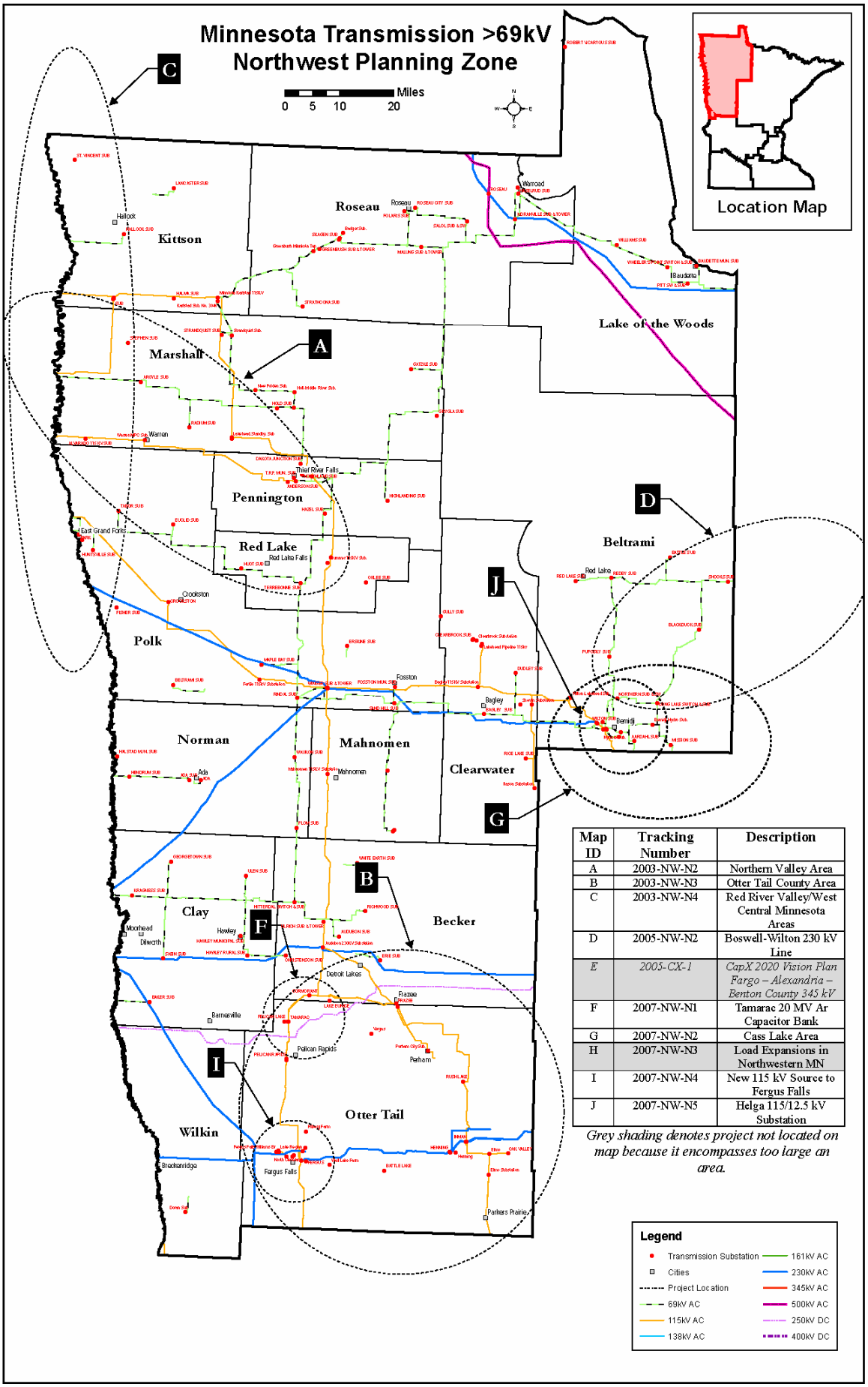
7.2 Northwest Zone

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	Unknown	Loading issues Hensel-Moranville transformers and expanded area under contingency conditions	7.2.2
2003-NW-N3	Otter Tail County Area (studies included: Otter Tail County Load Serving Study and Great River Long-Range Transmission Plan)	Staged first phase completed 4th quarter, 2004. Last phase in 2017	Summer peak load issues	7.2.3
2003-NW-N4	Red River Valley/West Central Minnesota Areas (includes RRV/WMN TIPS)	SVC 2006, Boswell-Wilton 2009 Fargo-St. Cloud unknown	Voltage stability issues and growing loads	7.2.4
2005-NW-N2	Boswell-Wilton 230 kV Line	Year-end 2009	Low voltage issues in the Bemidji area	7.2.5
2005-CX-1	CapX 2020 Vision Plan Fargo – Alexandria – Benton County 345 kV			7.2.6
2007-NW-N1	Tamarac 20 MVAr Capacitor Bank	Year-end 2009	Load growth related low voltage issues	7.2.7
2007-NW-N2	Cass Lake Area	2011 or sooner	Low voltage issues in the Cass Lake area	7.2.8
2007-NW-N3	Load Expansions in Northwestern Minnesota	2009/2010	Large Load Additions	7.2.9
2007-NW-N4	New 115 kV Source to Fergus Falls 12.5 kV System	2009	Load Growth Related Voltage Issues	7.2.10
2007-NW-N5	New Helga 115/12.5 kV Substation	2008	Increasing Load	7.2.11



Map ID	Tracking Number	Description
A	2003-NW-N2	Northern Valley Area
B	2003-NW-N3	Otter Tail County Area
C	2003-NW-N4	Red River Valley/West Central Minnesota Areas
D	2005-NW-N2	Boswell-Wilton 230 kV Line
E	*2005-CX-1*	*CapX 2020 Vision Plan Fargo – Alexandria – Benton County 345 kV*
F	2007-NW-N1	Tamarac 20 MV Ar Capacitor Bank
G	2007-NW-N2	Cass Lake Area
H	2007-NW-N3	Load Expansions in Northwestern MN
I	2007-NW-N4	New 115 kV Source to Fergus Falls
J	2007-NW-N5	Helga 115/12.5 kV Substation

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

7.2.1 Completed Projects

Some inadequacies in the Northwest 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-NW-N1	Minnkota Power Cooperative	New Lund Substation constructed south of Baudette	Permitted by Environmental Quality Board	2006
2005-NW-N1	Minnkota Power Cooperative Otter Tail Power	Second transformer installed at Wilton Substation outside Bemidji		2005

7.2.2 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, Falconer, Oslo and Warsaw in Minnesota and Hensel and Langdon in North Dakota. OTP and MPC serve the majority of the retail customers in this region.

Historical customer demand data indicates that loads in this area have grown substantially over the past couple of 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.

Along with loading concerns, the Northern Valley also suffers from low voltage issues even during normal operating conditions. When contingencies occur, additional low voltage can occur across the system and some voltages can sag to unacceptable levels.

