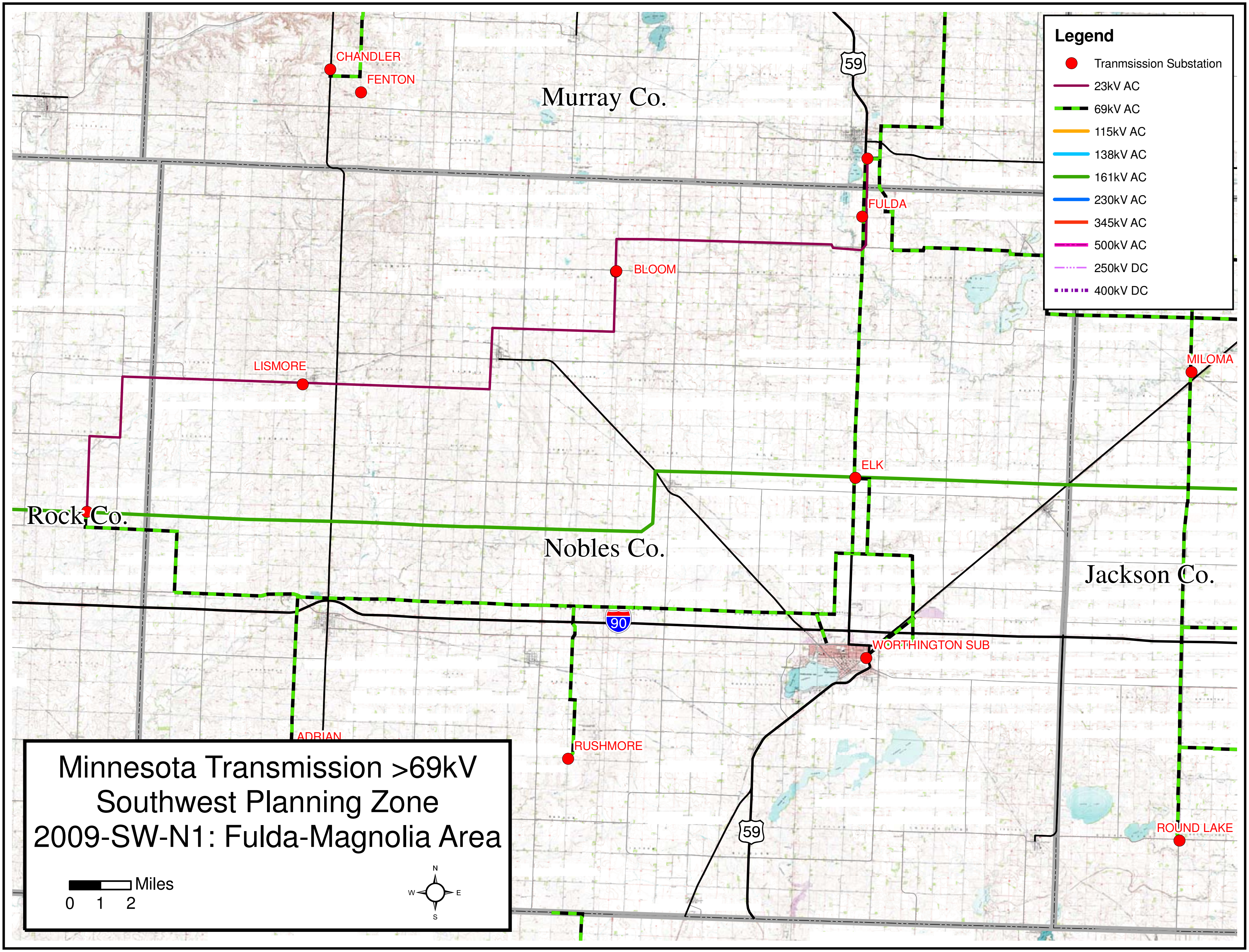
Alternatives. The alternatives investigated for addressing this inadequacy were:

Alternative 1: Add a new 115/69 kV 47 MVA transformer at Fenton Substation. Construct approximately three miles of 69 kV line to loop Fenton Substation into the 69 kV line between Chandler and East Ridge Wind. Add necessary substation equipment at Fenton Substation to enable the new line termination and transformer.

Alternative 2: Convert the existing 69 kV line from Pipestone to Lyon County Substation to 115 kV.

Analysis. This inadequacy was identified in Xcel Energy's 2008 NERC TPL Assessment. As part of that assessment, the above alternatives were investigated, and it was determined that Alternative 1 provided the most robust solution for the most reasonable price. Alternative 2 involves rebuilding approximately 90 miles of 69 kV line to 115 kV and changing significant amounts of substation equipment including several load-serving transformers.

Schedule. The Fenton Substation interconnection is planned to be in service by the end of 2012.


Minnesota Transmission >69kV
Southwest Planning Zone
2009-SW-N1: Fulda-Magnolia Area
Legend
Tranmission Substation
23kV AC
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
Murray Co.
Nobles Co.
Rock Co.
Jackson Co.
CHANDLER
FENTON
FULDA
BLOOM
LISMORE
MILOMA
ELK
WORTHINGTON SUB
ADRIAN
RUSHMORE
ROUND LAKE
59
90
Miles
0 1 2
N
S
E
W

6.6.9 Fulda – Magnolia

Tracking Number. 2009-SW-N2

Utility. Great River Energy

Inadequacy: The Bloom and Lismore Substations are owned by Nobles Co-op and are presently served from a 24 kV line between Fulda and Magnolia. This line is owned by Alliant Energy. Voltage at the Lismore Substation 24 kV bus is projected to be below criteria by the 2011 summer peak load conditions. Nobles Coop management has indicated a desire to improve the service to the Bloom and Lismore Substations.

A map of the Fulda – Magnolia area is shown at the end of the discussion.

Alternatives: Alliant has indicated plans to rebuild the 24 kV system with higher capacity conductor and add a bi-directional voltage regulator. Alliant estimates that this solution would last about 10 years. The cost to Alliant for the 24 kV rebuild is not known at this time. Alliant has indicated an intent to upgrade the 24 kV system within the next 2 to 4 years

Alternative 1: Rebuild the existing 24 kV line to 69 kV

The existing system could be upgraded by the addition of 69 kV breakers at Magnolia and Fulda and the construction of approximately 35 miles of 69 kV line for an estimated cost of about $14 million.

Alternative 2: Tap nearby 69 kV sources

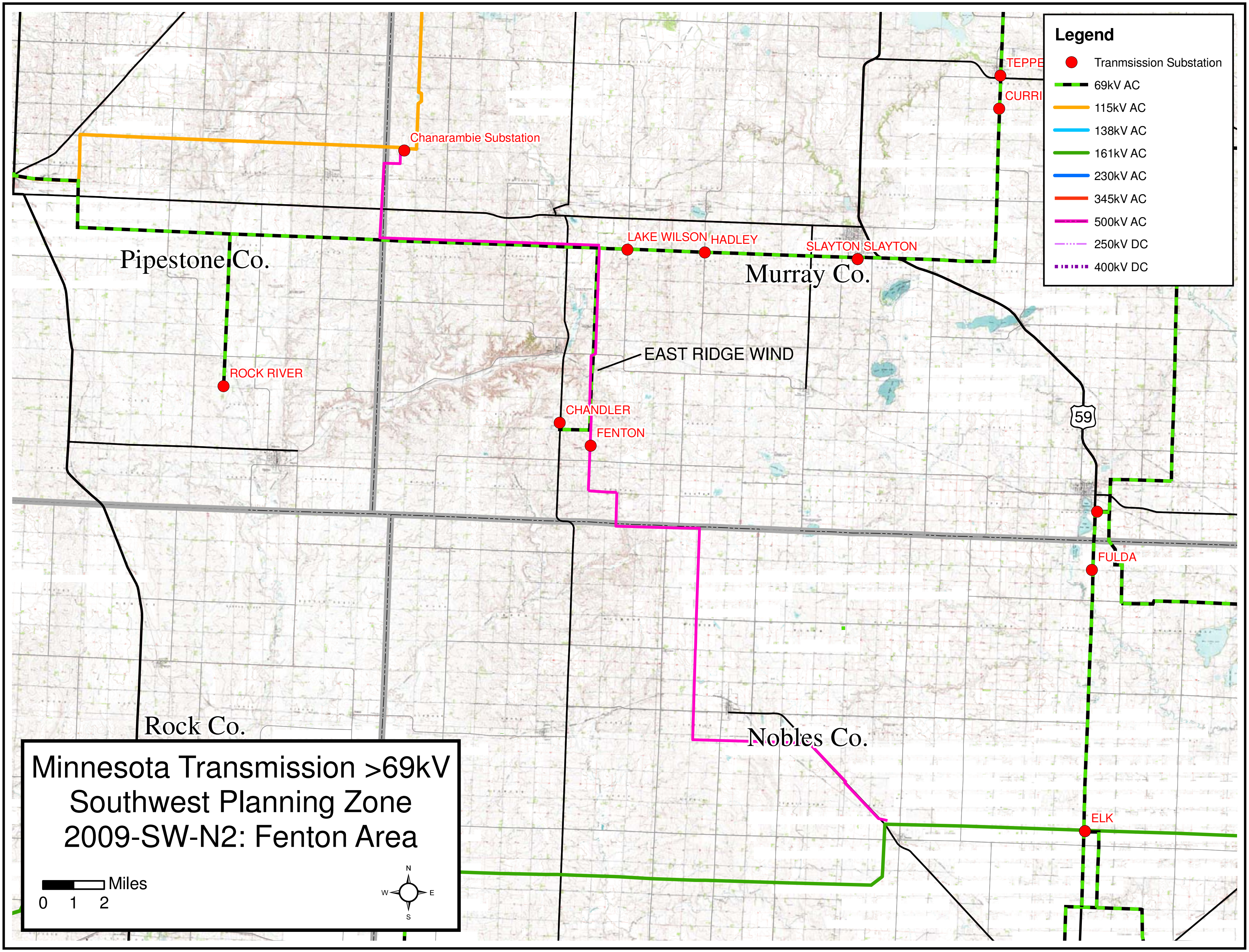
This would require only constructing a portion of the 69 kV loop project and leaving the Bloom and Lismore Substations on 69 kV radials from Magnolia and Fulda, respectively. Each tap is assumed to be about ten miles in length. 69 kV breakers would be required at Magnolia and Fulda. Approximate cost is $8.1 million. If the Lismore sub alone were converted to 69 kV, the estimated cost would be approximately $6.5 million.

Alternative 3: Tap the new Fenton—Nobles 115 kV #2 line

This option is only appropriate for the Lismore Substation. It would involve adding a 3-way, 115 kV switch in the Fenton—Nobles 115 kV line and constructing about three miles of new 115 kV line from the tap to the Lismore Substation. Total cost is estimated at approximately $1.27 million. Nobles Coop would have estimated costs of about $500,000 to upgrade the substation to 115 kV. A similar option might be available for the Bloom Substation, although the cost would be higher due to the need for a longer 115 kV tap line (about four miles). Total estimated cost for the Bloom sub alone would be about $1.7 million. Total estimated costs for both substations are about $3 million for GRE and $1 million for Nobles. Total combined cost is approximately $4 million.

Analysis: The 115 kV solution is recommended to accommodate future load serving needs. Rebuilding the 24 KV system is only a short-term solution, and one of the other solutions will also be required within 10 years.

Schedule: Great River Energy plans to seek an in service date by late 2014.



Legend
Tranmission Substation
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
TEPPE
CURRI
Chanarambie Substation
LAKE WILSON
HADLEY
SLAYTON
SLAYTON
Pipestone Co.
Murray Co.
EAST RIDGE WIND
ROCK RIVER
CHANDLER
FENTON
59
FULDA
Rock Co.
Nobles Co.
ELK
Minnesota Transmission >69kV
Southwest Planning Zone
2009-SW-N2: Fenton Area
Miles
0 1 2
N
W
E
S

6.6.10 Lakefield – Adams 345 kV System Upgrade

Tracking Number. 2009-SW-N3

Utility. ITC Midwest

Inadequacy. The Fox Lake to Rutland to Winnebago to Hayward 161 kV line is a transmission constraint in southern Minnesota. This constraint will be exacerbated by several Midwest ISO generator projects that have proposed interconnections in the area.

A map of the proposed Lakefield to Adams 345 kV line is provided on the following page

Alternatives. There are three alternatives.

Alternative 1. Replace the conductor on the existing 161 kV line with a higher rated conductor.

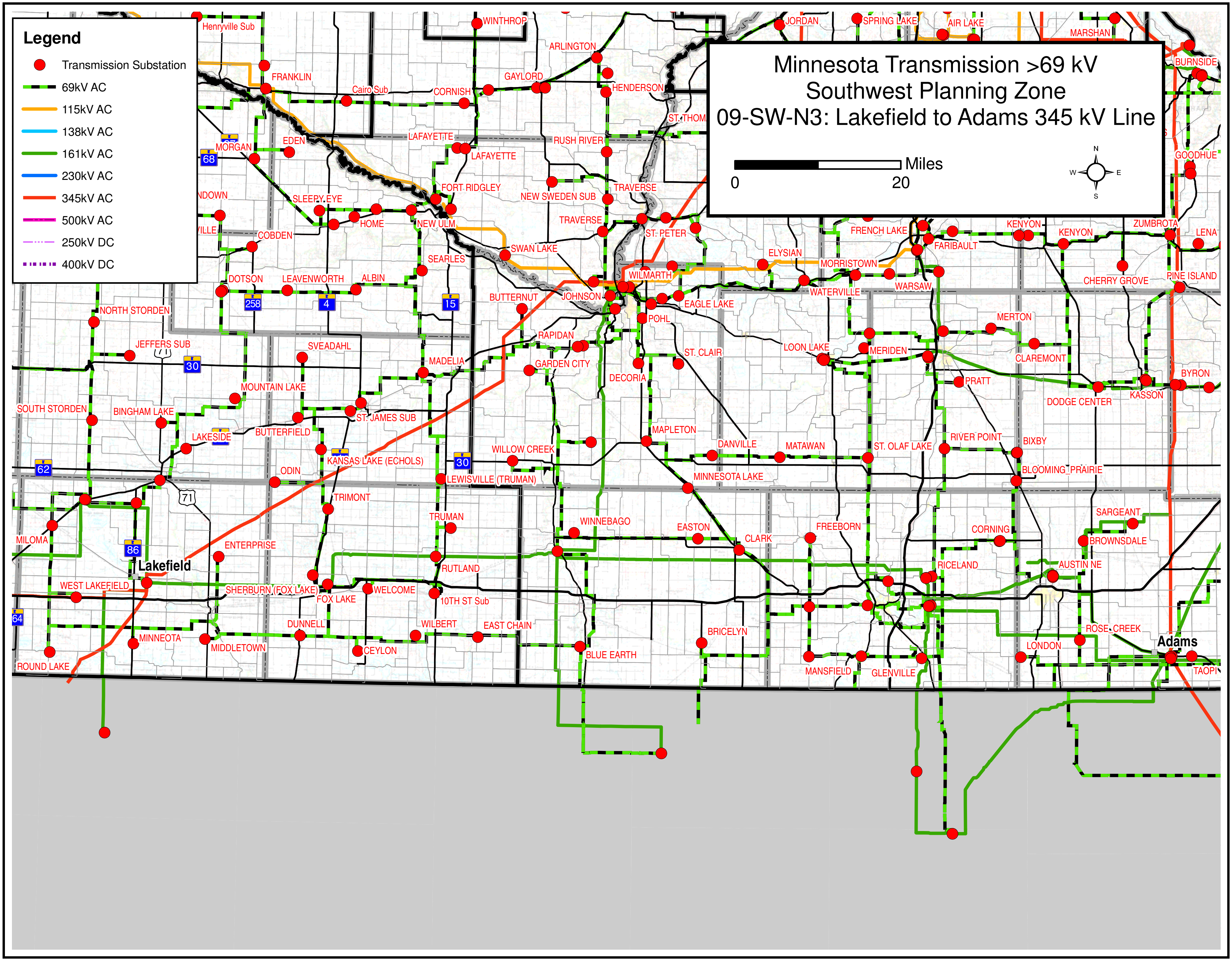
Alternative 2. Rebuild the existing 161 kV line.

Alternative 3. Construct a new 345 kV line between Lakefield and Adams.

Analysis. A west to east 345 kV tie from Lakefield to Adams is preferred. Replacing the conductor is impractical due to the age of existing structures, and rebuilding the existing 161 kV line alone will not provide sufficient capacity to accommodate outlet for generation projects in the region. Construction of a new 345 kV line from Lakefield to Adams would provide increased capacity for generation outlet, and losses would be less than those incurred for a single, high capacity, 161 kV solution.

The west to east Lakefield to Adams 345 kV line would provide greater system reliability by linking the existing south to north Raun to Lakefield to Wilmarth 345 kV line with the south to north Hazelton to Adams to Pleasant Valley 345 kV line. The approximately 150 mile long 345 kV line would also provide greater generation outlet than rebuilding the existing 161 kV system. Benefit of the Lakefield to Adams 345 kV line has been recognized in the Midwest ISO's Narrowly Constrained Area Study, the Regional Generation Outlet Study, and in Midwest ISO generator interconnection System Planning and Analysis Studies. The need for the line was also recognized in the Minnesota Renewable Energy Standard (RES) Update Study.

Schedule. The project was submitted to the Midwest ISO's MTEP in 2008 as a candidate project. An in service date has not been identified for the project. A Certificate of Need and Route Permit from the Public utilities Commission would be required for a new 345 kV line of the length required here.


Minnesota Transmission >69 kV
Southwest Planning Zone
09-SW-N3: Lakefield to Adams 345 kV Line
Legend
Transmission Substation
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
Miles
0
20
Lakefield
Adams

6.6.11 Redwood Falls Load Serving Substation

Tracking Number. 2009-SW-N4

Utility. Southern Minnesota Municipal Power Agency

Inadequacy. Load has continued to grow in the area around Redwood Falls, and additional resources are necessary to serve residential and commercial customers. The City of Redwood Falls has already determined that a new load serving substation, called the East Substation, should be installed on the east side of town. The remaining matter to be determined is how best to provide transmission to this new East Substation.

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

Alternatives. Two alternative transmission plans were studied to serve the proposed East Substation.

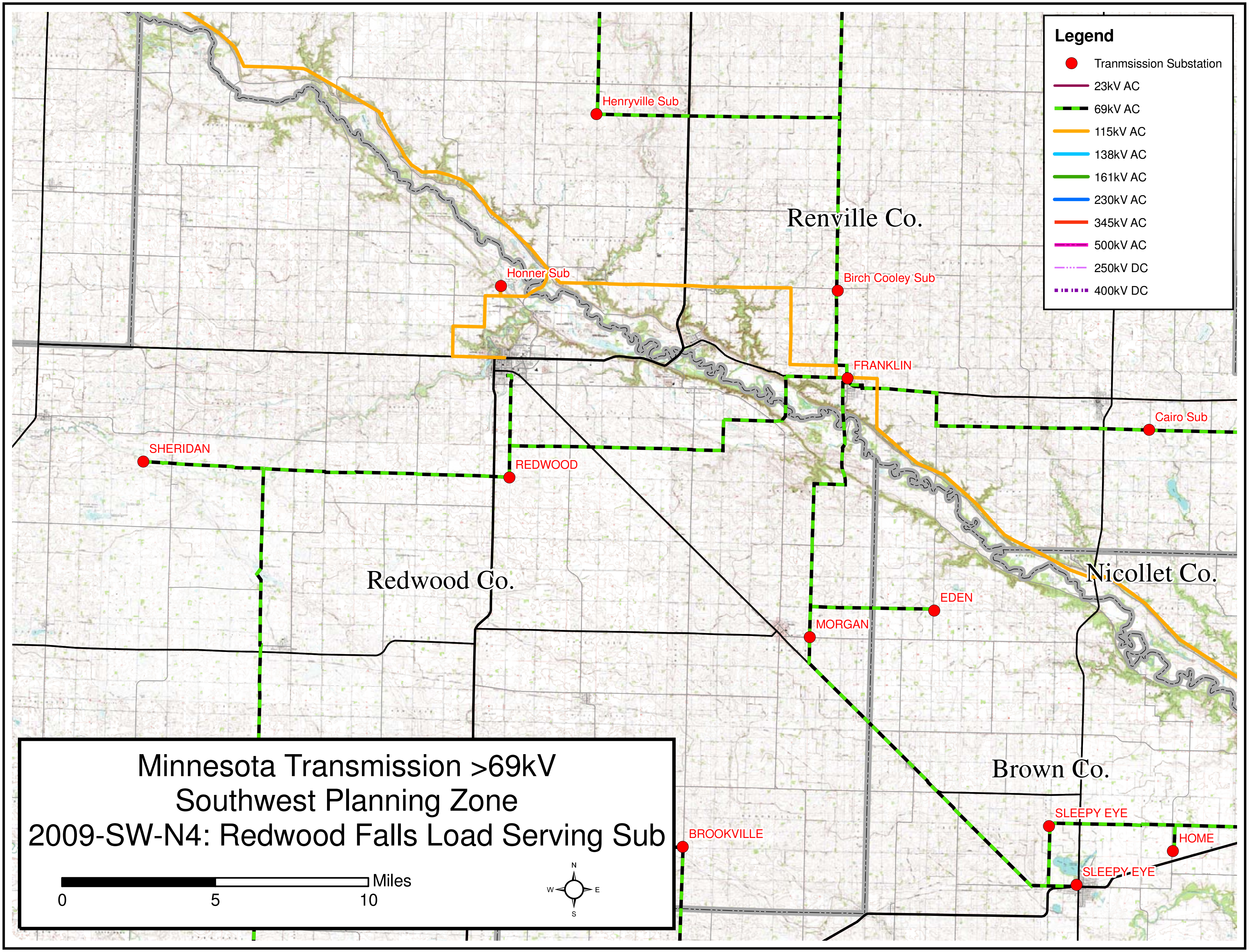
Alternative 1: Serve the new City load serving substation from the existing 69 kV transmission system in the area.

Alternative 2: Serve the new City load serving substation from the existing 115 kV transmission system in the area. This approach would involve approximately five miles of new 115 kV transmission line from the existing West Substation to the new East Substation within the City of Redwood Falls.

Analysis. Both Alternative 1 (the 69 kV alternative) and Alternative 2 (the 115 kV alternative) involve various choices for bringing either a 69 kV or a 115 kV source to the East Substation. The results of the analysis of the 69 kV alternatives that were considered indicated that the 69 kV transmission system in the area was only capable of providing adequate service until about 2015. Therefore, it was determined that the 115 kV option was preferable.

Two options for bringing a 115 kV source to the new East Substation are under consideration. One option is to rebuild Great River Energy's existing Franklin to Redwood Falls 69 kV line to double circuit 115 kV and 69 kV. The second option is to build a new 115 kV line between the proposed new East Substation and a new east tap on an existing Xcel Energy 115 kV line between Minnesota Valley and Franklin substations. These alternatives are still being studied.

Schedule. The proposed new City load serving East Substation and new 115 kV line serving this new load serving substation are planned to be in service by 2011. A decision on which of the 115 kV options to pursue will be made in early 2010. The new 115 kV transmission line will be approximately five miles in length, so a Certificate of Need for the line will not be required because it is under ten miles in length and does not cross the state border. A route permit from the Public Utilities Commission or local government will be required for the route.


Minnesota Transmission >69kV
Southwest Planning Zone
2009-SW-N4: Redwood Falls Load Serving Sub
Legend
Tranmission Substation
23kV AC
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
Renville Co.
Redwood Co.
Nicollet Co.
Brown Co.
Henryville Sub
Honner Sub
Birch Cooley Sub
FRANKLIN
Cairo Sub
SHERIDAN
REDWOOD
EDEN
MORGAN
SLEEPY EYE
HOME
SLEEPY EYE
BROOKVILLE
Miles
0
5
10
N
W
E
S

6.7 Southeast Zone

The following table provides a list of transmission needs identified in the Southeast Zone and the map on the following page shows the location of each item in the table.

