Environmental Impact Statement

In the Matter of the Otter Tail Corporation, d/b/a Otter Tail Power Company, Central Minnesota Municipal Power Agency, Great River Energy, Heartland Consumers Power District, Montana-Dakota Utilities Co., Southern Minnesota Municipal Power Agency, and Western Minnesota Municipal Power Agency (as represented by Missouri River Energy Services) Applications for a Route Permit and a Certificate of Need for the Big Stone Transmission Project in Southwestern Minnesota

PUC Docket Nos.
E017, et al./TR-05-1275
E017, et al./CN-05-619

Prepared by

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ABSTRACT

Otter Tail Power Company, et al., applied to the Public Utilities Commission (PUC) on January 9, 2006 for a Route Permit for the Big Stone 230 kV and 345 kV transmission lines project in Southwestern Minnesota. The companies applied to the PUC on September 30, 2005 for a Certificate of Need (CN) for these transmission lines. The lines are proposed to provide Minnesota customers with the output of the Big Stone II large electric power generating plant. The lines are also proposed to improve the reliability of the regional system, given the addition of approximately 600 MW of power to the grid.

An Environmental Report (ER) is required for the CN and an Environmental Impact Statement (EIS) is required for the Route Application. On November 29, 2005, the PUC issued an Order combining the ER and EIS, determining that this EIS would be prepared in lieu of the ER for the CN application.

Additional Information on this project is available in the project applications listed in the References section of this EIS. Much of the route application material is also available online at http://energyfacilities.puc.state.mn.us/Docket.html?Id=18215.

EIS COMMENTS DUE BY DECEMBER 11, 2006

Formal comments on the accuracy and completeness of the Draft EIS were accepted by the Department of Commerce through October 31, 2006. Any comments on the final EIS need to be forwarded to the Administrative Law Judges in this proceeding. Please refer to the PUC Docket Nos. E017/CN-05-619 or E017/TR-05-1275 in all correspondence. Comments should be sent by e-mail or U.S. mail to:

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Copies of this Environmental Impact Statement can be found at the following libraries:

Benson Public Library
200 13th St. S.
Benson, MN 56215

Canby Public Library
110 Oscar Ave.
Canby, MN 56220

Chippewa County Public Library
224 South First Street
Montevideo, MN 56265

Granite Falls Public Library
155 7th Ave.
Granite Falls, MN 56241

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401 6th Ave.
Madison, MN 56256

Morris Public Library
102 East 6th St.
Morris, MN 56267

Ortonville Public Library
412 2nd St. NW
Ortonville, MN 56278

Willmar Public Library
410 5th St. SW
Willmar, MN 56201

PUBLIC HEARING AND INFORMATION MEETINGS

The Department of Commerce held public information meetings on the draft EIS in conjunction with the public hearing on the project. The PUC turned the process over to the Office of Administration Hearings to hold the hearing. The hearing was conducted by an Administrative Law Judge (ALJ) who will ensure that the record created at the hearing is preserved and transmitted to the PUC. The ALJ will prepare a report that will include proposed findings of fact and conclusions and a recommendation.

Hearing sessions were held at:

October 9, 2006, Benson October 10, 2006, Morris October 11, 2006, Ortonville October 12, 2006, Canby October 13, 2006, Granite Falls October 16, 2006, St. Paul	Informational meetings and public hearing sessions were held each day at 1:00 p.m. and 6:00 p.m.

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Supplemental information not contained in the Applications was provided by the Applicants through HDR Engineering, Inc.

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1.0 SUMMARY

Otter Tail Power Company and its partners (Otter Tail) are seeking to construct high voltage transmission lines (HVTL) in southwestern Minnesota in order to accommodate the expansion of the Big Stone coal-fired power plant in South Dakota. The addition of the Big Stone II plant would add 600 MW of electricity to the power grid. Otter Tail is planning to build 230 kV and 345 kV lines in the area to serve local Minnesota customers of the partners. The HVTL project is also intended to strengthen the reliability of the regional transmission system, given the additional load on the system from the new plant.

Otter Tail applied to the Public Utilities Commission (PUC) in September 2005, for a Certificate of Need (CN) for the HVTL project. They applied to the PUC in January 2006 for a Route Permit to construct and operate the HVTL project. Typically, an Environmental Report is necessary at the CN stage, and an Environment Impact Statement (EIS) is required for a Route Permit. In this case, the PUC ruled in November 2005 to combine the processes in a joint hearing and to require one environmental document to inform both processes. This EIS is that required document.

The specific topics and the extent of analysis provided in this EIS were outlined in the Environmental Impact Statement Scoping Decision as ordered by the Commissioner of the Department of Commerce in February 2006 (Appendix I).

Regulatory Framework

The Big Stone II plant expansion permit application was before the South Dakota Public Utilities Commission. That Commission unanimously approved the application to construct the plant on July 14, 2006.

A Certificate of Need from the Minnesota PUC is required to build a transmission line over 200 kV in Minnesota that is over 1500 feet in length.

Effective July 1, 2005, Article 3 of Senate File 1368 transferred energy facility permitting (power plants, transmission lines, pipeline and wind turbine siting) authority from the Minnesota EQB to the PUC, including authority to route HVTLs. The full one-year permitting process is required for lines over 200 kV.

Proposed Project Description

Otter Tail is proposing to build two separate high voltage transmission lines. One line would run north and east from the Big Stone Plant in Big Stone City, South Dakota, to Morris, Minnesota, and a second line would run south from the Big Stone Plant within South Dakota, then east to

Canby, Minnesota, and on to Granite Falls, Minnesota. The lines are more specifically described below:

Line One (the "Morris" line) – Big Stone to Morris, Minnesota:

- A new 230 kV transmission line from the Big Stone Plant to Ortonville, Minnesota (approximately seven miles long, two miles of which are located in Minnesota);
- The rebuild of an existing 115 kV transmission line to 230 kV from Ortonville, Minnesota, to the Johnson Junction switching station located in Johnson, Minnesota (approximately 25 miles), and then from the Johnson Junction switching station to the Morris substation near Morris, Minnesota (approximately 16 miles).