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

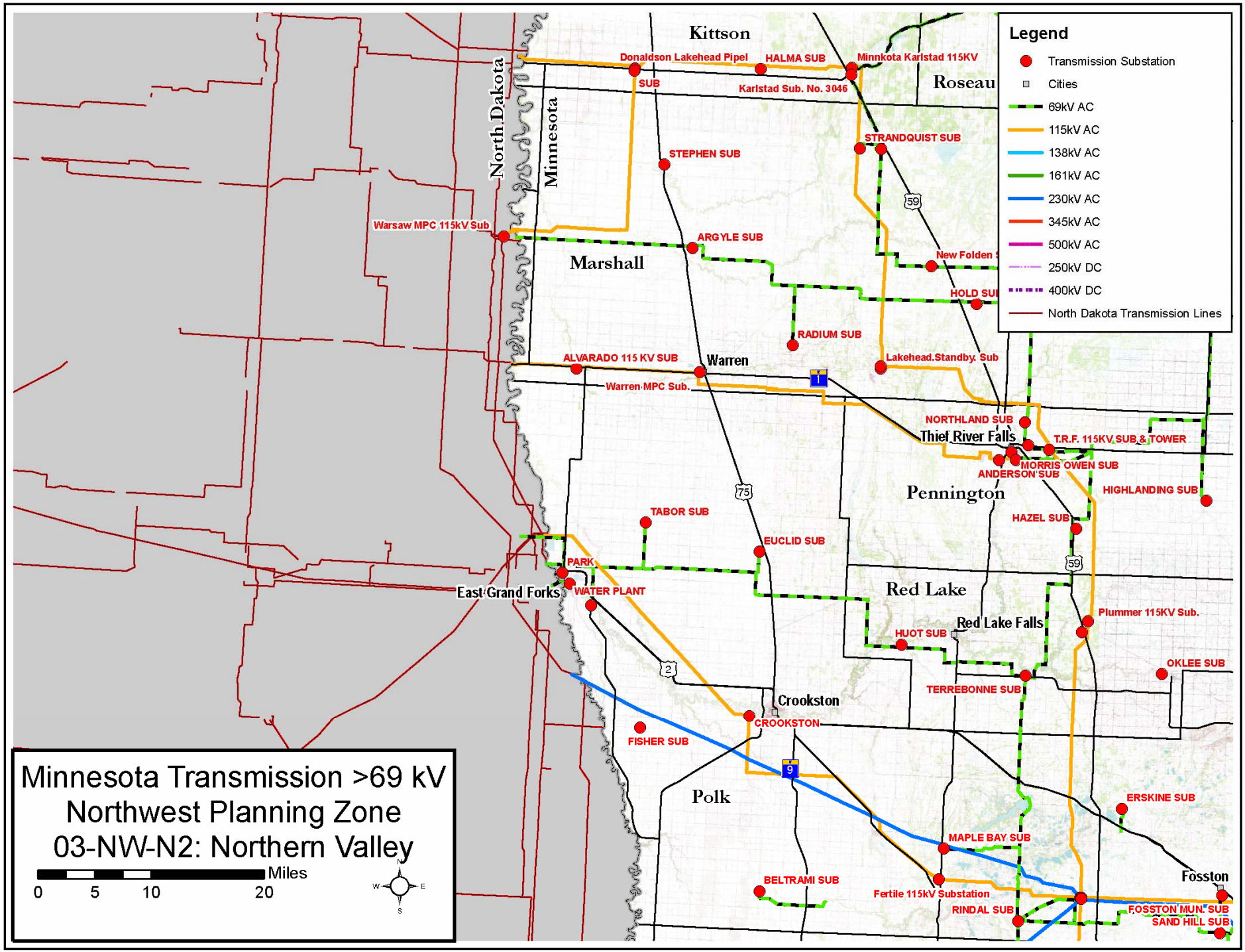
Alternatives. As described in the 2005 Report, several alternatives, both short-term and long-term, have been identified. Short-term alternatives include (1) installation of capacitor banks, (2) reconductoring existing lines, and (3) employing alternative switching procedures.

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 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. A *Northern Valley Load Serving Study* has not had any updates since the last MTO report in 2005. However, a generation interconnection project near Langdon, North Dakota, has prompted the need for a new 115 kV line between Langdon and Hensel (North Dakota). Completion of this new 115 kV line is expected in December 2007 and will significantly improve load serving ability between Hensel and Devils Lake.

Additional system reinforcement is anticipated for the NW MN region. The addition of the new Langdon to Hensel 115 kV has the ability to slightly improve system performance in NW MN, but it is not going to eliminate the need for new transmission. A long-term transmission study is needed to determine the best transmission plan to meet the growing loads in this area well into the future. Load forecasts received by OTP indicate that a new transmission project may need to be in-service as early as mid-2009 (see reference to 2007-NW-N3) in order to meet the anticipated load in this area.

Schedule. Transmission studies are expected to begin in 2008. A fast-tracked transmission project may be needed in the 2009 timeframe to serve the anticipated load growth in the NW MN region.


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
Kittson
Roseau
Marshall
Warren
Pennington
Red Lake
Red Lake Falls
Crookston
Polk
Thief River Falls
East Grand Forks
Fosston
North Dakota
Minnesota
Donaldson Lakehead Pipel SUB
HALMA SUB
Minnkota Karlstad 115KV
Karlstad Sub. No. 3046
STRANDQUIST SUB
STEPHEN SUB
Warsaw MPC 115kV Sub
ARGYLE SUB
New Folden
HOLD SUB
RADIUM SUB
ALVARADO 115 KV SUB
Warren MPC Sub.
Lakehead Standby. 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
ERSKINE SUB
MAPLE BAY SUB
BELTRAMI SUB
Fertile 115kV Substation
RINDAL SUB
FOSSTON MUN. SUB
SAND HILL SUB
59
75
1
2
9

7.2.3 Otter Tail County Area

Tracking Number. 2003-NW-N3

Utility. Otter Tail Power Company and Great River Energy

Inadequacy. During summer peak contingency scenarios, the transmission and subtransmission system in Otter Tail County falls below operating limits. Contingency events cause transformer loading violations, line-loading violations, and under-voltage violations. During summer peak conditions, ten different contingencies on the 41.6 kV system between Fergus Falls and Henning violate system-operating criteria. In addition, load within Otter Tail County is increasing at a rate of 2.1% annually. This increase in future electrical power usage, combined with these previously identified problems, requires an upgrade in the electrical network in Otter Tail county.

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

Alternatives. A number of interim solutions such as the installation of capacitor banks between Fergus Falls and Henning and changes at the Pelican Rapids Substation have been completed.

A new substation at the utilities identified several alternatives in the 2003 Report. The recommended short-term solutions identified in the Report (called the Integration of Subsystems) has been implemented. Construction of a new 2.5 mile 115 kV line to the Pelican Rapids Turkey plant was completed in January of 2005. This line is being operated at 41.6 kV and will be converted to 115 kV once the projected 2017 load levels are reached. The appropriate changes have been completed at the Pelican Rapids substation in order to serve the turkey plant on a dedicated circuit breaker. The new line to the turkey plant is shielded and will increase the reliability of service to the plant.

In addition, capacitor banks were installed between Fergus Falls and Henning during the fourth quarter of 2004. These capacitor banks are expected to maintain acceptable voltage levels until such time that the Silver Lake 230/41.6 kV substation is built near Battle Lake. The need for this new 230/41.6 kV substation is expected around 2011.

Other alternatives evaluated during this study were identified in the 2003 Report. They are listed here in abbreviated form for convenience.

Fergus Falls to Pelican Rapids Subsystem: Three alternatives:

(1) Convert the Pelican Rapids load from 41.6 kV to 115 kV.
(2) Replace two transformers at the Pelican Rapids substation with larger, load tap changing transformers.
(3) Construct a new substation at Erhard, approximately half way between Fergus Falls and Pelican Rapids.