Southeast Zone

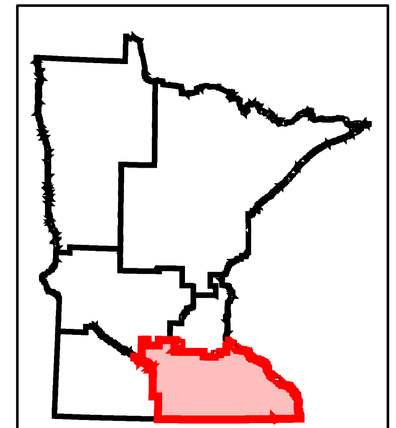
Tracking Number	Description	Projected In-Service Year	Need Driver	Section No
2003-SE-N1	Rochester & Southeast Minnesota Areas; includes Rochester load serving study and Rochester new transmission tie	2011	Load serving in Rochester and the Greater LaCrosse Area	6.7.2
2003-SE-N3	City of Mankato	To be Determined	Transformer Overloads and system reliability	6.7.3
2005-SE-N4	Dodge County Wind	To be Determined	Generation outlet	6.7.4
2005-SE-N5	Mower County Wind	2009	Generation outlet	6.7.5
2005-CX-3	CapX 2020 Vision Plan Twin Cities – Rochester – LaCrosse 345 kV			6.7.6
2007-SE-N1	Rochester-Adams 161 kV Line	2009	Line subject to overloads due to wind generators around Adams	6.7.7
2007-SE-N2	Grand Meadow Wind	2009	Generation outlet	6.7.8
2007-SE-N3	North Mankato Load Serving	2010	Low voltages and line overloads	6.7.9
2007-SE-N4	Wind Generation Upgrades – Freeborn and Mower Counties	2009 – 2010	Generation Outlet	6.7.10
2009-SE-N1	Harmony-Beaver Creek Line	2010	Generation Outlet	6.7.11
2009-SE-N2	Mankato-Minnesota Lakes Area	2016	Mankato Area Load Serving	6.7.12
2009-SE-N3	Cannon Falls Area	2010	Load Serving and System Reliability in Cannon Falls Area	6.7.13
2009-SE-N4	Byron-Westside Rochester Area	2010	Load Serving and System Reliability in the Rochester Area	6.7.14
2009-SE-N5	Saint Peter Area	2010	Load Serving	6.7.15

Minnesota Transmission >69kV
Southeast Planning Zone

Miles: 0 5 10 20

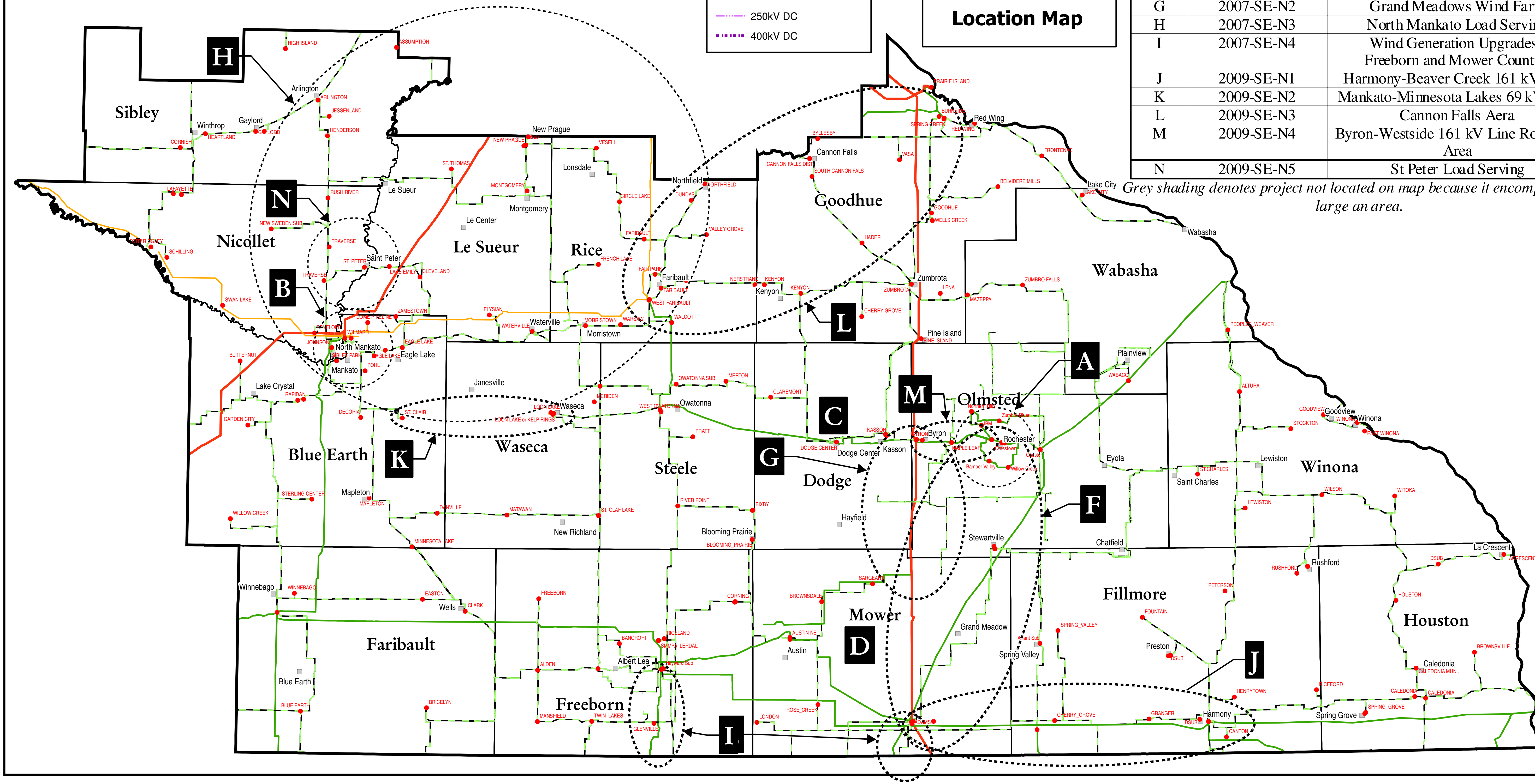
Legend

- Transmission Substation
- Cities
- Project Location
- 69kV AC
- 115kV AC
- 138kV AC
- 161kV AC
- 230kV AC
- 345kV AC
- 500kV AC
- 250kV DC
- 400kV DC



Map ID	Tracking Number	Description
A	2003-SE-N1	Rochester & Southeast Minnesota Area; includes Rochester load serving study and Rochester new transmission tie
B	2003-SE-N3	City of Mankato
C	2005-SE-N4	Dodge County Wind
D	2005-SE-N5	Mower County Wind
E	*2005-CX-3*	*CapX 2020 Vision Plan Twin Cities – Rochester – LaCrosse 345 kV*
F	2007-SE-N1	Rochester-Adams 161 kV Line
G	2007-SE-N2	Grand Meadows Wind Farm
H	2007-SE-N3	North Mankato Load Serving
I	2007-SE-N4	Wind Generation Upgrades - Freeborn and Mower Counties
J	2009-SE-N1	Harmony-Beaver Creek 161 kV Line
K	2009-SE-N2	Mankato-Minnesota Lakes 69 kV Area
L	2009-SE-N3	Cannon Falls Aera
M	2009-SE-N4	Byron-Westside 161 kV Line Rochester Area
N	2009-SE-N5	St Peter Load Serving

Grey shading denotes project not located on map because it encompasses too large an area.



6.7.1 Completed Projects

Some inadequacies in the Southeast Zone that were identified in earlier Biennial Reports were alleviated through the construction and completion of specific projects over the last two years. Information about each of the completed projects is summarized briefly in the table below, and those matters will be removed from the list of inadequacies that are discussed in the 2009 Report. More detailed information about these projects and inadequacies can be found in the 2005 and 2007 Reports and in the PUC Docket for the matter if the project fell within the jurisdiction of the Public Utilities Commission, in which case the Docket Number is shown below. Also, additional information is available by contacting the designated person for the utility that was responsible for constructing the project.

Tracking Number	Utility	Description	PUC Docket	Date Completed
2005-SE-N1	Xcel Energy	Mankato Generation Capacity increases on three 115 kV lines	CN-03-1884	2009
2005-SE-N2	Xcel Energy	Cannon Falls Generation Three New 115 kV lines (3.6 miles total length) and one new substation	TL-06-459	2009
2005-SE-N3	Xcel Energy and SMMPA	Lake City Area New 69 kV line, substation upgrades	None	2009

6.7.2 Rochester and Southeast Minnesota Areas

Tracking Number. 2003-SE-N1

Utility. Xcel Energy, Dairyland Power Cooperative, Rochester Public Utilities, Southern Minnesota Municipal Power Agency, and Wisconsin Public Power Inc.

Inadequacy. Transmission issues in the Rochester and Southeast Minnesota area were first reported on in the 2003 Biennial Report. The following issues have been identified:

1. *Rochester load.* The loss of the Byron – Maple Leaf 161 kV line would limit the input into the Rochester area to about 160 MW, when the summer peak demand is 300 MW. And load growth is projected to require even more power in the area.

2. *Transfer limit.* The capacity of the Byron – Maple Leaf 161 kV line is a limiting factor in setting the available transfer capability for Minnesota to Wisconsin transfers.

3. *Load serving the greater LaCrosse area*. The Greater LaCrosse Area, electrically, includes Winona, LaCrescent, Houston, and Caledonia as well as a significant area surrounding LaCrosse on the Wisconsin side of the Mississippi. In the 2005 Report, it was reported that the loss of the Genoa-LaCrosse-Marshland 161 kV line created an overload on the Genoa – Coulee 161 kV line. In 2007 the Genoa – Coulee 161 kV line was reconductored to 377 MVA. With this reconductor the Genoa – LaCrosse 161 kV line overloads for the loss of the Genoa-Coulee 161 kV line. This overload is exacerbated by an outage of the generator at the Alma site.

4. *Serving Regional Load*. Due to numerous constrained flow-gates within the MAPP and Midwest ISO areas, utilities have experienced difficulty securing firm transmission service to deliver firm generation purchases from sources within and outside the MAPP region. In addition, utilities have encountered difficulty locating possible new generation within their service areas due to these constraints. For those utilities within MISO, transmission is less of an issue with respect to energy; however demonstration of firm transmission for capacity accreditation remains a requirement for any capacity purchases in excess of 10% of network load. Lack of firm transmission exposes these utilities to high energy costs. The inability to secure firm transmission has also limited the sale of excess generation.

   It should be noted that in October 2006, the person serving as the Independent Market Monitor for MISO declared a broad area, including the Southeast Transmission Zone, a Narrowly Constrained Area ("NCA") under the MISO tariff. FERC subsequently accepted the designation. This designation indicates that the area is subject to high congestion charges due to the need to re-dispatch more costly generation (peaking capacity) to alleviate constraints on the area's transmission system. Because of the electrical location of some generators, these constraints can give the operator "market power" placing area load at a disadvantage. By designating the region an NCA, the operators are limited to their offer prices. The Independent Market Monitor indicated in his report that the NCA condition was likely to continue for some time and remains in effect at the time of this report.

5. *CapX 2020 Vision Plan*. In order to serve projected new load in Minnesota, major additions to the 345 kV system in the state are required with access to regions outside of Minnesota. One of the vision projects identified is the need for a 345 kV line from the south side of the Twin Cities to eastern Wisconsin.

6. *Adams-Rochester 161 kV Line*. This line overloads due to the addition of new wind generation and has been given its own Tracking Number (2007-SE-N1).

A map of the area is shown following the discussion.

Alternatives. As part of the CapX 2020 process, the utilities considered two options for a 345 kV line between the Twin Cities area and LaCrosse, Wisconsin. One option was a line from a new Hampton Corner Substation in Dakota County, Minnesota, to LaCrosse and the other option was a line from Prairie Island to LaCrosse. The utilities determined that the line from Hampton Corner was the preferred option.

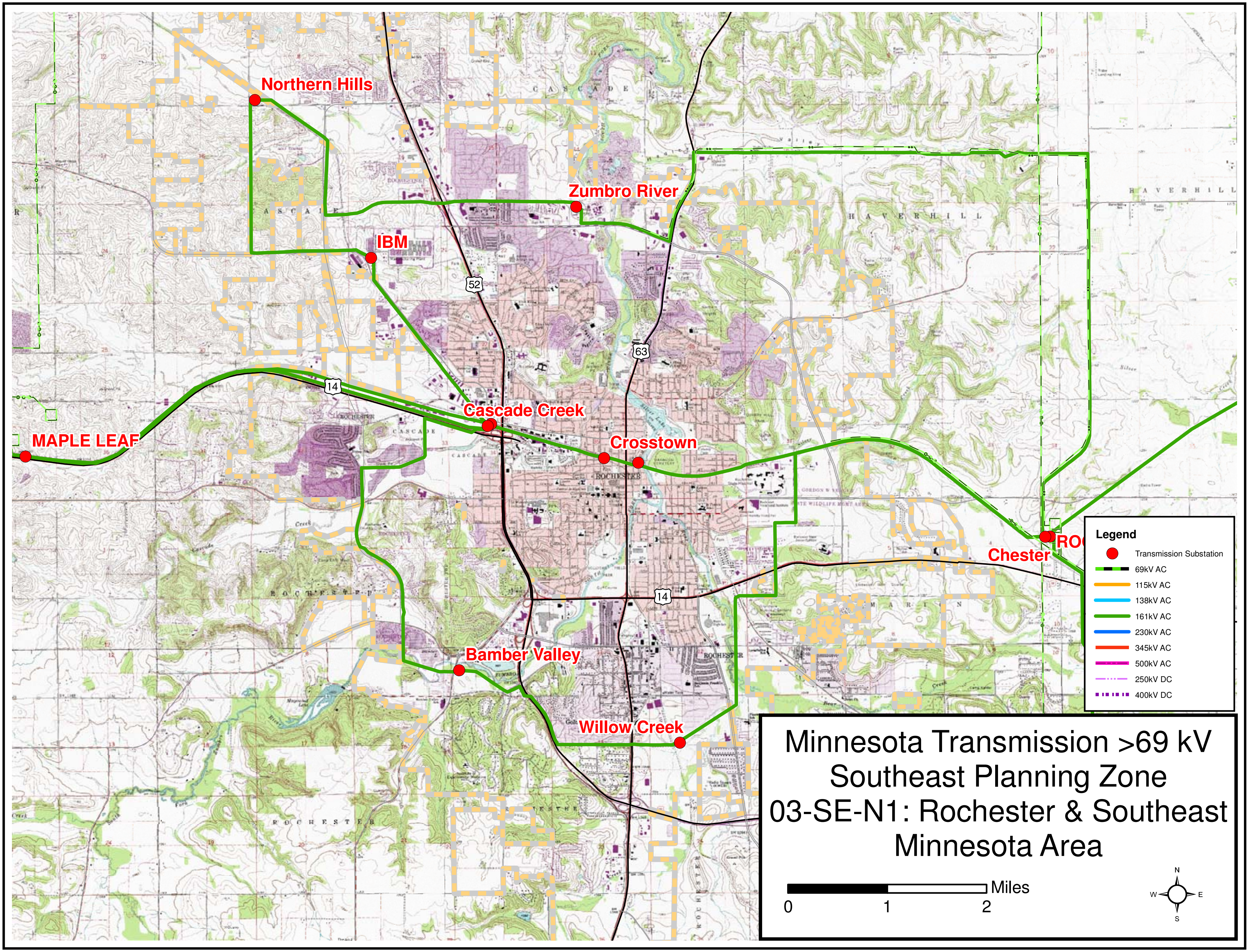
The 345 kV line from Hampton Corner to LaCrosse also includes a new substation, called the North Rochester Substation, and a 161 kV segment continuing for about 10–15 miles from the North Rochester Substation to the Northern Hills Substation in the Rochester are. In addition, a 161 kV line extending south from the North Rochester Substation to the Chester Substation is also part of the proposal, with the option to construct that segment to 345 kV capability.

Analysis. The major study effort for these deficiencies is the *Southeastern Minnesota-Southwestern Wisconsin Reliability Enhancement Study, dated March 13, 2006* (SE 345 kV Study). In August 2007 Xcel Energy and GRE filed an application for a Certificate of Need with the Public Utilities Commission for the Hampton-North Rochester-LaCrosse line, including the 161 kV segments. In August of 2009, the Minnesota Public Utilities Commission granted a Certificate of Need for the CAPX projects which included the Hampton Corner - North Rochester – North LaCrosse 345 kV line, plus the North Rochester – Northern Hills 161 kV line and the North Rochester – Chester 161 kV line.

The utilities are still investigating routing issues. There are two main routing options under review. One routing option generally follows US Highway 52. The other generally tracks south from Hampton Corner and then generally east to North Rochester. The North Rochester 345/161 kV substation taps the existing Prairie Island-Byron 345 kV transmission line on the northwest side of the city of Rochester.

The North Rochester – LaCrosse segment routing is driven by the suitable Mississippi River crossing candidates. The candidates are from north to south – Alma Winona, and La Crescent – and all three have existing overhead transmission crossings.

Schedule. An application for a Route Permit for the 345 kV line and the 161 kV lines will be filed with the Minnesota Public Utilities Commission by the end of 2009. The timeframe for placing the new 345 kV and 161 kV facilities into service is 2012-2015.


Northern Hills
Zumbro River
IBM
Cascade Creek
Crosstown
MAPLE LEAF
Bamber Valley
Willow Creek
Chester
Legend
Transmission Substation
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
Minnesota Transmission >69 kV
Southeast Planning Zone
03-SE-N1: Rochester & Southeast
Minnesota Area
Miles
0
1
2
N
W
E
S

6.7.3 City of Mankato

Tracking Number. 2003-SE-N3

Utility. Xcel Energy

Inadequacy. The City of Mankato is supplied by the Wilmarth 345/115/69 kV substation on the north side of the city and a 69 kV transmission line loop around the city. This matter was first reported in the 2005 Report as a two-pronged problem. This year a third concern has been identified. The three separate transmission issues that have been identified are: (1) outage of the Wilmarth-Eastwood-Pohl Road tap results in an overload of the Rutland-Truman 69 kV line and low voltages in the area between Madelia and Decoria, (2) the loss of any of the three 115/69 transformers at the Wilmarth substation results in the overloading of the remaining two and (3) less than desirable reliability due to the large number of common-breaker circuit miles on the existing 69 kV system.

A map of the area is shown following the discussion.

Alternatives. There are two alternatives in the Mankato area to address all the low voltage and thermal overload issues that exist.

Alternative 1: This alternative calls for a new high voltage loop around the City of Mankato by upgrading the existing 69 kV lines to 115 kV. This 115 kV loop can be achieved by implementing the following projects:

- New 161/115/69 kV substation at South Bend township.
- Operate existing 161 kV line from South Bend – Wilmarth at 115 kV.
- Re-terminate the existing 69 kV line from Century – Ballard Corner into South Bend.
- Build a new 115/69 kV substation at Hungry Hollow
- Convert the existing 69 kV line from South Bend – Ballard Corner to 115 kV.
- 115 and 69 kV double circuit from Ballard Corner to Hungry Hollow.
- Convert the existing 69 kV line from Hungry Hollow – Pohl tap to 115 kV.
- Convert Pohl substation to 115 kV.
- Operate the existing 69 kV line, constructed at 161 kV, from Pohl – Eastwood at 115 kV.

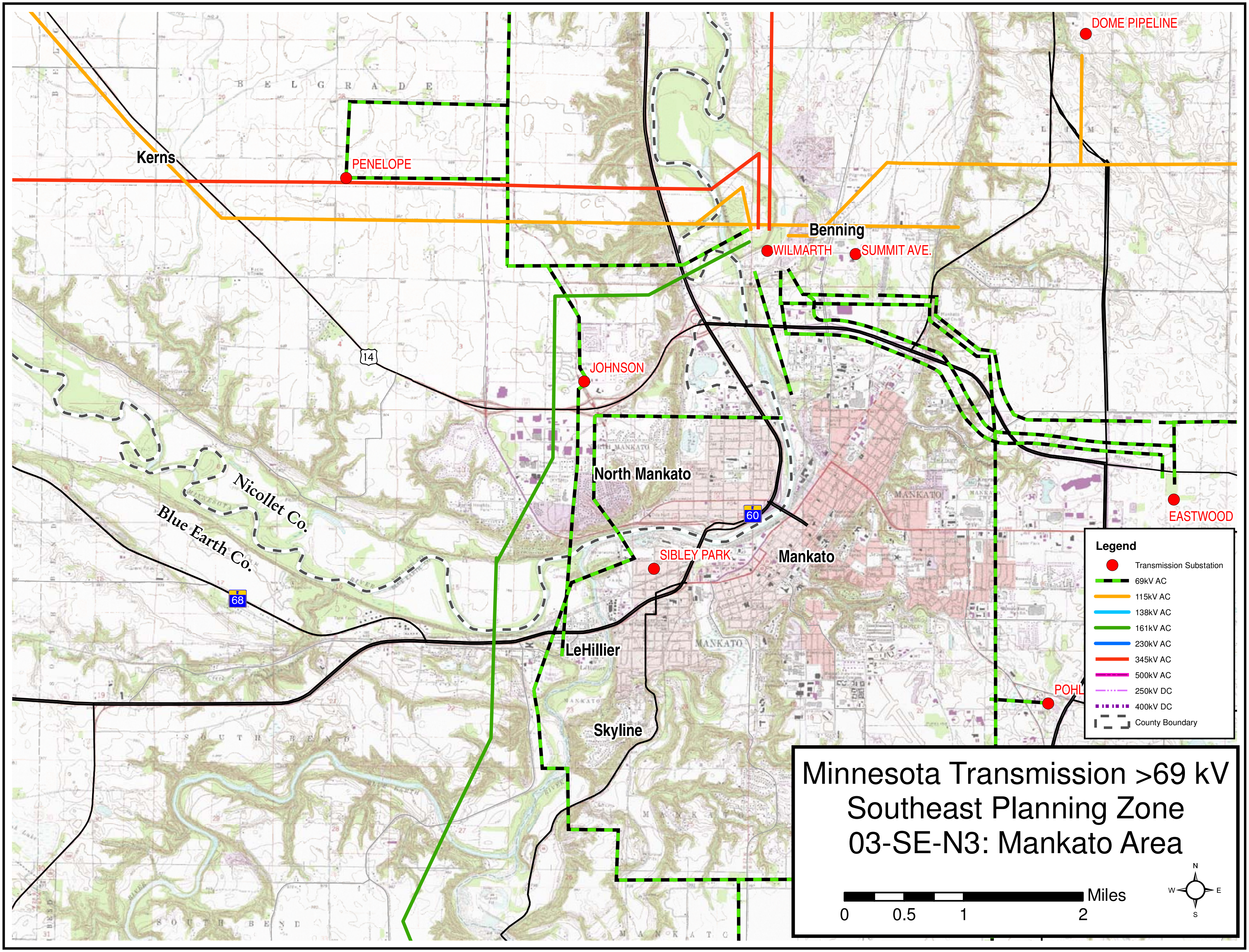
The operating voltage of the line between Wilmarth and South Bend has to be lowered from 161 to 115 kV, and the line between Pohl and Eastwood is built to 161 kV specifications and needs to be operated at 115 kV. This option also allows addition of new load on the 115 kV loop without replacement of the Wilmarth 115/69 kV transformers.

Alternative 2: This alternative comprises a new 115/69 kV substation at Hungry Hollow and a new 115 kV line from Eastwood to Hungry Hollow. This alternative will also involve upgrading all three Wilmarth 115/69 kV transformers to higher capacity.

Analysis. Alternative 1 is the recommended plan, as it provides adequate transmission for the current and future needs of City of Mankato. Xcel Energy and Great River Energy jointly applied to the Public Utilities Commission for a route permit for an eight mile long 115 kV line between South Bend and Stoney Creek in August 2008.

Schedule. On April 21, 2009, the Public Utilities Commission issued a route permit for the 115 kV line between South Bend and Stoney Creek. The project is expected to be completed by March 2010.