Line Two (the "Granite Falls" line) – Big Stone to Granite Falls, Minnesota:

- A new line capable of operating at 345 kV from the Big Stone Power Plant to Canby, Minnesota, traveling due south in South Dakota, and most likely crossing the Minnesota-South Dakota border due west of Canby (approximately 54 miles, approximately 14 miles of which are in Minnesota);
- The rebuild of an existing 115 kV transmission line from Canby, Minnesota, to Granite Falls, Minnesota (approximately 39 miles), to a line which is also designed and capable of operating at 345 kV, but which would likely operate at 230 kV initially. The line would terminate at the Granite Falls substation.

Project Alternatives

The project alternatives selected for review needed to have a material impact on transmission in Minnesota. One alternative reviewed is a no build option in which transmission in Minnesota would not be built, even under a scenario in which the plant expansion had occurred. A second option is a renewable/gas option, where the proposed generation and transmission plan has been replaced by renewable electric generation, coupled with a natural gas component to compensate for base load requirements. The third alternative reviewed is a distributed generation option that also assumes to replace the proposed generation and transmission plan.

Analysis of Proposed and Alternate Projects

Book 1 of the EIS addresses the human and environmental impacts of the project in respect to the Certificate of Need analysis. In doing so, this section evaluates the matters of size, type and timing that would not normally be included in an EIS for a route permit application.

The alternatives selected provide an equal amount of energy and capacity as the proposal by the applicants. The alternatives were chosen as options having the potential to reduce, mitigate or eliminate the need for the applicants' proposed transmission lines, while delivering the proposed "needed" energy to load centers.

By this review, none of the options were found to have lesser impacts than the proposed Big Stone Transmission Project. The No Build Option does not mitigate for pollutants from the plant nor does it account for customer need or grid reliability. The other two options account for fulfilling customer need, but are not feasibly comparable on a cost[1] or reliability scale.

Route Alternatives

Applicants submitting a route application under the full permitting process must provide an alternative route for consideration. The applicants have proposed two separate route alignments along each of the above general areas.

Additionally, they have proposed two route alignments from Ortonville to Willmar. Also, two additional corridors under review in the Federal EIS being prepared by Western Area Power Administration received route alternative considerations in the application. The one corridor is a variation along the Willmar corridor, and another is a corridor running on the Minnesota side of the South Dakota border between Ortonville and Canby.

Analysis of Proposed and Alternate Routes

Book 2 of the EIS addresses the human and environmental impacts of each of the proposed and alternative routes. Much of this review is assumed from the CN and Route Permit environmental evaluations that accompanied those applications. This analysis also includes a matrix that identifies impacts (see Appendix D) for each route segment, setting forth quantitative impacts for residences, farm land, flora and fauna, project costs, et cetera.

[1] (The comparable cost analysis was challenged by the intervenors represented by MCEA. This comment is addressed in the chapter, "Responses to Substantive Comments on the Draft EIS.)

By this review, the proposed routes offer the least new impact on the environment and on the populace as a whole. The project as proposed includes replacing lines within existing utility rights-of-way. Additionally, longer spans in some areas may mitigate some of the current impacts on wetland areas. The option from Ortonville to Willmar creates the greatest new impacts due to its length and the establishment of new right-of-way.

2.0 ENVIRONMENTAL IMPACT STATEMENT STRUCTURE

The EIS has three primary parts: General Project Information, Book 1, and Book 2. Each part incorporates, by reference, and is primarily based on the analysis and information provided by Otter Tail Corporation dba Otter Tail Power Company, Central Minnesota Municipal Power Agency, Great River Energy, Heartland Consumers Power District, Montana-Dakota Utilities Co., Southern Minnesota Municipal Power Agency, Western Minnesota Municipal Power Agency (as represented by Missouri River Energy Services), collectively the Applicants, in the Certificate of Need Application and the Route Permit Application. In addition, references used in the analysis of the project are identified parenthetically throughout the document and are listed in Section 19.0.

2.1 BOOK 1

Book 1 contains the information that is required by Minnesota Rule 7849.0230 and is specified in Minnesota Rule 4410.7035. It is the human and environmental impact information that would normally be required in the Environmental Report and would typically be prepared for a Certificate of Need. The Public Utilities Commission (PUC) has directed the Department to prepare a single EIS document in order to streamline the process for the Applicants and other parties and to assist the public participation process. Much of this information was gathered using the Route Permit Application submitted by the Applicants, the Environmental Information from the Certificate of Need, and Western Area Power Administration's (Western) Federal Draft EIS. Book 1 comprises Section 7 through Section 11.

The Alternatives evaluated were selected based on the following assumptions:

- That the alternatives may attempt to reduce, mitigate or eliminate the need for the Applicants' proposed transmission lines, while delivering the proposed "needed" energy to load centers
- The alternatives provide an equal amount of energy and capacity as proposed by the Applicants.

2.2 BOOK 2

Book 2 addresses the human and environmental impacts of the proposed routes and other impacts identified by public comments received through the scoping process as required by Minnesota Rule 4400.1700. Much of this information was gathered using the Route Permit Application submitted by the Applicants. The route alternatives evaluated in Book 2 were identified by the Applicants in their Route Permit Application. Book 2 comprises Section 12 through Section 18.

3.0 SUMMARY OF THE PROJECT

3.1 PROJECT DESCRIPTION

As required by Minnesota law, the Applicants have identified several possible route options for the two proposed transmission lines. One new transmission line would run from the Big Stone 230 kilovolt (kV) Substation in South Dakota to the Morris Substation near Morris, Minnesota, a total of approximately 48 miles, about 43 miles of which are in Minnesota. The other transmission line would run from the Big Stone 345 kV[2] and 230 kV substations in South Dakota to Granite Falls, Minnesota, a distance of approximately 90 miles, 54 miles of which would be in Minnesota. The Big Stone 230 kV Substation to Morris Substation transmission line would be constructed at 230 kV (Morris transmission line). The Granite Falls transmission line would be constructed at 345 kV but operated initially at 230 kV (Granite Falls transmission line).

An alternative to the Morris line is a transmission line from the Big Stone Plant to the Willmar, Minnesota area. The Willmar transmission line would be constructed at 230 kV (Willmar transmission line). Additionally, several substation modifications would be associated with the project. Section 4.1 identifies the Applicants' proposal.

3.2 PROJECT LOCATION

The project is located in southwestern Minnesota, within Big Stone, Chippewa, Kandiyohi, Lac qui Parle, Stevens, Swift and Yellow Medicine counties. A project location map is included in Appendix A.