Fergus Falls to Henning Subsystem: Two alternatives:

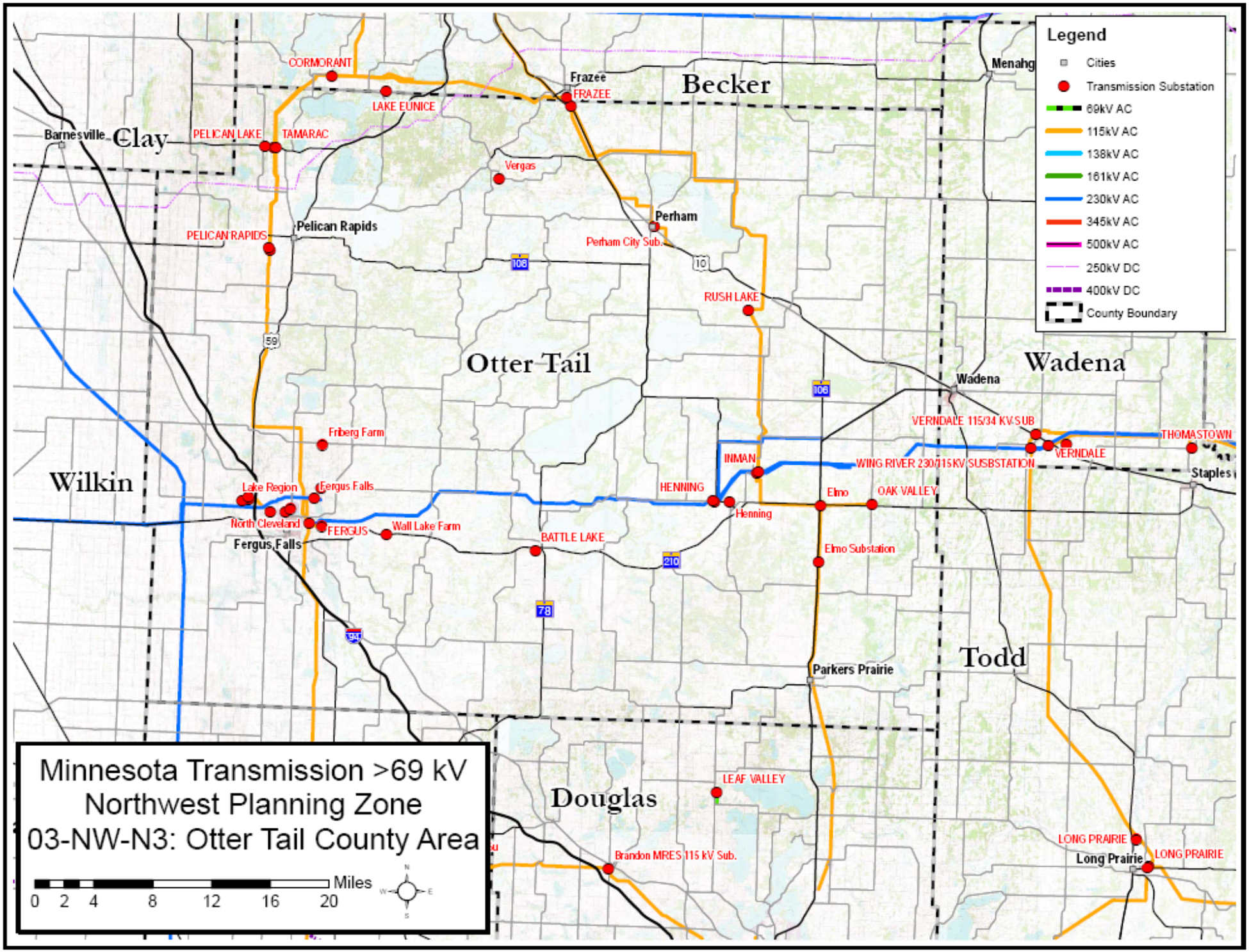
(1) Construct a new substation called Silver Lake near the City of Battle Lake
(2) Construct a new 115 kV transmission line from Fergus Falls to Henning (approximately 33 miles).

Analysis. Converting the voltage along an existing line and replacing transformers at an existing substation should be unobtrusive. New substations would require a plot of land but the likely areas are relatively remote. Constructing a new 115 kV transmission line for 50 miles or so would require new right-of-way.

The following table lists the estimated cost for each of the options listed above.

Alternative	Estimated Capital Investment
(1) Pelican Rapids 115 kV Load Conversion	$1,197,000
(2) 41.6 kV System Improvement	$2,888,000
(3) New 115/41.6 kV Source at Erhard	$1,810,000
(4) New 230/41.6 Source	$3,021,000
(5) Henning to Fergus Falls 115 kV Upgrade	$17,243,000

Schedule. Construction of a new substation at Silver Lake is likely the next step to increasing the load serving ability of the local 41.6 kV system. This substation is expected to be needed in 2011. No Certificate of Need will be required because the tap is likely to be less than 1500 feet in length but a Route Permit for the tap and the substation will be required.


Legend
Cities
Transmission Substation
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
County Boundary
Minnesota Transmission >69 kV
Northwest Planning Zone
03-NW-N3: Otter Tail County Area
Miles
0 2 4 8 12 16 20
Becker
Clay
Otter Tail
Wadena
Wilkin
Douglas
Todd
Barnesville
Pelican Rapids
Perham
Wadena
Fergus Falls
Parkers Prairie
Long Prairie
Staples
CORMORANT
LAKE EUNICE
Frazee
FRAZEE
PELICAN LAKE
TAMARAC
Vergas
PELICAN RAPIDS
Perham City Sub.
RUSH LAKE
Friberg Farm
VERNDALE 115/34 KV SUB
VERNDALE
THOMASTOWN
INMAN
WING RIVER 230/115 KV SUBSTATION
Lake Region
Fergus Falls
HENNING
Elmo
OAK VALLEY
Henning
North Cleveland
FERGUS
Wall Lake Farm
BATTLE LAKE
Elmo Substation
LEAF VALLEY
Brandon MRES 115 kV Sub.
LONG PRAIRIE
LONG PRAIRIE
Menahg

7.2.4 Red River Valley and West Central Minnesota Areas

Tracking Number. 2003-NW-N4

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

Inadequacy. The Red River Valley area and the West Central Minnesota area are both in need of significant electrical facility upgrades to meet a growing demand for power. Many electrical facilities are reaching their allowable operating limits. Under contingency scenarios, both line and transformer overloads occur and low voltage situations develop. The areas could potentially face voltage security issues in the future, which could result in partial or regional system blackouts.

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

Alternatives. One long-term solution that is being pursued is the construction of a 230 kV line from Boswell to Wilton. This project is reported at 2005-NE-N2.

An additional solution is being proposed to resolve the issues in the southern Red River Valley and in west central Minnesota, near Alexandria. This solution is the construction of the CapX 345 kV line from Fargo to Alexandria to St. Cloud to Monticello. That matter is reported at 2005-CX-1.