PUC Docket Number. TR-08-734 (Route Permit)



Minnesota Transmission >69 kV
Southeast Planning Zone
03-SE-N3: Mankato Area

6.7.4 Dodge County Wind

Tracking Number. 2005-SE-N4

Utility. Xcel Energy

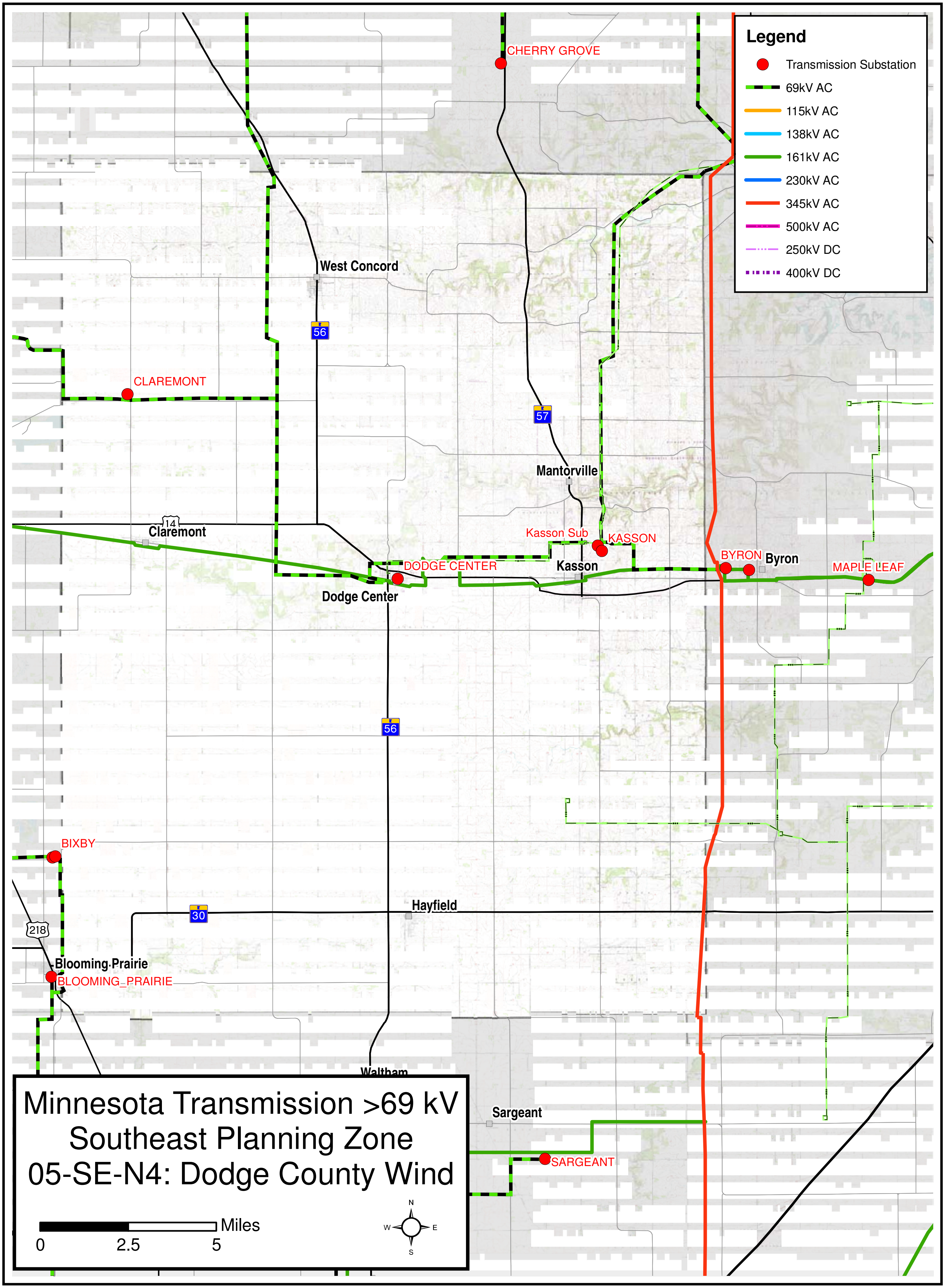
Inadequacy. An independent power producer has connected 49 MW of wind generation to the 69 kV transmission system near Dodge Center. There is a proposal to connect an additional 23 MW for a total of 72 MW. Both system protection and service quality issues require that the wind project only be allowed to operate with the Byron source in-service. Voltage fluctuations that exceed Xcel Energy's voltage flicker criteria were identified at generation levels of greater than 49 MW. The other issue identified was line capacity – the capacity limit of the 69 kV line from Dodge Center to Kasson is reached when the output of the wind generation exceeds 56 MW.

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

Alternatives. One alternative identified to address system protection and service quality issues is to install breakers at Kasson and Kenyon. A solution to address capacity issues is to upgrade the 69 kV line from Dodge Center to Kasson (approximately seven miles).

Analysis. A number of studies have been conducted. The studies show that upgrading the Dodge Center to Kasson line is preferable to building a new line, which would have greater environmental issues and be more expensive.

Schedule. The status of the generation interconnection is currently listed as "Suspended." Additional work on this inadequacy will be postponed until the developer announces an intent to proceed and will be closed if the developer withdraws from the queue.



Legend
Transmission Substation
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
CHERRY GROVE
West Concord
56
CLAREMONT
57
Mantorville
14
Claremont
Kasson Sub
KASSON
DODGE CENTER
Kasson
BYRON
Byron
MAPLE LEAF
Dodge Center
56
BIXBY
Hayfield
30
218
Blooming Prairie
BLOOMING_PRAIRIE
Waltham
Sargeant
SARGEANT
Minnesota Transmission >69 kV
Southeast Planning Zone
05-SE-N4: Dodge County Wind
Miles
0
2.5
5
N
W
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S

6.7.5 Mower County Wind

Tracking Number. 2005-SE-N5

Utility. ITC Midwest, Dairyland Power Cooperative

Inadequacy. The Public Utilities Commission issued a wind permit to High Prairie Wind Farm I in May 2006 for a 98.9 MW wind project in Mower County. High Prairie Wind Farm II, a 100 MW project, was permitted in May 2007. The power from the wind generation cannot be delivered to the transmission grid without certain upgrades.

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

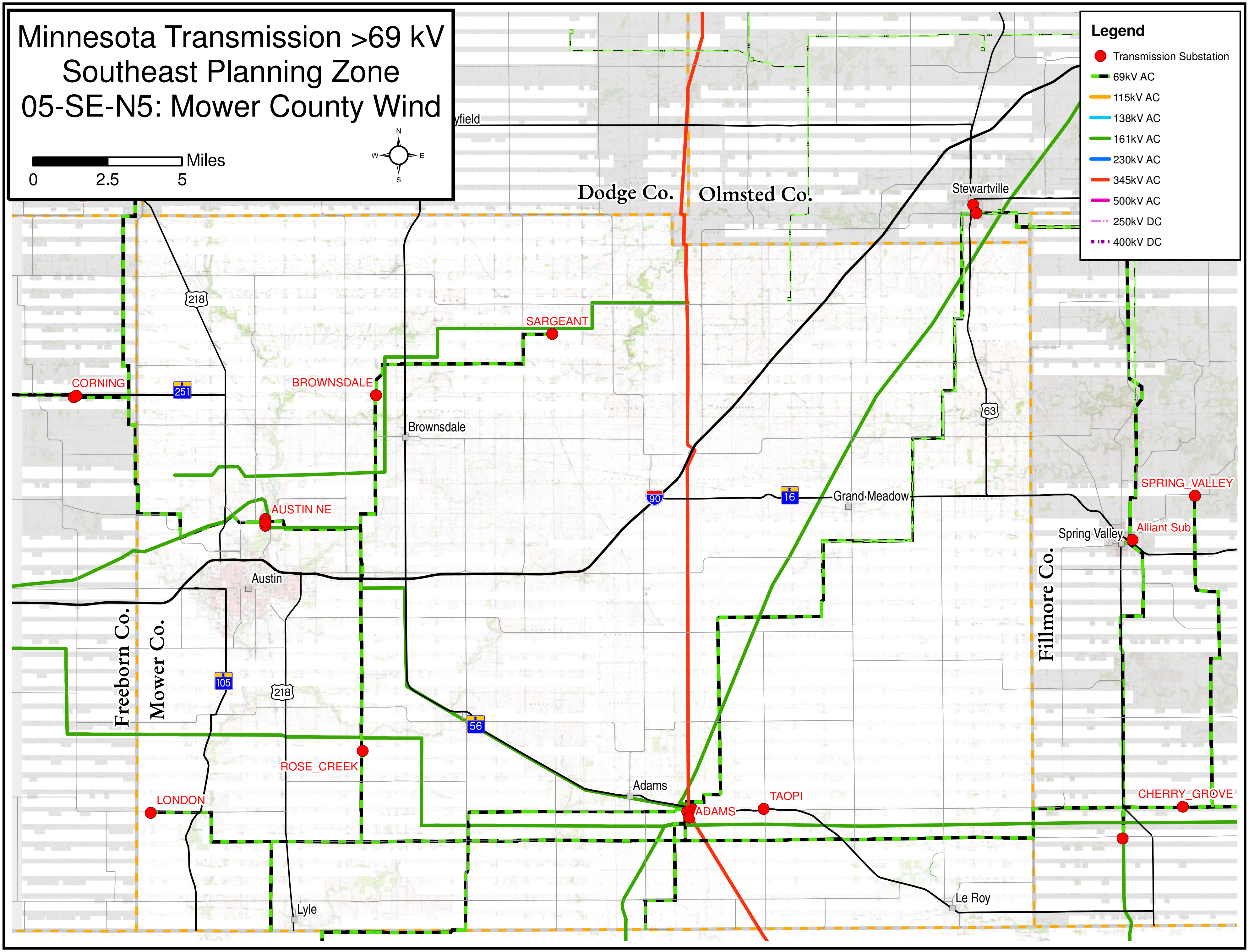
Alternatives. Two transmission upgrade projects are needed to accommodate the generation from the two wind farms. The first project requires the upgrade of the Prairie Island – Red Rock 345 kV line #2.

The second project requires the upgrade of the Rochester – Adams 161 kV line. This project is reported as Tracking Number 2007-SE-N1.

Analysis. The transmission service request study performed by MISO indicates that only 20 MW would have been deliverable without the upgrades mentioned above. The upgrade of the Prairie Island – Red Rock 345 kV line accommodated the first 100 MW of wind, but the second project must be placed in service to accommodate the delivery of the second 100 MW. After both upgrades are complete, the wind generating facilities will be able to deliver all of their power.

Schedule. The first phase of the project – High Prairie Wind Farm I – was placed in service in 2006, and the wind farm was interconnected to the 161 kV side of the Adams substation. The Prairie Island – Red Rock #2 345 kV line upgrade was completed in mid 2007. The Rochester-Adams line upgrade is scheduled to be placed in service by the end of December 2009.

PUC Docket Numbers. WS-06-91 (Wind Farm I Site Permit)
WS-06-1520 (Wind Farm II Site Permit)


Minnesota Transmission >69 kV
Southeast Planning Zone
05-SE-N5: Mower County Wind
Miles
0
2.5
5
N
W
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S
Legend
Transmission Substation
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
Dodge Co.
Olmsted Co.
Freeborn Co.
Mower Co.
Fillmore Co.
Stewartville
SARGEANT
CORNING
BROWNSDALE
Brownsdale
AUSTIN NE
Austin
Grand Meadow
SPRING_VALLEY
Spring Valley
Alliant Sub
ROSE_CREEK
LONDON
Adams
ADAMS
TAOPI
CHERRY_GROVE
Le Roy
Lyle
218
251
90
16
63
105
56

6.7.6 CapX 2020 Projects

Tracking Numbers. 2005-CX-1 (Fargo –Twin Cities 345 kV)
2005-CX-2 (Brookings – Southeast Twin Cities 345 kV)
2005-CX-3 (LaCrosse – Southeast Twin Cities 345 kV)
2005-NW-N2 (Bemidji-Grand Rapids 230 kV)

CapX 2020 Utilities. CapX 2020 is a joint initiative of 11 transmission-owning utilities in Minnesota and the surrounding region to expand the electric transmission grid to ensure continued reliable service. The CapX 2020 current roster consists of eleven utilities: Central Minnesota Municipal Power Agency, Dairyland Power Cooperative, Great River Energy, Minnesota Power, Minnkota Power Cooperative, Missouri River Energy Services, Otter Tail Power Company, Rochester Public Utilities, Southern Minnesota Municipal Power Agency, Wisconsin Public Power, Inc., and Xcel Energy.

More information about CapX 2020 is available in the 2005 and 2007 Biennial Reports and on the webpage maintained by the utilities: http://www.capx2020.com

CapX 2020 Transmission Projects. The CapX 2020 utilities have identified three 345 kV transmission lines and one 230 kV line as part of the Group I projects. The four lines are:

- Twin Cities – Fargo. This is an approximately 250-mile long, 345 kV project between Monticello, St. Cloud, Alexandria, and Fargo, North Dakota.

- Twin Cities – Brookings County. This is an approximately 200-mile, 345 kV project between the southeast comer of the Twin Cities and Brookings County, South Dakota, as well as a 345 kV segment from Marshall to the Granite Falls area.

- Twin Cities – LaCrosse. This is an approximately 150-mile, 345 kV project between the southeast corner of the Twin Cities, Rochester, and LaCrosse, Wisconsin. This project also includes two 161 kV transmission lines from a new North Rochester Substation into Rochester.

- Bemidji-Grand Rapids. This is an approximately 68 mile long line from the 230 kV Wilton Substation located just west of Bemidji, Minnesota (jointly owned by Otter Tail Power and Minnkota Power) to Minnesota Power’s 230 kV Boswell Substation in Cohasset, Minnesota, northwest of Grand Rapids, Minnesota. The Bemidji-Grand Rapids 230 kV project is reported under its own Tracking Number (2005-NW-N2).

Projects in Southeast Zone. The Twin Cities to LaCrosse line crosses the Southeast Zone.

Status. On May 22, 2009, the Public Utilities Commission issued a Certificate of Need for the three 345 kV CapX 2020 transmission lines. The CapX 2020 utilities applied for a route permit for the Brookings County to Hampton line in December 2008. The utilities have elected to apply for permits for the Fargo – Twin Cities line in two segments, a Monticello to St. Cloud segment, and a St. Cloud to Fargo segment. An application for a route permit for the Monticello to St. Cloud segment was submitted to the PUC in April 2009, and an application for the St. Cloud to

Fargo segment was submitted in October 2009. A permit for the LaCrosse to Twin Cities line will be applied for by the end of 2009. On July 14, 2009, the Commission issued a Certificate of Need for the Bemidji to Grand Rapids line. A route permit for the Bemidji to Grand Rapids line was applied for in 2008 and a decision is expected in mid-2010.

Upsizing. During the Certificate of Need proceeding for the CapX 2020 345 kV lines, the Public Utilities Commission found that the proposed (primarily single circuit) facilities were not optimized for potential future needs. The Commission concluded that the CapX 2020 utilities should consider potential longer-term needs and not just those in the near-term for which the lines were initially proposed. As a result, the Commission, in its Order granting Certificates of Need for the lines, ordered that all segments of the three CapX 2020 345 kV lines be "upsized" i.e., constructed to double-circuit capability. The lone exception to this conclusion was a segment of the Twin Cities – Brookings 345 kV line that was initially proposed by the utilities to be double-circuited; this segment remained unchanged.

Constructing the facilities to be capable of carrying a second 345 kV circuit will help minimize future transmission corridors and optimize the use of the transmission system. At the same time, not constructing the second circuit initially will allow the utilities to defer some portion of the incremental cost until the capability provided by the second circuit could be used. By deferring some of the capital expenditures for the second circuit, the CapX 2020 utilities are able to more closely match investment with future growth. However, deferring construction also increases the overall cost of the facilities as it will require multiple deployments of crews and potentially additional materials.

The CapX 2020 utilities have begun to analyze the costs and timing of deploying the second circuit. This analysis has included consideration of whether it may be more cost-effective to construct the second circuit at the time of initial construction. Relevant factors in this analysis include but are not limited to:

- The material and labor cost of various transmission line designs depending on how many davit arms are hung during initial construction and the corresponding steel and concrete requirements;
- The material and labor cost of stringing the second circuit at the time of initial construction;
- The material and labor cost of stringing the second circuit at some later date (including mobilization of new line crews);
- The cost of additional damage to crops and wetland mitigation;
- The loss benefit created by reducing the overall impedance of the system when the second circuit is strung (including the avoided cost of replacement generation);
- The cost of generation curtailment during any line outages necessary to string the second circuit;
- The cost of capital for each of the projects; and
- The expected escalation or inflation rates for these costs.

Once this analysis is completed, a recommendation will be made regarding whether it is best for the second circuit to be strung during initial construction or at some later date. At that point, necessary regulatory approvals will be sought.

Schedule. The Brookings line is scheduled to be in-service in the Second Quarter 2013. The St. Cloud to Monticello line is scheduled to be in-service in Fourth Quarter 2011, and the Fargo to St. Cloud segment in Third Quarter 2015, although the St. Cloud - Alexandria segment will be in service in 2nd or 3rd Quarter 2013. The Twin Cities to LaCrosse 345 kV line and two 161 kV lines in the Rochester area are scheduled to go into service over the 2012-2015 timeframe. The Bemidji to Grand Rapids line is scheduled to be in-service by the end of 2011.

PUC Docket Numbers. CN-06-1115 (Certificate of Need for Three 345 kV Transmission Lines)
TL-08-1474 (Brookings County to Hampton Route Permit)
TL-09-246 (Monticello to St. Cloud Route Permit)
TL-09-1056 (Fargo to St. Cloud Route Permit)
CN-07-1222 (Bemidji to Grand Rapids Certificate of Need)
TL-07-1327 (Bemidji to Grand Rapids Route Permit)

6.7.7 Rochester – Adams 161 kV Line

Tracking Number. 2007-SE-N1

Utility. Dairyland Power Cooperative

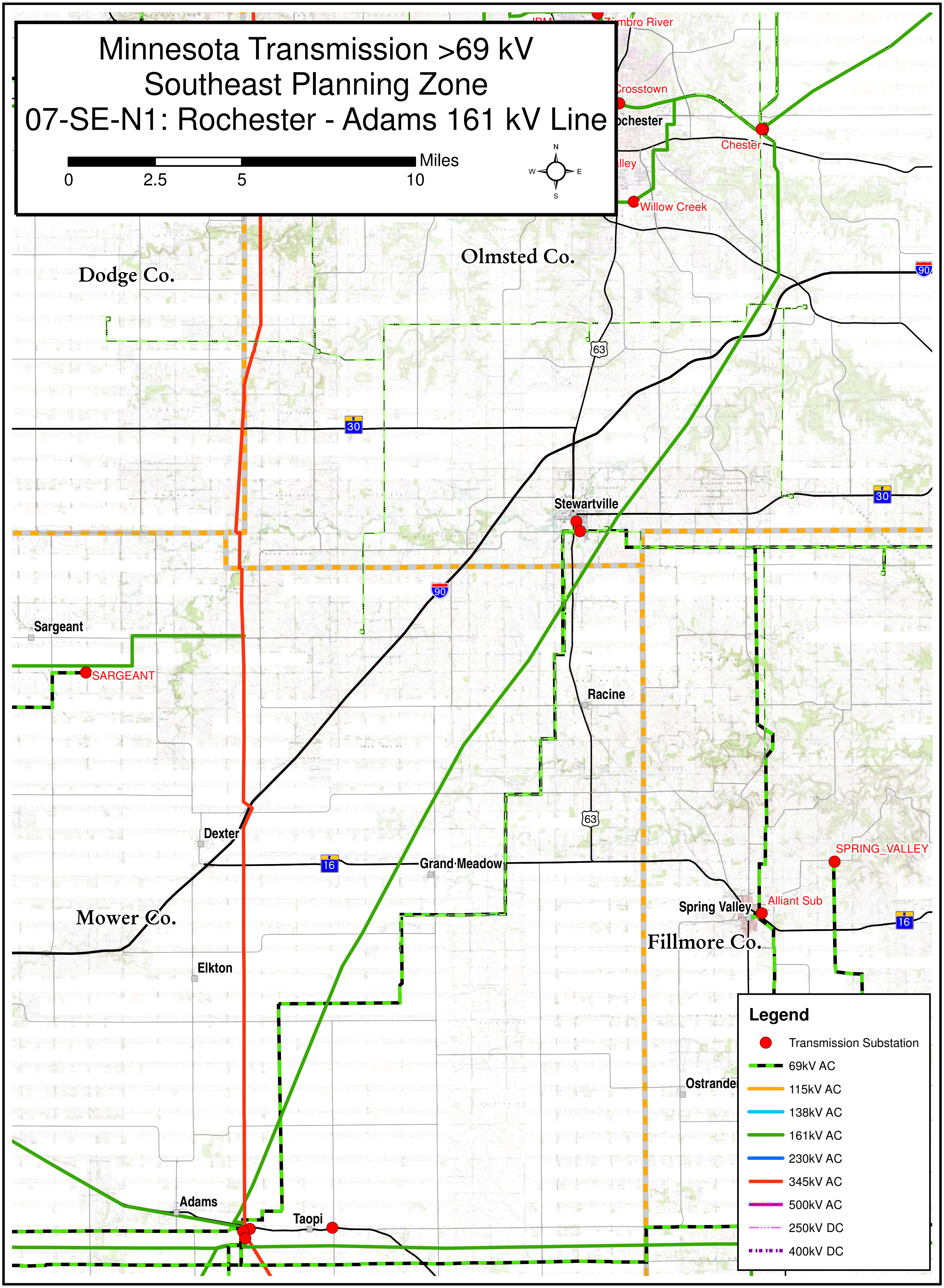
Inadequacy. The loading of the Rochester-Adams 161 kV transmission line manifested itself as a new transmission inadequacy in 2007. This line tends to load heavily under certain conditions such as high south to north transfers. The line loading is exacerbated by the noticeable increase of wind generation around and south of the Adams substation. Real time monitoring of Rochester-Adams 161 kV indicates that this line will overload under high south to north transfers for an outage of either the Byron-Pleasant Valley 345 kV line or the Byron 345/161 kV transformer. Several interconnection studies for wind farm integration around the Adams area have shown that the Adams-Rochester line is an injection constraint.

A map of the Rochester-Adams 161 kV line is shown on the following two page.

Alternatives. No alternatives to reconductoring the line are possible.

Analysis. This deficiency has a detrimental impact on new wind generation connection to the system and requesting firm transmission service around the Adams substation. An increased rating on this line is required for several wind farms to connect to the system and generate at full output.

Schedule. Dairyland Power Cooperative will reconductor the line with 795 ACSS conductor and raise some of the 161 kV structures for an increased line rating to 380 MVA. The estimated completion date is December 31, 2009.



Minnesota Transmission >69 kV
Southeast Planning Zone
07-SE-N1: Rochester - Adams 161 kV Line
Miles
0
2.5
5
10
N
E
S
W
Crosstown
Chester
Willow Creek
Olmsted Co.
Dodge Co.
63
30
90
Stewartville
Sargeant
SARGEANT
Racine
Dexter
16
Grand Meadow
SPRING_VALLEY
Alliant Sub
Spring Valley
Mower Co.
Fillmore Co.
Elkton
Adams
Taopi
Legend
Transmission Substation
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC

6.7.8 Grand Meadow Wind

Tracking Number. 2007-SE-N2

Utility. Xcel Energy

Inadequacy. Xcel Energy and enXco (an independent power producer) have teamed together to propose a 200 MW wind farm (100 MW of which will be owned by Xcel Energy) in Mower County in southeast Minnesota. The wind farms are called the Grand Meadow project (100 MW) and the Wapsipinicon project (100 MW).

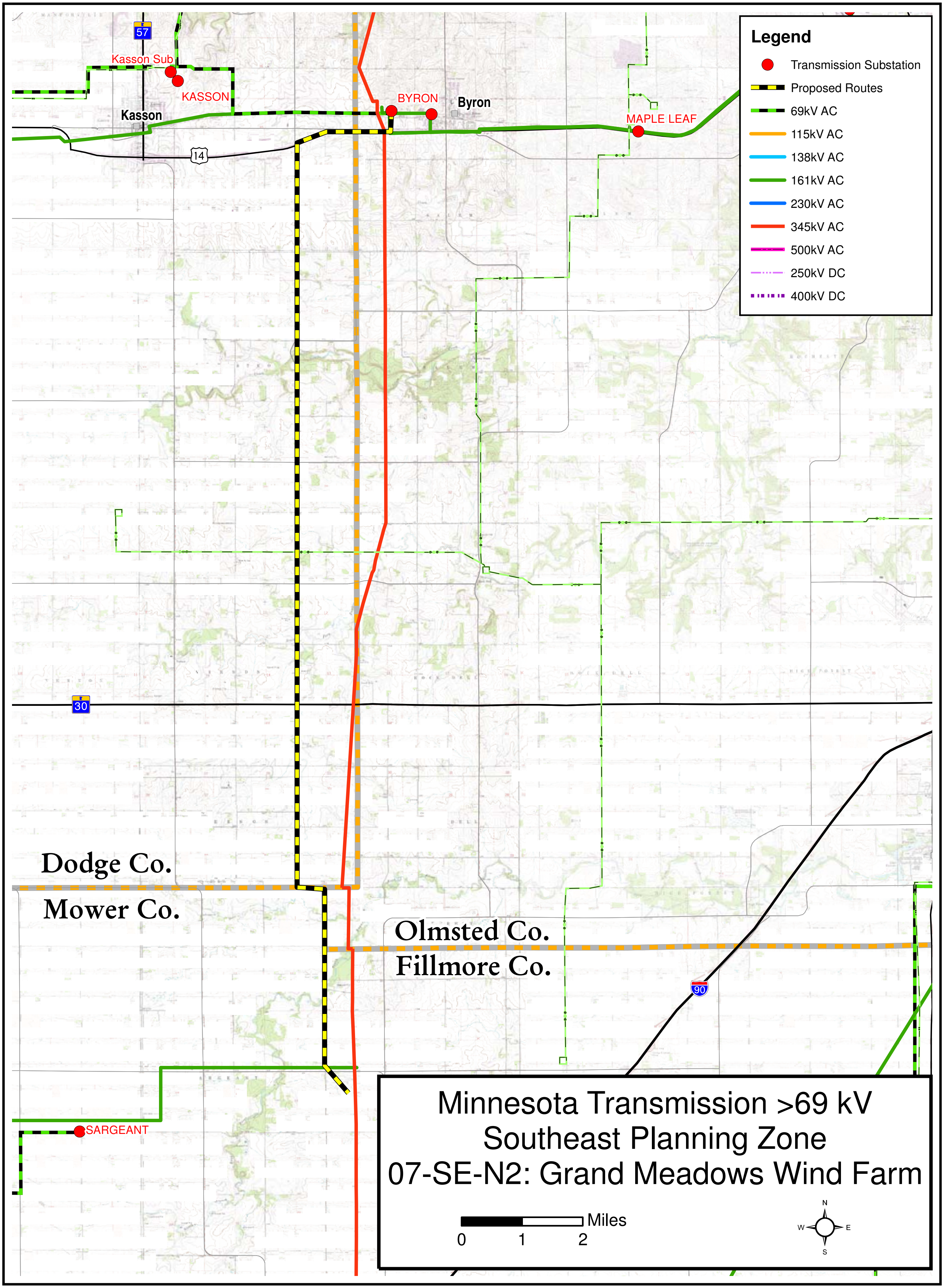
A map of the area is shown on the following page.