3.3 PROJECT PURPOSE

The Big Stone Transmission Line Project is proposed to meet the additional regional power requirements of the seven project Applicants. The Big Stone Transmission Line Project intends to serve two purposes: (1) provide an outlet for the power from the proposed Big Stone II Plant and (2) increase the transmission capacity and improve reliability of the electric transmission system in the Buffalo Ridge area in Minnesota and South Dakota.

The Applicants are members of the Mid-continent Area Power Pool (MAPP), an association of electric utilities and other electric industry participants. A 2005 MAPP Load and Capability

[2] According to comments from Western on the Draft EIS, "there has been no mention or discussion of construction of this as a new substation. Due to the uncertainty of the timing of the construction of this new substation, Westerns's DEIS addresses it in the cumulative impacts section as a reasonably foreseeable future action."

study indicates that utilities within the region are forecasted to become deficient by 2011 (MAPP, 2005). The Applicants propose the Big Stone Transmission Line Project to help offset a portion of the forecast capacity deficit by transmitting the 600 megawatts (MW) of power (net) that will be produced by the proposed Big Stone II Plant (CN, 2005).

The current transmission capacity available in the local area is not sufficient to carry and deliver the power generated at the proposed Big Stone II Plant to the Applicants' load centers. Transmission system modifications would be required, which would include upgrading existing transmission lines, and/or constructing new transmission lines. Additionally, the Applicants are planning to construct transmission line capacity above the Big Stone II Plant needs to levels consistent with regional transmission plans. The Granite Falls transmission line is proposed to be constructed at 345 kV to provide additional transmission capacity, which could be used to interconnect future generation in the Buffalo Ridge region. Section 1.2 of the Federal Draft EIS provides further details on the studies carried out to determine the need for the project.

4.0 PROJECT ALTERNATIVES – BOOK 1

4.1 BIG STONE TRANSMISSION LINE PROJECT

The Big Stone Transmission Line Project involves the construction of two transmission lines. There are two system alternatives proposed by the Applicants to provide outlet from Big Stone II Plant and to increase the transmission capacity and improve reliability of the electric transmission system in the Buffalo Ridge area in Minnesota and South Dakota. The two system alternatives[3] are as follows:

System Alternative 1 includes:

- A 230 kV transmission line between the Big Stone 230 kV Substation in South Dakota and the Morris Substation near Morris, Minnesota, and
- A 345 kV transmission line that would run from the Big Stone 345 kV and 230 kV substations in South Dakota to the Granite Falls Substation in Granite Falls, Minnesota. The transmission line would be constructed at 345 kV but operated initially at 230 kV.

System Alternative 2 includes:

- A 230 kV transmission line from Big Stone II Plant to the Willmar, Minnesota area, and
- A 345 kV transmission line that would run from the Big Stone 345 kV and 230 kV substations in South Dakota to the Granite Falls Substation in Granite Falls, Minnesota. The transmission line would be constructed at 345 kV but operated initially at 230 kV.

The need for these transmission lines and the basis for their selection are described in greater detail in the Certificate of Need Application that was filed with the PUC on September 30, 2005 (CN, 2005).

[3] (See the Western comment letter in Appendix J for additional detail on the system alternatives described above.)

4.2 NO BUILD (WITHOUT BIG STONE II)

The No Build Alternative without the Big Stone II Plant (No Big Stone II) would involve no construction of transmission lines or any other power generation facilities, including the Big Stone II Plant in South Dakota.

4.3 NO BUILD (WITH BIG STONE II)

Under the No Build Alternative with the Big Stone II Plant (with Big Stone II), the proposed Big Stone II Plant would be built in South Dakota, but no directly-associated transmission lines would be constructed in Minnesota.

4.4 WIND/GAS

The wind and natural gas generation alternative assumes the following generation and associated infrastructure as an alternative to the proposed Big Stone Transmission Line Project:

- Construction of 747 MW of wind generation capacity and transmission line upgrades in Minnesota in locations and quantities identified by the Midwest Independent System Operator's (MISO) Group 4 Interconnection Study (ABB, 2006).
- Construction of a 250 to 650 MW capacity, state-of-the-art natural gas combined cycle generation facility and associated pipeline and transmission infrastructure similar to the Mankato Energy Center (MEC) and the Faribault Energy Park (FEP) generation facilities recently completed or under construction in Minnesota.

A map identifying the Group 4 projects and the wind resource areas is included as Appendix A.3.

4.5 DISTRIBUTED GENERATION

A Distributed Generation (DG) alternative of roughly 400 MW accredited capacity has been developed for evaluation. The alternative considers the use of wind, diesel, gas turbine, biomass, landfill gas, and Demand Side Management (DSM). This particular scenario was developed to identify a reasonable DG alternative that can be used as a comparative tool in evaluating potential environmental impacts of an alternative to the Big Stone Transmission Line Project. Table 1 summarizes the DG Alternative Scenario.

Table 1
Summary of DG Alternative Scenario for the Big Stone HVTL Project

Summary	MW	Capacity Factor (percent)	Accreditation Factor (percent)	Accredited Capacity	MWh
Wind	277	32.5	13.5	37	788,619
Diesel	62	85.0	100.0	62	461,652
Gas Turbine	203	85.0	100.0	203	1,511,538
Biomass	39	70.0	100.0	39	239,148
Landfill Gas	15	85.0	100.0	15	111,690
DSM	36	33.6	100.0	36	105,961
Total	632			392	3,218,608

5.0 TRANSMISSION ALTERNATIVES – BOOK 2

Possible routes for the Big Stone II Plant transmission lines and the associated facility improvements are described more specifically in Book 2. The following describes the alternatives for each route. Each route is identified in Appendix A.1 and is provided in detail in Appendix B.1 through Appendix B.14.

5.1 THE 230 KV MORRIS TRANSMISSION LINE ROUTE

The Morris route alternatives are identified in Appendix B.1 through Appendix B.14. The preferred route for the 230 kV Morris transmission line (Morris Route 1) is along the route of an existing 115 kV transmission line. The Applicants intend to rebuild the existing 115 kV transmission line to 230 kV standards. If Morris Route 1 were chosen, approximately 99.7 percent of the route would be rebuilt using the existing 115 kV right-of-way (ROW). The alternative route (Morris Route 2) is west of the preferred route to Malta Township, where it shifts to the east of the preferred route and interconnects with the Johnson Junction Substation. The alternative is then north of the preferred route to the Morris Substation. Morris Route 2 is along new transmission ROW for 90.6 percent of the route. The routes will utilize H-frame or single pole structures and would begin at the Minnesota/South Dakota border south of Ortonville, Minnesota. Approximately 4 miles of the route would be in South Dakota for this route.