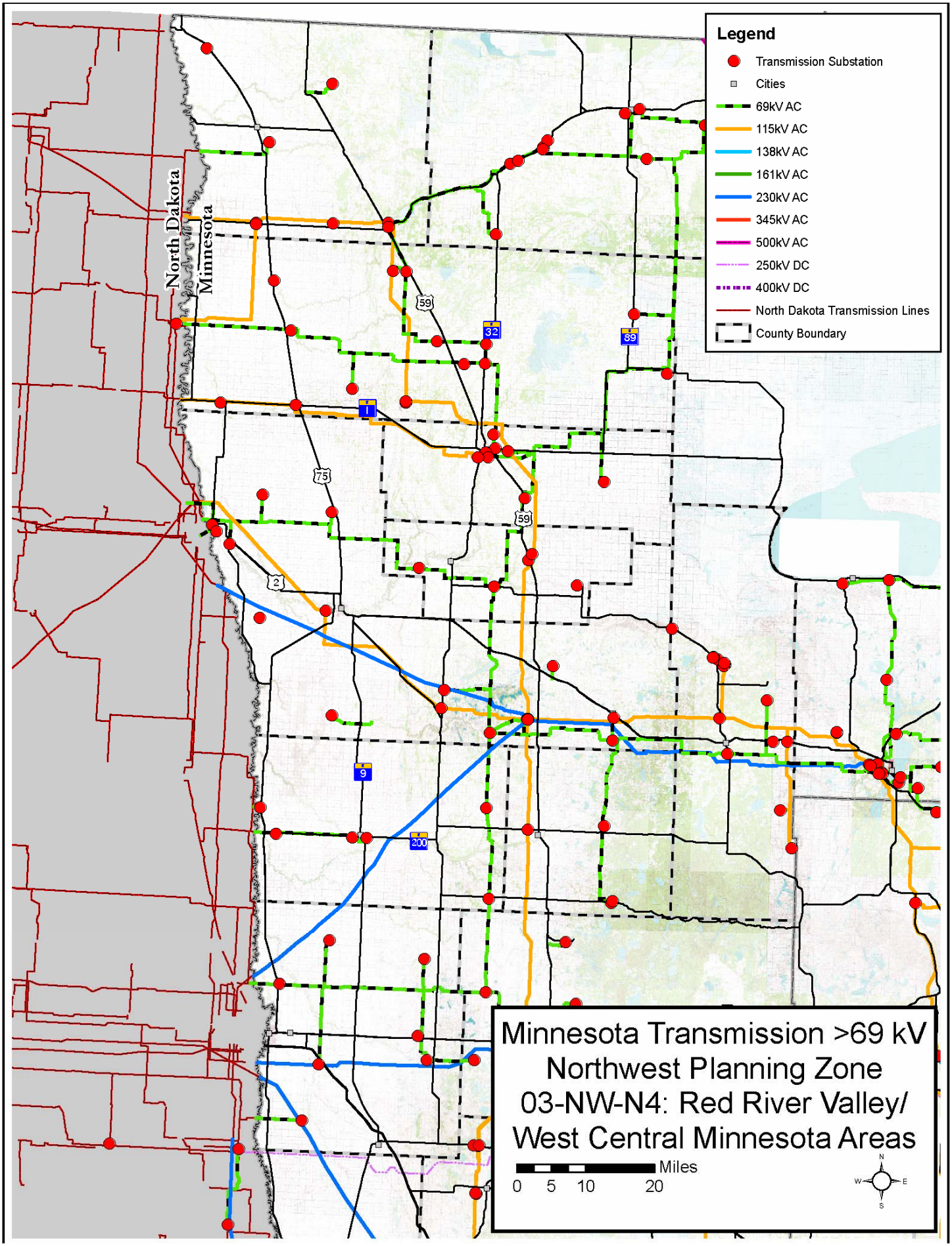
Due to the size of the area in need, use of distributed generation for these areas is not feasible. Far more than 10 MW of generation capacity is needed to meet the needs of the Red River Valley and siting a larger (non-distributed) generator would require significant transmission infrastructure upgrades in order to effectively deliver the power to the areas in the region in which it is needed.

A number of short-term solutions are also under consideration including the installation of capacitors at the Jamestown Substation (in North Dakota) and in the Audubon/Hubbard area (in Minnesota). These short-term solutions will not provide any significant load serving capability to mitigate the issues seen in Minnesota over the long term.

Analysis. Initial analysis of the load serving issues in the Red River Valley was performed in 2002. The CapX utilities undertook a study effort in 2006 to complete the load serving study for the Red River Valley. The report, which was finalized in early 2007, recommended the construction of a new Bemidji – Grand Rapids 230 kV line for support to the Bemidji and Grand Forks area and the construction of a new Fargo – Alexandria – St. Cloud – Monticello 345 kV line for support to the Fargo area and other critical load pockets in Minnesota (Alexandria and St. Cloud). The final report is called the *Red River Valley/Northwest Minnesota Load-Serving Transmission Study (TIPS Update).*

Schedule. Otter Tail Power, Minnkota Power Cooperative, Minnesota Power, Great River Energy, Missouri River Energy Services, and Xcel Energy have decided to go forward with the 230 kV line from Boswell to Wilton and intend to file a combined Certificate of Need and Route Permit Application to the MN PUC for this line in the December 2007 / January 2008 timeframe.

An application for a Certificate of Need for the CapX line from Fargo to Monticello was submitted to the MN PUC in August 2007. Since this line will serve more than just the Red River Valley, this line has been given its own tracking number – 2005-NW-N2. Further information about the Fargo – Twin Cities 345 kV line is found in section 5.3.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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
County Boundary
North Dakota
Minnesota
Minnesota Transmission >69 kV
Northwest Planning Zone
03-NW-N4: Red River Valley/
West Central Minnesota Areas
Miles
0 5 10 20
N
W
E
S

7.2.5 Bemidji – Grand Rapids 230 kV Line

Tracking Number. 2005-NW-N2

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

Inadequacy. The Bemidji area experiences low voltage incidents during winter peak conditions. The outage of the Winger-Wilton 230 kV line is a critical contingency for the Bemidji area. Despite multiple recent capacitor additions on the 115 kV system in the Bemidji area, more load serving capability is needed.

Analysis 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 demand for electric power.

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

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 in Bemidji, a distance of approximately 70 miles. In addition, the CapX 345 kV line from Fargo to Monticello is also being pursued.

Upon completion of the 2006 TIPS Update, the utilities initiated additional transmission studies to determine if an equally effective transmission alternative was available for the Bemidji area. This study considered the following four options:

