

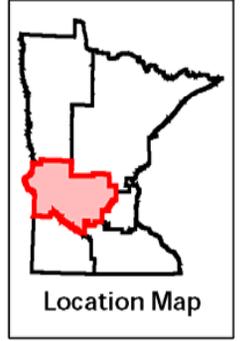
7.4 West Central Zone

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

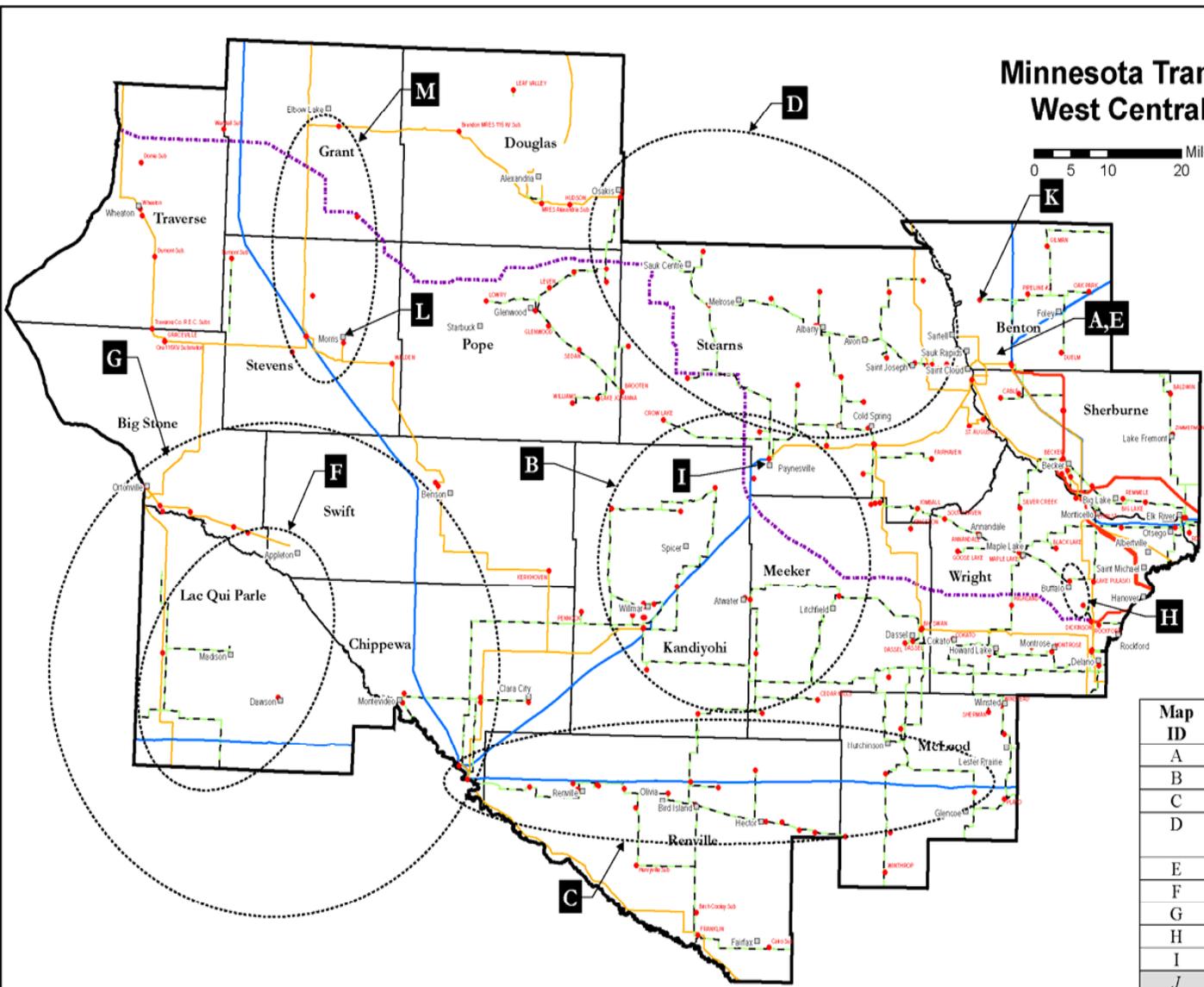
Tracking Number	Description	Projected In-Service Year	Need Driver	Section No.
2003-WC-N4	St. Cloud Area	To be Determined	Benton County 230/115 kV transformer overload; Low voltages in St. Cloud and Stearns County; Monticello-St. Cloud 115 kV line overload	7.4.2
2003-WC-N5	Willmar – Litchfield-Paynesville Area	To be Determined	Willmar 115/69 kV transformer overload; Low voltages in Kandiyohi County	7.4.3
2003-WC-N7	Panther Area	2012	Crooks-Emmet 69 kV line overload; Olivia low voltage; Brownston low voltage; Hector low voltage	7.4.4
2003-WC-N8	Douglas County – Paynesville-Wakefield-West St. Cloud	2012		7.4.5
2003-WC-N9	West St. Cloud Area	2009	West St. Cloud 115/69 kV transformer overload; Blue Heron-Wakefield line overload	7.4.6
2003-WC-N10	Appleton – Canby Rebuild	2008	Canby 115/41.6 kV transformer overload; Dawson low voltage	7.4.7
2005-WC-N1	Big Stone Interconnection	2013	New generation interconnection	7.4.8
2005-WC-N3	Buffalo Area, Wright County	To be Determined	Low voltage	7.4.9
2005-WC-N4	Rugby Wind Project	To be Determined	Paynesville 230 kV transient voltage problem	7.4.10
2005-CX-1	CapX 2020 Projects Twin Cities – Fargo 345 kV			7.4.11
2007-WC-N1	Mayhew Lake distribution substation	2008	Load growth	7.4.12
2007-WC-N2	Morris 230/115 kV Transformer	2012	Big Stone II Interconnection Upgrade	7.4.13
2007-WC-N3	Morris – Grant County 115 kV Line	2012	Big Stone II Interconnection Upgrade	7.4.14
2007-WC-N4	West Central Minnesota Generation Outlet	To be Determined	Upgrade facilities that limit generation outlet	7.4.15

Minnesota Transmission >69kV West Central Planning Zone



Legend

- Transmission Substation
- Cities
- Project Location
- 161kV AC
- 230kV AC
- 345kV AC
- 69kV AC
- 115kV AC
- 138kV AC
- 500kV AC
- 250kV DC
- 400kV DC



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	2003-WC-N10	Appleton-Canby Rebuild
G	2005-WC-N1	Big Stone Interconnection
H	2005-WC-N3	Buffalo Area, Wright County
I	2005-WC-N4	Rugby Wind Project
J	2005-CX-1	CapX 2020 Projects Fargo – Twin Cities 345 kV
K	2007-WC-N1	Mayhew Lake Distribution Substation
L	2007-WC-N2	Morris 230/115 kV Transformer
M	2007-WC-N3	Morris – Grant County 115 kV Line

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

7.4.1 Completed Projects

Some inadequacies in the West Central Zone that were identified in the 2005 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 2007 Report. More detailed information about these projects and inadequacies can be found in the 2005 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-WC-N1	Xcel Energy	Four separate lines were constructed in the Southwest Zone	CN-01-1958	2006 and 2007 and 2008
2003-WC-N2	Glencoe Light and Power Commission	A new 9.5 mile long 115 kV line between Glencoe and the McLeod Substation was constructed.	Permitted locally – McLeod County	November 2006
2003-WC-N3	Xcel Energy	A new 345/115 kV substation at Sherco. A rebuild of the 115 kV line from Monticello to St. Cloud to higher capacity.	Permitted locally	June 2007
2003-WC-N6	Great River Energy	A new substation, called the Liberty Substation, was constructed along the Monticello-Sherco 115 kV line.	None	June 2007
2003-WC-N11	Missouri River Energy Services	The Grant County to Alexandria 115 kV line was reconducted with a higher MVA-rated conductor.	None	Late 2003
2003-WC-N12	Great River Energy	A new substation called the Big Swan Substation was constructed north of Dassel	Permitted locally – Meeker County	2005
2003-WC-N13	Great River Energy	The Rockville Substation was converted to handle a 115 kV load.	None	Early 2006
2005-WC-N2	Wright-Hennepin Cooperative Electric Association	A new substation called Lake Constance in Buffalo Township was constructed.	Permitted locally – Wright County	Spring 2006

7.4.2 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.

A distributed generation alternative is not a feasible alternative here because the area to be served is geographically large and the load is substantial. A second source of energy is preferable because it provides a more reliable system, one that benefits the entire region because an additional connection provides for a more robust system that can better withstand system contingencies. Furthermore, a generation alternative would have a substantially higher cost than a transmission addition and an acceptable location or locations for an adequately-sized generation project could be difficult to find.

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. *See also* the discussion in Section 5 for more information about the CapX 2020 projects.

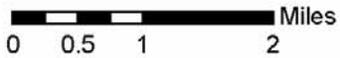
A St. Cloud study was completed in 2006 that evaluated alternative ways to tap into a new 345 kV line near St. Cloud to provide a new bulk supply for the 115 kV loop and to address distribution issues in the area. The St. Cloud Study recommended a St. Cloud-area 345 kV interconnection on the west side of town to provide a transmission source geographically diverse from the Benton County source. The study also recommends upgrading the existing 115 kV infrastructure in St. Cloud to support the growing load in the area.