Alternatives. On January 24, 2007, the Midwest ISO released the results of its System Impact Study. This study identified a need for two transmission facilities in order for the wind farm to interconnect to the transmission system. The first facility identified is a new Pleasant Valley – Byron 161 kV line and the second is a second 345/161 kV transformer at the Pleasant Valley Substation. Additionally, a new six mile 161 kV line is necessary to interconnect the wind farm's collector substation to the transmission system.

Analysis. MISO completed a facility study in 2008, which identified the facilities that are needed for delivery. Delivery of power from the Grand Meadow Wind Farm and a sister project, the Wapsipinicon North Wind Project, will require a six mile long 161 kV transmission line to the Pleasant Valley Substation. Mower County did the necessary permitting on the six mile 161 kV interconnection line and associated facilities. In addition, permits for the Pleasant Valley – Byron 161 kV line are being pursued through the PUC permitting process. This new line is necessary to ensure adequate system performance during contingencies when the wind farm is in service.

Schedule. Grand Meadow Wind Farm is currently in service. The transmission service facilities are expected to be in service in 2010.

PUC Docket Numbers. WS-07-839 (Wapsipinicon and Grand Meadow Wind Farms)
CN-07-873 (Grand Meadow Wind Farm)
CN-08-334 (Wapsipinicon Wind Farm)
CN-08-992 (Pleasant Valley – Byron 161 kV Line)



Legend
Transmission Substation
Proposed Routes
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
Kasson Sub
KASSON
Kasson
BYRON
Byron
MAPLE LEAF
57
14
30
90
Dodge Co.
Mower Co.
Olmsted Co.
Fillmore Co.
SARGEANT
Minnesota Transmission >69 kV
Southeast Planning Zone
07-SE-N2: Grand Meadows Wind Farm
Miles
0
1
2
N
W
E
S

6.7.9 North Mankato Load Serving

Tracking Number. 2007-SE-N3

Utility. Xcel Energy and Great River Energy

Inadequacies. The study covers most of the areas North and East of the City of Mankato. The total load in the region is approximately 95 to 100 MW. This region is mostly served from the Wilmarth substation through a long 69 kV line. The following problems were observed in the region:

1. Loss of Wilmarth – Penelope 69 kV line will result in low voltages at Le Sueur and thermal overloads on Jamestown – Cleveland 69 kV line.

2. Loss of Le Sueur – Le Sueur Tap line will result in severe low voltages at Le Sueur and St. Thomas, and thermal overload on Cleveland – Le Center 69 kV line.

3. Loss of Traverse – New Sweden 69 kV line will result in low voltages at Le Sueur, New Sweden and Rush River.

4. Loss of Traverse – St. Peter 69 kV line will result in low voltages at St. Peter, Lake Emily and Cleveland.

5. Loss of Wilmarth – Eagle Lake 69 kV line will result in low voltages on the 69 kV line between Eagle Lake – Cleveland – St. Thomas and Lake Emily, and thermal over loads on the line between Wilmarth – Traverse – St. Peter.

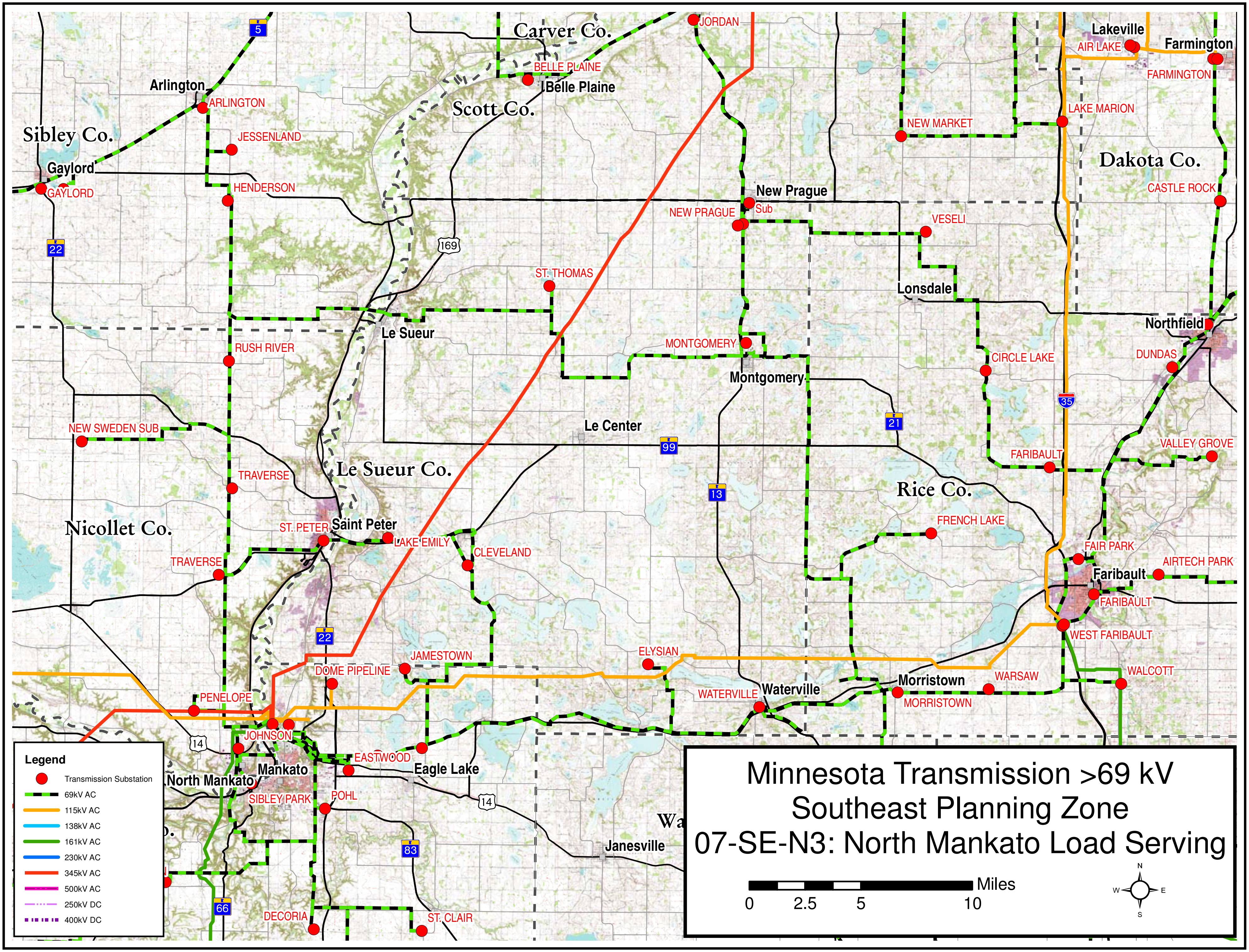
Alternatives. The North Mankato study jointly performed by GRE, SMMPA and NSP considered two transmission alternatives to address the deficiencies in the region.

Alternative 1: This plan consists of bringing a new 115 kV line from the proposed Helena Substation to the 69 kV system near St. Thomas Lake. Depending on the location of the Helena Substation, a new 115 kV line may not be required as the Helena substation could include a 115/69 kV transformer. This alternative also involves building a new 69 kV switching station at LeSueur tap.

Alternative 2: This alternative involves building a 115 kV line from the existing Eastwood – West Faribault 115 kV line to the Cleveland Substation and a new 115/69 kV transformer at the Cleveland Substation. This alternative also includes building a 69 kV switching station west of the City of LeSueur.

Analysis. Alternative 1 was identified as the recommended long-term plan for the region since the new 345 kV substation at Helena meets the current and future needs of the area.

Schedule. Xcel Energy is currently planning to file for a route permit for this project by the end of 2009. The expected inservice date for this project is 2013 and will be coordinated with the 345 kV line from Brookings Co, South Dakota, to the Twin Cities (Tracking Number 2005-CX-2).



Minnesota Transmission >69 kV
Southeast Planning Zone
07-SE-N3: North Mankato Load Serving
Legend
Transmission Substation
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
Miles
0
2.5
5
10
N
S
E
W
Carver Co.
Scott Co.
Sibley Co.
Dakota Co.
Le Sueur Co.
Rice Co.
Nicollet Co.
JORDAN
BELLE PLAINE
Belle Plaine
Arlington
ARLINGTON
JESSENLAND
Gaylord
GAYLORD
HENDERSON
Lakeville
AIR LAKE
Farmington
FARMINGTON
LAKE MARION
NEW MARKET
CASTLE ROCK
New Prague
NEW PRAGUE
Sub
VESELI
ST. THOMAS
Lonsdale
Le Sueur
Northfield
RUSH RIVER
MONTGOMERY
Montgomery
DUNDAS
CIRCLE LAKE
NEW SWEDEN SUB
Le Center
VALLEY GROVE
FARIBAULT
TRAVERSE
Saint Peter
ST. PETER
LAKE EMILY
CLEVELAND
FRENCH LAKE
FAIR PARK
Faribault
AIRTECH PARK
FARIBAULT
WEST FARIBAULT
ELYSIAN
JAMESTOWN
DOME PIPELINE
WARSAW
WALCOTT
Morristown
MORRISTOWN
WATERVILLE
Waterville
PENELOPE
JOHNSON
EASTWOOD
Mankato
North Mankato
Eagle Lake
SIBLEY PARK
POHL
Janesville
DECORIA
ST. CLAIR
5
22
169
99
21
35
13
14
83
66

6.7.10 Wind Generation Upgrades – Freeborn and Mower Counties

Tracking Number. 2007-SE-N4

Utility. ITC Midwest

Inadequacy. Two wind generating facilities were interconnected to ITC Midwest's transmission system at locations in Cerro Gordo and Worth Counties in Northern Iowa. The two Iowa projects, a 150 MW wind generating facility interconnecting in northern Cerro Gordo County and a 160 MW wind generating facility interconnecting in Worth County, have collectively been shown to overload 27 miles of the Lime Creek to Adams 161 kV line and the NIW-to Hayward 161 kV line. These overloads have been identified as injection related constraints by the Midwest ISO, and mitigation of the constraints is required prior to the projects being granted interconnection service under the MISO tariff.

A system map displaying the location of the interconnection projects and the overloaded line sections is provided for reference following the discussion.

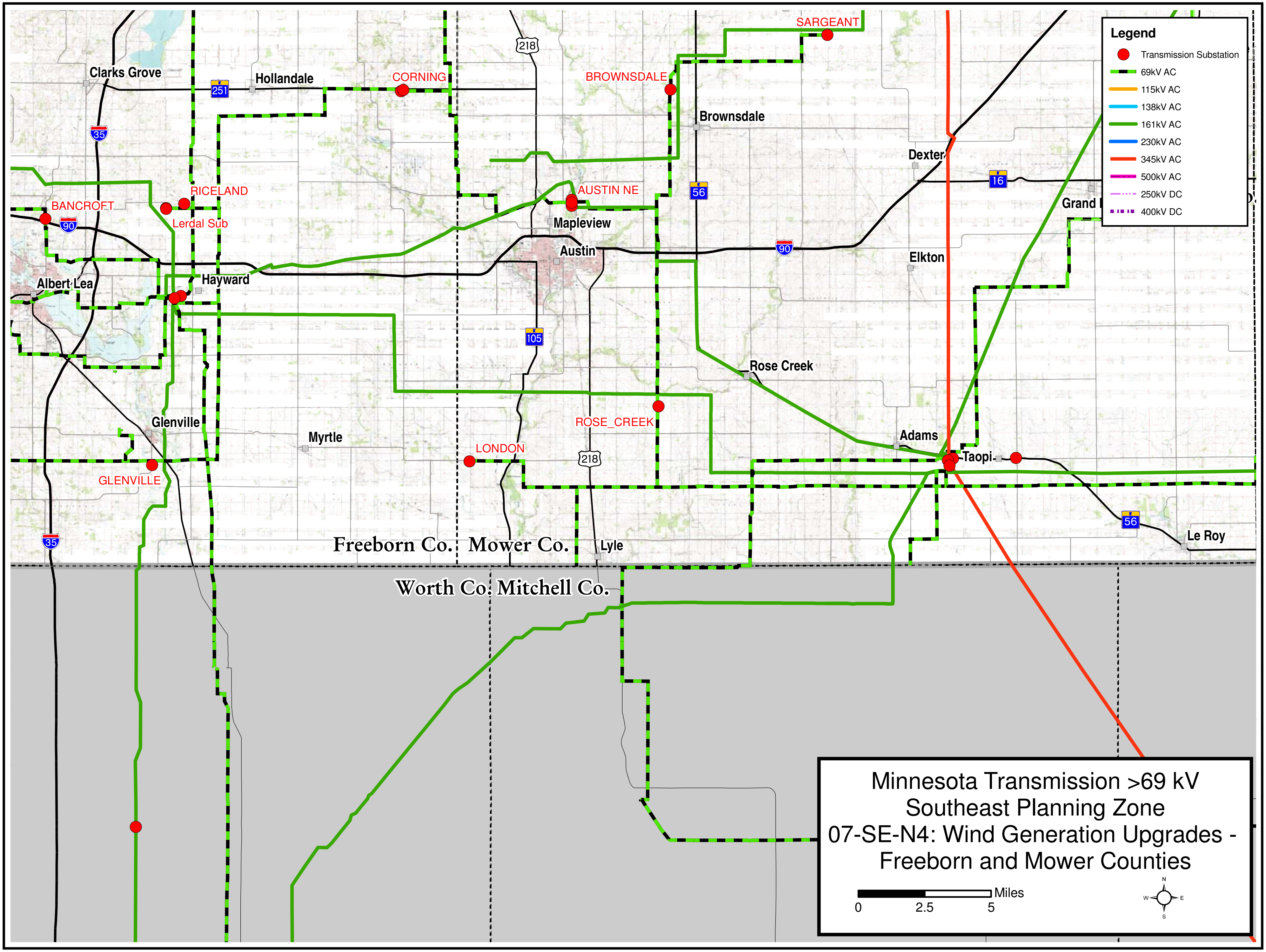
Alternatives. The 160 MW wind generating facility has proposed connection to the Lime Creek-Adams 161kV line approximately 27 miles southwest of the Adams substation in Minnesota. The Adams to Lime Creek 161 kV line has been shown to overload from this project's interconnection point to the Adams substation, a distance of about 27 miles, and reconstruction of the existing line from the interconnection point to Adams substation has been identified as the solution for the overload. The existing line will be removed and a new 440 MVA line will be constructed on the exiting right of way. Approximately 5.5 miles of this line reconstruction will take place in Minnesota.

Both projects impact the NIW-Hayward 161 kV line, and this line will also be removed, and a newly constructed 440 MVA line will be constructed on the existing right of way. Approximately 11 miles of this line reconstruction will occur in Minnesota. Reconstruction of existing lines was identified as the preferred solution for alleviating line overloads created by interconnection of the two proposed wind generation projects; no other alternatives were accepted.

Analysis. The aforementioned overloads were identified as part of the MISO Group 5 System Impact Study. The Group 5 Study evaluated the impact of 37 generator interconnection projects with a collective output of 2,857.9 MW of new generation intending to connect in Southern Minnesota, Iowa, and Southeast South Dakota. The Group 5 study identified many transmission constraints due to insufficient generation outlet. Reconstruction of existing lines on existing right of way was identified as the preferred solution for mitigating the constraints caused by the wind generation.

Schedule. Projects G540/G548 and G595 were interconnected to the ITC Midwest transmission system in 2008, and the projects are operating under restricted output until the line reconstruction is completed. It is estimated that reconstruction of the NIW to Hayward 161kV line will be completed by the end of the second quarter of 2010. Reconstruction of the 27 mile section of the

Adams to Lime Creek line is expected to be complete by the end of 2009. A route permit from the PUC was not required for reconstruction of the lines because there was no change in voltage and no change in the rights-of-way.


Legend
Transmission Substation
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
Clarks Grove
Hollandale
CORNING
BROWNSDALE
SARGEANT
Brownsdale
Dexter
Grand
RICELAND
BANCROFT
Lerdal Sub
AUSTIN NE
Mapleview
Austin
Elkton
Albert Lea
Hayward
Rose Creek
Glenville
Myrtle
ROSE_CREEK
LONDON
Adams
Taopi
GLENVILLE
Le Roy
Lyle
Freeborn Co.
Mower Co.
Worth Co.
Mitchell Co.
Minnesota Transmission >69 kV
Southeast Planning Zone
07-SE-N4: Wind Generation Upgrades -
Freeborn and Mower Counties
Miles
0
2.5
5

6.7.11 Harmony-Beaver Creek 161 kV Line

Tracking Number. 2009-SE-N1

Utility. Dairyland Power Cooperative

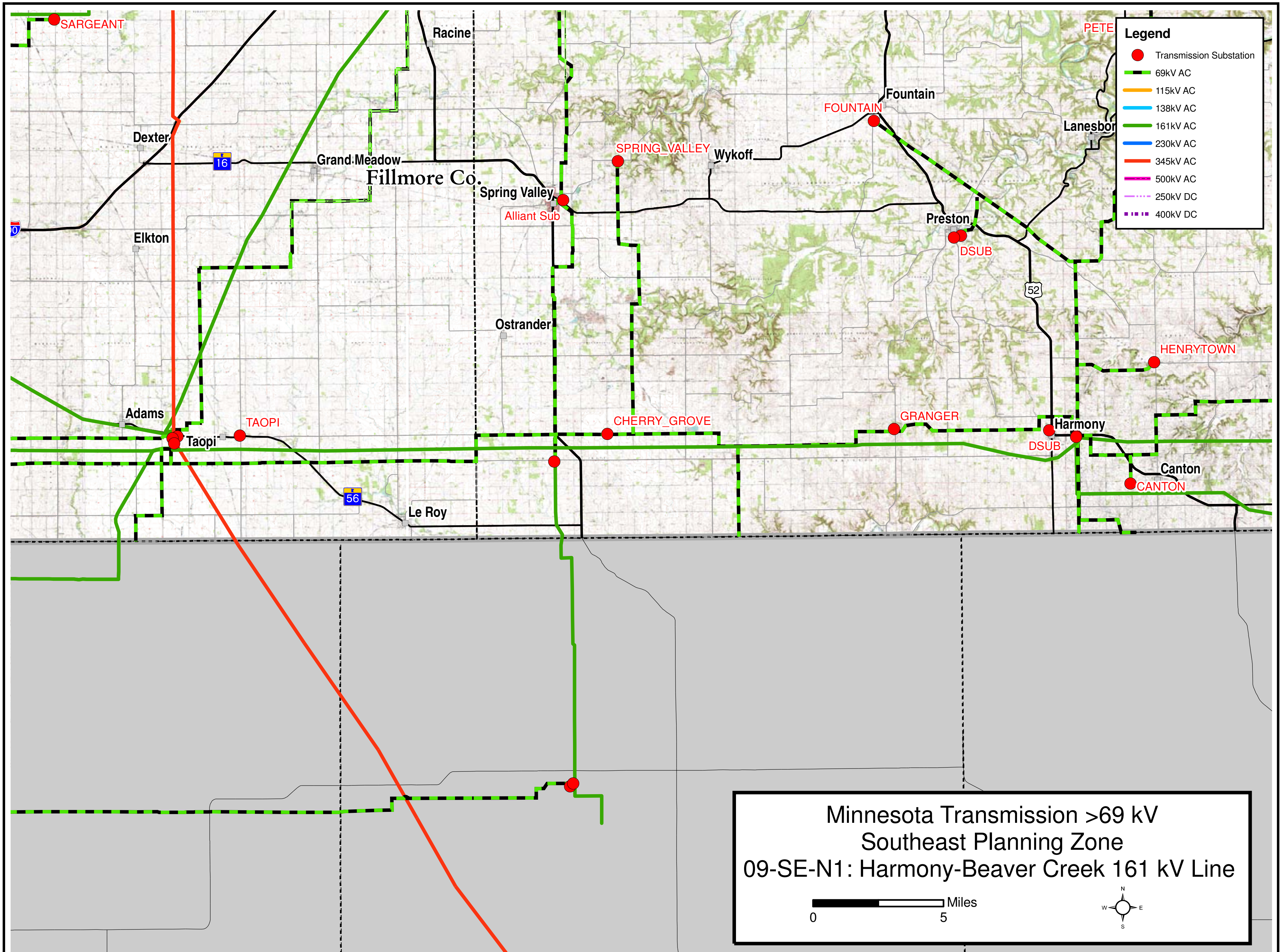
Inadequacy. The Harmony-Beaver Creek 161 kV line is one section of a three terminal Harmony-Rice-Adams 161 kV line. MISO's G551 – Point of Interconnection Change Report identified the Harmony-Beaver Creek 161 kV line section as an injection constraint for the 100 MW wind farm in Howard County, Iowa.

A map of the Harmony-Beaver Creek 161 kV line section is on the following page.

Alternatives. No alternatives to reconductoring the line are possible.

Analysis. The line rating of the Harmony-Beaver Creek 161 kV line section will need to be increased in order for G551 to generate at full output.

Schedule. Dairyland Power Cooperative will reconductor the line with 795 ACSS conductor and raise some of the 161 kV structures for an increased line rating. The estimated completion date is March 31, 2010.



Minnesota Transmission >69 kV
Southeast Planning Zone
09-SE-N1: Harmony-Beaver Creek 161 kV Line

6.7.12 Decoria-Minnesota Lake Area

Tracking Number. 2009-SE-N2

Utility. Great River Energy

Inadequacy: This area consists of a 69 kV line from Stoney Creek to Minnesota Lake and Danville. The normal source for this is the Stoney Creek 115/69 kV substation. During outages of this source, line switching allows the loads to be served from the 69 kV source at Albert Lea. The Stoney Creek source is under development and is expected to be in service in 2010. See Tracking No. 2003-SE-N3. Based on load projects for the area referencing GRE's 2008 Long Range Plan, deficiencies will occur in the 2015 time frame during contingency loss of the 69 kV source at Stoney Creek. The back-up source is located a relatively long distance away at Albert Lea and the voltages at Decoria and St. Clair can no longer be adequately supported.

A map of the Decoria-Minnesota Lake Area is on the following page.

Alternatives: The long term solution proposed is a new 69 kV line (built at 115 kV) between the Loon Lake substation near Waseca and the St. Clair substation southeast of Mankato. The project consists of the following components:

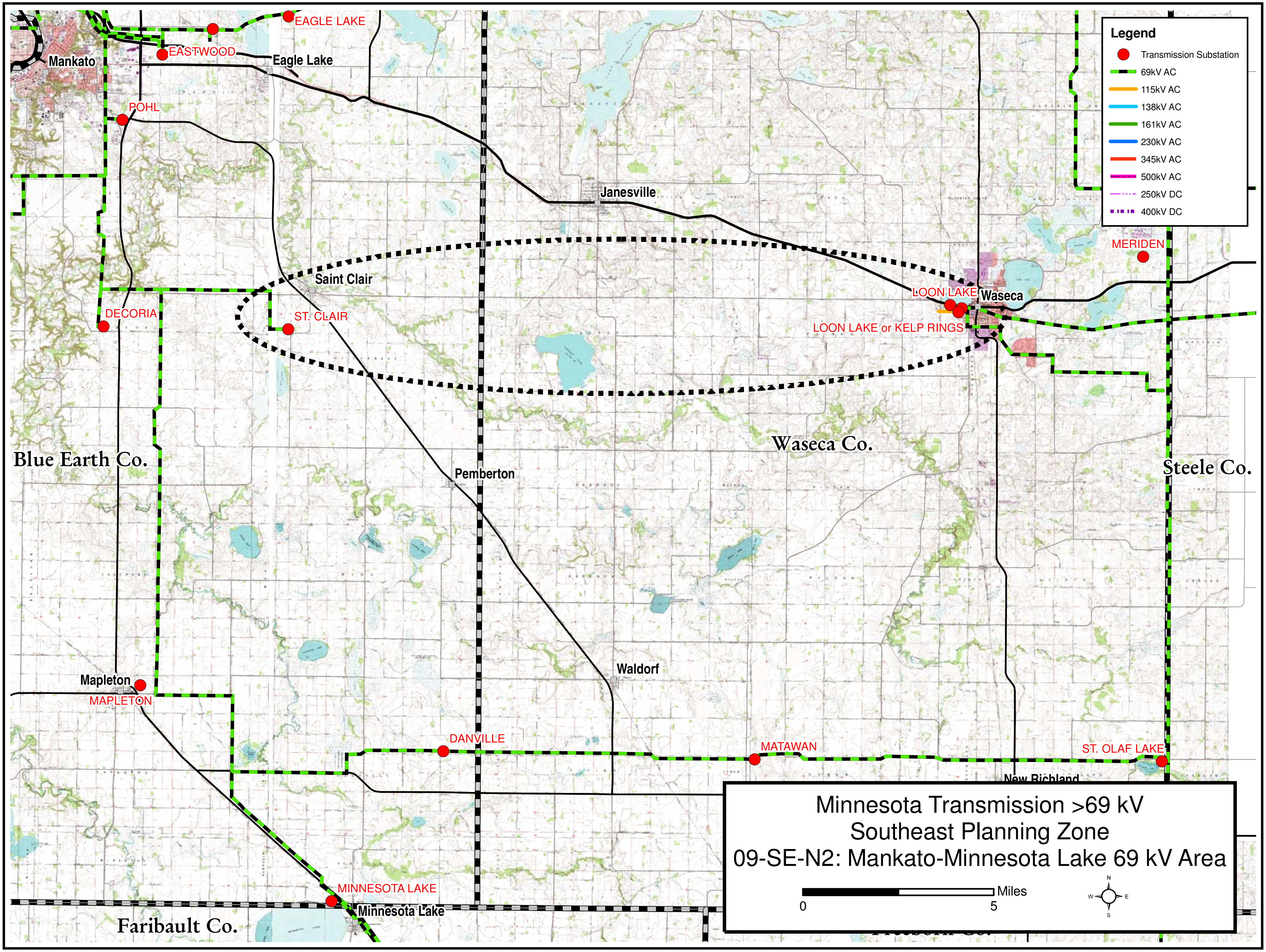
- 25 miles of 69 kV line, 477 ACSR, built to 115 kV standards, initially operated at 69 kV

- 69 kV breaker addition at the Loon Lake substation

- 3-way, motor operated switch at the St. Clair substation

Analysis: Additional analysis will be done prior to initiating the solution proposed above to determine whether it is still the appropriate solution to the long-term needs of the area south of Mankato. The total estimated cost for this project is approximately $10,000,000.