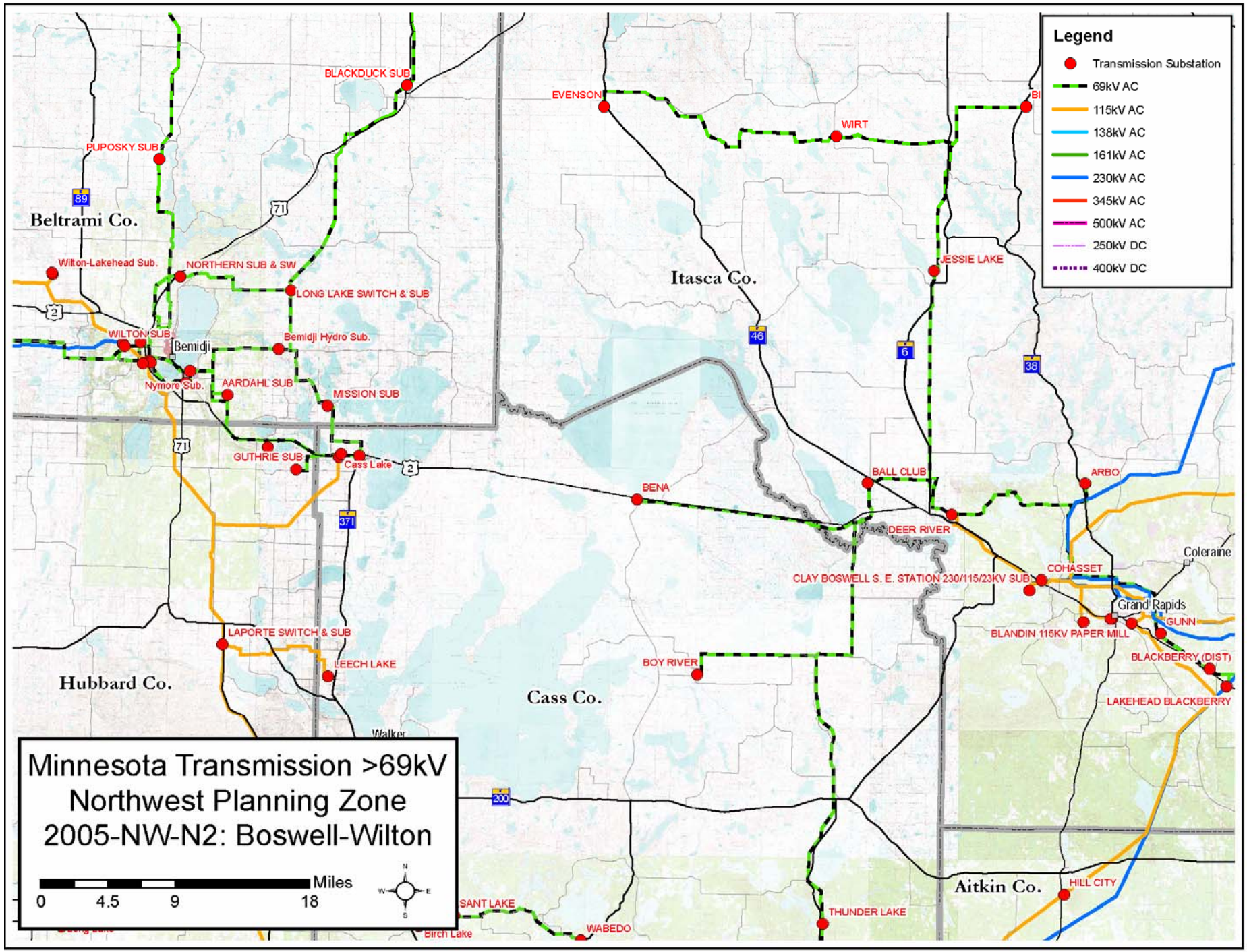
1. Winger – Wilton 230 kV line #2;
2. Badoura – Wilton 230 kV line;
3. Bemidji – Grand Rapids 230 kV line; and
4. Reconductor the two 115 kV lines into the Bemidji area.

These additional transmission studies concluded that the Bemidji – Grand Rapids 230 kV line was the most effective alternative for the Bemidji area because it offered greater load serving capability and lower overall system losses. (Note: the Bemidji – Grand Rapids was referred to as the Boswell – Wilton line in the 2005 Report.)

Analysis. The utilities have determined that the Bemidji – Grand Rapids line is the preferred alternative and will apply for a combined Certificate of Need and Route Permit Application in the December 2007 / January 2008 timeframe. This new line will not only address the Bemidji area load serving issue but will also facilitate development of wind energy generation in the Red River Valley and eastern North Dakota. The line does present some routing challenges that will likely drive the construction costs of this project higher than for other 230 kV lines in this region.

Schedule. The utilities plan to submit a combined Certificate of Need and Route Permit application in the December 2007/January 2008 timeframe. The utilities anticipate that the line will be placed into service in 2012.

PUC Docket Number. CN-07-1396 (Certificate of Need)


Legend
Transmission Substation
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
Minnesota Transmission >69kV
Northwest Planning Zone
2005-NW-N2: Boswell-Wilton
Miles
0
4.5
9
18
Beltrami Co.
Itasca Co.
Hubbard Co.
Cass Co.
Aitkin Co.
BLACKDUCK SUB
EVENSON
WIRT
PUPOSKY SUB
Wilton-Lakehead Sub.
NORTHERN SUB & SW
LONG LAKE SWITCH & SUB
JESSIE LAKE
WILTON SUB
Bemidji
Bemidji Hydro Sub.
Nymore Sub.
AARDAHL SUB
MISSION SUB
GUTHRIE SUB
Cass Lake
BENA
BALL CLUB
ARBO
DEER RIVER
Coleraine
COHASSET
CLAY BOSWELL S. E. STATION 230/115/23KV SUB
Grand Rapids
GUNN
BLANDIN 115KV PAPER MILL
BLACKBERRY (DIST)
LAKEHEAD BLACKBERRY
LAPORTE SWITCH & SUB
LEECH LAKE
BOY RIVER
Walker
SANT LAKE
Birch Lake
WABEDO
THUNDER LAKE
HILL CITY

7.2.6 CapX 2020 Vision Plan

Tracking Number. 2005-CX-1 (Fargo – Alexandria – Benton County 345 kV)

Discussion. The CapX 2020 Projects are discussed in detail in Section 5. One of the three CapX lines is a 345 kV line from Fargo to Alexandria to Benton County, part of which will be located in the Northwest Zone.

7.2.7 Tamarac 20 MVAR Capacitor Bank

Tracking Number. 2007-NW-N1

Utility. Great River Energy

Inadequacy. Contingency analyses on the 2009 summer peak and winter peak cases identified low voltage concerns on the 41.6 kV and 115 kV systems in the Fergus Falls – Pelican Rapids – Erhard area. This is mainly caused due to the addition of the new ethanol plant load at the Lake Region Cooperative Fergus Falls distribution substation. The Hoot Lake – Edge town tap 115 kV line outage causes three GRE substations to go below the 92% contingency voltage criteria. Also, existing system deficiencies result from an Audubon 230/115 kV source outage, which causes undervoltage concerns at five GRE substations.