Schedule. A Certificate of Need application for the Twin Cities – Fargo 345 kV line was filed in August 2007. A western St. Cloud interconnection was proposed in the application. Once a

Certificate of Need for the 345 kV interconnection is issued in 2008, Xcel Energy will apply to the Public Utilities Commission for a Route Permit to complete the necessary 115 kV work in the St. Cloud area. The necessary 115 kV construction will be completed in the 2010-2011 timeframe.

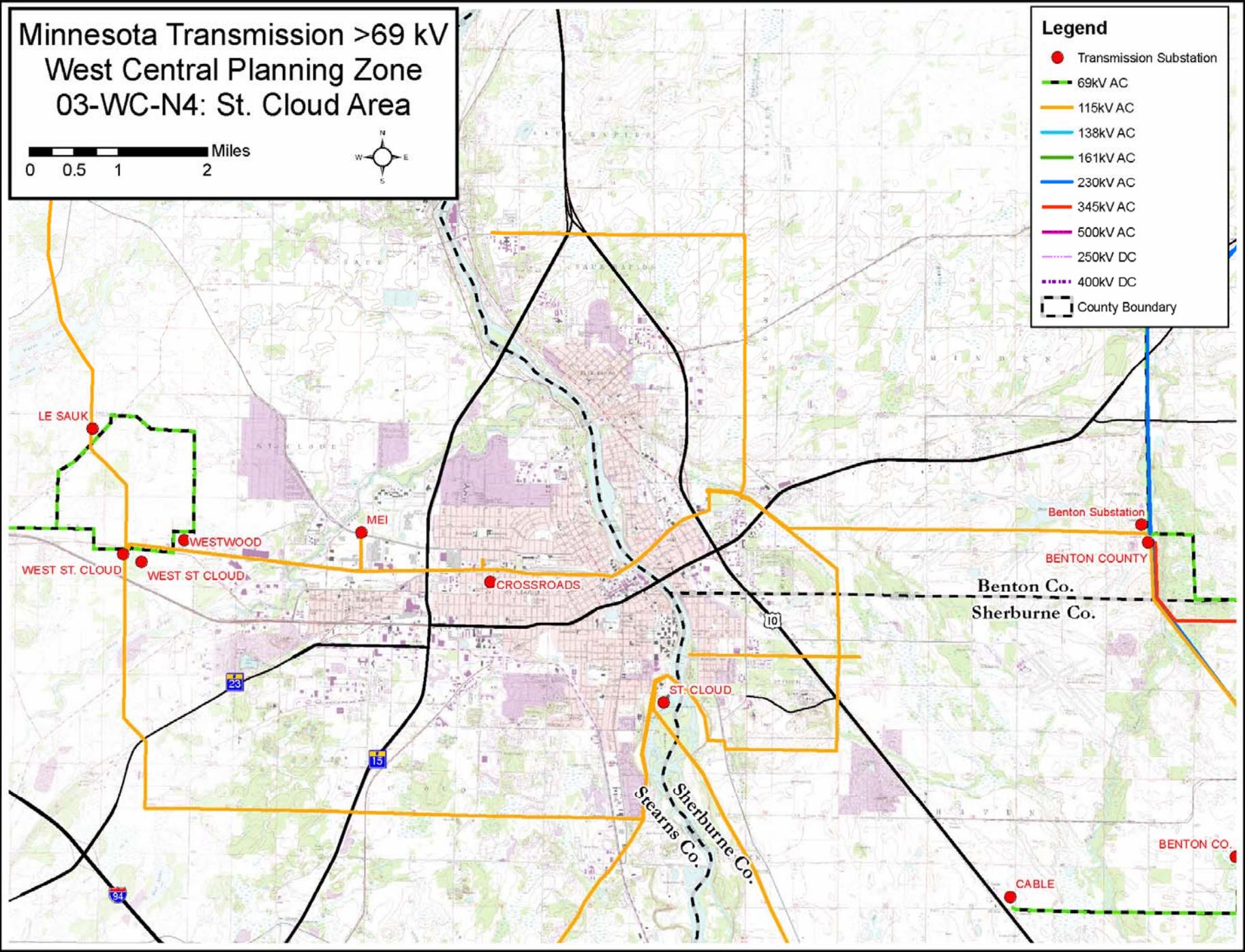
PUC Docket Number. CN-06-1115 (Certificate of Need)

Minnesota Transmission >69 kV
 West Central Planning Zone
 03-WC-N4: St. Cloud Area



Legend

- Transmission Substation
- 69kV AC
- 115kV AC
- 138kV AC
- 161kV AC
- 230kV AC
- 345kV AC
- 500kV AC
- 250kV DC
- 400kV DC
- ▭ County Boundary



7.4.3 Willmar-Litchfield-Paynesville Area

Tracking Number. 2003-WC-N5

Utility. Great River Energy

Inadequacy. This is a large area that could incur low voltages during various contingency events, such as line outages along the 69 kV loop, as early as 2006.

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

Alternatives. Numerous alternatives were evaluated in the *West Central Transmission Study* (completed in September 1999) and described in the 2005 Biennial Report. Because the inadequacies covered such a relatively large geographic area, possible solutions were developed in two sets – a western set of solutions and an eastern set of solutions. For ease of reference the following discussion is repeated from the 2005 Biennial Report.

The western set of solutions included the following:

- W1: Rebuild the Granite Falls – Willmar 69 kV line
- W2: Rebuild the Granite Falls – Willmar 69 kV line to 115 kV operation
- W3: Rebuild Granite Falls – Willmar 69 kV line to 230 kV operation
- W4: Construct a new 230/115 kV substation at Six Mile Grove
- W5: Remove the Granite Falls – Willmar 69 kV line from service

The eastern set of solutions included the following:

- E1: Kandiyohi County substation and connection to the Big Swan – Panther 69 kV line
- E2: Kandiyohi County substation and second Big Swan – Litchfield 69 kV line
- E3: Paynesville – Gravgaard (Hawick) 69 kV line

A number of other facilities have been identified that would improve the system. These are shown in the table below.

Estimated Year	Facility
2013	Construct 230/69 kV substation near Spicer
2013	Build 2.5 mile double circuit 69 kV line: Kandiyohi – SH line
2013	Build 9.2 mile double circuit 115 kV line: Kandiyohi – Atwater
2019	Add second 230/69 kV transformer at Panther

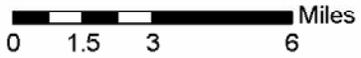
Analysis. Great River Energy is continuing to evaluate the technical viability of the alternatives. GRE is planning on budgeting funds for the 230/69 kV substation near Spicer and the construction of a double-circuit 115 kV line, operated at 69 kV, from Kandiyohi to Atwater. Due to wind generation outlet concerns, Great River Energy will continue to investigate another 230 kV source from the west into Willmar. This line could emanate from the Granite Falls substation or a new 230 kV switching station in the Six Mile Grove area.

Distributed generation is not considered a viable alternative due to the uncertainty of its being on line when a transmission failure occurs and the requirement for multiple sites. The generation facilities would also need to be fairly large to match the deliverability capability of the transmission alternatives.

Schedule. GRE completed several improvements in the system in the last two years. Capacitor banks were added at the Benson and Willmar substations and at the Litchfield Municipal substation. In addition, the Pennock substation was converted to a 115 kV operation.