Schedule: This project is needed by the summer of 2016. A Certificate of Need from the Public Utilities Commission will be required for the 25 mile 115 kV line and a Route Permit from the PUC or local government will also be required.



Legend
Transmission Substation
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
Mankato
EASTWOOD
EAGLE LAKE
Eagle Lake
POHL
Janesville
MERIDEN
Saint Clair
ST. CLAIR
DECORIA
LOON LAKE
Waseca
LOON LAKE or KELP RINGS
Blue Earth Co.
Waseca Co.
Steele Co.
Pemberton
Waldorf
Mapleton
MAPLETON
DANVILLE
MATAWAN
ST. OLAF LAKE
New Richland
MINNESOTA LAKE
Minnesota Lake
Faribault Co.
Minnesota Transmission >69 kV
Southeast Planning Zone
09-SE-N2: Mankato-Minnesota Lake 69 kV Area
Miles
0
5

6.7.13 Cannon Falls Area

Tracking Number. 2009-SE-N3

Utility. Xcel Energy

Inadequacy. There are two 115/69 kV transformers at the Cannon Falls Substation and loss of either one will overload the remaining transformer. In addition, should a circuit breaker at Colvill Substation fail to operate, the resulting switching will cause overloads.

A map of the area is shown following the discussion.

Alternatives. Several alternatives were studied to help resolve this outage situation.

Option 1 Spring Creek to Cannon Falls 69 kV line rebuild to 115 kV.
This option would rebuild the existing Cannon Falls to Spring Creek 69 kV line to 115 kV, convert all of the substations along the route, and add a new substation to feed the 69 kV system. A variation of this option would have the line end at Colvill instead of Cannon Falls.

Option 2 New Miesville Tap 161/69 kV Substation.
This option would create a new 161/69 kV substation designed to allow for a fault on the 161/69kV transformer to not cause the 69 kV lines to be lost. Some substation work at Colvill Substation would occur and a ring bus would be added to Cannon Falls Substation. This option effectively unloads the Cannon Falls 115/69 kV transformers by providing another source to the 69 kV system.

Option 3 New 115 kV line from West Faribault to Cannon Falls.
This option would create a new 115 kV line from West Faribault to Cannon Falls. The new line would run roughly parallel with the existing 69 kV line that runs from West Faribault to Cannon Falls.

Option 4 New 115/69 kV Transformer and Breaker Change at Colvill Substation.
This option involves changing the existing breaker configuration at Colvill Substation and adding a ring bus at Cannon Falls Substation. At Colvill Substation a new 115/69 kV transformer would be installed and a new 69 kV line would be built two miles to the existing Cannon Falls to Byllesby 69 kV line. The transmission lines around Colvill Substation would also be reconfigured. Some equipment upgrades at Byllesby Substation would be necessary to increase the capacity on the 69 kV system under contingency. This option unloads the Cannon Falls transformers by providing another source to the 69 kV system.

Option 5 New Transformer and Breaker Sectionalizing at Colvill Substation
At Colvill Substation a new 115/69kV transformer would be installed and a breaker row would be added. A new 69kV line would be built 2 miles to the existing Cannon Falls to Byllesby 69kV line. Breaker failure sectionalizing will be added to three breakers. This option minimizes the work done at Colvill substation while still unloading the Cannon Falls transformers by providing another source to the 69 kV system.

Option 6 Distributed Generation.

Analysis. This inadequacy was uncovered during Xcel Energy's 2008 NERC compliance assessment. A more detailed study looking at the above six options was conducted to determine the preferred alternative.

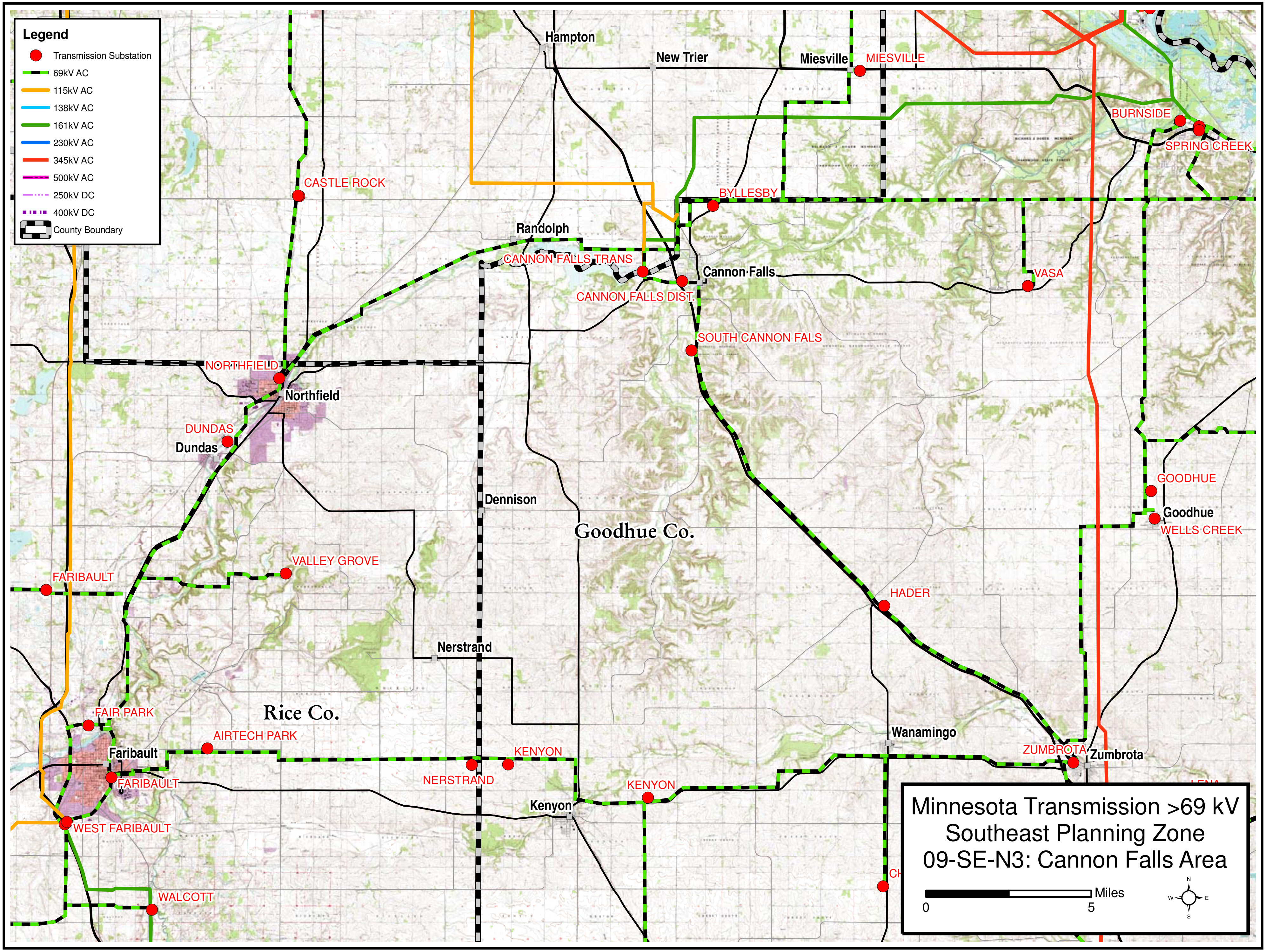
Options 2, 4, and 5 were the most attractive options. In the end, Option 5 was selected as the alternative to pursue because no work is needed at the Cannon Falls Substation as part of this alternative and because the costs, estimated at $5,500,000, are the lowest of the options. In addition, this option can be most easily implemented from a construction standpoint.

Option 1 was not considered after an initial analysis determined it would cost approximately $30,000,000. This cost is too high for the low load area it would cover and other options are as effective and cost less.

Option 3 was rejected after an initial analysis determined that the project would cost approximately $17,000,000. This cost is too high and other options are more effective and cost less.

Option 6 (distributed generation) is not believed to be a viable alternative to address these inadequacies. With the installation of the new 350 MW generator in the area, there is adequate generation to serve load in the area. The critical contingencies reduce the capacity of the system for that generation to access the transmission grid.

Schedule. The recommended alternative is expected to be in service by summer 2010.


Legend
Transmission Substation
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
County Boundary
Hampton
New Trier
Miesville
MIESVILLE
BURNSIDE
SPRING CREEK
CASTLE ROCK
BYLLESBY
Randolph
CANNON FALLS TRANS
Cannon Falls
VASA
CANNON FALLS DIST
SOUTH CANNON FALS
NORTHFIELD
Northfield
DUNDAS
Dundas
Dennison
Goodhue Co.
GOODHUE
Goodhue
WELLS CREEK
VALLEY GROVE
FARIBAULT
HADER
Nerstrand
Rice Co.
FAIR PARK
AIRTECH PARK
Faribault
KENYON
NERSTRAND
FARIBAULT
Wanamingo
ZUMBROTA
Zumbrota
KENYON
Kenyon
WEST FARIBAULT
WALCOTT
Minnesota Transmission >69 kV
Southeast Planning Zone
09-SE-N3: Cannon Falls Area
Miles
0
5
N
W
E
S

6.7.14 Byron-Westside Rochester Area

Tracking Number: 2009-SE-N4

Utility: Southern Minnesota Municipal Power Agency

Inadequacy: The Byron-Westside Rochester area needs additional load serving support to protect against loss of load in contingency situations. In addition, there are current congestion constraints on the Byron to Maple Leaf 161 kV MISO flow gate, resulting in an increase in the Locational Marginal Price for Rochester and People's Cooperative customers in the Rochester area under most system conditions.

A map of the Byron-Westside-Rochester Area is shown on the following page.

Alternatives: The only alternative is a second 161 kV line between Byron and Maple Leaf.

Analysis: The existing Byron-Maple Leaf-Cascade Creek 161 kV line was constructed in 1985. This line was designed for a second 161 kV circuit (double circuit structure capable). This project will utilize this existing designed double circuit 161 kV line. This new line is approximately seven miles long and is proposed to be strung on the existing poles along an existing route that parallels Highway 14 for the majority of its length.

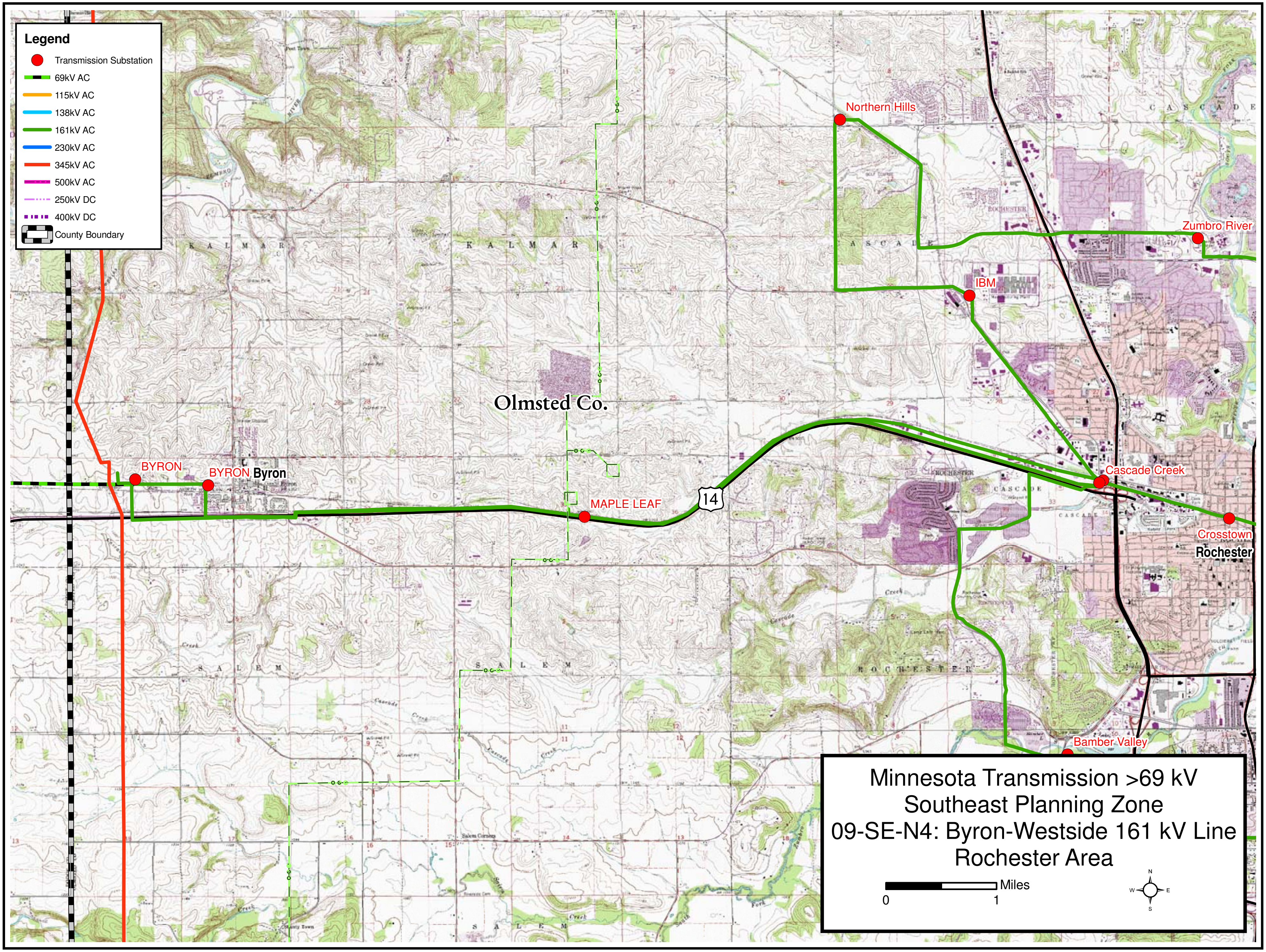
This project consists of the following components:

- approximately 7 miles of 161 kV line, same as the existing conductor 954 ACSR
- 161 kV breaker addition at the existing Byron Substation
- 161 kV breaker addition at Rochester's new Westside Substation

The total estimated cost for this project is approximately $3,500,000.

Additional analysis for this line was performed under the RIGO Study.

Schedule: This project is needed by the fall of 2010. This project does not require a Certificate of Need from the Commission because it is less than 200 kV and less than 10 miles in length, but a route permit from the PUC or local government will be required.



Legend
Transmission Substation
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
County Boundary
Northern Hills
Zumbro River
IBM
Olmsted Co.
BYRON
BYRON Byron
MAPLE LEAF
14
Cascade Creek
Crosstown
Rochester
Bamber Valley
Minnesota Transmission >69 kV
Southeast Planning Zone
09-SE-N4: Byron-Westside 161 kV Line
Rochester Area
Miles
0
1

6.7.15 Saint Peter Area

Tracking Number: 2009-SE-N5

Utility: Southern MN Municipal Power Agency

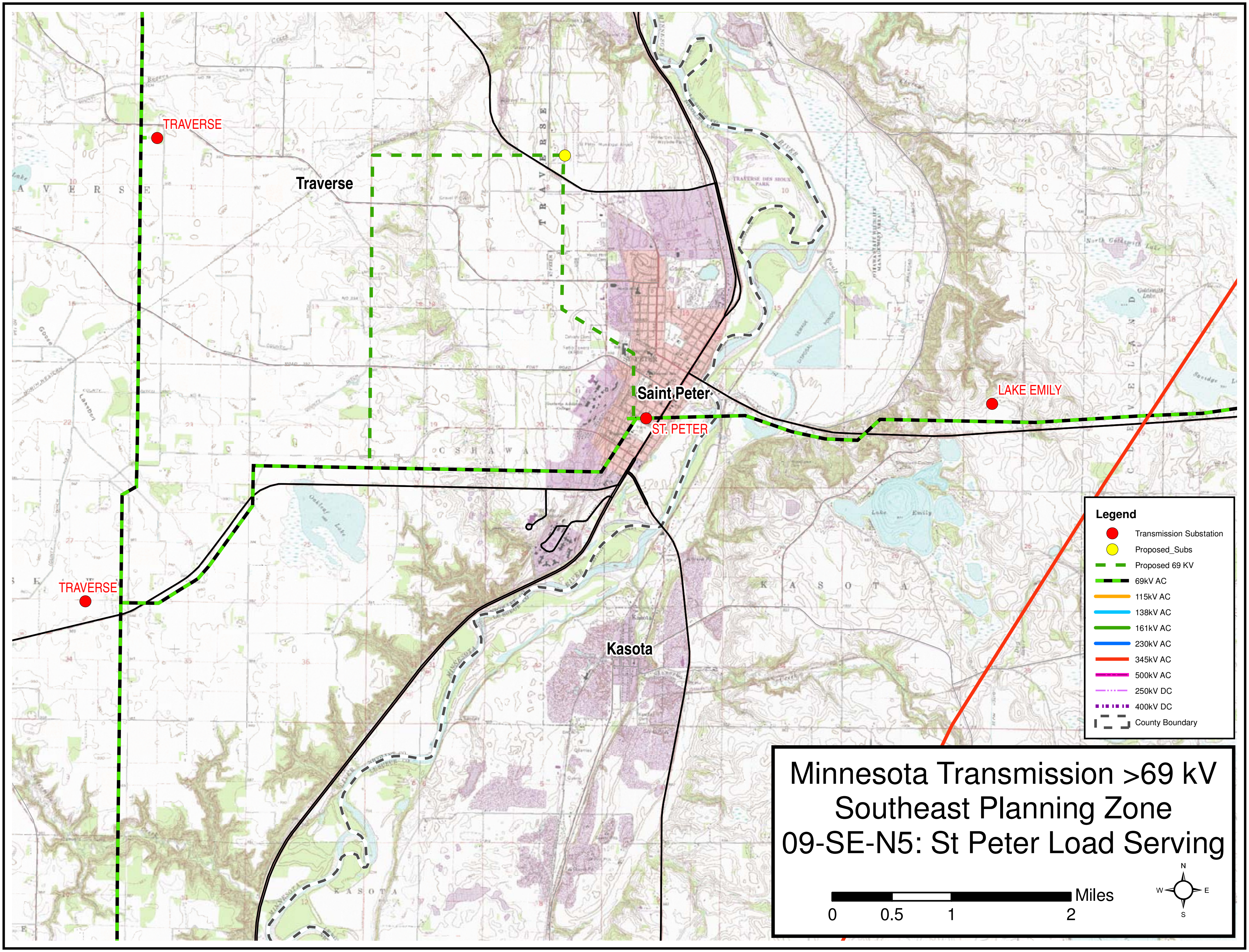
Inadequacy: Load has continued to grow in the City of Saint Peter area in Nicollet County, and additional load serving resources are necessary. The existing distribution system is inadequate to serve these new load centers within the City of Saint Peter.

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

Alternatives: The only alternative is to build a new 69 kV load serving distribution substation in the City.

Analysis: The City has determined that the best solution is to build a new 69 kV substation in the northeast part of the City called the Sunrise Substation. A new 69 kV line will be constructed between the City's existing Broadway Substation and the new Sunrise Substation. The rating of this new 69 kV line section would be 71.7 MVA. This new 69 kV line section will be part of the existing 69 kV line between Traverse and Lake Emily Substations. In addition, once the new line and substation are constructed, 3.3 miles of an existing Xcel Energy 69 kV transmission line between the existing Main (Front) Substation and 36th Avenue can be retired. This section of line being retried has a rating limitation and was planned to be rebuilt in 2010.

Schedule: This project is expected to be completed by the fall of 2010. Since the project involves only 69 kV facilities, no state review by the Public Utilities Commission will be required.



TRAVERSE
Traverse
Saint Peter
ST. PETER
LAKE EMILY
TRAVERSE
Kasota
Legend
Transmission Substation
Proposed_Subs
Proposed 69 KV
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
County Boundary
Minnesota Transmission >69 kV
Southeast Planning Zone
09-SE-N5: St Peter Load Serving
Miles
0
0.5
1
2
N
W
E
S

7.0 Transmission-Owning Utilities

7.1 Introduction

In the 2007 Biennial Report, the Minnesota Transmission Owners included a separate chapter that provided some background information about each of the reporting utilities and answered specific questions about transmission line ownership, maintenance expenses, and compliance with upcoming renewable energy milestones for each utility. In this chapter in the 2009 Report, the utilities have provided the following information.

Background Information and Contact Person

For ease of reference, the utilities have provided much of the same background information that was provided in the 2007 Report. This information relates to the history of the utility and the extent of its service territory and operations. An Internet link is provided where additional information can be found. In addition, a Contact Person is identified for each utility.

Transformer Availability

Some MTO utilities are required under Minnesota Statutes § 216B.16, subd. 7 and Minnesota Rules parts 7825.2390 through 7825.2920 to make detailed filings supporting the automatic adjustment of their retail rates to reflect fluctuations in prices of electricity they produce or purchase for delivery to ratepayers. In the most recent Annual Automatic Adjustment of Charges proceeding (for reporting year 2006-2007), in PUC Docket No. E,G999/AA-07-1130, the Public Utilities Commission ordered the affected utilities to include in the 2009 Biennial Report certain information about the number of transformers in use and the availability of spare transformers. Specifically, in its August 31, 2009, Order Acting on Electric Utilities' Annual Reports and Requiring Additional Filings, the Commission ordered:

> 18. ITC Midwest LLC and all electric utilities required to file annual automatic adjustment reports, with the exception of Dakota Electric, shall include in their 2009 Biennial Transmission Projects Reports the following information:
>
> a. the number of transformers exceeding 100 kilovolts on their system and the size of each transformer;
>
> b. an analysis as to whether they are maintaining in inventory or otherwise have reasonable access to a reasonable number of spare transformers in different sizes so as to avoid excessive replacement power costs during outages.

The utilities participating in this 2009 Biennial Report that have to provide the information about transformers are Northern States Power Company, Minnesota Power, Otter Tail Power Company, and ITC Midwest. For those four utilities, the requested information is provided in the section relating to that utility.

Transmission Line Ownership

The utilities provided in the 2007 Report information on the miles of transmission owned by each utility. The table on the next page is the latest information on the transmission lines in Minnesota owned by each utility. In addition, information specific to each utility is included in the discussion for that utility.

Miles of Transmission

Utility	<100 kV	100-199 kV	200-299 kV	> 300 kV	DC
American Transmission Company	0.00	0.00	0.00	12.00	0.00
Dairyland Power Cooperative	401.07	148.00	0.00	0.00	0.00
East River Electric Power Cooperative	158.13	45.74	0.00	0.00	0.00
Great River Energy	2989	448	523	145	436
Hutchinson Utilities Commission	8.00	9.00	0.00	0.00	0.00
ITC Midwest LLC	731.68	277.82	0.00	19.77	0.00
L&O Power Cooperative	44.52	8.52	0.00	0.00	0.00
Marshall Municipal Utilities	0.00	18.10	0.00	0.00	0.00
Minnesota Power	0.22	1290.30	605.18	8.35	0.00
Minnkota Power Cooperative	992.37	143.79	248.77	0.00	0.00
Missouri River Energy Services	0.00	212.22	10.97	0.00	0.00
Northern States Power Company	1808.23	1556.15	365.5	1101.3	0.00
Otter Tail Power Company	1298.75	544.66	111.54	0.00	0.00
Rochester Public Utilities	0.00	40.51	0.00	0.00	0.00
Southern Minnesota Municipal Power Agency	128.69	116.32	16.84	0.00	0.00
Willmar Municipal Utilities	21.50	0.00	13.50	0.00	0.00
Totals:	8582.16	4859.13	1895.30	1286.42	436.00

7.2 American Transmission Company, LLC

Background Information. American Transmission Company, LLC began operations on January 1, 2001, the first multi-state electric transmission-only utility in the country. The company is headquartered in Pewaukee, Wisconsin, with approximately 500 employees working in Wisconsin, Michigan, and Washington, D.C.