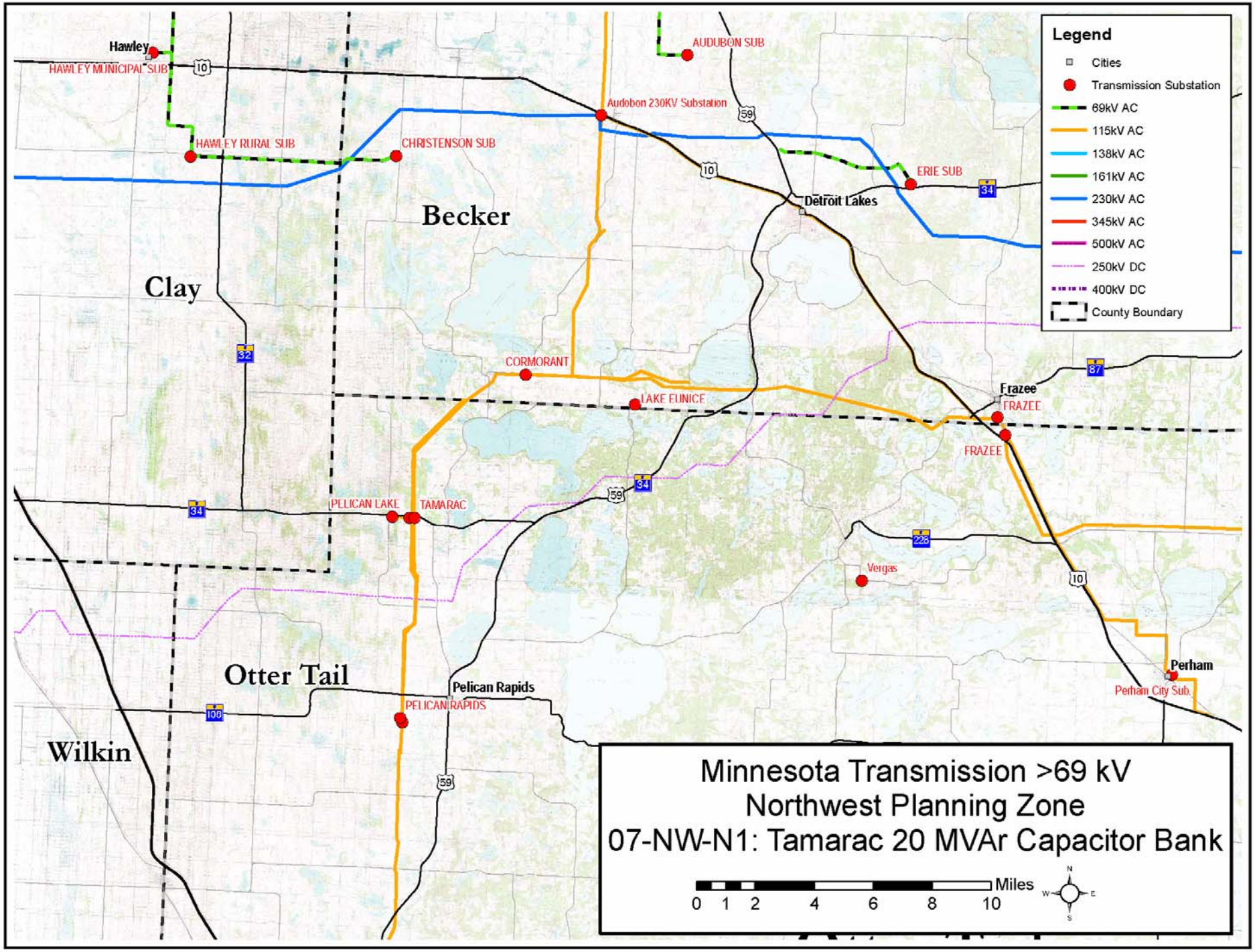
A map of the area is shown on the following page.

Alternatives. Only one option has been identified so far, installation of a 20 MVAP capacitor bank at the Tamarac Substation. GRE will look at long term solutions for this area in its long range plan study, which is expected to be completed in 2008.

Analysis. A capacitor bank can be installed at the Tamarac Substation for about $1,000,000. This step will allow for reliable operation for at least another four years while a more long-term solution is determined.

In order to install a new capacitor bank at Tamarac, the substation will have to be expanded.

Schedule. The capacitor bank is needed in 2009.


Legend
Cities
Transmission Substation
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
County Boundary
Hawley
HAWLEY MUNICIPAL SUB
HAWLEY RURAL SUB
CHRISTENSON SUB
AUDUBON SUB
Audubon 230KV Substation
ERIE SUB
Detroit Lakes
Becker
Clay
CORMORANT
LAKE EUNICE
Frazee
FRAZEE
FRAZEE
PELICAN LAKE
TAMARAC
Vergas
Perham
Perham City Sub.
Otter Tail
Pelican Rapids
PELICAN RAPIDS
Wilkin
Minnesota Transmission >69 kV
Northwest Planning Zone
07-NW-N1: Tamarac 20 MVAr Capacitor Bank
Miles
0 1 2 4 6 8 10

7.2.8 Cass Lake Area

Tracking Number. 2007-NW-N2

Utility. Great River Energy

Inadequacy. Contingency analysis performed on the 2006 and 2011 winter peak load conditions has identified low voltages on the 115 kV and 69 kV systems in the Cass Lake area. These voltage issues are caused by outages of the 115 kV line from Wilton to Bemidji to Nary Junction with the critical contingency being the loss of the Wilton to Bemidji 115 kV line.

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

Alternatives. One short-term and two long-term alternatives have been identified. The short-term alternative involves the installation of two 10 MVAR capacitor banks at the Cass Lake 115 kV bus and a third 25 MVAR capacitor bank at the Wilton 115 kV bus.

Long-term alternatives include (1) adding a 230/115 kV substation on the proposed Bemidji – Grand Rapids 230 kV line near Cass Lake, and (2) adding a second 115 kV line between Wilton and Bemidji.

Analysis. A Bemidji Area Electric Transmission System Study: Evaluation of the Near-Term Transmission Needs in the Bemidji/Wilton Area has recently been completed and a written report is being prepared. Previous transmission system studies have identified the Bemidji/ Wilton/Cass Lake area as being increasingly susceptible to post-contingent voltage collapse conditions. To address this concern, the regional transmission owners are undertaking a study to (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, (3) evaluate the feasibility and applicability of Under-Voltage Load Shedding (UVLS), and (4) determine the extent that additions of reactive power supply facilities could improve load-serving capability until additional transmission (such as the Bemidji – Grand Rapids 230 kV line which is not anticipated to be in-service before 2012) is developed into the Bemidji load center.

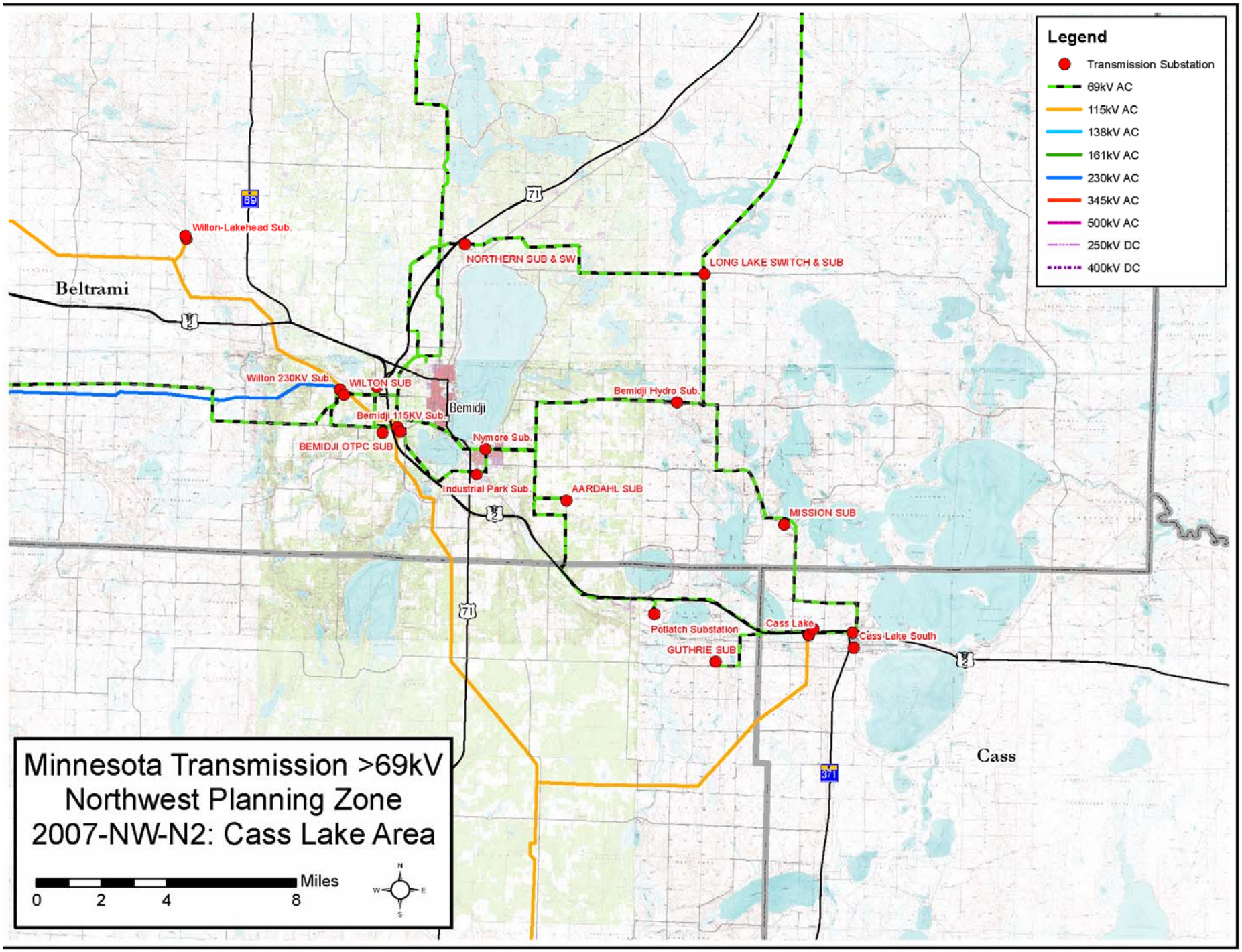
This study analyzed system intact, first contingency ("N-1"), and second contingency ("N-2") conditions. The N-1 load-serving capability was found to be generally constrained by voltage adequacy concerns, while the N-2 load-serving situation is constrained by both voltage adequacy and thermal limitations (line overloads).