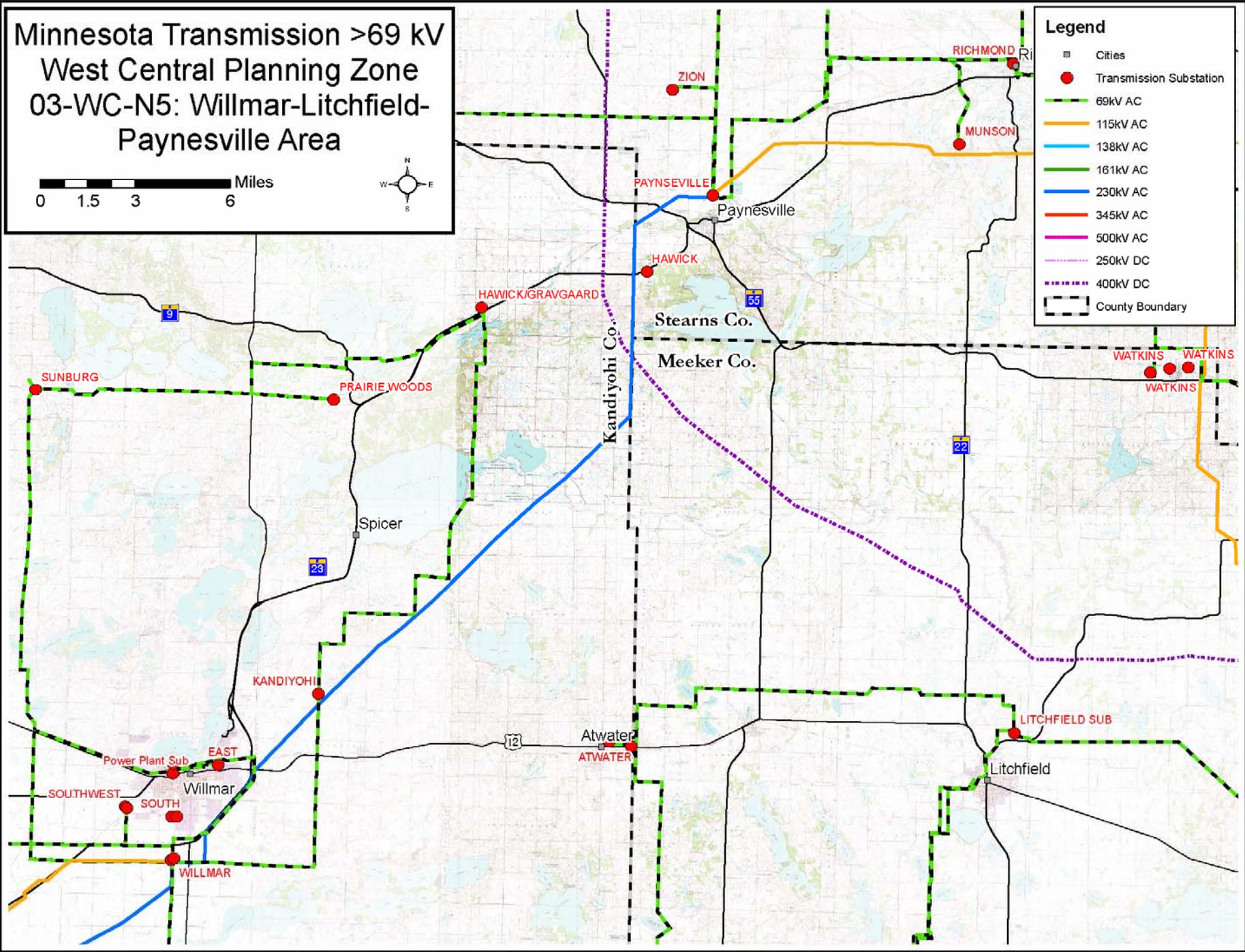
The timeframe for implementing the projects in the above table are shown in the table. The timeframe for the other alternatives is still being developed.

Minnesota Transmission >69 kV
 West Central Planning Zone
 03-WC-N5: Willmar-Litchfield-
 Paynesville 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



7.4.4 Panther Area

Tracking Number. 2003-WC-N7

Utility. Great River Energy

Inadequacy. Panther is a substation north of Bird Island, Minnesota. The Bird Island/Olivia area suffers low voltage and line overloads if any of the 69 kV lines serving the area are out of service. Also, the upgrade of some lines in the area might help provide increased outlet for wind generation from the Buffalo Ridge area.

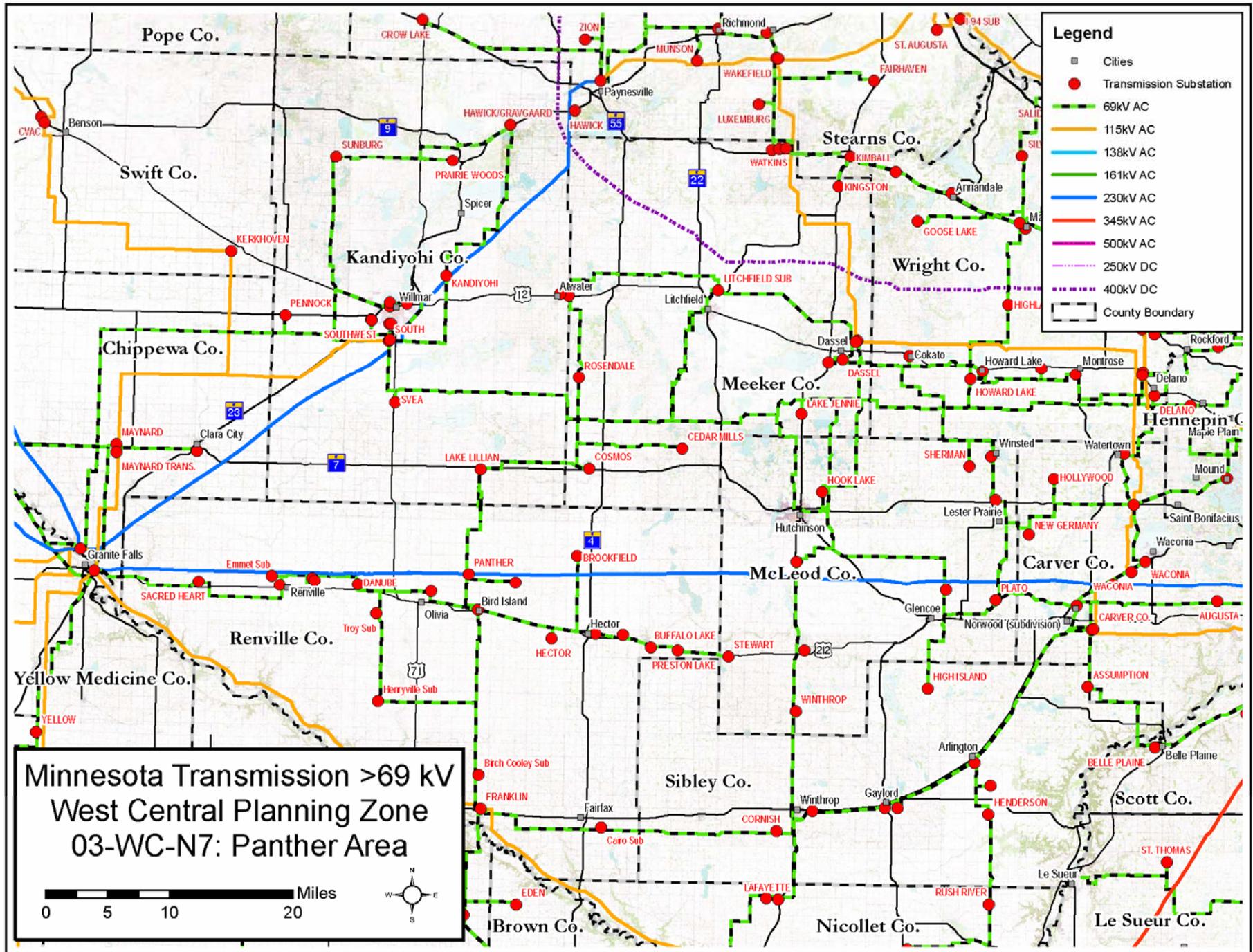
A map of the area is shown on the following page.

Alternatives. By 2012 or later, a new transmission line and substation may be needed in the area. Upgrades of some of the existing 69 kV lines in the area and a new 69 kV breaker station for wind outlet have also provided load serving benefits to the area. By 2019 it is expected that a second 230/69 kV transformer will be required at the Panther substation as identified in 2003-WC-N5.

GRE will continue to explore the possibility of installing distributed generation in the area, although it is expected that multiple generation sites would be required to address the situation and these could require transmission infrastructure to be built to deliver to the load.

Analysis. The capacitor addition at the Hector substation will defer the need for a long-term solution until about 2012. At that time a new line and substation could be required, likely a new Brownton/McLeod 115 kV line and Brownton substation. A 69 kV breaker station at Brownton might be the first step in implementing this plan. The addition of a new 115 kV circuit between Brownton and McLeod would require the routing of a new transmission line along new right-of-way.

Schedule. A decision on a new 115 kV circuit will not be made for several years.



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

Tracking Number. 2003-WC-N8

Utility. Great River Energy/Xcel Energy

Inadequacy. The increasing demand for power in this area that the utilities have been reporting since 2003 is continuing. In addition, low voltages would be experienced if certain lines or transformers were out of service.