At least 28 utilities, municipalities, municipal electric companies, and electric cooperatives from Wisconsin, Michigan, and Illinois have invested transmission assets or money for an ownership stake in the company. ATC is responsible for operating and maintaining the transmission lines of its equity owners. It owns approximately 9,400 circuit miles of transmission lines and wholly or jointly owns 510 substations in portions of four states – Wisconsin, Michigan, Illinois, and Minnesota. ATC has $2.5 billion in total assets.

ATC is a transmission-owning member of the Midwest Independent Transmission System Operator and its transmission system is located in both the Midwest Reliability Organization (MRO) and Reliability*First* Corporation (RFC).

More information about the company is available on its web page at:

http://www.atcllc.com

Contact Person: Robert McKee

Manager, Planning Policy Analysis & Methodology

American Transmission Company, LLC
P.O. Box 47
Waukesha, WI 53187-0047
Ph: (262) 506-6700
Fax: (608) 877-3606
e-mail: rmckee@atcllc.com

Transmission Lines. ATC owns approximately 9,400 miles of transmission lines in total, twelve miles of which are located in Minnesota. The transmission line segment in Minnesota extends from the Arrowhead Substation in the Duluth area to the St. Louis River and is part of the 220-mile 345 kV Arrowhead-Weston line that extends from the Arrowhead Substation to the Gardner Park Substation in Wausau, Wisconsin. The Arrowhead-Weston line, which cost $439 million to construct, was energized in January of 2008. Arrowhead-Weston provides such benefits as improving reliability, enhancing transfer capacity between Minnesota and Wisconsin, and providing ATC and other utilities greater opportunities to perform maintenance on other parts of the electric system, which reduces operating costs.

7.3 Dairyland Power Cooperative

Background Information. Dairyland Power Cooperative, a Touchstone Energy Cooperative, was formed in December 1941. A generation and transmission cooperative, Dairyland provides the wholesale electrical requirements to 25 member distribution cooperatives and 19 municipal utilities in Wisconsin, Minnesota, Iowa and Illinois. Today, the cooperative's generating resources include coal, hydro, wind, natural gas, landfill gas and animal waste.

More information about Dairyland Power Cooperative is available at:

http://www.dairynet.com

Contact Person: Steve Porter
Planning Engineer II
Dairyland Power Cooperative
3200 East Avenue South
LaCrosse, WI 54601
Ph: (608) 787-1229
Fax: (608) 787-1475
e-mail: scp@dairynet.com

Transmission Lines. Dairyland delivers electricity via more than 3,100 miles of transmission lines and nearly 300 substations located throughout the system's 44,500 square mile service area. Dairyland has the following transmission facilities in Minnesota:

Dairyland Transmission Lines

<100 kV	100-199 kV	200-299 kV	>300 kV	DC
401.07	148.0	0	0	0

7.4 East River Electric Power Cooperative

Background Information. East River Electric Power Cooperative ("East River"), headquartered in Madison, South Dakota, is a wholesale electric power supply and transmission cooperative serving 20 rural distribution electric cooperatives and one municipally-owned electric system, which in turn serve more than 86,000 homes and businesses. East River's 36,000 square mile service area covers the rural areas of 41 counties in eastern South Dakota and nine counties in western Minnesota.

Two of East River's member systems have service areas entirely in western Minnesota and one member system has service areas in both eastern South Dakota and western Minnesota, The remaining seventeen member systems have service areas entirely in eastern South Dakota. Approximately 7,600 of the 86,000 consumers served by East River's 21 member systems are located in Minnesota. Additional information about East River is available at:

More information about East River Electric Power Cooperative is available at:

http://www.eastriver.coop

Contact Person:
Jim Edwards
Assistant General Manager – Operations
East River Electric Power Cooperative
P.O. Box 227
Madison, SD 57042
Ph: (605) 256-4536
Fax: (605) 256-8058
e-mail: jedwards@eastriver.coop

Transmission Lines. East River delivers electricity via approximately 2,600 miles of transmission lines and 215 substations located throughout the system's 36,000 square mile service area in eastern South Dakota and western Minnesota. East River has the following transmission facilities in Minnesota:

East River Electric Power Cooperative Transmission Lines

<100 kV	100-199 kV	200-299 kV	>300 kV	DC
158.13	45.74	0	0	0

7.5 Great River Energy

Background Information. Great River Energy ("GRE") is a generation and transmission electric cooperative with headquarters in Maple Grove, Minnesota. GRE provides electrical energy and related services to 28 member distribution cooperatives in Minnesota and Wisconsin. These member cooperatives distribute electricity to more than 600,000 homes, businesses and farms. The service territories of GRE's 28 members stretch from the southwest corner to the northeast corner of Minnesota, with one member serving a small part of northwestern Wisconsin.

More information about Great River Energy is available at:

http://www.greatriverenergy.com

Contact Person: Gordon Pietsch
Director, Transmission Planning & Operations
Great River Energy
12300 Elm Creek Blvd
Maple Grove, MN 55369-4718
Ph: (800) 445-5000
Fax: (763) 445-5050
e-mail: projects@GREnergy.com

Transmission Lines. GRE has the following transmission lines in Minnesota:

GRE Transmission Lines

<100 kV	100-199 kV	200-299 kV	>300 kV	DC
2989	448	523	145	436

7.6 Hutchinson Utilities Commission

Background Information. The City of Hutchinson is located 55 miles west of Minneapolis in McLeod County and has a population of approximately 14,000 people. The area is expected to continue to grow over the next decade. The Hutchinson Utilities Commission was established in 1936 by the City of Hutchinson as a municipal public utilities commission under Minn. Stat. §§ 412.321 et seq., and added a municipal natural gas operation in 1960. HUC provides electricity and natural-gas services to commercial and residential customers in Hutchinson. Its largest commercial customers are 3M and Hutchinson Technologies, Inc.

Additional information is available at:

http://www.ci.hutchinson.mn.us/util.htm

Contact Person: Michael Kumm
Hutchinson Utilities Commission
225 Michigan Street SE
Hutchinson, MN 55350
Ph: (320) 587-4746
Fax: (320) 587-4721
e-mail: mkumm@ci.hutchinson.mn.us

Transmission Lines. Hutchinson Utilities Commission owns 8 miles of a 69 kV transmission line and 9 miles of a 115 kV line in McLeod County.

7.7 ITC Midwest LLC

ITC Midwest LLC ('ITC Midwest") is an independent transmission company subsidiary of ITC Holdings Corp. ITC Midwest purchased the transmission assets of Interstate Power and Light, a subsidiary of Alliant Energy, in December 2007. The Minnesota Public Utilities Commission approved the sale in an Order dated February 7, 2008. PUC Docket No. PA-07-540.

ITC Midwest has headquarters in Cedar Rapids, Iowa, and ITC Holdings Corp. is headquartered in Novi, Michigan. ITC Midwest also has offices in Dubuque and Des Moines, Iowa, and in St. Paul, Minnesota.

More information about ITC Midwest and ITC Holdings Corp. can be found at www.itctransco.com

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Manager, Regulatory Strategy (Minnesota & Illinois)
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St Paul, MN 55101
Ph: 651-222-1000 extension 2308
Fax: 651-222-5544
e-mail: DGrover@itctransco.com

Transformers.

ITC Midwest owns and operates nine transmission substations in Minnesota with voltages exceeding 100 kV and owns transformers at seven of these substations. The ITC Midwest transmission system is planned, designed, and operated to comply with North American Energy Regulatory Commission ("NERC"), Midwest Reliability ("MRO), and ITC Midwest Planning Criteria. The various criteria include a demonstration that ITC Midwest's transmission system is designed such that no loss of firm load will occur, except for load served from radial facilities, for the loss of any single transformer.

Although the reliability of individual transformers is very high, outages can occur which affect replacement power costs during outages. ITC Midwest spare transformers are intended to minimize replacement power costs, and ITC Midwest performs periodic review to determine if additional spare transformers are needed. At this time, ITC Midwest is maintaining a sufficient and reasonable number of spare transformers to avoid incurring excessive costs arising from system disturbances.

A listing of ITC Midwest's transformers 100 kV and greater that are operating in Minnesota is provided in the table below. Only ITC Midwest-owned spare transformers with operating voltages available for use in Minnesota are identified in the list.

Substation Location	Equipment ID	Primary (kV)	Secondary (kV)	Rating (MVA)
FOX LAKE	012-1229	161	69	74.7
FOX LAKE	FOX LAKE 161/69 KV	161	69	75
ELK	016-1271	161	69	30
ELK	016-1271	161	69	30
HAYWARD	007-1242	161	69	74.7
HAYWARD	007-1242	161	69	74.7
HERON LAKE	009-1230	161	69	56
HERON LAKE	009-1230	161	69	56
LAKEFIELD JUNCTION	009-1268	345	161	336
LAKEFIELD JUNCTION	009-1268	345	161	336
LAKEFIELD JUNCTION	009-1268	161	69	74.7
MAGNOLIA	MAGNOLIA 161/69 KV	161	69	56
WINNEBAGO JUNCTION	005-1244	161	69	30
WINNEBAGO JUNCTION	005-1244	161	69	74.7
SPARE	XCS71591	161	69	65

Transmission Lines. The ITC Midwest system includes approximately 6,800 miles of transmission lines, operating at voltages from 34.5 kV to 345 kV in Minnesota, Iowa, Illinois, and Missouri.

ITC Midwest owns approximately 1,029 miles of transmission line in the state of Minnesota, operating at voltages of 345 kV, 161 kV and 69 kV. The total miles of these transmission lines are listed by voltage class in the table below.

ITC Midwest Transmission Lines

<100 kV	100-199 kV	200-299 kV	>300 kV	DC
731.68	277.82	0	19.77	0

7.8 L&O Power Cooperative

Background Information. L & O Power Cooperative ("L&O"), headquartered in Rock Rapids, Iowa, is a wholesale electric power supply and transmission cooperative serving three rural distribution electric cooperatives. These member cooperatives in turn serve more than 5,600 homes and businesses across Rock and Pipestone counties in southwest Minnesota, and Lyon and Osceola counties in northwest Iowa. Approximately 2,700 of the total 5,600 total consumers served are located in Minnesota.

Additional information about L&O is available at:

www.landopowercoop.com

Contact Person: Curt Dieren
Manager
L&O Power Cooperative
P.O. Box 511
1302 S. Union Street
Rock Rapids, IA 51246
Ph: (712) 472-2556
Fax: (712) 472-2710
e-mail: CDieren@dgrnet.com

Transmission Lines. L&O delivers wholesale electricity via approximately 193 miles of transmission lines and 16 substations located throughout the system's four county service area in southwestern Minnesota and northwestern Iowa. L&O has the following transmission facilities in Minnesota:

L&O Power Cooperative Transmission Lines

<100 kV	100-199 kV	200-299 kV	>300 kV	DC
44.52	8.32	0	0	0

7.9 Marshall Municipal Utilities

Background Information. Marshall Municipal Utilities (MMU) has been providing electric and water utility services to the City of Marshall for over 114 years. Marshall is a community of approximately 13,000 people located in Lyon County in Southwest Minnesota approximately 30 miles east of the South Dakota border and 50 miles north of the Iowa border. MMU is the second largest municipal utility in the state in terms of retail energy sales at over 602,775 MWhs sold in 2008. MMU serves over 6,400 customers and has a peak demand of more than 85 megawatts.

More information about MMU is available at:

http://www.marshallutilities.com/about

Contact Person: Brad Roos
Marshall Municipal Utilities
113 4th Street South
Marshall, MN 56258-1223
Ph: (507) 537-7005
Fax: (507) 537-6836
e-mail: bradr@marshallutilities.com

Transmission Lines. Marshall Municipal Utilities owns 18.1 miles of 115 kV transmission line.

7.10 Minnesota Power

Background Information. Minnesota Power, a division of ALLETE, is an investor-owned utility headquartered in Duluth, Minnesota. Minnesota Power provides electricity in a 26,000-square-mile electric service territory located in northeastern Minnesota. Minnesota Power supplies retail electric service to 141,000 retail customers and wholesale electric service to 16 municipalities.

More information is available on the company's web page at:

http://www.mnpower.com

Contact Person: David Van House
Engineer
Minnesota Power
30 West Superior Street
Duluth, MN 55802
Ph: (218) 355-2514
e-mail: dvanhouse@mnpower.com

Transformers

Background

Minnesota Power has several autotransformers for which all load serving windings are greater than 100 kV. Minnesota Power's backbone transmission system is 230 kV with underlying 115 kV which serve distribution substations. All of the transformation between the 230 kV and 115 kV system is accomplished with autotransformers. Additionally, Minnesota Power is interconnected at 115 kV, 138 kV, 345 kV, as well as 500 kV. All of these higher voltage transformations (greater than 100 kV), except for the 115 kV, are accomplished by autotransformers. (An autotransformer is simply a special connection/winding of a transformer which is useful to reduce the complexity and therefore cost of the transformer.) Minnesota Power does have autotransformers in this class that connect separate portions internal to the Minnesota Power grid and form no interconnection externally.

Station and Transformer Redundancy

At Minnesota Power sites, there are two typical designs or arrangements for this transformation: Firm Capacity and Non Firm. In the Firm Capacity Stations there is adequate redundancy. This is accomplished by the use of two transformers each with a capacity equal to or greater than the substation's normal peak loading patterns. In a scheduled or unscheduled outage of one transformer, all load can continue to be served via the second unit (transformer).

Emergency Backup

In the case where the station is not firm capacity as described above, other responses are necessary. Minnesota Power would utilize one of the transformers from a Firm Capacity station for the Non Firm Capacity substations. The unit (transformer) would be moved to and installed at the non firm substation in place of the failed unit. In emergency situations this could be accomplished in less than one week.

Spare Units

Minnesota has a spare, unenergized autotransformer (115kV/138kV) for use on our internal 138 kV system. The spare unit (transformer) would be moved and installed in place of the failed unit. In emergency situations this could be accomplished in less than one week.

Station Autotransformer Census

Minnesota Power has four stations in which the design and number of autotransformers meet the Full Capacity criteria. There are another six sites which have a single autotransformer. This does not include the internal 115/138kV system.

Phase Shift Transformers

Minnesota Power also has two phase shifting transformers which have all their load serving windings above 100 kV. These units (transformers) are installed (in series) essentially providing a Firm Capacity transformation. Under normal conditions one phase shifter is adequate to meet the anticipated phase shift and power flow adjustments. Each unit has a bypass circuit as well.

Transmission level transformers inventory (greater than 100 kV on the low side)

Station Name	Unit No.	High Voltage (kV)	Low Voltage (kV)	Rating (KVA)
SYL LASKIN S.E. STATION	SP	131.1	115	75,000
BADOURA 230/115 KV SUB	5	230	115	186,667
ARROWHEAD 345/230/115 KV	6	230	115	373,333
ARROWHEAD 345/230/115 KV	7	230	115	373,333
FORBES 500/230/115KV SUB	8C	288.68	132.79	224,000
FORBES 500/230/115KV SUB	8A	288.68	132.79	224,000
FORBES 500/230/115KV SUB	8B	288.68	132.79	224,000
LITTLEFORK 230/115 KV	3	218.5	116	186,667
SYL LASKIN S.E. STATION	20	134.55	115	186,667
TACONITE HARBOR 138/115	4	138	115	186,667
HILLTOP 230/115 KV SUB	1	230	115	187,000
MINN TAC 230/115 KV	1	230	115	373,000
MINN TAC 230/115 KV	2	230	115	373,000
FORBES 500/230/115KV SUB	3	230	115	373,000
BLACKBERRY 230/115KV SUB	1T	230	115	373,000
BLACKBERRY 230/115KV SUB	2T	230	115	373,000
INTERNATIONAL FALLS-115/	10	120	120	180,000
INTERNATIONAL FALLS-115/	11	120	120	180,000
SHANNON 230/115 KV SUB	2	230	115	187,000
RIVERTON 230/115 KV SUB	6	230	115	187,000
MUD LAKE 230/115KV SUB	1	230	115	187,000
SHANNON 230/115 KV SUB	1	230	115	187,000

Transmission Lines. The number of miles of transmission in Minnesota owned by Minnesota Power is shown in the following table. In addition, Minnesota Power is seeking approval from the Public Utilities Commission to purchase approximately 465 miles of a +/- 250 kV high voltage direct current transmission line between the Square Butte Substation in Center, North Dakota, and Minnesota Power's Arrowhead Substation near Duluth. PUC Docket No. E015/PA-09-526 and FERC Docket No. EC09-108-000.

Minnesota Power Transmission Lines

<100 kV	**100-199 kV**	**200-299 kV**	**>300 kV**	**DC**
0.22	1,290.3	605.18	8.35	0

7.11 Minnkota Power Cooperative

Background Information. Minnkota Power Cooperative, Inc. (Minnkota) is a regional generation and transmission cooperative serving 11 member-owner distribution cooperatives in eastern and northwestern Minnesota and northeastern North Dakota. Minnkota's service area is approximately 34,500 square miles over the two states. Minnkota is also the operating agent for the Northern Municipal Power Agency (NMPA). Together Minnkota and the NMPA comprise the Joint System.

Additional information about Minnkota is available at:

http://www.minnkota.com

Contact Person: Dale Sollom
Planning Manager
Minnkota Power Cooperative, Inc.
P.O. Box 13200
Grand Forks, ND 58208-3200
Ph: (701) 795-4315
Fax: (701) 795-4214
e-mail: dsollom@minnkota.com

Transmission Lines. The Joint System owns 1,384.93 miles of transmission line in Minnesota and 1,641.76 miles in North Dakota. The miles of Minnesota transmission lines are shown in the following table:

Joint System Transmission Lines

<100 kV	100-199 kV	200-299 kV	>300 kV	DC
992.37	143.79	248.77	0	0

7.12 Missouri River Energy Services

Background Information. MRES began in the early 1960s as an informal association of northwest Iowa municipalities with their own electric systems that decided to coordinate their efforts in negotiating the purchase of power and energy from the United States Bureau of Reclamation of the United States Department of the Interior ("USBR"). MRES was established as a body corporate and politic organized in 1965 under Chapter 28E of the Iowa Code and existing under the intergovernmental cooperation laws of the states of Iowa, Minnesota, North Dakota, and South Dakota. Municipalities in Minnesota, North Dakota and South Dakota subsequently joined MRES pursuant to compatible enabling legislation in each state.

MRES is comprised of 60 municipally owned electric utilities in the States of Iowa, Minnesota, North Dakota, and South Dakota. The MRES member cities' service territories roughly coincide with the boundaries of the respective incorporated cities. MRES has no retail load, and all of its firm sales are made to municipal or other wholesale utilities. MRES acts as an agent for the Western Minnesota Municipal Power Agency ("WMMPA"), which itself was incorporated as a municipal corporation and political subdivision of the State of Minnesota. WMMPA provides a means for its members to secure, by individual or joint action among themselves or by contract with other public or private entities within or outside the State of Minnesota, an adequate, economical and reliable supply of electric energy. Current membership in WMMPA consists of 24 municipalities, of which 23 are MRES' members located in Minnesota, each of which owns and operates a utility for the local distribution of electricity.

More information about Minnesota River Energy can be found at:

http://www.mrenergy.com

Contact Person: Brian Zavesky
Missouri River Energy Services
3724 West Avera Drive
P.O. Box 88920
Sioux Falls, SD 57108-8920
Ph: (605) 330-6986
Fax: (605) 978-9396
e-mail: brianz@mrenergy.com

Transmission Lines. Missouri River Energy Services has 212.22 miles of 115 kV transmission lines and 10.97 miles of 230 kV transmission line in Minnesota.

7.13 Northern States Power Company, a Minnesota corporation

Background Information. Northern States Power Company, a Minnesota corporation (NSP), is a public utility organized under the laws of the State of Minnesota, and is a wholly-owned subsidiary of Xcel Energy Inc., a publicly-traded company listed on the New York Stock Exchange. NSP is headquartered in Minneapolis, Minnesota. Xcel Energy's other utility subsidiaries are Northern States Power Company, a Wisconsin corporation (NSPW), headquartered in Eau Claire, Wisconsin, Public Service Company of Colorado, headquartered in Denver, Colorado, and Southwestern Public Service Company, headquartered in Amarillo, Texas. NSP provides electricity and natural gas to customers in a service territory that encompasses the Twin Cities, many mid-size and small towns throughout Minnesota, and also to portions of South Dakota and North Dakota. NSP and NSPW operate an integrated generation and transmission system (the NSP System).

More information can be found on Xcel Energy's web page at:

http://www.xcelenergy.com

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Minneapolis, MN 55401
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e-mail: paul.lehman@xcelenergy.com

Transformers

Existing Transformers. NSP and NSPW presently have the following transformers on the NSP System in Minnesota and Wisconsin:

NSP System Transmission Transformers Over 100 Kv (In-Service)

	Primary Voltage Class	Secondary Voltage Class	Maximum MVA	Operating Company	Location
1	345	161	300	NSP	Adams Substation
2	345	115	448	NSP	Allen S King Substation
3	230	115	336	NSP	Benton County Substation
4	230	115	336	NSP	Benton County Substation
5	230	115	336	NSP	Blue Lake Substation
6	345	115	336	NSP	Blue Lake Substation
7	345	115	448	NSP	Brookings County Substation
8	345	115	448	NSP	Chisago County Substation
9	500	345	1200	NSP	Chisago County Substation
10	500	345	1200	NSP	Chisago County Substation

	Primary Voltage Class	Secondary Voltage Class	Maximum MVA	Operating Company	Location
11	161	115	187	NSP	Collville Substation
12	345	115	672	NSP	Coon Creek Substation
13	345	115	672	NSP	Coon Creek Substation
14	345	115	448	NSP	Eden Prairie Substation
15	345	115	448	NSP	Eden Prairie Substation
16	345	115	448	NSP	Elm Creek Substation
17	345	115	550	NSP	Inver Hills Substation
18	345	115	448	NSP	Kohlman Lake Substation
19	345	115	448	NSP	Kohlman Lake Substation
20	230	115	187	NSP	Maple River Substation
21	230	115	187	NSP	Maple River Substation
22	230	115	187	NSP	Minnesota Valley Substation
23	230	115	187	NSP	Minnesota Valley Substation
24	345	230	336	NSP	Monticello Substation
25	345	115	300	NSP	Monticello Substation
26	345	115	672	NSP	Nobles County Substation
27	345	115	450	NSP	Parkers Lake Substation
28	345	115	450	NSP	Parkers Lake Substation
29	230	115	336	NSP	Paynesville Transmission Substation
30	345	161	224	NSP	Prairie Island Substation
31	230	115	336	NSP	Prairie Substation
32	230	115	336	NSP	Prairie Substation
33	345	230	336	NSP	Red Rock Substation
34	345	115	448	NSP	Red Rock Substation
35	345	115	448	NSP	Red Rock Substation
36	345	115	448	NSP	Sherco Substation
37	230	115	187	NSP	Sheyenne Substation
38	230	115	187	NSP	Sheyenne Substation
39	161	115	187	NSP	Split Rock Substation
40	230	115	336	NSP	Split Rock Substation
41	345	115	448	NSP	Split Rock Substation
42	345	115	448	NSP	Split Rock Substation
43	345	115	672	NSP	Terminal Substation
44	345	115	672	NSP	Terminal Substation
45	161	115	187	NSP	Wilmarth Substation
46	345	115	448	NSP	Wilmarth Substation
47	161	115	186	NSPW	Crystal Cave Substation
48	345	161	300	NSPW	Eau Claire Substation
49	345	161	300	NSPW	Eau Claire Substation
50	161	115	187	NSPW	Gingles Substation
51	161	115	187	NSPW	Hydro Lane Substation
52	161	115	112	NSPW	Pine Lake Substation
53	345	161	336	NSPW	Stone Lake Substation

Spare Transformers. The following table illustrates the 2010 NSP System spare transformer inventory and planned deliveries:

Primary Voltage Class	Secondary Voltage Class	Maximum MVA	Operating Company	Location	Status
345	115	672	NSP	Maple Grove	Storage*
230	115	112	NSP	Minn Valley	Storage
230	115	50	NSP	Minn Valley	Storage
230	115	50	NSP	Minn Valley	Storage
161	115	62.5	NSPW	Pine Lake	Storage
161	115	46.7	NSPW	Tremval	Storage
345	161	336	NSP	Maple Grove	On Order
161	115	187	NSP	Maple Grove	On Order

* Note: A Transformer in Storage does not have bus work connected and could be in a yard or on a pad in a substation.