5.1.1 MORRIS ROUTE 1

Segments included in Morris Route 1 are: M1, M2, M3, M5, M7, M9, M10, and M17. Below is a description of the route, by segment, starting on the western end.

M1 begins at the Minnesota/South Dakota border and follows an existing 115 kV transmission line ROW, which crosses the Minnesota River. The route alignment then crosses MN Trunk Highway 7 and the segment ends at the top of the hill.

M2 begins on the east side MN Trunk Highway 7 and continues east for 1.5 miles where it turns north, crosses U.S. Highway 12 and continues to follow Township Road 135 until County State Aid Highway (CSAH) 12. At this point, the segment turns northeast following CSAH 12 for approximately 0.6 miles.

M3 follows CSAH 12 through the Prairie Wildlife Management Area (WMA). The route continues northeast for approximately 2.4 miles to Township Road 104, where it crosses to the east side of CSAH 12. Once on the east side of CSAH 12 the transmission line will turn north-northeast again, then cross back to the west side of the road and continue northeast for approximately 0.85 miles to CSAH 10. At CSAH 10, the route alignment will turn east along the north side of the road for 0.4 miles.

M5 begins at the intersection of CSAH 10 and Township Road 128. The route alignment follows the north side of CSAH until it turns north along the west side of CSAH 21. The segment continues north for 4 miles and ends at County Road 71.

M7 continues north from County Road 71 along CSAH 21 for 9.5 miles, where it will interconnect at the new Johnson Junction Substation.

M9 and M10 are approximately 3 miles long. The route alignment heads east from the new Johnson Junction Substation and will follow the half-section along the existing 115 kV transmission line ROW to the Big Stone/Stevens County transmission line.

M17 continues east from the Big Stone/Stevens County transmission line for 12.5 miles along the existing 115 kV transmission line, terminating at the Morris Substation.

5.1.2 MORRIS ROUTE 2

Segments included in Morris Route 2 are: M1, M2, M3, M4, M6, M8, M11, M13, M14, and M18. Below is a description of the route, by segment, starting on the western end.

M1 begins at the Minnesota/South Dakota border and follows an existing 115 kV transmission line ROW, which crosses the Minnesota River. The route alignment then crosses MN Trunk Highway 7 and the segment ends at the top of the hill.

M2 begins on the east side MN Trunk Highway 7 and continues east for 1.5 miles where it turns north, crosses U.S. Highway 12 and Township Road 135 until CSAH 12. At this point, the segment turns northeast following CSAH 12 for approximately 0.6 miles.

M4 continues northwest along the western edge of a Waterfowl Production Area (WPA) for 1 mile until County Road 65. At this point the segment follows County Road 65 for 1.1 miles, then turns east at the half-section line of Section 24 for 1 mile until Township Road 130. The

segment then follows Township Road 130 north for 0.5 miles, then turns east along CSAH 10 for 1.25 miles until CSAH 12.

M6 continues north following Township Road 128 on the east side for 3.75 miles until County Road 71. It follows County Road 71 east, then north, then east again for 1.25 miles until CSAH 21.

M8 begins at CSAH 21 and follows County Road 71 for 1 mile east. At this point, the segment turns north along Township Road 84 for 9.5 miles. The segment runs adjacent to a WPA for 1 mile and the Freed WMA for 1,900 feet. The segment ends at the existing 115 kV transmission line to Morris.

M11 begins at the existing 115 kV transmission line and follows Township Road 84 north for 0.5 miles until MN Highway 28 and continues north cross-country for 0.5 miles along the east edge of Johnson, Minnesota. The segment ends at an abandoned railroad ROW.

M13 continues north cross-country for 0.75 to the Big Stone/Traverse county line.

M14 follows the south side of the Big Stone/Traverse county line east for 1 mile.

M18 follows the south side of the Big Stone/Traverse county line east for 11 miles to the Morris Substation.

5.2 THE WILLMAR TRANSMISSION LINE ROUTE

Two possible route options between the Big Stone II Plant and the Willmar area have been identified and are examined in this EIS. Both routes would require new transmission ROW. These routes are identified in Appendix B.1 through Appendix B.14.

5.2.1 WILLMAR ROUTE 1

Segments included in the Willmar Route 1 are: G-W, W2, W3, W5A, W5B, W6, W7, W9, W12A, W12B, W15, and W16. Below is a description of the route, by segment, starting on the western end.

G-W begins at the Minnesota/South Dakota border and follows an existing 115 kV transmission line ROW, which crosses the Minnesota River and ends at MN Trunk Highway 7/U.S. Highway 75.

W2 follows MN Trunk Highway 7/U.S. Highway 75 southeast, then east for 6.5 miles.

W3 continues along CSAH 14 for 3.2 miles. The segment then turns north at the half-section for 1 mile cross-country, then turns east and follows 30th Street SW (Swift County) for 9.9 miles until U.S. Highway 12. This section is adjacent to one WPA for 0.5 miles in Section 13 in Big Stone County. W3 continues east following U.S. Highway 12 on the south side for 6.6 miles until U.S. Highway 59.

W5A continues east along U.S. Highway 12 for 3 miles until CSAH 38.

W5B continues east following U.S. Highway 12 for 3 miles until turning south at CSAH 13 for 1 mile.

W6 continues east following CSAH 14 for 4.8 miles. The segment ends at the intersection with an existing 115 kV transmission line and is adjacent to the Clair Rollings WMA.

W7 begins at the existing 115 kV transmission line and continues east along CSAH 14 for 3.1 miles.

W9 continues east along CSAH 14 for 6 miles, then turns south cross-country for 1 mile at the Torning/Kildare township line. At CSAH 10, the segment turns east for 2.2 miles until U.S. Highway 12. At this point, the segment follows U.S. Highway 12 southeast for 1.9 miles, turning east for 2.6 miles along the Kildare/Dublin township line. The segment then turns south for 1.5 miles, east cross-country for 1.5 miles, then south for 0.5 miles, then east for 2.5 miles until County Road 89.