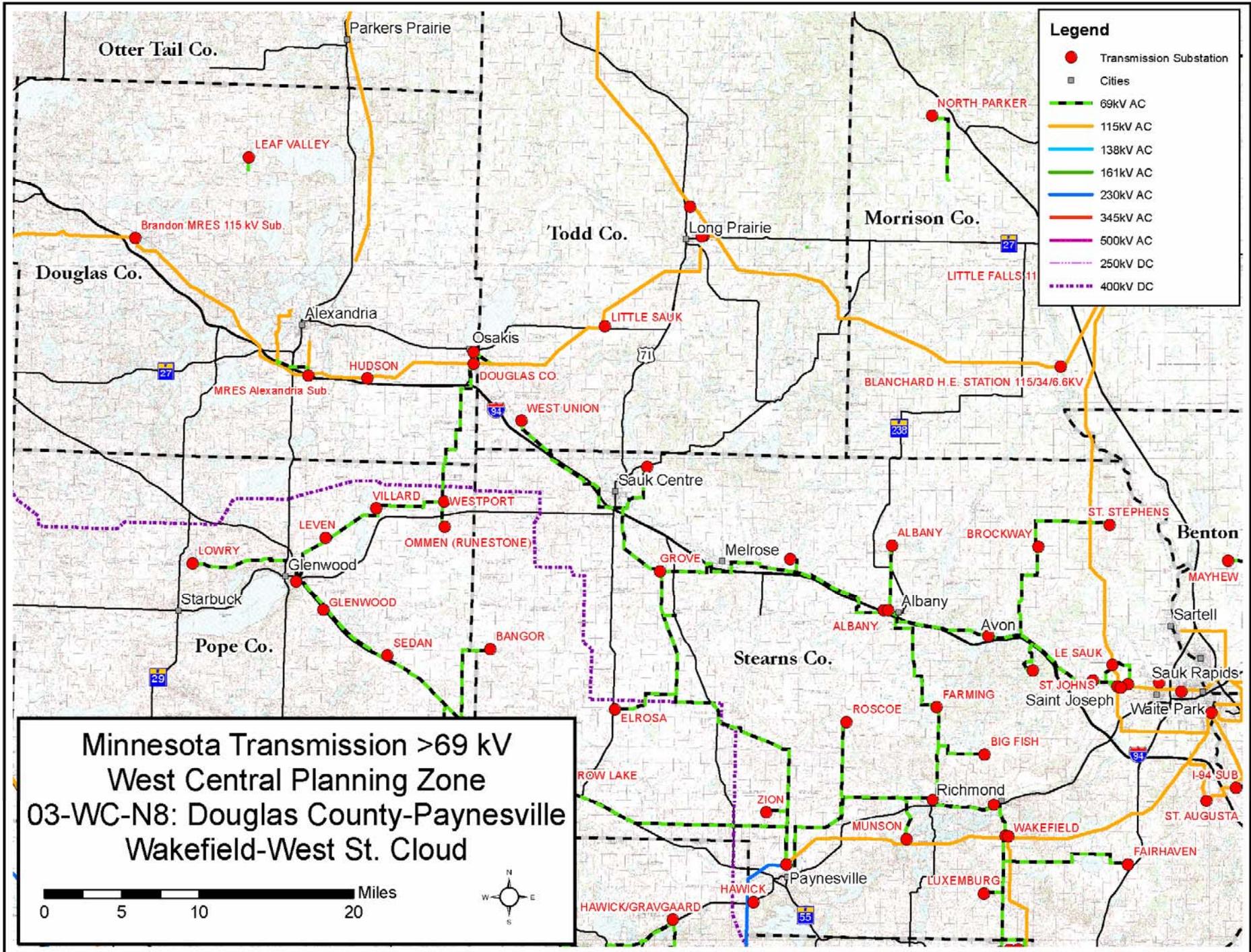
A map of the area is shown on the following page.

Alternatives. Two general alternatives have been under consideration for several years: (1) a new 115 kV line from Alexandria to West St. Cloud along with substation upgrades, and (2) improving the existing 69 kV system through capacitor additions and additional 69 kV lines.

Analysis. Alternative 1 is cheaper than Alternative 2. Alternative 1 offers a long-term solution, as it provides potential sources for future load growth along I-94, while Alternative 2 is only capable of serving the area if load growth is low.

Distributed generation is not considered a viable alternative due to the uncertainty of its being on line when a transmission failure occurs and the requirement for multiple sites. The generation facilities would also need to be fairly large to match the deliverability capability of the transmission alternatives.

Schedule. Due to the significant commercial and residential development along the I-94 corridor between Alexandria and St. Cloud, this area needs further study to determine the appropriate expansion of the transmission system required to provide continued reliable electric service to the area. GRE will be reviewing this area in its proposed 2008 Long Range Plan for load serving transmission projects. GRE is also waiting for CapX 2020 Twin Cities to Fargo 345 kV corridor to be determined to potentially share structures. This matter is impacted by all the other activity in the St. Cloud area, including the proposed construction of the 345 kV CapX project from the Twin Cities to Fargo.



7.4.6 West St. Cloud Area

Tracking Number. 2003-WC-N9

Utility. Great River Energy

Inadequacy. GRE reported in the 2005 Biennial Report that a loss of certain facilities serving customers in the Stearns Electric Association service area on the west side of St. Cloud would cause transformers to overload and voltage to drop.

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

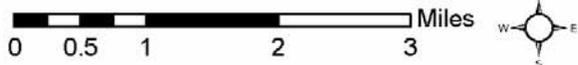
Alternatives. The alternatives involve converting certain loads at substations from 69 kV to 115 kV.

Analysis. GRE is continuing to look at converting a 69 kV substation located near 115 kV lines to the 115 kV level. Some potential substations are Le Sauk, Westwood #1 and St. Stephens. The impacts for converting substations would be minimal due to use of existing substations and transmission lines.

Distributed generation is not being considered as an alternative because substation conversions should be satisfactory and can be implemented quickly and without requiring new right-of-way or additional land.

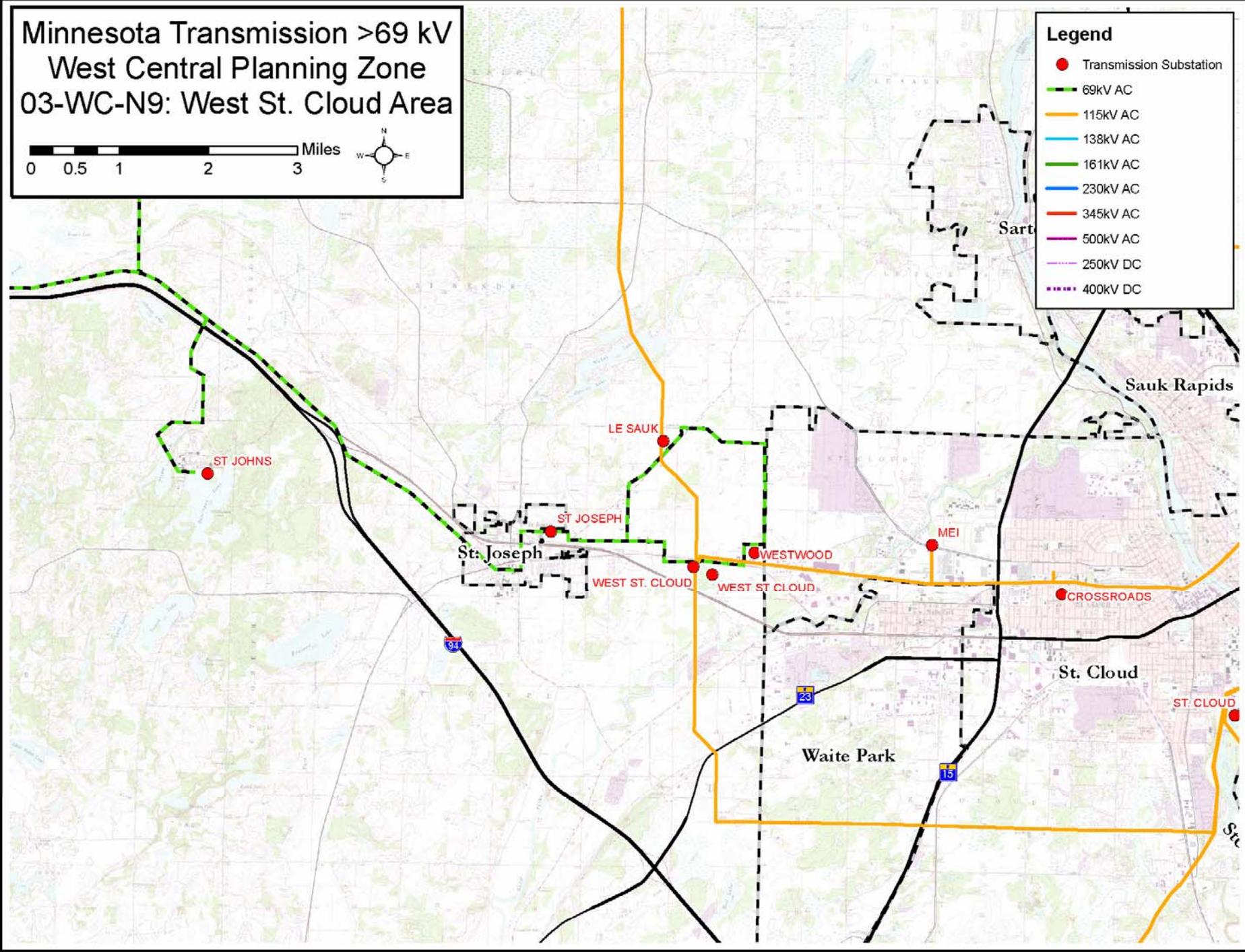
Schedule. GRE is continuing to monitor the situation. This matter is impacted by all the other activity in the St. Cloud area, including the proposed construction of the 345 kV CapX project from the Twin Cities to Fargo.