The NSP System maintains a reasonable number of transformers in inventory in order to: (1) maintain the reliability of the system; (2) remain consistent with NERC mandatory reliability criteria; and (3) balance the economic benefit to ratepayers. Transmission transformers typically provide high reliability performance and durability, although they do fail from time to time regardless of the efforts of the Company. Such failures may result, for example, from extreme weather conditions, exposure to excessive dust, or natural corrosion. Despite the NSP Companies' long-standing practice of improving and maintaining the transmission capability throughout the NSP System, outages of individual transformers do occur from time to time, affecting purchased energy costs. The eight transformers the NSP System has available in inventory or on order are sufficient to minimize the amount of time the NSP System would need to generate or purchase replacement power because of a transformer problem.

Transmission Lines. Northern States Power Company owns over 4,500 miles of transmission lines in the state of Minnesota. The miles of Minnesota transmission lines are shown in the following table.

NSP Transmission Lines

<100 kV	100-199 kV	200-299 kV	>300 kV	DC
1808.23	1556.15	365.5	1101.3	0.00

7.14 Otter Tail Power Company

Background Information. Otter Tail Power Company ("OTP") is a public utility organized under the laws of the State of Minnesota, and is the utility division of Otter Tail Corporation, a company publicly traded on the NASDAQ Stock Market. OTP is headquartered in Fergus Falls, Minnesota. It provides electricity to approximately 127,000 residential, commercial, and industrial customers throughout Minnesota, South Dakota, and North Dakota, with approximately 58,000 customers in Minnesota. OTP was originally incorporated in 1907, and first delivered electricity in 1909 from the Dayton Hollow Dam on the Otter Tail River.

More information can be found on Otter Tail Power's web page at:

http://www.otpco.com

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Transformers

Otter Tail Power Company's transmission system is composed of transmission operated at 345 kV, 230 kV, 115 kV, and 41.6 kV. Otter Tail is interconnected with several neighboring utilities, which results in a highly integrated transmission system with joint ownership along many transmission lines and within several substations. Most of the transformers owned by Otter Tail on the transmission system are used to step down the voltage from the bulk transmission system (230 kV, 115 kV) to the local load serving transmission system (69 kV, 41.6 kV).

Availability of Spare Transformers

The transmission system is designed to withstand the loss of any transformer and still be able to reliably serve all load on the system. As a result, Otter Tail does not have any spare transformers with a low side winding of greater than 100 kV. However, at Otter Tail's two largest generating stations (Big Stone and Coyote), there are spare generator step-up transformers available in the event of a failure to reduce the down-time of these generators.

Some of the substations within the transmission system do have redundant transformers in-service. In the event of a transformer failure at a substation, it would be possible to move a transformer from a different substation that may have redundant transformers in-service. This would be possible since many of the transformers on the transmission system are of a similar design.

Existing Transformers

Transformers on Otter Tail Power's system include:

Substation	High Voltage (kV)	Medium Voltage (kV)	Low Voltage (kV)	Size (MVA)
Maple River Transformer #1	345	230	13.8	336
Maple River Transformer #2	345	230	13.8	336
Jamestown Transformer #1	345	115	41,6	112
Jamestown Transformer #2	345	115	41,6	112
Buffalo Transformer	345	115	41,6	112
Forman Transformer	230	115	41.6	140
Rugby Transformer	230	115	13.8	125
Wilton Transformer	230	115	13.8	140
Winger Transformer	230	115	13,2	140
Big Stone Transformer	230	115	13.8	233

Transmission Lines. OTP has the following transmission lines in Minnesota:

OTP Transmission Lines

<100 kV	100-199 kV	200-299 kV	>300 kV	DC
1298.75	544.66	111.54	0	0

7.15 Rochester Public Utilities

Background Information. Rochester Public Utilities (RPU), a division of the City of Rochester, Minnesota, is the largest municipal utility in the state of Minnesota. RPU serves over 45,000 electric customers. In 1978, Rochester joined the Southern Minnesota Municipal Power Agency (SMMPA) with City Council approval. Initially, RPU was a full-requirements member with SMMPA controlling all of Rochester's electric power. Today, RPU is a partial requirements member of SMMPA and retains control over its own generating units. All of RPU's load and generation are serviced by the Midwest Independent System Operator (MISO) through its market function.

More information about Rochester Public Utilities is available at:

http://www.rpu.org/about

Contact Person: Gerry Steffens
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Transmission Lines. Rochester Public Utilities owns 40.51 miles of 161 kV transmission line in Minnesota.

7.16 Southern Minnesota Municipal Power Agency

Background Information. Southern Minnesota Municipal Power Agency ("SMMPA") is a not-for-profit municipal corporation and political subdivision of the State of Minnesota, headquartered in Rochester, Minnesota. SMMPA was created in 1977, and has eighteen municipally owned utilities as members, located predominantly in south-central and southeastern Minnesota. SMMPA serves approximately 92,000 retail customers.

More information about SMMPA is available at:

http://www.smmpa.com

Contact Person: Richard Hettwer, PE, MBA
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Southern Minnesota Municipal Power Agency
500 First Avenue Southwest
Rochester, MN 55902-3303
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e-mail: rj.hettwer@smmpa.org

Transmission Lines. Southern Minnesota Municipal Power Agency has the following transmission lines in Minnesota:

SMMPA Transmission Lines

<100 kV	100-199 kV	200-299 kV	>300 kV	DC
128.69	116.32	16.84	0	0

7.17 Willmar Municipal Utilities

Background Information. Willmar, a regional center for West Central Minnesota, is located 100 miles west of the Twin Cities. It is the Kandiyohi County Seat with a population of 19,000. Willmar Municipal Utilities maintains an electric system that currently has four substations with 190 miles of distribution lines and 35 miles of transmission lines.

Additional information is available at:

http://wmu.willmar.mn.us

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e-mail: wmu@wmu.willmar.mn.us

Transmission Lines. Willmar Municipal Utilities owns 21.5 miles of 69 kV transmission line and 13.5 miles of 230 kV transmission line.

8.0 Renewable Energy Standards

8.1 Introduction

Minnesota Statutes § 216B.2425, subd. 7, states that in the Biennial Report the utilities shall address necessary transmission upgrades to support development of renewable energy resources required to meet upcoming Renewable Energy Standard milestones. In its May 30, 2008, Order approving the 2007 Biennial Report and Renewable Energy Standards Report, the Commission said, "Future biennial transmission projects reports shall incorporate and address transmission issues related to meeting the standards and milestones of the new renewable energy standards enacted at Minn. Laws 2007, ch. 3."

In the 2007 Biennial Report, the utilities submitted a separate, extensive Renewable Energy Standards Report in response to direction from the Legislature for such a report. The legislation (Minn. Laws 2007, ch. 3, § 2) required the utilities to address specific issues identified in the law. Readers are referred to the 2007 Report for additional detail.

In addition, Minnesota Statutes § 216B.1691, subd. 3, requires the utilities to periodically report to the Commission on their "plans, activities, and progress" with regard to the RES requirements and demonstrate to the Commission their efforts to comply with the standards. In 2008 the Commission opened a separate docket to specifically consider the utilities' efforts to meet the RES requirements. Docket No. is M-08-1163 (*In the Matter of Commission Consideration and Determination on Compliance with Renewable Energy Obligations and Renewable Energy Standards*). As part of that docket, each of the utilities provided extensive information about its individual situation and its efforts to meet the RES. The Commission recognized that its decision in the RES docket did not preclude the Commission or others from requesting additional data, and the utilities are required to submit another compliance report by November 15, 2010.

It is not the intent here to attempt to repeat or even summarize the whole of the data provided in the RES compliance docket. The biennial reporting process focuses on transmission. In response to the Commission's direction, the utilities are reporting on their best estimates for how much renewable generation will be required to meet the Minnesota Renewable Energy Standards in future years and what efforts are underway to ensure that adequate transmission will be available to convey that energy to the necessary market areas.

A Gap Analysis is provided to illustrate the amount of renewable generation that is already available and how much will be required in the future to meet the standard. The utilities also report on the transmission lines that will be relied on to bring renewable energy to their customers to satisfy RES requirements. Further, a brief analysis of two significant issues affecting the utilities' ability to obtain renewable energy – allocation of transmission costs and other states' requirements for renewable energy – is included. Finally, information responsive to the PUC's August 10, 2009, Order in the CapX 2020 Certificate of Need proceeding is provided.

8.2 Reporting Utilities

It should be pointed out that the utilities that are required to submit the Biennial Transmission Projects Report are not identical to those that are required to meet the Renewable Energy Standards. The information in this chapter reflects the work of all the utilities that are required to meet RES milestones, regardless of whether they own transmission lines and are required to participate in the Biennial Report. A list of those utilities participating in the Biennial Transmission Projects Report can be found in Chapter 2.0. The utilities participating in this part of the 2009 Biennial Report on renewable energy are the following.

Investor-owned Utilities

Interstate Power and Light Company
Minnesota Power
Northern States Power Company, a Minnesota corporation
Otter Tail Power Company

Generation and Transmission Cooperative Electric Associations

Basin Electric Power Cooperative
Dairyland Power Cooperative
East River Electric Power Cooperative
Great River Energy
L&O Power Cooperative
Minnkota Power Cooperative

Municipal Power Agencies

Central Minnesota Municipal Power Agency
Minnesota Municipal Power Agency
Southern Minnesota Municipal Power Agency
Western Minnesota Municipal Power Agency/Missouri River Energy Services

Power District

Heartland Consumers Power District

8.3 Compliance Summary

On August 31, 2009, the Commission issued its Order Finding Utilities in Compliance With Reporting Requirements and Objectives of Renewable Energy Obligations – Renewable Energy Standards Statute in Docket No. M-08-1163. The Commission specifically found that twelve of the reporting utilities were in compliance with the 2007 Renewable Energy Objective of one percent, and the other four had made good faith efforts to comply. The Commission found that all sixteen have plans to meet the renewable energy objectives for the years up to and including 2010.

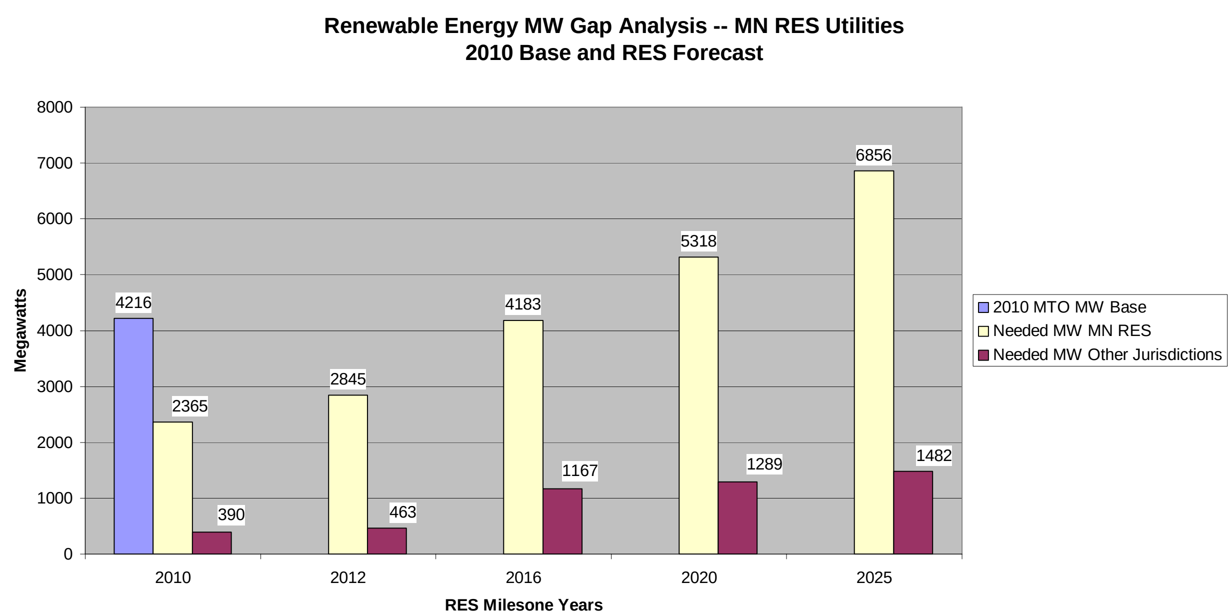
The utilities have made substantial progress with respect to meeting future RES milestones. The present analysis shows that the utilities are on course to meet the RES milestones for 2010, 2012, and 2016. Significantly, the utilities have determined that without the addition of the CapX 2020 Group 1 projects, the transmission system in the 2016 timeframe would not be adequate to meet the combined 2016 Minnesota RES and non-Minnesota RES milestones. The utilities recognize that additional transmission and generation will be necessary for 2020 and beyond in Minnesota, and that other demands for renewable energy will impact Minnesota's compliance status.

8.4 Gap Analysis

In the 2007 Renewable Energy Standards Report, updated in a Supplemental Compliance Filing submitted on September 11, 2008, the utilities provided information referred to as a Gap Analysis. A Gap Analysis is an estimate of how many more megawatts of renewable generating capacity will be required beyond what is already available to obtain the required amount of renewable energy that must come from renewable sources at a particular time in the future. It is important to understand, however, the Gap Analysis described here was prepared for transmission planning purposes. This Gap Analysis is not an exercise intended to verify the validity of forecasted energy sales and associated capacity needs. Each utility must verify the validity of its own sales forecast and capacity requirements. This Gap Analysis assumes energy and capacity forecast validity and then incorporates such results into evaluating future transmission needs.

2010 Base Capacity and RES/REO Forecast (Bar Chart # 1)

The bar chart on the following page presents a system-wide overview of existing capacity in 2010 (used as a base figure throughout the various milestone periods) and forecasted renewable capacity requirements to meet Minnesota RES as well as non-Minnesota RES/REO needs. Each utility provided its own forecast of Minnesota RES and non-Minnesota RES/REO renewable energy needs, and converted such estimates into capacity based on their own mix of renewable resources (wind, biomass, hydropower) using the most appropriate capacity factors unique to their specific generating resources.



***Definitions**

1. 2010 MW Base Systemwide = RES capacity acquired, actually installed and operational ("in the ground and running") regardless of geographic location. Does not include projects under contract but not yet under construction, and it does not include projects under construction but not yet completed.

2. Needed MW Minnesota RES = Renewable capacity required to meet the RES energy goals for each utility serving customers in Minnesota.

3. Needed MW Other Jurisdictions = Gross non-Minnesota renewable capacity required to meet RES requirements or REO goals in states served by the reporting utility other than Minnesota.

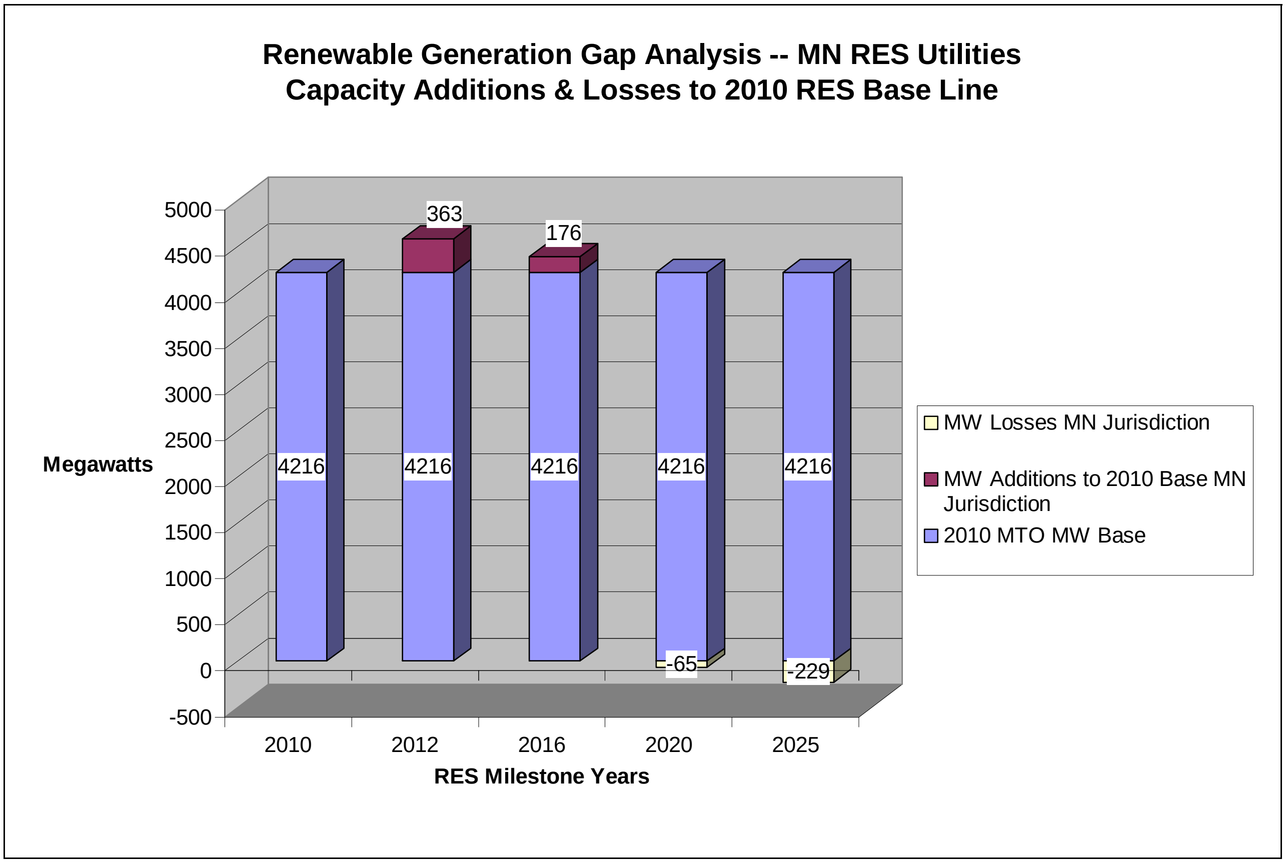
A more specific breakdown of each utility's Minnesota RES and non-Minnesota RES/REO capacity forecast is as follows:

Table 1. MN & Non-MN RES Forecast (MW)*										
Utility	**2010**		**2012**		**2016**		**2020**		**2025**	
	MN RES	**Non -MN RES**	**MN RES**	**Non -MN RES**	**MN RES**	**Non -MN RES**	**MN RES**	**Non -MN RES**	**MN RES**	**Non -MN RES**
Basin**	3.4	45.6	53.1	92.8	90.7	306.9	120.9	333.5	181.3	358.1
CMMPA	7.53	0	13.41	0	20.32	0	27.9	0	37.55	0
Dairyland	13.2	74.4	23.2	130	34.9	227.1	43.6	278.5	58.3	323.7
GRE	231	0.4	394	0.4	587	1.6	743	1.6	1,039	1.6
Heartland	9.5	0	16.5	0	14.1	6.5	4.7	6.8	6.2	7.2
IPL	18	50	32	50	49	50	61	50	84	50
Minnkota	33	0	59	0	90	67	114	72	161	80
MN Power	150	10	291	10	426	17	531	17	683	17
MRES	21.3	8.4	37.2	17.1	65.3	32.1	92.1	34.1	127.5	38.9
SMMPA	65.23	0	117.1	0	180.5	0	228.9	0	308	0
Otter Tail	52.2	0	92.7	0	140.7	69	153	69	190.2	69
RPU	0.9	0	3.4	0	7.9	0	12	0	12.7	0
Xcel	1,763	201.7	1,713	162.7	2,476	389.6	3,186	426.1	3,967	536.4
Total	2,368	390	2,846	463	4,182	1,167	5,319	1,289	6,856	1,482

* Capacity factor assumptions established by each utility.
** Basin Electric numbers include East River Electric and L&O

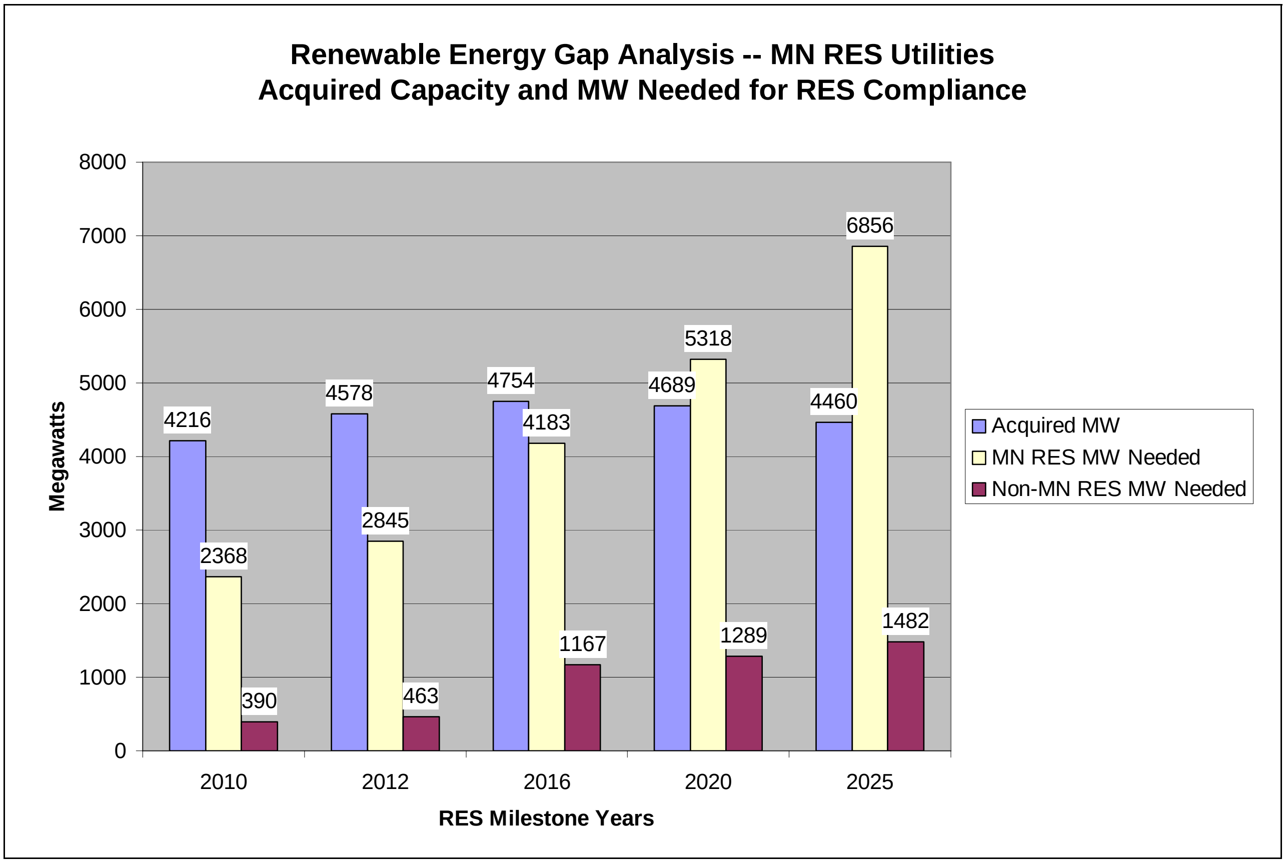
Capacity Acquisitions & Expirations (Bar Chart # 2)

This bar chart presents a system-wide overview of additional renewable capacity that will be acquired by individual utilities beginning as early as 2012 and capacity that will expire between 2016 and 2025. Such reductions in renewable capacity are attributable primarily due to the expiration of various power purchase agreements for renewable energy generation.



RES Capacity Acquired and Net RES/REO Need (Bar Chart # 3)

This bar chart represents the total renewable capacity system-wide that will be acquired and lost between 2010 and 2025, as well as the projected total Minnesota RES and non-Minnesota RES/REO needs between 2010 and 2025.



A more specific breakdown of each utility's forecast follows:

Table 2. RES Capacity Acquired & Net MN RES Capacity Need* (MW)										
Utility	**2010**		**2012**		**2016**		**2020**		**2025**	
	RES Cap Acq.	**MN RES Net**	**RES Cap Acq.**	**MN RES Net**	**RES Cap Acq.**	**MN RES Net**	**RES Cap Acq.**	**MN RES Net**	**RES Cap Acq.**	**MN RES Net**
Basin**	327.8	0	479.3	0	627.8	0	627.8	0	620.5	0
CMMPA	19.72	0	19.72	0	24.02	0	44.02	0	46.42	0
Dairyland	87.7	0	153.3	0	262.1	0	322.1	0	382.1	0
GRE	216	0	316	0	310	278	299	446	295	745
Heartland	36	0	36	0	36	0	36	0	36	0
IPL	23	0	23	0	22	0	20	0	18	0
Minnkota	359	0	359	0	359	0	359	0	359	0
MN Power	409	0	448	0	420	6	420	111	420	263
MRES	82.4	0	82.4	0	82.4	0	82.4	9.7	82.4	45.1
SMMPA	124.3	0	125.9	0	125.9	54.6	125.9	103.1	125.9	182.1
Otter Tail	190.2	0	190.2	0	190.2	0	190.2	0	190.2	0
RPU	7.5	0	12.5	0	12.5	0	12.5	0	12.5	1.87
Xcel	2,333	0	2,333	620	2,282	194	2,150	1,036	1,872	2,095
Total	4,216	0	4,578	620	4,754	533	4,689	1,746	4,460	3,332

* Capacity factor assumptions established by each utility.
** Basin Electric numbers include East River Electric and L&O
*** Some utilities with less than sufficient capacity to meet the MN RES need may use renewable energy credits to fulfill their requirement.