W12A continues east for 0.5 miles along 80th Street NW, then turns south cross-country for 1 mile, then along 165th Avenue for 1.5 miles until U.S. Highway 12. The segment then turns east along U.S. Highway 12 for 0.5 miles, then south along 170th Avenue for 1.25 miles. The segment then crosses into Chippewa County and continues south for 4.5 miles.

W12B turns east cross-country for 1 mile.

W15 continues east cross-country for 0.5 miles

W16 continues east cross-country for almost 2 miles, and then follows the south side of MN Highway 23 for 2.5 miles until turning south for 0.5 miles and into the Willmar Substation.

5.2.2 WILLMAR ROUTE 2

Segments included in the Willmar Route 2 are: G-W, W1A, W19B, W20, W21, W22, W23, W24, W29, W12B, W14, W17, and W18. Below is a description of the route, by segment, starting on the western end.

G-W begins at the Minnesota/South Dakota border and follows an existing 115 kV transmission line ROW, which crosses the Minnesota River and ends at MN Trunk Highway 7/U.S. Highway 75.

W1A follows the existing Ortonville to Morris 115 kV transmission line east for 1.5 miles. The segment continues east cross-country for 1.5 miles, then south for 0.5 miles along County Road 67. The segment then turns east for 2 miles running adjacent to a WPA. The segment then turns south along CSAH 21 for 0.5 miles, then east cross-country for 2 miles running south of a WPA. At Township Road 122, the segment turns north for 1 mile, then east cross-country along the half-section for 6 miles until CSAH 25. At CSAH 25, the segment turns north for 0.5 miles to U.S. Highway 12 and continues on the south side of U.S. Highway 12 into Swift County for 4.5 miles. As U.S. Highway 12 veers southeast, the segment continues east along 40th Street SW for 6.5 miles. The segment then turns south for 0.5 miles, then east cross-country for 3 miles, then south for 0.5 miles along 140th Avenue SW ending at U.S. Highway 12.

W19B continues south along the west side of 140th Avenue SW for 1 mile, then east along 20th Street SW for 1 mile until CSAH 38/130th Avenue SW.

W20 continues south along CSAH 38, crossing the Burlington Northern Santa Fe Railway Company (BNSF) railroad tracks in Section 19. The segment continues south along County Road 61 for 2.9 miles.

W21 continues south along County Road 61 for 1.5 miles until CSAH 6. At CSAH 6, the segment turns east for 13 miles.

W22 continues east along CSAH 6 for 4 miles then turns south at County Road 83 for 2 miles, then turns east for 1 mile along 110th Street SW and 3 miles east cross-country ending at 90th Avenue.

W23 continues east cross-country for 1 mile then follows 110th Street SW for 1 mile, then east cross-country for 2.5 miles, then south cross-country for 3 miles on the half-section.

W24 continues south cross-country on the half-section line for 2.5 miles until is intersects with an existing 69 kV transmission line.

W29 continues east along the existing 69 kV transmission line for 3.5 miles. The Sena WMA is adjacent to this segment for 0.5 miles in Section 26.

W12B continues east cross-country for 1 mile to the Chippewa/Kandiyohi county line.

W14 follows the Chippewa/Kandiyohi county line south for 0.5 miles then turns east at 45th Avenue SW for 1 mile. The segment then turns south along 135th Street SW for 1 mile, then east along 60th Avenue SW for 4 miles until MN Highway 23.

W17 follows 60th Avenue SW east for 4.25 miles until it intersects with the Granite Falls to Willmar 230 kV transmission line.

W18 follows the existing 230 kV transmission line northeast and north for 1.25 miles into the Willmar Substation.

5.3 THE 345 KV GRANITE FALLS TRANSMISSION LINE ROUTE

The Granite Falls route alternatives are identified in Appendix B.1 through Appendix B.14. The 345 kV Granite Falls transmission line route preferred by the Applicants (Granite Falls Route 1) travels the first 36 miles in South Dakota and crosses the border just east and north of Gary, South Dakota, where it continues essentially east for approximately 14 miles to the Canby Substation. From the Minnesota/South Dakota border to the Canby Substation, the transmission line will follow new ROW as a 345 kV transmission line, initially operated at 230 kV. From the Canby Substation to the Granite Falls Substation, the existing 115 kV transmission line will be rebuilt to the eastern edge of Hazel Run Township. It will also be designed as a 345 kV transmission line, but will initially be operated at 230 kV. From the eastern edge of Hazel Run Township to the Granite Falls Substation (a distance of approximately 9.4 miles), the transmission line will be constructed to 230 kV standards. An alternative route between Canby, Minnesota and Granite Falls, paralleling the preferred route (Granite Falls Route 2), is also examined in this document.

An alternative to the preferred route that was considered between Canby and the Big Stone II Plant would place the transmission line on the Minnesota side of the border rather than on the South Dakota side. Two possible routes on the Minnesota side (Granite Falls Routes 3 and 4) are examined in this document.

5.3.1 GRANITE FALLS ROUTE 1

Segments included in the Granite Falls Route 1 are: G14, G15A, G15B, G17, G21, G30, G31, G32, G39, G45, G49, and G50. Below is a description of the route, by segment, starting on the western end.

G14 continues south in Minnesota along the Minnesota/South Dakota border for 1.2 miles ending just before the residence on the east side of the road. A minor change has been proposed to this segment in the Applicant's comments on the DEIS and in the direct testimony of Myron Rader, filed on October 2, 2006. The adjustment in alignment bypasses an area of interest for the USFWS in order to minimize environmental impacts. See new map in Appendix B.16.

G15A angles southeast across a farm field to the Las qui Parle/Yellow Medicine county line. The segment then turns east along the county line for 4.3 miles ending at CSAH 9.

G15B follows CSAH 14 south for 0.5 miles.

G17 continues south for 0.5 miles along CSAH 14.

G21 continues south for 2.5 miles along CSAH 14, turns east along the half-section line for 0.5 miles until it intersects and existing 115 kV transmission line.

G30 continues east cross-country along the half-section line for 2.25 miles.

G31 continues east along the existing 115 kV transmission line for 3.6 miles.

G32 continues south along the existing 115 kV transmission line for 1 mile and into the Canby Substation.

G39 continues east along the existing 115 kV transmission line for 8.7 miles ending at the intersection with an existing 69 kV transmission line.