The study results show under 2006 winter peak load conditions that N-1 conditions are marginally acceptable, provided all local generation is at full output, and all existing shunt capacitor banks function correctly, but N-2 conditions could result in voltage collapse. Furthermore, N-2 conditions can result in 115 kV line loadings in excess of 200% of their respective normal continuous rating.

Under 2011 winter peak conditions, the analysis indicates that continued load growth will cause increased need for reactive power supply for both system intact and post-contingent conditions. For N-1 conditions, capacitors in conjunction with the Solway generation in synchronous

condenser or real power mode are required in order to provide acceptable operation through 2011.

Schedule. The report should be complete by the end of 2007. Steps will have to be implemented as far in advance of 2011 as possible.


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 115KV Sub.
BEMIDJI OTPC SUB
Nymore Sub.
Industrial Park Sub.
AARDAHL SUB
Bemidji Hydro Sub.
MISSION SUB
Potlatch Substation
GUTHRIE SUB
Cass Lake
Cass Lake South
Cass
Minnesota Transmission >69kV
Northwest Planning Zone
2007-NW-N2: Cass Lake Area
Miles
0
2
4
8

7.2.9 Load Expansions in Northwestern Minnesota

Tracking Number. 2007-NW-N3

Utility. Otter Tail Power Company

Inadequacy. OTP has recently been informed of potential large load additions in the northwestern MN region that will likely trigger the need for major transmission expansions. It is anticipated that the existing 115 kV system will need additional support by means of new 230 kV sources as early as the 2009/2010 timeframe.

Alternatives. Preliminary transmission studies and meetings with OTP's retail customers are underway. Once more accurate forecasts are available, detailed transmission studies will be performed considering a wide array of alternatives. It is possible that the alternatives that will be identified for this potential inadequacy could be the same as what has been identified in the Northern Valley study (Tracking Number 2003-NW-N2). Conversely, it is possible that the recommended alternative from this transmission study could replace the need for additional transmission improvements identified in the Northern Valley study.

Analysis. Transmission studies are just getting underway.

Schedule. It is anticipated that analysis will begin in late 2007 and continue into 2008. An expected completion date of the transmission studies is summer of 2008. It is possible that permitting efforts could be started shortly after completion of the transmission studies depending on the preferred transmission plan.

7.2.10 New 115 kV Source to Fergus Falls 12.5 kV System

Tracking Number. 2007-NW-N4

Utility. Otter Tail Power Company

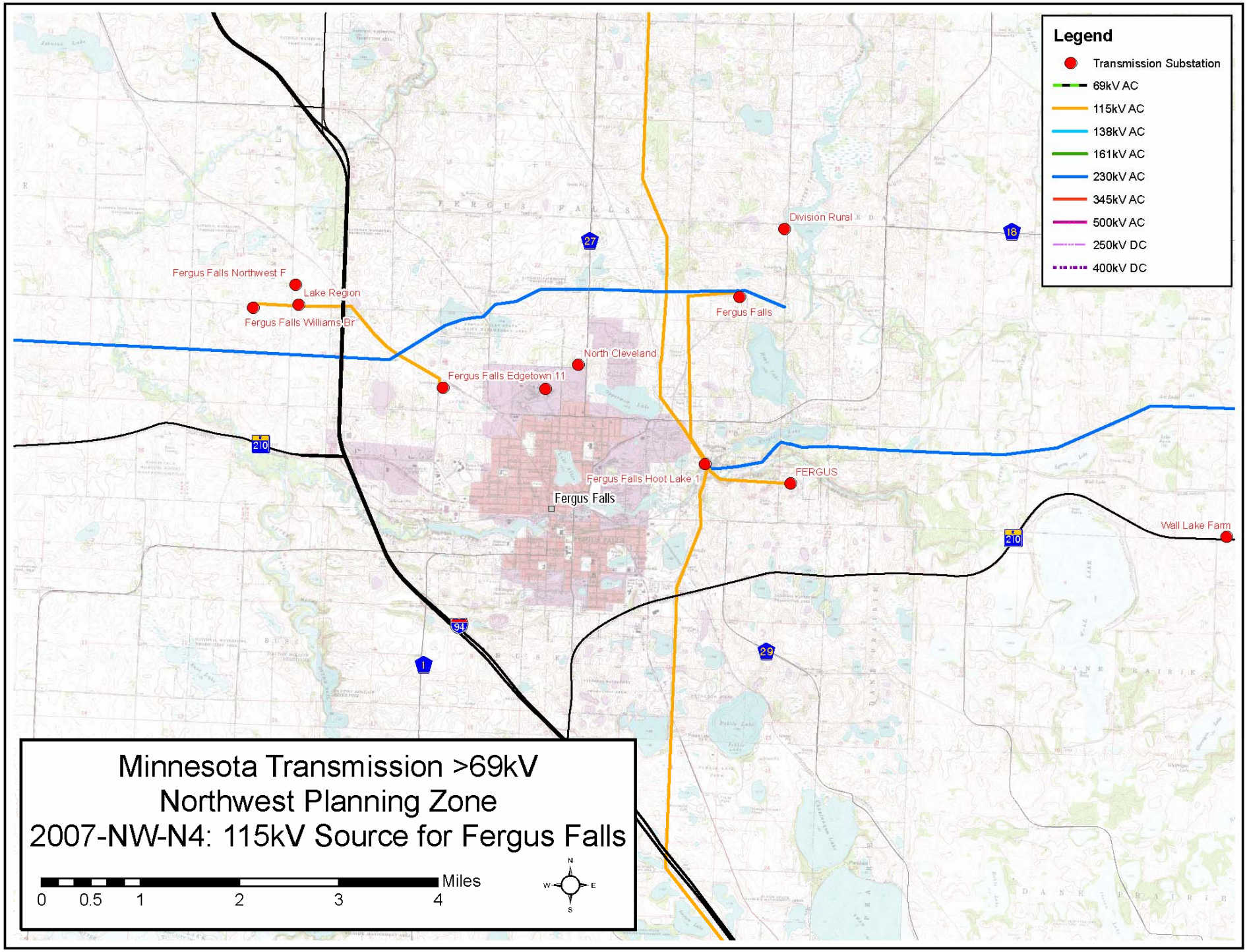
Inadequacy. The Fergus Falls 12.5 kV system is currently served from two 115 kV sources and one 41.6 kV source. During contingencies that involve loss of one of the 115 kV sources, system voltages on the 12.5 kV system drop below acceptable contingency levels.