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



Legend

- Transmission Substation
- 69kV AC
- 115kV AC
- 138kV AC
- 161kV AC
- 230kV AC
- 345kV AC
- 500kV AC
- 250kV DC
- 400kV DC



7.4.7 Appleton-Canby Rebuild

Tracking Number. 2003-WC-N10

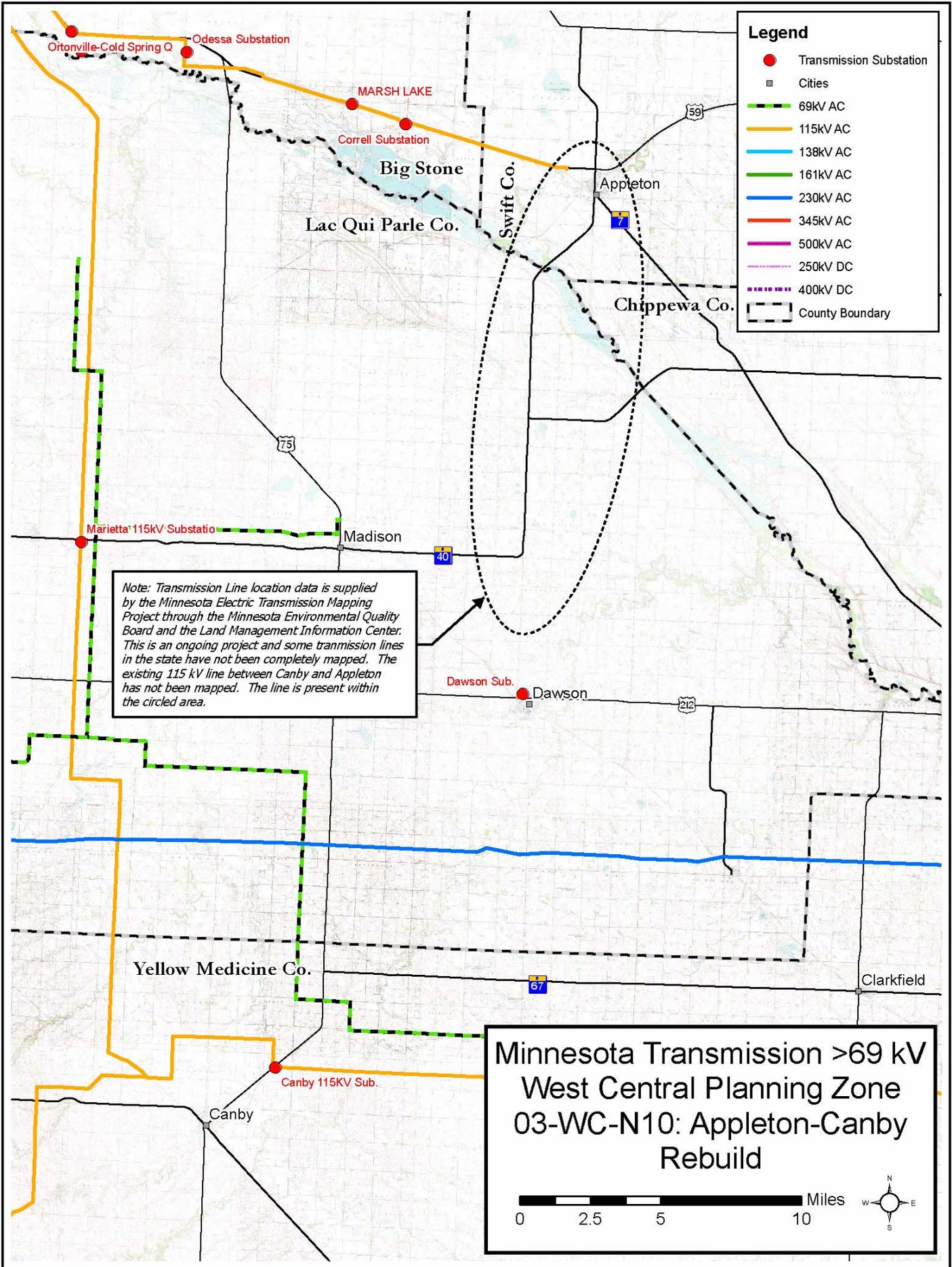
Utility Otter Tail Power Company

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

Selected Alternative. Otter Tail Power has opted to upgrade the existing 41.6 kV line between Appleton and Canby.

Schedule. Otter Tail Power submitted a Certificate of Need application and a Route Permit application to the Public Utilities Commission on September 7, 2006. The CON and Route Permit were approved on April 18, 2007. Construction of the upgrade began in late April 2007 and the line is expected to be energized at 115 kV by June 2008.

PUC Docket Numbers. CN-06-677 (Certificate of Need)
TL-06-1265 (Route Permit)



Legend

- Transmission Substation
- Cities
- 69kV AC
- 115kV AC
- 138kV AC
- 161kV AC
- 230kV AC
- 345kV AC
- 500kV AC
- 250kV DC
- 400kV DC
- - - County Boundary

Note: Transmission Line location data is supplied by the Minnesota Electric Transmission Mapping Project through the Minnesota Environmental Quality Board and the Land Management Information Center. This is an ongoing project and some transmission lines in the state have not been completely mapped. The existing 115 kV line between Canby and Appleton has not been mapped. The line is present within the circled area.

**Minnesota Transmission >69 kV
West Central Planning Zone
03-WC-N10: Appleton-Canby
Rebuild**

0 2.5 5 10 Miles

7.4.8 Big Stone Interconnection

Tracking Number. 2005-WC-N1

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

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

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.

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

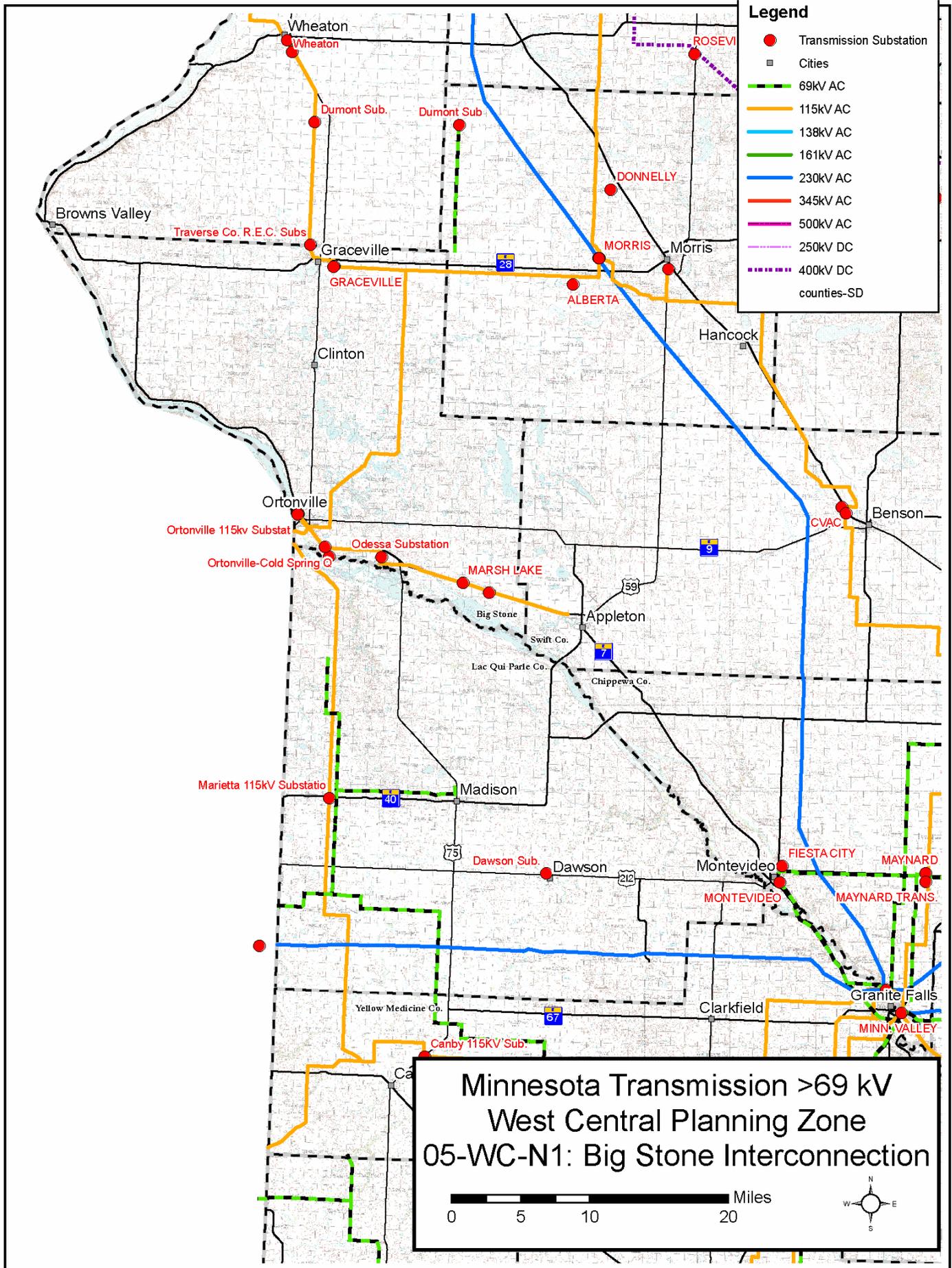
- (1) Big Stone – Johnson Jct. – Morris 230 kV line with a Big Stone – Canby – Granite Falls 230 kV line.
- (2) Big Stone – Willmar 230 kV line with a Big S tone – Canby – Granite Falls 230 kV line.