G45 continues east along the existing 115 kV transmission line for 16 miles. The segment passes adjacent to the Omro WMA for 2,000 feet and passes through the Lanners WMA for 1,600 feet.

G49 continues east along the existing 115 kV transmission line for 4 miles to 500th Street.

G50 continues east along the existing transmission line for 1 mile. At this point, the proposed transmission line will change to 230 kV and continue north along the existing transmission line for 3.5 miles until County Road 67. The segment then follows the existing transmission line and County Road 67 for 0.5 miles, and then follows the existing transmission line east for 0.5 miles, north for 2.1 miles, and east across the Minnesota River for 0.75 miles into the Granite Falls Substation.

5.3.2 GRANITE FALLS ROUTE 2

Segments included in the Granite Falls Route 2 are: G14, G16, G20, G23, G24, G26, G27, G29, G32, G34, G38, G42, G44, G46, G47, G48, G51, G52, and G53. Below is a description of the route, by segment, starting on the western end.

G14 continues south in Minnesota along the Minnesota/South Dakota border for 1.2 miles ending just before the residence on the east side of the road. (See G14 in 5.3.1.)

G16 continues south along the Minnesota/South Dakota border for 0.75 miles to the half-section line of Section 4. At this point, the segment turns east for 0.5 miles, south along 111th Avenue for 0.5 miles and east along CSAH 14 for 4 miles.

G20 continues east along CSAH 4 for 1 mile.

G23 continues east along CSAH 4 for 1.5 miles.

G24 follows County Road E2 south for 0.5 miles, then east cross-country for 1 mile at the half-section line.

G26 continues east cross-country along the half-section line for 1 mile until CSAH 13.

G27 follows CSAH 13 south for 0.5 miles then east along 260th Avenue for 1 mile to 200th Street.

G29 continues along 260th Avenue for 1.5 miles then turns south cross-country for 1.5 miles ending at an existing 115 kV transmission line.

G32 continues south along the existing 115 kV transmission line for 1 mile and into the Canby Substation.

G34 follows the existing 115 kV transmission line northeast out of the Canby Substation for 0.75 miles.

G38 continues east for 2 miles along 240th Avenue.

G42 continues east for 6 miles along 240th Avenue ending at an existing 69 kV transmission line.

G44 follows County Road 11 and the existing 69 kV transmission line south for 0.5 miles.

G46 continues along County Road 11 and the 69 kV transmission line for 0.5 miles and follows the 69 kV transmission line east for 1 mile, then south for 1 mile. The segment then turns east along CSAH 3 and continues for 15 miles ending at an existing 115 kV transmission line.

G47 follows the existing 115 kV transmission line north for 1 mile.

G48 follows 230th Avenue east for 4 miles, then turns north for 0.5 miles. At this point, the proposed transmission line will change to 230 kV.

G51 follows 500th Street north for 3.5 miles until County Road 67. The segment continues north cross-country for 1 mile, then turns east along 280th Avenue for 1 mile, then north along 510th Street for 0.5 miles.

G52 follows the existing 115 kV transmission line east for 1 mile, northeast for 1.8 miles, and east for 0.5 miles.

G53 follows the existing 115 kV transmission line across the Minnesota River and into the Granite Falls Substation (0.75 miles).

5.3.3 GRANITE FALLS ROUTE 3

Segments included in the Granite Falls Route 3 are: G15B, G17, G21, G30, G31, G32, G39, G45, G49, G50, G59, G61, G63, G65, G67, G69, and G70. Below is a description of the route, by segment, starting on the northern end.

G59 follows the Minnesota/South Dakota border south for 1.6 miles on the Minnesota side, then turns east 1,320 feet from the section line and goes east for 1.8 miles, then turns south along CSAH 7 for 1.8 miles.

G61 continues south along CSAH 7 for 1.5 miles to CSAH 30, then turns east along CSAH 30 for 0.5 miles until the half-section line.

G63 follows the half-section line south cross-country for 9 miles ending at MN Highway 40.

G65 continues south along the half-section line cross-country for 1 mile, along 141st Avenue for 1 mile and cross-country again for 1 mile ending at 210th Street.

G67 continues south along the half-section line cross-country for 2 miles ending at U.S. Highway 212.

G69 continues south along the half-section line cross-country for 3 miles ending at CSAH 12.

G70 jogs west along CSAH 12 for 1,320 feet, turns south along the half-section line for 2 miles until 140th Street. At this point, the segment turns east for 1 mile, south cross-country for 2 miles. The segment turns east along County Road 50 for 2 miles then south along CSAH 9 for 1 mile.

G15B follows CSAH 14 south for 0.5 miles.

G17 continues south for 0.5 miles along CSAH 14.

G21 continues south for 2.5 miles along CSAH 14, turns east along the half-section line for 0.5 miles until it intersects an existing 115 kV transmission line.

G30 continues east cross-country along the half-section line for 2.25 miles.

G31 continues east along the existing 115 kV transmission line for 3.6 miles.

G32 continues south along the existing 115 kV transmission line for 1 mile and into the Canby Substation.

G39 continues east along the existing 115 kV transmission line for 8.7 miles ending at the intersection with an existing 69 kV transmission line.

G45 continues east along the existing 115 kV transmission line for 16 miles. The segment passes adjacent to the Omro WMA for 2,000 feet and passes through the Lanners WMA for 1,600 feet.

G49 continues east along the existing 115 kV transmission line for 4 miles to 500th Street.

G50 continues east along the existing transmission line for 1 mile. At this point, the proposed transmission line will change to 230 kV and continue north along the existing transmission line for 3.5 miles until County Road 67. The segment then follows the existing transmission line and County Road 67 for 0.5 miles, and then follows the existing transmission line east for 0.5 miles, north for 2.1 miles, and east across the Minnesota River for 0.75 miles into the Granite Falls Substation.

5.3.4 GRANITE FALLS ROUTE 4

Segments included in the Granite Falls Route 4 are: G24, G26, G27, G29, G32, G34, G38, G42, G44, G46, G47, G48, G51, G52, G53, G54, G55, G56, G57, and G58. Below is a description of the route, by segment, starting on the northern end.

G54 begins at the Minnesota/South Dakota border and goes east along 380th Street for 1 mile, south for 0.5 miles along 111th Avenue, east cross-country at the half-section line for 3 miles until County Road 51. At this point, the segment turns south along County Road 51 for 3 miles.