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

Alternatives. The primary alternative is to rebuild an existing 12.5 kV line from the Hoot Lake substation to the 12.5 kV distribution station (referred to as the "Buse" substation) to 115 kV and add a 115/12.5 kV transformer at the Buse substation. A second option under consideration is to tap the Hoot Lake to Grant County 115 kV line and construct a new 115 kV line to a different distribution substation in Fergus Falls (referred to as the "South Cascade" substation) and add a 115/12.5 kV transformer at the South Cascade station. However, this option requires the acquisition of a new easement for the transmission line corridor.

Analysis. Preliminary analysis of these options is just getting underway.

Schedule. It is estimated that analysis will begin in late 2007 and be completed in early 2008. It is anticipated that permitting efforts will start shortly after completion of the transmission studies. The in-service date of the new facilities is expected to be early 2009. Depending on the alternative selected, it is likely that the project will involve less than ten miles of new 115 kV line and, therefore, will be handled through local permitting processes.


Legend
Transmission Substation
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
Division Rural
Fergus Falls Northwest F
Lake Region
Fergus Falls Williams Br
Fergus Falls
North Cleveland
Fergus Falls Edgetown 11
Fergus Falls Hoot Lake 1
FERGUS
Fergus Falls
Wall Lake Farm
Minnesota Transmission >69kV
Northwest Planning Zone
2007-NW-N4: 115kV Source for Fergus Falls
Miles
0 0.5 1 2 3 4
N
W
E
S

7.2.11 New Helga 115/12.5 kV Substation

Tracking Number. 2007-NW-N5

Utility. Minnkota Power Cooperative, Inc.

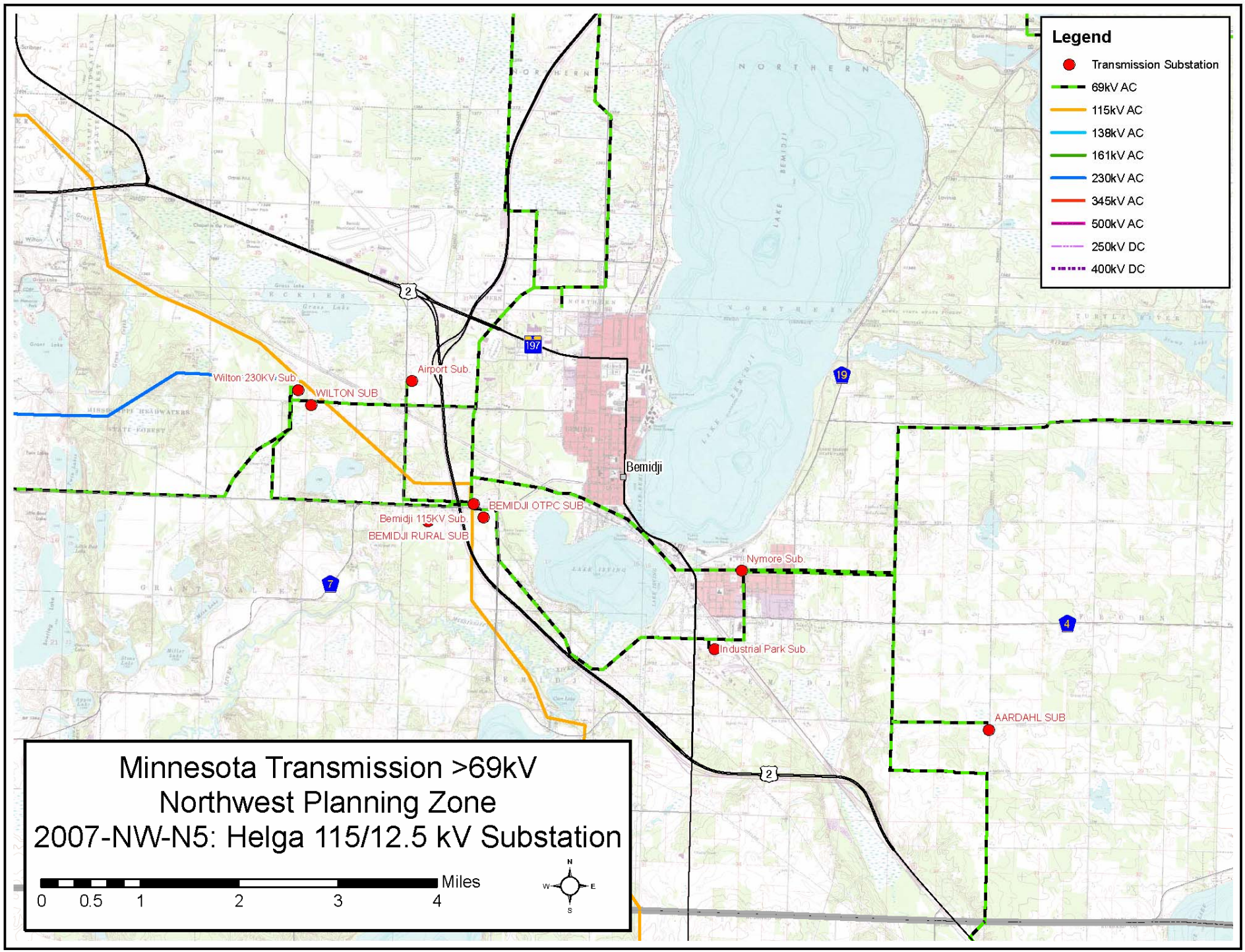
Inadequacy. The increasing load in the Bemidji area that is served by Beltrami Electric Cooperative's Bemidji Rural Substation is driving the need for increased distribution substation capacity.

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

Alternatives. There are only two possible alternatives: (1) build a new substation, or (2) increase the capacity of the existing Bemidji Rural Substation and the distribution facilities of Beltrami Electric Cooperative.

Analysis. The results of the analysis shows that from both a cost-effective solution and from a reliability perspective, constructing a new Helga 115/13.2 kV substation served from the Bemidji – Nary Switch 115 kV line was the preferred alternative. The Helga distribution substation will consist of a 10 MVA fuse protected 115/13.2 kV transformer with a low side breaker. The Helga substation will be served from a new 115 kV two-way switch that will be located 7.67 miles south of the Bemidji OTP substation and 4.96 miles north of the Nary OTP switch. The 115/13.2 kV transformer impedance will be 8.59%.

Schedule. In-service date is projected to be January 1, 2008.


Legend
Transmission 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
Bemidji
BEMIDJI OTPC SUB
Bemidji 115KV Sub
BEMIDJI RURAL SUB
Nymore Sub
Industrial Park Sub
AARDAHL SUB
Minnesota Transmission >69kV
Northwest Planning Zone
2007-NW-N5: Helga 115/12.5 kV Substation
Miles
0 0.5 1 2 3 4