8.5 RES Requirements for CapX 2020 Utilities

On August 10, 2009, the Public Utilities Commission issued its Order Granting and Denying Motions for Reconsideration, and Modifying Conditions regarding Certificates of Need for CapX 345-kV Transmission Projects in Docket No. CN-06-1115. In Order Point 7, the Commission directed the utilities to include in the 2009 Biennial Transmission Projects Report certain information relating to renewable energy requirements. Specifically, the utilities were directed to identify the net Minnesota RES capacity need and provide a forecast of the annual non-Minnesota RES or renewable energy objective (REO) capacity required through 2025. This information is included in the Gap Analysis presented above, for more than just the CapX utilities.

In addition to the quantitative capacity data requested by the Commission's Order, the utilities were asked to provide information pertaining to how the capacity data were derived. Specifically, the Order requested the utilities to respond to the following:

- Question 7.A.c.
  Whether an allowance was included for generation capacity to be built in the region for non-CapX purposes;

- Question 7.A. d.
  An explanation of how Minnesota's energy savings goal was incorporated into a utility's capacity forecast; and

- Question 7.A. e.
  A brief discussion of various scenarios regarding the geographic distribution of forecasted capacity needs.

The responses to these questions are set forth in the table below.

CMMPA	
7.A.c.	CMMPA has no non-Minnesota load and no non-CAPX members, hence no allowance was used for non-CAPX generation capacity additions.
7.A.d.	Energy efficiency gains are included in the load forecast, albeit not higher than .75% in any year of the forecast horizon.
7.A.e.	CMMPA's planned RES capacity would likely be added within the southern/central Minnesota area but, depending on wind capacity factors and the appetite for individual municipal utilities to have generators within their territories, the specific locations are in flux.
Dairyland	
7.A.c.	If a non-CapX utility proposes a project within Dairyland Power Cooperative's (DPC) transmission system, DPC works with the utility to develop the project. An example of this is the 99 MW Crane Creek Wind Farm being developed by Wisconsin Public Service near Riceville, Iowa.
7.A.d.	Energy efficiency gains are included within DPC's load forecast. The need for renewable energy projects is adjusted according to the load forecast. The challenge of attaining and sustaining 1.5 percent energy savings goals into the future will impact the timing of renewable energy projects.
7.A.e.	DPC's service area encompasses 62 counties in four states (Wisconsin, Minnesota, Iowa and Illinois). Renewable energy projects will be sited based on developer preferences, availability of resources and cost. For example, the wind farms in DPC's system are in Minnesota and Iowa due to the better wind conditions when compared to Wisconsin.
Great River Energy	
7.A.c.	None included.
7.A.d.	Capacity forecast assumes meeting a 1.5% energy conservation goal through programs that reduce retail sales about 1% and system efficiency improvements that do not reduce retail sales about 0.5%.
7.A.e.	GRE plans to add resources connected to MISO transmission facilities or that can otherwise deliver energy into the MISO market. Specific locations have not been determined and will depend on individual project competitiveness. Most likely they will be in MN, ND, SD, or IA.

MINNKOTA	
7.A.c.	No allowance applicable.
7.A.d.	The 1.0 percent and 1.5 percent goal was not incorporated.
7.A.e.	There are numerous scenarios regarding future geographic distribution of interconnection needs. It is difficult to assess which scenarios are most probable but the bulk of such options will occur in North Dakota.
Minnesota Power	
7.A.c.	None included.
7.A.d.	The impact of conservation and DSM/CIP programs are assumed implicit within MN Power's energy projections and are incorporated into the price and income coefficients. The effects are therefore quantified in the econometric model specifications of MN Power's retail sales forecast.
7.A.e.	MN Power anticipates additional North Dakota wind facilities with energy delivered to its service territory via the Square Butte to Arrowhead DC line.
Otter Tail	
7.A.c.	None included.
7.A.d.	Minnesota's 1.5% energy savings goal was incorporated into the forecast for energy requirements. For 2010, the goal was 1.05% and for 2011 and thereafter the goal was 1.5%. For each year, the conservation was calculated based on the prior three-year average of retail sales. Renewable generation requirements were calculated based on the conserved forecast.
7.A.e.	Of the projected unacquired renewable generation, 8 MW is anticipated to come from a heat recovery unit located in Minnesota. An additional 61 MW of wind will be required in 2025, assuming that Renewable Energy Credits (RECs) are not banked throughout the study period. At this time, Otter Tail anticipates that banked RECs will be allowed, which may delay the need for additional renewable generation. The location of this potential wind resource would likely be in Minnesota, North Dakota, or South Dakota.
RPU	
7.A.c.	None included.
7.A.d.	The 1.0 – 1.5% CIP savings goals were incorporated into the SMMPA July 2009 IRP forecast which was used for this report.
7.A.e.	This forecast distributes load growth only on the RPU system and related RPU buses.
SMMPA	
7.A.c.	None included.
7.A.d.	SMMPA incorporated the 1-1.5% energy savings goal into the forecast of future resource needs. The load forecast is not adjusted to account for a certain percentage of energy savings, but rather the amount of energy savings is determined as a result of a DSM Screening model and those results are selected on par with supply side options in our EGEAS capacity expansion model.

7.A.e.	SMMPA currently does not plan to develop Company-owned wind projects but rather will acquire wind resources through power purchase agreements. The use of PPAs limits SMMPA's options to those locations that have been pre-determined by a developer. Geographical location affects the power purchase cost and transmission availability affects the Local Marginal Price. In the past, SMMPA has looked at projects in southeastern Minnesota rather than projects with a higher capacity factor in western Minnesota where transmission is more constrained.
Xcel Energy	
7.A.c.	None included.
7.A.d.	The energy forecast is based on historical sales, and then reduced by the projected amount of incremental DSM required in our most recently approved Resource Plan. The DSM forecast used in this energy forecast is 1.16% in 2010 and ramping to 1.3% of retail sales in 2012.
7.A.e.	Xcel Energy's MN RES requires that at least 24% of the energy we provide to MN customers by 2020 must come from wind resources. The best wind resources available in our service territory are in western Minnesota and North and South Dakota.

8.6 RES Studies

Substantial progress in transmission planning for the Minnesota Renewable Energy Standards has been made since the 2007 Biennial Report was issued. A significant development is the completion and issuance of four significant studies that focused on transmission for meeting the Renewable Energy Standard.

- Corridor Study
- RES Update Study
- CVS Study
- DRG Phase II Study

Each of these studies is briefly described below, and electronic links to these studies are provided. Combined, these studies provide a good assessment of what transmission is likely needed over the next 10 to 15 years, and serve as a blueprint for future transmission development.

These studies, described in more detail below are available on the Minnelectrans website at: http://www.minnelectrans.com/reports.html.

8.6.1 Corridor Study

Based on the results of other transmission studies, it was established that one of the most common limiting facilities to generation development in the region was the Minnesota Valley – Blue Lake 230 kV line. This facility is an older transmission line and currently comprises one of the most direct routes from wind-rich southwest Minnesota to the Twin Cities. Due to its positioning in a critical transmission area, the Minnesota Valley – Blue Lake 230 kV line is difficult to remove from service for maintenance or upgrade. With installation of the Twin Cities – Brookings 345 kV line as part of the CapX Group I projects, this largely parallel transmission facility will offload the Minnesota Valley – Blue Lake 230 kV line and provide a window of opportunity for the line to be removed from service.

Given this opportunity, the Corridor Study focused on determining what should be done with the limiting 230 kV line. The Corridor Study was completed in March 2009. The study verified that the Minnesota Valley – Blue Lake 230 kV line limits generation expansion – not only in Minnesota but in points west as well. After verifying the line as a limiting facility the study sought to optimize a mitigation plan for the line. Ultimately, the Corridor Study recommended the existing 230 kV corridor be rebuilt to double-circuit 345 kV (often referred to as the "Corridor Upgrade") and found that doing so would increase generation delivery capability from west central and southwest Minnesota by 2000 MW.

8.6.2 RES Update Study

Completed in conjunction with the Corridor Study in March 2009, the RES Update Study sought to examine potential transmission additions that would increase transmission delivery beyond the levels studied in the Corridor Study. In order to aid in timing and deployment considerations, scenarios were studied that examined the Corridor facilities both in service and out of service. This enabled completion of a comprehensive assessment of the impact of various transmission facilities on generation delivery capability in the Upper Midwest to be performed. By dispatching high cost generation throughout the Midwest ISO market footprint, the RES Update Study was designed to align closely with how the transmission system is operated. The RES Update Study primarily investigated three separate scenarios for siting generation – southeast Minnesota, southwest Minnesota and South Dakota, and North Dakota. By looking at generation in these three scenarios, the RES Update Study was able to analyze the full spectrum of wind generation impacts and design transmission facilities that could be pursued as actual generation is located and additional transmission capability is required.

There are two noteworthy findings from the Corridor and RES Update Studies: (1) the realization of a "tipping point" in the ability to sink generation to the Twin Cities, and (2) the need for and benefit of a new 345 kV transmission line from La Crosse to Madison in Wisconsin.

The studies identified that upon completion of the Corridor Upgrade and interconnection of the related 2000 MW of generation, the generators located in the greater Twin Cities area were at the lowest levels they could reliably be operated. Some generators were offline entirely and others were operating at their lowest possible levels. As a result, the interconnection of additional wind generation would require some of these Twin Cities facilities to be taken offline, an action that would impede the ability of the Twin Cities generators to respond to fluctuations in wind generation levels.

This tipping point demonstrated the need for additional transmission facilities to enable the Twin Cities to access additional energy sources during a sudden loss of wind generation. The La Crosse – Madison 345 kV line was determined to be the appropriate solution for this issue. Traveling through an area relatively devoid of high voltage transmission support, and tying together two largely separate transmission systems, the La Crosse – Madison 345 kV line was also shown to significantly increase generation delivery capability. The 1600 MW of capability enabled by the La Crosse – Madison line is located primarily in southeast Minnesota. When combined with the Corridor Upgrade, these two facilities have the potential to enable 3600 MW of new generation to be connected to the transmission system.

8.6.3 CVS Study

At the time of the Capacity Validation Study (CVS), which was completed in March 2009, many study efforts were being undertaken throughout the region. Each of these study efforts had its own group of stakeholders that developed separate inputs and assumptions. The significant amount of study work going on was also creating a great deal of uncertainty as to just how the various transmission proposals fit together. To address this, the CVS Study was intended to analyze some of the many transmission facilities being studied under one common set of assumptions. In addition, the CVS Study sought to verify the findings of the Corridor and RES Update studies. By assessing system capability in groups of potential projects (over 200 different project combinations were analyzed), information was gained as to how the various proposals would perform together.

The CVS Study produced two key findings that will inform both future transmission planning study and project development efforts: (1) studying projects together yields more capability than considering individual projects, and (2) sink assumptions (which generation is turned down to account for new generation being studied) has a significant impact on potential outlet capability.

When transmission system upgrades are pursued, they are usually studied individually for their impact, specifically where it relates to generation delivery capability. However, when multiple upgrades are pursued in a given geographical area, they perform together to provide more capability than the simple sum of the individual projects. The CVS Study demonstrated this idea very clearly with the CapX 2020 Group I projects.

The second key finding will inform future studies, as the CVS found that depending upon which generation is assumed to be turned down to allow for the delivery of new generation, vastly different outlet capability can be found. This informs a need to carefully align generation dispatch assumptions in transmission planning studies as closely as possible with how the transmission system is operated in real-time. This finding validated the “economic dispatch” methodology used in the Corridor and RES Update Studies.

8.6.4 Dispersed Renewable Generation (DRG) Study

State legislation in 2007 required a statewide study of dispersed renewable generation potential to identify locations in the transmission grid where a total of 1200 MW of relatively-small renewable energy projects could be operated with little or no change to the existing infrastructure. For the purposes of this study, dispersed renewable energy projects are wind, solar and biomass projects that will generate between 10 and 40 MW of power.

The Phase I study goal was to analyze a 2010 model of the transmission system in Minnesota to identify locations in the transmission grid where a total of 600 MW of relatively small-sized renewable energy projects could be operated with little or no changes required to the existing infrastructure. The potential locations studied were based on public input, regional availability of renewable resources, current dispersed generation in the MISO queue, and access to existing transmission. Phase I was completed in June 2008.

Phase II of the study began in October of 2008 and was completed on September 15, 2009. The goal of Phase II was to analyze a 2013 model of the transmission system in Minnesota to identify locations for an additional 600 MW of dispersed renewable energy.

Each study succeeded in identifying 600 MW of projects that could be completed. Phase I managed to do so without any significant transmission upgrades. However, Phase II required significant transmission upgrades in order to accommodate the new generation, even though the generation sites were relatively small and spread throughout the state. Phases I and II both demonstrated that even small generation installations have measurable (and in some cases significant) impacts on the transmission system.

8.7 Specific Transmission Lines

Not only does the present assessment establish that there should be enough generation to meet the upcoming milestones through 2016, the utilities have determined that with the addition of the CapX 2020 Group 1 projects, the transmission system in the 2016 timeframe should be adequate to meet the 2016 Minnesota RES milestones.

Beyond 2016, there is a gap between the RES milestone and the identified renewable generation that will be required, and this gap will likely require additional transmission. The Gap Analysis information can be used together with the transmission studies related to renewable energy that were released earlier this year to put together a roadmap for transmission development. In an attempt to project the transmission needs for meeting the Minnesota RES beyond 2016, the following is one potential scenario for transmission development that matches the RES GAP Analysis with the transmission plans that have been identified.

After completion of the CapX 2020 Group I projects, the next most likely transmission addition is the Corridor project. This project is an upgrade of the existing 230 kV line between Granite Falls, Minnesota and Shakopee, Minnesota. As discussed above, the Corridor Study recommended that this line be upgraded to double-circuit 345 kV operation. The initial study results described above indicate that the Corridor project will have the ability to add approximately 2000 MW of generation to the system. This transmission addition has the potential to provide enough transmission to meet the 2020 RES milestone.

At the present time, the utilities are projecting a shortfall of approximately 2100 megawatts of generation by the year 2025, just for meeting the Minnesota Renewable Energy Standard. One possible way that this amount of additional generation could be transmitted would be with the addition of a La Crosse to Madison 345 kV transmission line, which enables a significant amount of new generation capability in southeast Minnesota. This project, in conjunction with the Corridor project, could potentially add 3600 megawatts of capability to the system, which is enough to meet the RES requirements that are presently projected.

8.8 Transmission Beyond 2025

At this point, the utilities have not completed a Gap Analysis beyond the 2025 timeframe. However, the transmission planning that was completed as part of the RES study has identified other potential transmission additions that would be helpful in assuring adequate renewable energy to comply with the Minnesota Renewable Energy Standards. Some facilities identified include:

- Fargo – Sioux Falls 345 kV
- Ashley – Hankinson 345 kV
- Lakefield – Adams 345 kV
- Adams – Genoa 345 kV

It is important to consider that the Minnesota RES is only one of the driving factors in developing the necessary transmission to meet the standards. Another factor that will impact the transmission system is the renewable energy goals and requirements of other states. Not all the renewable energy generated in Minnesota can be assumed to be for Minnesota customers. The needs of other states will require additional transmission in Minnesota and elsewhere. This is particularly true if an aggressive federal renewable energy mandate is enacted, such as the 20 percent mandate contemplated in legislation being debated in the U.S. Congress.

Another factor that must be taken into account is load growth. The RES is a percentage of retail sales; as consumption changes, so will the amount of the renewable energy required. In addition, load growth will drive the need for transmission to ensure compliance with national and regional reliability standards.

Still a third factor impacting transmission is new nonrenewable generation. Other forms of generation will be added to the system and in some cases will most likely require additional transmission.

In addition to these other needs, MISO continues to process its interconnection queue for generation additions. As these studies are completed, transmission system additions may be identified. These additions may result in substation modifications or new transmission line additions that are generally unique to the generator interconnection project. The utilities in

Minnesota actively participate in these studies to ensure that the needs of Minnesota are addressed in a reliable and economic manner.

8.9 Policy Issues

There are two key policy issues that are having big implications on transmission development.

- Cost allocation
- Market for Renewable Generation Development

8.9.1 Cost Allocation

As the Commission is well aware, transmission cost allocation continues to be a complex, controversial, and rapidly changing discussion. There are many forums for which cost allocation discussions are occurring. The Midwest ISO has assembled a Regional Expansion Cost and Benefits (RECB) Task Force to examine more equitable cost allocation methodologies. This effort is being pursued in two phases. The first phase culminated in a filing to change the generator interconnection cost allocation methodology that was conditionally accepted by FERC in its Order Conditionally Accepting Tariff Amendments and Directing Compliance Filing in Docket No. ER09-1431-000, dated October 23, 2009. The first phase was viewed as an interim "stop gap" solution until a second, more long-term solution can be developed by the Task Force. A filing that encompasses a longer-term solution is anticipated no later than July 15, 2010.

In addition to the RECB Task Force, the Organization of MISO States (OMS) is pursuing a cost allocation effort of its own. This effort, known as Cost Allocation and Resource Planning (CARP), is focused on finding a cost allocation methodology that is acceptable to the regulatory bodies of the states in which the Midwest ISO operates. Regulatory and policy maker acceptance is critical in any cost allocation methodology so the CARP effort is a very important process that is necessary to long-term cost allocation resolution.

Aside from these efforts, other cost allocation efforts are also underway. The Upper Midwest Transmission Development Initiative (UMTDI) is considering this issue as it relates to development of transmission capacity for renewable resources in the five-state UMTDI area. FERC has also shown an interest in facilitating cost allocation discussions as it hosted a series of recent Technical Conferences that focused in part on cost allocation. FERC recently issued a Notice of Request for Comments dated October 8, 2009, in Docket No. AD09-8-000 entitled Transmission Planning Processes Under Order No. 890.

Cost allocation is a significant issue across the country and requires serious thought and consideration. Without a clear transmission cost allocation policy, there is risk that necessary transmission may be delayed.

8.9.2 Other Demands for Renewable Energy

Another key question that has tremendous implications on the development of the transmission system is to what extent will renewable generation development occur in the Dakotas and

Minnesota that will be used to meet the needs of other regions. For example, will renewable generation that is developed in Minnesota be used to meet renewable energy standards in other states? If so, how remote are those states located from Minnesota? Answers to these questions will have a large impact on the development of the transmission system.

One of the initiatives looking at the implications of these questions is the Upper Midwest Transmission Development Initiative (UMTDI). The planning studies for UMTDI are part of the Midwest ISO Regional Generation Outlet Study (RGOS) Phase I, discussed in Chapter 3. UMTDI is looking at scenarios to determine both the transmission necessary to meet the renewable energy needs of each of the states (ND, SD, MN, IA, WI) participating in UMTDI, as well as accommodating exports from the UMTDI region. The initial results of these studies have identified several 345 kV and 345 kV/765 kV build-out options. The UMTDI initiative is just one example of efforts underway to try and address these critical policy questions. Other studies to identify transmission infrastructure needed to facilitate development of renewable generation include ITC's Green Power Express Study and the SmarTransmission study, both of which are also discussed in Chapter 3.

This policy question could be answered at a Federal level through a national Renewable Portfolio Standard (RPS), or it could be addressed at a more local level such as the UMTDI. Until this policy question is fully addressed, however, it will be difficult to determine the optimum transmission system required to satisfy Minnesota and other renewable energy goals.

8.10 Transmission Expansion Scenario to Meet Minnesota RES

In its August 10, 2009, Order (paragraph 7.B.), the PUC also directed the CapX utilities to `develop a proposed transmission expansion plan to meet Minnesota Renewable Energy Standards. Transmission planning is a complex process that involves a myriad of assumptions. These changing assumptions make it difficult to develop a specific transmission plan since any such plan reflects a snapshot in time. Relying on the results of the transmission studies that have been recently completed, as described in Section 8.6 above, and considering recent developments regarding new transmission, the CapX utilities have developed a transmission scenario to meet the Minnesota RES. This scenario is presented in the table on the following page.

The table represents one potential transmission system expansion scenario for supporting the interconnection of renewable generation and sequencing new transmission facilities needed to achieve compliance with the Minnesota Renewable Energy Standards. It includes projects that are complete, transmission projects that are in the permitting phase, and future transmission projects that have been identified in recent transmission planning studies. Many events could occur to change this scenario, including generation location, but it is one conceptual plan for transmission expansion.

Transmission Expansion Scenario to Meet Minnesota RES

Project	Estimated Incremental Addition (MW)	Estimated Total Capacity (MW)	Status	Description
425 Wind	258	425	In Operation	Small System Upgrades
825 Wind	400	825	In Operation	Additional small system upgrades, three new 115/161 kV upgrades, and a 90-mile Split Rock-Lakefield 345 kV line.
BRIGO	350	1175	In Operation	Three 115 kV lines (approx. 60 miles total) and 345/115 kV transformer.
Blue Lake Upgrade	600	1775	In Progress	Structural modifications to increase ground clearance of 345 kV line, substation equipment replacement, and capacity upgrades.
RIGO	700	2475	Permit Needed	Two 161 kV lines (approx. 25 miles total) and a 345/161 kV transformer.
Twin Cities – Brookings	700	3175	Permit applied for	200 mile 345 kV line (approx. half double-circuit).
Twin Cities – Fargo	700	3875	Permit applied for	250 mile 345 kV line.
Corridor Upgrade	2000	5875	Under study	125 mile double-circuit 345 kV line.
LaCrosse – Madison	1600	7475	Under study	150 mile double-circuit 345 kV line.
Fargo – Split Rock	1000	8475	Under study	300 mile double-circuit 345 kV line.

8.11 Interconnection Issues

In addition to a possible transmission scenario, the PUC in its August Order also directed the CapX utilities to include in the Biennial Report information relating to various interconnection issues implicated under the proposed plan. Relying on the scenario presented in the table on the previous page, and on the studies described in this chapter, and on the Gap Analysis that was developed as part of the RES status, the utilities can provide the following response to the issues presented.

Interconnection Capability Approved But Not Yet Used

The first estimate the Commission requested of the CapX utilities is an estimate of the interconnection capability already approved but not yet used, *i.e.* available to meet forecasted demand. This is a difficult question to answer, as there are many factors that play into determining the capability of the transmission system as well as what generation projects are using the capability. Recent experience would suggest that as the transmission facilities are placed into service for the purposes of renewable energy, they are fully subscribed when they are commissioned. At some point, transmission additions will likely be placed into service without the full capability being subscribed immediately. It is difficult to project when this will occur, but it may occur when the CapX Group 1 projects are placed into service.

The MISO interconnection process also helps address this question. Under the existing MISO interconnection queue, there is not enough transmission capability to accommodate all of the projects that are currently requesting interconnection to the grid. However, not all projects in the MISO queue move forward. As an example, there are many more generation projects that would like to use the capability created by the Brookings line than the line can accommodate, but it is not clear whether all of those projects will move forward.

It must be kept in mind that the existence of transmission capacity does not necessarily mean that it is available to transport renewable energy for purposes of meeting the Minnesota RES. Simply because transmission facilities are built in Minnesota does not mean that Minnesota utilities have a lock on that capacity. The transmission grid is open to all comers, and out-of-state utilities may have access to transmission capacity in the state. Indeed, there are some out of state utilities that have already signed power purchase agreements with wind farms in Minnesota.

Annual Generation Interconnection Capability Created by the Proposed Transmission Plan

The second issue the Commission asked the CapX utilities to address is to provide an estimate of the annual generation interconnection capability created by the transmission plan proposed by the utilities. The transmission expansion scenario presented in the table provides an estimate of potential generation interconnection capability associated with each transmission addition, as well as the total cumulative capability.

Size, Type, and Timing Issues Inherent in the Proposed Plan

The sequencing of the projects identified in the table above was based on the information collected as part of the Gap Analysis and the transmission studies. This is one example of how the system could evolve. Ultimately, the location of specific generation projects as well as other needs (reliability, etc.) could change the sequencing.

Geographic Uncertainty in Interconnection Needs

Transmission planners do not have control over the location of where generation will interconnect to the transmission system. It seems reasonable, however, based on present experience and knowledge, to assume that significant wind development will occur in western and southeastern Minnesota and in the Dakotas. Studies indicate that there are well identified corridors that become constrained for generation additions on a wide area basis. The proposed transmission plan addresses all of these areas of wind development and the transmission constraints.

NonInterconnection Benefits

For the most part, if a transmission facility is added to the system as a result of a robust planning process, these facilities will provide reliability benefits that include reduced line loading on adjacent transmission facilities, better voltage support and the possibility of enhancing the stability of the transmission system. In addition, most transmission system additions result in reduced line losses, which reduce the need for generation capacity and energy. A strong network also provides operating and maintenance flexibility and the capability to support future load serving needs.

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