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 applicants have chosen to pursue the Morris transmission alternative for several reasons. This alternative involves two new transmission lines: (1) a 230 kV line from a new Big Stone substation in South Dakota to the Morris, Minnesota, substation. This line will replace an existing 115 kV line from Big Stone to Morris and will be constructed in the existing 115 kV line corridor. (2) A line from the Big Stone substation to the Granite Falls, Minnesota, substation. 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 line section from Big Stone to the new Hazel substation will be constructed to 345 kV standards but operated at 230 kV until the proposed CapX SW Minnesota to Twin Cities EHV line is constructed. The line section from the Hazel substation to Granite Falls will be constructed for and operated at 230 kV.

Schedule. An application for a Certificate of Need was submitted to the Public Utilities Commission on October 3, 2005. An application for Route Permits for the two new lines was submitted on December 9, 2005. Both applications are pending before the Public Utilities Commission and a decision is expected in spring 2008. The applicants intend to construct the Granite Falls line first and then construct the Morris line.

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



7.4.9 Buffalo Area, Wright County

Tracking Number. 2005-WC-N3

Utility. Great River Energy

Inadequacy. The city of Buffalo in Wright County is normally served from the Lake Pulaski 115/69 kV source. The alternate source is Maple Lake (Wakefield 115/69 kV), which is normally open. Both the city and the surrounding loads exceeded their projected 2005 load forecasts this year. A 0.02 mile line coming out of Lake Pulaski overloaded under system intact conditions. Due to the overload the city was switched to an alternate source (Wakefield). Marginal voltages were experienced on the low side by the city after the switching occurred.

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

Alternatives. Three alternatives have been identified to address the low voltage issues in the area:

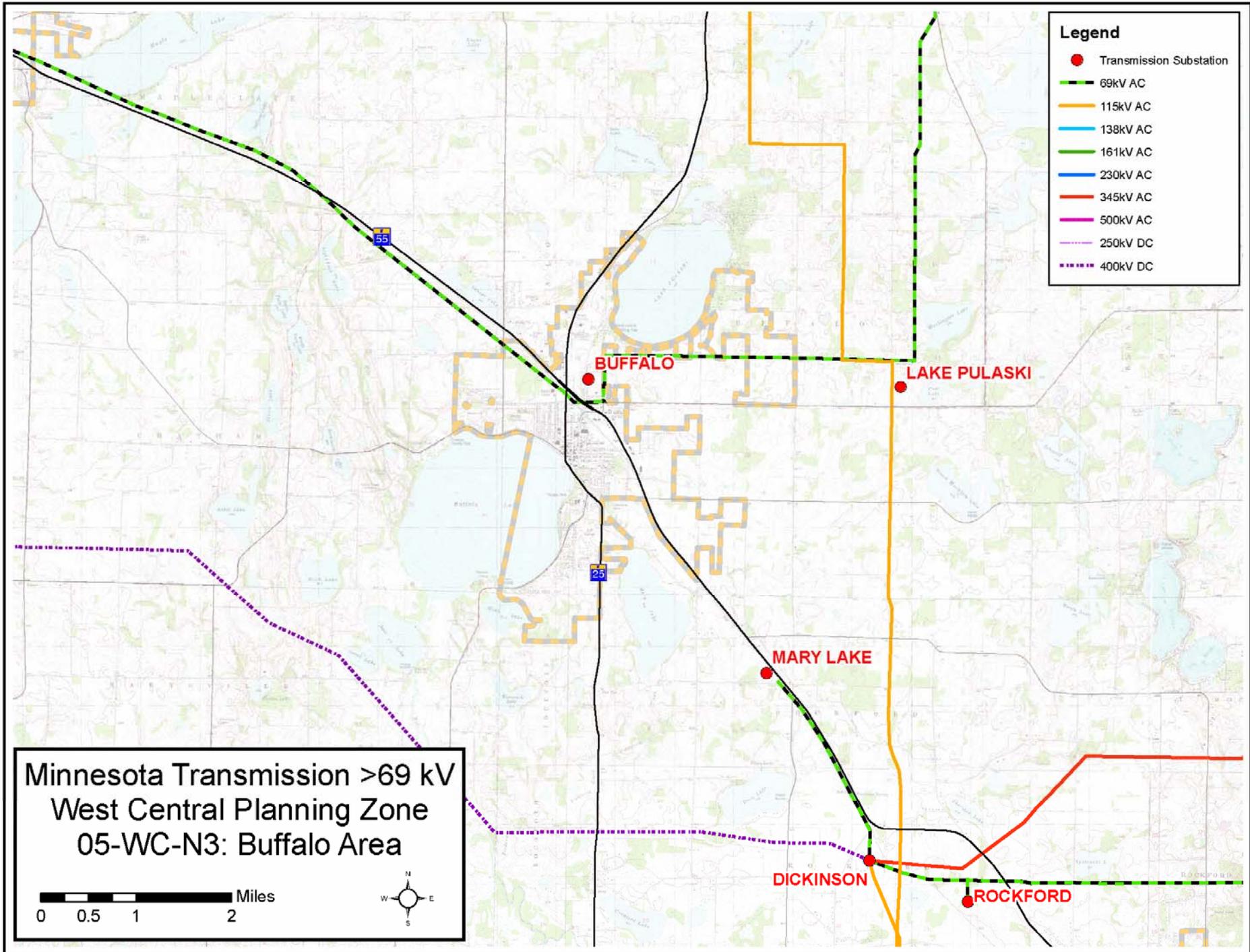
Alternative 1: This would involve a new 5 mile 115 kV line operated at 69 kV between City of Buffalo and Wright-Hennepin Co-op Mary Lake substation. This option does not require upgrading the Buffalo and Mary Lake substations to 115 kV at this time.

Alternative 2: A new 115 kV source from Lake Constance to Buffalo (about 4 miles). The 3.3 miles of 69 kV from Lake Pulaski to Buffalo would also need to be upgraded to 115 kV. This alternative provides 115 kV service to the City of Buffalo, and the substation has to be upgraded to 115 kV. Since the 69 kV source to Maple Lake from Pulaski will be eliminated, a new 115/69 kV substation will also be required near Kingston.

Alternative 3: This option requires tapping the existing 115 kV line between Big Swan and Crow River and building a 9 mile 115 kV line to City of Buffalo. The 3.3 miles of 69 kV from Lake Pulaski to Buffalo would also need to be upgraded to 115 kV. Similar to alternative 2, this option requires upgrade the Buffalo substation to 115 kV and a new 115 kV source at Kingston.

Analysis. While providing sufficient load serving capability to the region, Alternative 1 requires minimal facilities without any substation upgrades. This option also provides the flexibility to convert the line from Dickinson to Buffalo to Pulaski to 115 kV in the future along with Buffalo and Mary Lake substations. Due to these reasons, Alternative 1 is the recommended solution to address the inadequacies in the area.

Schedule. The expected in-service date for this project is mid 2008. A Certificate of Need from the Public Utilities Commission is not required for a line of the length and voltage involved here. A Route Permit is required for a 115 kV line of this length but the utility has the option of seeking authorization from the county.



7.4.10 Rugby Wind Project

Tracking Number. 2005-WC-N4

Utility. Otter Tail Power Company

Inadequacy. An independent power producer has proposed to connect 150 MW of wind generation in North Dakota at the Rugby 230 kV bus on the Otter Tail Power Company system. The connection would cause a transient voltage problem at the Paynesville 230 kV bus in Minnesota.

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

Alternatives. A system impact study conducted by MISO found that one of the capacitor banks at the Paynesville 115 kV bus should be increased. No other alternatives have been identified.

Analysis. The MISO study recommended increasing one of the 20 MVAR capacitor banks to 30 Mvar at the Paynesville 115 kV bus.