G55 continues south along CSAH 3 for 6.5 miles. The segment continues south along an existing 69 kV transmission line, then follows 141st Avenue for 3 miles.

G56 continues south along the 69 kV transmission line for 3 miles.

G57 follows the existing 69 kV transmission line south for 2 miles.

G58 follows the existing 69 kV transmission line south for 2 miles, east for 2 miles, then south for 1 mile. At this point, the segment continues south cross-country on the half-section line for 5 miles. At CSAH 4, the segment turns east for 0.5 miles then south along 167th Avenue for 1 mile and into Yellow Medicine County along County Road E2 for 1 mile.

G24 follows County Road E2 south for 0.5 miles, then east cross-country for 1 mile at the half-section line.

G26 continues east cross-country along the half-section line for 1 mile until CSAH 13.

G27 follows CSAH 13 south for 0.5 miles then east along 260th Avenue for 1 mile to 200th Street.

G29 continues along 260th Avenue for 1.5 miles then turns south cross-country for 1.5 miles ending at an existing 115 kV transmission line.

G32 continues south along the existing 115 kV transmission line for 1 mile and into the Canby Substation.

G34 follows the existing 115 kV transmission line northeast out of the Canby Substation for 0.75 miles.

G38 continues east for 2 miles along 240th Avenue.

G42 continues east for 6 miles along 240th Avenue ending at an existing 69 kV transmission line.

G44 follows County Road 11 and the existing 69 kV transmission line south for 0.5 miles.

G46 continues along County Road 11 and the 69 kV transmission line for 0.5 miles and follows the 69 kV transmission line east for 1 mile then south for 1 mile. The segment then turns east along CSAH 3 and continues for 15 miles ending at an existing 115 kV transmission line.

G47 follows the existing 115 kV transmission line north for 1 mile.

G48 follows the 230th Avenue east for 4 miles, then turns north for 0.5 miles. At this point, the proposed transmission line will change to 230 kV.

G51 follows 500th Street north for 3.5 miles until County Road 67. The segment continues north cross-country for one mile then turns east along 280th Avenue for 1 mile, then north along 510th Street for 0.5 miles.

G52 follows the existing 115 kV transmission line east for 1 mile, northeast for 1.8 miles and east for 0.5 miles.

G53 follows the existing 115 kV transmission line across the Minnesota River and into the Granite Falls Substation (0.75 miles).

5.4 JOHNSON JUNCTION SWITCH STATION MODIFICATIONS

The existing Johnson Junction Switch Station is located 25 miles north of Ortonville in the east half of Section 9, Township 124N, Range 45W of Big Stone County, Minnesota. The switch station is owned by Great River Energy (GRE). A new substation to accommodate the 230 kV Morris transmission line from the Big Stone 230 kV Substation will be constructed adjacent to the switch station. The new Johnson Junction Substation will require the following equipment:

- 3-breaker ring-bus
- 3-phase 230/115 kV transformer
- 115 kV breaker
- control house for relaying
- fencing to enclose the substation yard

To allow for construction of the substation while the existing switching station remains energized, location of the additional equipment is planned directly south of the existing fenced area. To accommodate the new equipment, an area approximately 400 feet by 400 feet (3.67 acres) will be graded, and concrete footings for the electrical equipment and a gravel pad will be constructed. The Applicants propose purchasing approximately 5 acres of land south of the existing property (Appendix C.1).

5.5 MORRIS SUBSTATION MODIFICATIONS

The existing Morris 230 kV Substation is located west of Morris in the SE ¼ of the SW ¼ of Section 36, Township 124, Range 43W in Stevens County, Minnesota. The substation has one 3-phase 230/115 kV transformer and one 3-phase 115/41.6 kV transformer. The Morris 230 kV Substation is owned and operated by Western, and any modifications to this station are within their jurisdiction. Planned modifications include a new 230 kV transmission line termination, a breaker with associated switches, and transmission line relaying equipment. Additionally, the current 230/115 kV transformer will likely be replaced with a larger unit. However, system studies are not completed yet, so final modifications and whether they will require substation expansion are still under review (see Western's DEIS, p. 2-28).

5.6 WILLMAR SUBSTATION MODIFICATIONS

The existing Willmar 230 kV Substation is located in Willmar in the SE ¼ of the SW ¼ of Section 27, Township 119, Range 35, in Kandiyohi County, Minnesota. The City of Willmar, Xcel Energy and GRE currently share ownership of this facility. The existing facility has one 3-

phase 230/69 kV transformer and one 3-phase 115/69 kV transformer. Modifications to this facility to accommodate the proposed new 230 kV transmission line are as follows:

- Install a parallel 230/69 kV transformer by replacing the existing 115/69 kV transformer with a new 230/69 kV transformer
- Construct a breaker and a half scheme to accommodate the new transformer and associated equipment

These modifications will require that the site be expanded to the northwest of the facility. The expansion is estimated at approximately 250 feet by 250 feet (1.5 acres) and will require grading and installation of concrete footings and a gravel pad. Approximately 3 acres of land will be purchased for the proposed expansion (Appendix C.2).

5.7 CANBY SUBSTATION MODIFICATIONS

The existing Canby 115/41.6 kV Substation is located north of Canby in the SW ¼ and NW ¼ of Section 25, Township 115, Range 45, in Yellow Medicine County, Minnesota. The Canby 115/41.6 kV Substation is owned and operated by Otter Tail Power Company (OTP). The facility has one 3-phase 115/41.6 kV transformer. Modifications to the substation will include the following:

- Installation of a new 230 kV 3 position ring bus with transmission line terminations for the Big Stone and Granite Falls lines
- Installation of a new 3-phase 230/115kv transformer
- Expansion of the existing control house or construction of a new control house to accommodate the necessary control and relaying equipment for the new transmission line

As much of the 230 kV 3-position ring bus will be constructed with 345 kV-rated equipment as practicable to accommodate the future 345/115 kV transformer that will replace the 230/115 kV transformer when the 345 kV Granite Falls transmission line is energized at 345 kV.

These modifications will require that the site be expanded or moved to a new location. If expansion occurs at the existing site, the expansion area is estimated at 500 feet by 550 feet (6.3 acres) and will require grading and installation of concrete footings and a gravel pad.