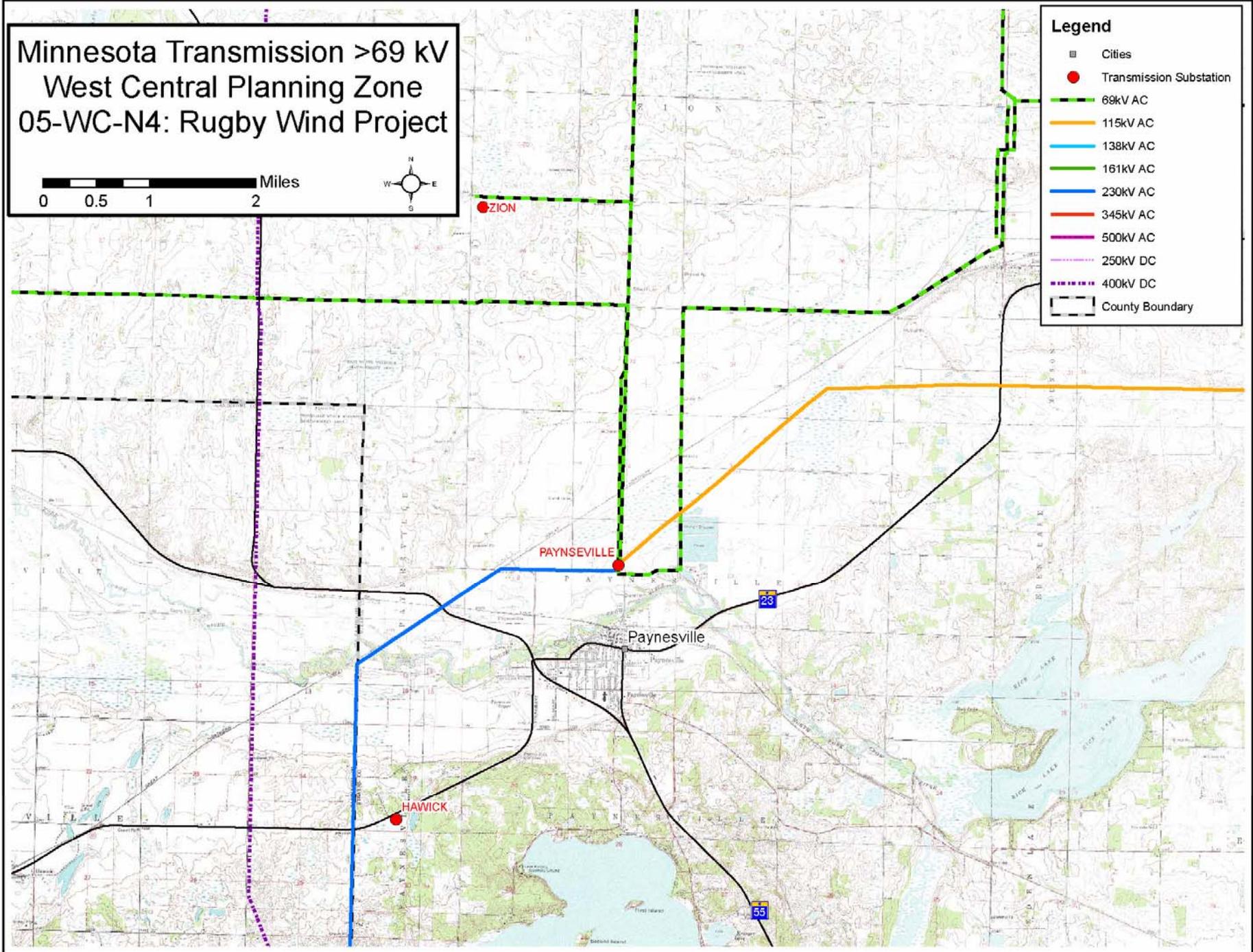
Schedule. The schedule for increasing one of the capacitor banks is yet to be determined. There have been no developments regarding this matter since the 2005 Biennial Report was submitted because the wind developer has not proceeded with the project.

Minnesota Transmission >69 kV
West Central Planning Zone
05-WC-N4: Rugby Wind Project



Legend

- Cities
- Transmission Substation
- 69kV AC
- 115kV AC
- 138kV AC
- 161kV AC
- 230kV AC
- 345kV AC
- 500kV AC
- 250kV DC
- 400kV DC
- County Boundary



7.4.11 CapX 2020 Projects

Tracking Numbers. 2005-CX-1 (Twin Cities – Fargo 345 kV)
2005-CX-2 (Southeast Twin Cities – Brookings County 345 kV)

Discussion. The CapX 2020 Projects are discussed in detail in Section 5. One of the three CapX lines (2005-CX-1) is a 345 kV line from Fargo to Alexandria to Benton County, part of which will be located in the West Central Zone. Another CapX line (2005-CX-2) located partially in the West Central Zone is a 345 line from Brookings, South Dakota, to the Southeast Twin Cities.

7.4.12 Mayhew Lake Distribution Substation

Tracking Number. 2007-WC-N1

Utility. Xcel Energy

Inadequacy. The load growth to the north of the City of St. Cloud requires a new distribution substation to relieve the load on existing substations and feeders in St. Cloud and improve reliability of the distribution system in the region.

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

Alternatives. The only alternative is a new distribution substation to the north of the City of St. Cloud. The new distribution substation is proposed to be located on the radial 115 kV line serving the Verson Paper Mill load to the north of St. Cloud.

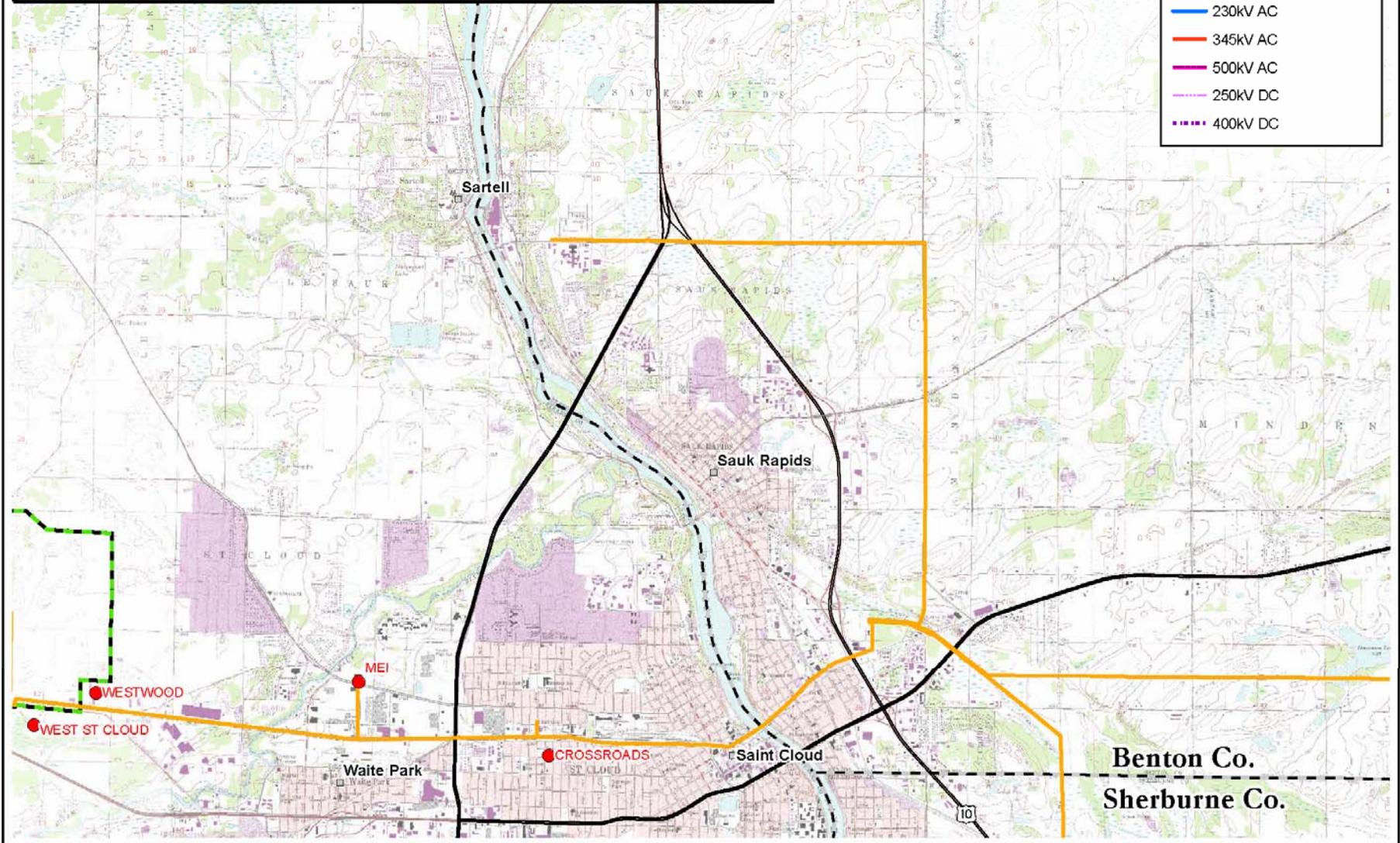
Analysis. The new substation is expected to relieve load and shorten the feeders from Granite City, Sauk Rapids and St. Cloud. This project is also expected to relieve load on the existing Granite City distribution bank.

Schedule. The scheduled in-service date for this substation is mid 2008. Xcel Energy is currently identifying possible sites for locating the substation. A Certificate of Need will not be required from the Public Utilities Commission. A permit for the substation may be required but the utility will have the discretion to seek approval from the local governmental body.

Minnesota Transmission >69 kV West Central Planning Zone 07-WC-N1: Mayhew Lake Distribution Substation



- ### Legend
- Transmission Substation
 - Cities
 - 69kV AC
 - 115kV AC
 - 138kV AC
 - 161kV AC
 - 230kV AC
 - 345kV AC
 - 500kV AC
 - 250kV DC
 - 400kV DC



7.4.13 Morris 230/115 kV Transformer

Tracking Number. 2007-WC-N2

Utility. Western Area Power Administration

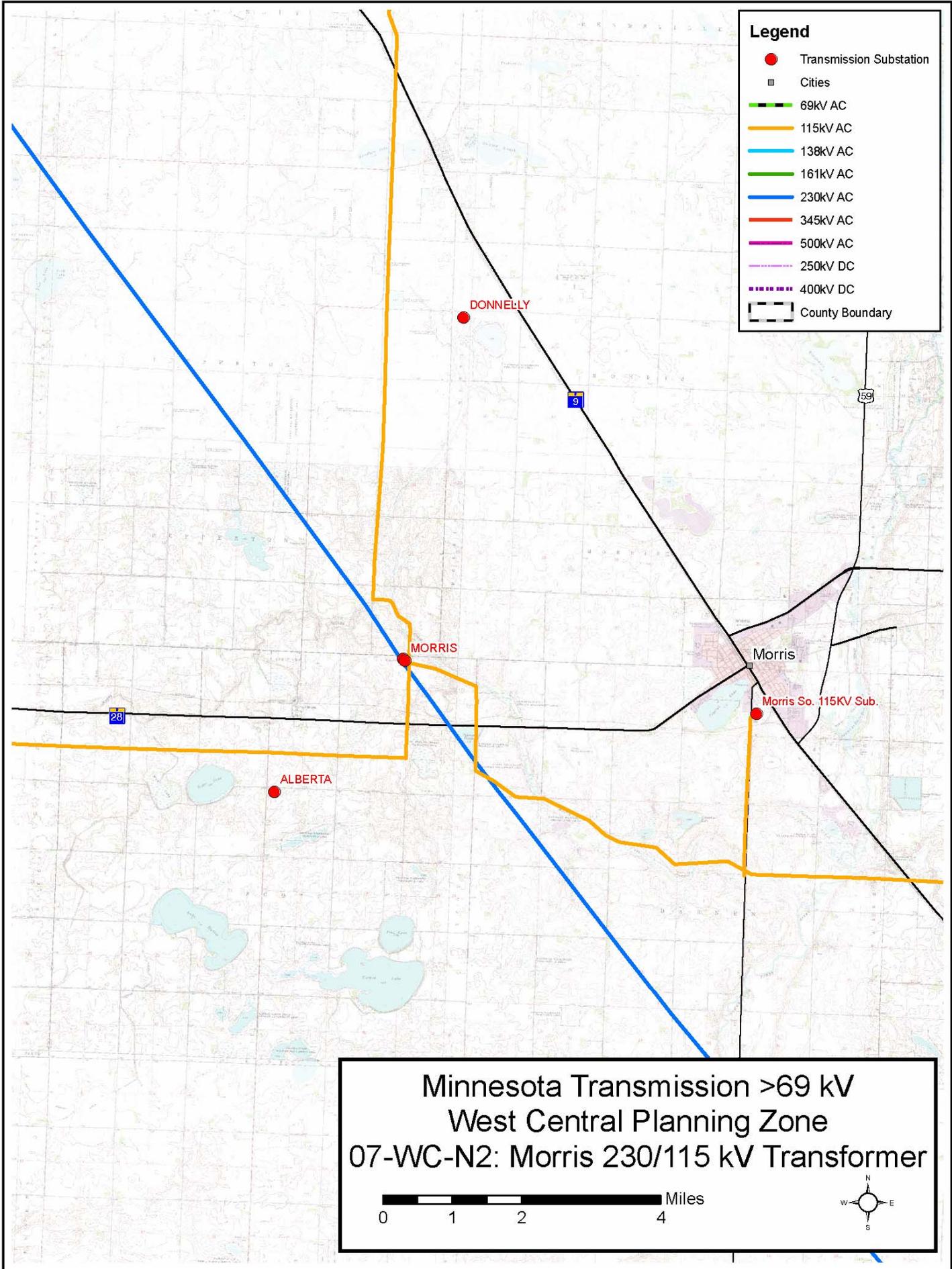
Inadequacy. Interconnection studies being performed for Big Stone II have identified an overload of the Morris 230/115 kV transformer when the proposed transmission lines are in operation (Big Stone – Johnson Jct. – Morris 230 kV with Big Stone – Canby – Granite Falls built at 345 kV and initially operated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

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

Alternatives. A facility study completed by Western Area Power Administration concluded that the existing 230/115 kV transformer should be replaced with a larger transformer as part of the Big Stone II project. No other alternatives have been identified.

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).

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.



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
 07-WC-N2: Morris 230/115 kV Transformer

0 1 2 4 Miles

N
W E
S

7.4.14 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.

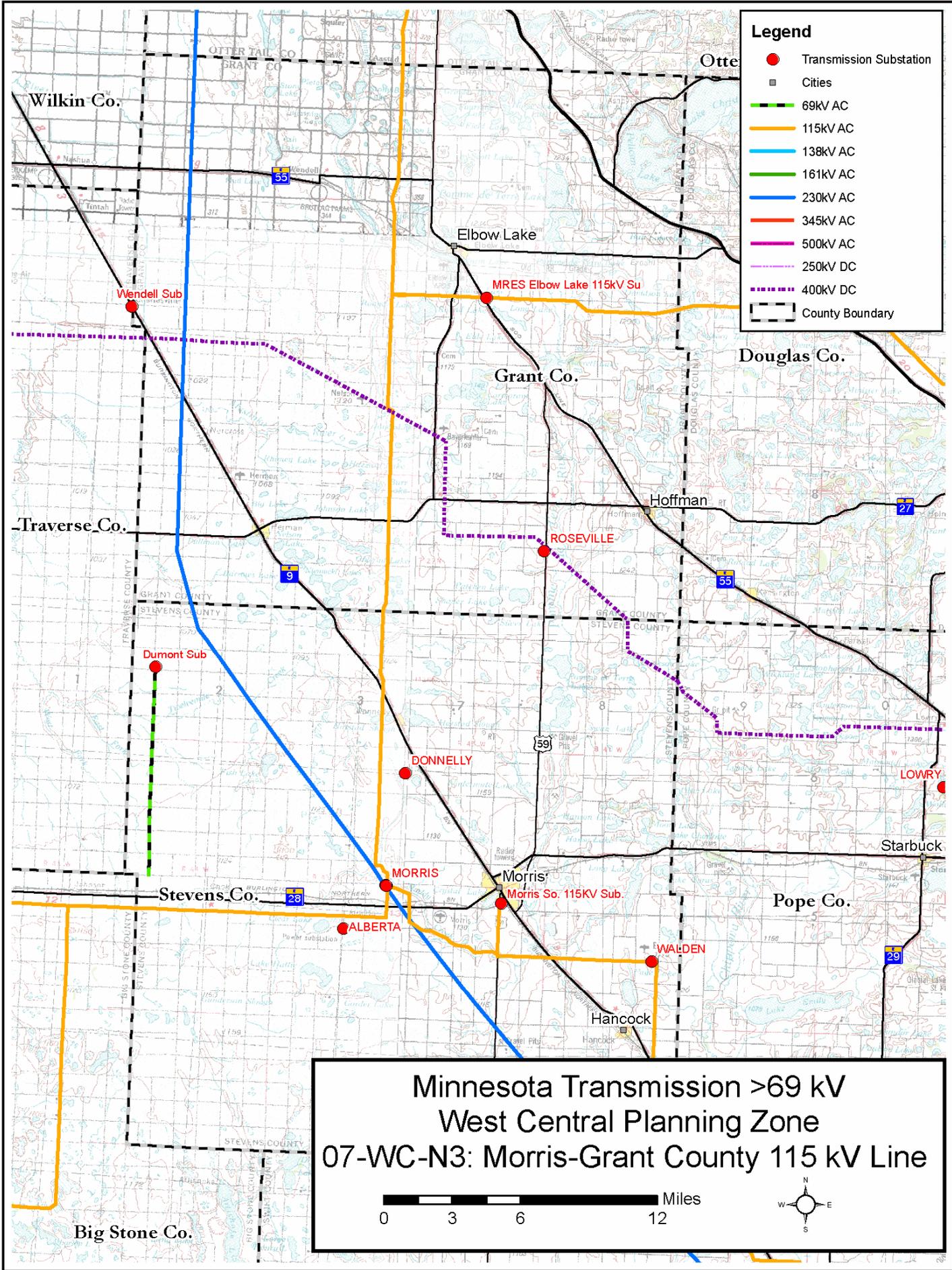
A map of the area is shown on the following page.

Alternatives. Significant upgrade of the facility is needed and a complete facility rebuild is the most practical alternative to achieving the required capacity increase.

Analysis. Missouri River Energy Services (MRES) and Otter Tail Power Company (OTP) currently jointly own the Morris – Grant County 115 kV line. The line is approximately 27 miles in length with termination points at the MRES Grant County 115 kV Switching Station and the Western Area Power Administration's Morris 230/115 kV Substation. It 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 of the poles alone eliminates the possibility of replacing only the line's conductor. Installing larger conductor results in more than 70% of the structures along the 27 miles of line having significant structural deficiencies. In addition, numerous spans lack sufficient NESC safety clearance when operating at the higher capacity. 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. A Route Permit may be required, depending on whether any changes in the route or the capacity of the conductor are required.



Minnesota Transmission >69 kV
 West Central Planning Zone
 07-WC-N3: Morris-Grant County 115 kV Line

7.4.15 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 s 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. A full slate of alternatives has not yet been determined, but 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. A generation outlet study will begin in early 2008 to address this issue.

Schedule. It is believed this line could pose a challenge to meeting the 2016 Renewable Energy Standard milestone if the system in west central Minnesota remains in its current form. It is assumed that permitting and construction for a major transmission project will likely take as many as seven years, so a Certificate of Need application must be filed in 2009 in order to have the project permitted and in service by 2016.

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