There are four alternative sites to relocate the Canby Substation (Appendix C.3). Alternative A is approximately ½ mile east of the existing facility following the exiting 115 kV line to Granite Falls. This property is located in the SE ¼ of the NE ¼ of Section 25 of Hammer Township in

Yellow Medicine County. Approximately 20 acres would be required for the substation and transmissions lines at this site.

Alternative B is approximately 1 mile north and ¼ mile west of the existing facility. This property is located in the NW ¼ of the SW ¼ of Section 24 of Hammer Township in Yellow Medicine County. Approximately 20 acres would be required for the substation and transmissions lines at this site.

Alternative C is approximately 1 mile northeast of the existing facility along U.S. Highway 75. This property is located in the SW ¼ of the SW ¼ of Section 19 of Oshkosh Township in Yellow Medicine County. The entire 58-acre triangular parcel would likely be acquired for the substation and transmissions lines at this site.

Alternative D is approximately 4 miles west of the existing facility. This property is located in the SE ¼ of the SE ¼ of Section 30 of Hammer Township in Yellow Medicine County. It is located at Burr Junction on a parcel owned by OTP. Expansion at this site would likely require approximately 6.3 acres of land.

Depending on the locations chosen, appropriate rerouting of the transmission line to the substation would occur.

In their response to the DEIS, the Applicants note their proposal to change the location of the Canby Substation to Alternative C above (see the prefiled testimony of Darryl Shoemaker and Myron Rader). The new site is outside the floodplain, and there are no different environmental impacts that result from moving the substation to this location. A detailed map of the alternative interconnection for the Canby Substation has been added as Appendix C.4 for this Final EIS.

5.8 GRANITE FALLS SUBSTATION MODIFICATIONS

The existing Granite Falls 230 kV Substation is located north of Granite Falls in the SW ¼ of the NE ¼ of Section 28, Township 116N, Range 39W. The Granite Falls 230 kV Substation is owned and operated by Western. The substation includes one 3-phase 230/69 kV transformer and one 3-phase 115/69 kV transformer. Modifications to this substation include a new 230 kV transmission line termination, a breaker with associated switches, and transmission line relaying equipment. However, system studies are not completed yet, so final modifications and whether they will require substation expansion are still under review (Western's DEIS, p. 2-28).

6.0 REGULATORY FRAMEWORK

6.1 PUC CERTIFICATE OF NEED

No new transmission line with a voltage over 200 kV and greater than 1,500 feet in length, or over 100 kV with more than 10 miles of length in Minnesota, can be constructed in Minnesota without a Certificate of Need from the PUC (Minnesota Statute §216B.243). Both of the transmission lines being evaluated in this EIS require a Certificate of Need.

Book 1 of this document represents the Environmental Report as required by Minnesota Rule 7849.0230. The contents of Book 1 provide the human and environmental impact information as outlined by Minnesota Rule 4410.7035, Subp. 1(c) and 3.

6.2 PUC PERMIT REQUIREMENT

Minnesota Statute §116C.57 Subd. 2a states, "Any person seeking to construct a large electric power generating plant or a high voltage transmission line must apply to the board for a site permit or a route permit." Minnesota Statute §116C.52, Subd. 4 defines a high voltage transmission line (HVTL) as "a conductor of electric energy and associated facilities designed for and capable of operation at a nominal voltage of 100 kilovolts or more and is greater than 1,500 feet in length." The Applicants' proposed transmission lines meet this definition, and the Applicants are required to obtain a route permit from the PUC.

Under the siting authority defined by Minnesota Statute §116C.53, it is the policy of the PUC to choose routes "that minimize adverse human and environmental impact while insuring continuing electric power system reliability and integrity, and insuring that electric energy needs are met and fulfilled in an orderly and timely fashion." The route permit will contain conditions specifying construction and system operational standards.

6.3 SCOPING OF ENVIRONMENTAL IMPACTS AND ALTERNATIVE ROUTES

The public was provided the opportunity to contribute to the scope of the EIS by submitting public comments during the public meetings held by the EFP of the Department on January 24-26, 2006 in Benson, Morris, Ortonville, Canby and Granite Falls, Minnesota. The public was also given until February 13, 2006 to submit written comments regarding the scope of the EIS.

Copies of the comment letters received during the scoping period are part of the EIS Scoping Decision Document and can be found on the PUC website at http://energyfacilities.puc.state.mn.us/Docket.html?Id=18215 and the Scoping Decision Document is in Appendix I.

There were numerous comments on the proposed project. The following represents a summary of those comments that were considered in determining the project scope:

Air Quality

- The EIS should address the public health impacts in Minnesota from additional mercury emissions from the Big Stone II Plant, in particular, the bio-accumulation of mercury in the environment.
- The permit should require that the existing Big Stone II Plant achieve the best possible standards for mercury and greenhouse gas emissions.

Economic Impacts

- The EIS should address the economic effects to Minnesota on recreation (fishing) due to mercury emissions from the Big Stone II Plant.
- The EIS should evaluate the lost opportunity for local development and jobs by constructing wind and other renewable energy resources.
- The EIS should evaluate the opportunity to locate energy generation in Minnesota to benefit Minnesota with jobs and tax revenue.

Water Resources, Wildlife and Nongame Species Impacts

- The EIS should evaluate ways to minimize impacts to Department of Natural Resources (DNR) and U.S. Fish and Wildlife Service (USFWS) wetlands that the government spent tax dollars preserving.
- The EIS should address the potential of waterfowl impacts due to transmission line collisions and noise affecting nesting.

Agricultural Impacts and Property Values

- The EIS should evaluate ways to minimize additional agricultural land impacts, including burying transmission lines when crossing prime farmland.
- The EIS should address the reduction in agricultural land values due to the presence of the easement and transmission line.

Visual Impacts of the Big Stone II Plant and Transmission

- The EIS should evaluate the visual impacts of constructing the transmission line adjacent to U.S. Highway 12.

Human Health and Safety

- The EIS should evaluate the potential health impacts from the transmission lines.
- The EIS should evaluate stray voltage impacts from the transmission lines.
- The EIS should evaluate the affects on farmer and public safety from the placement of structures in fields.

Renewable Energy, Distributed Resources, and Energy Efficiency and Conservation

- The EIS should evaluate the potential of locally produced wind and renewable energy resources over coal based generation.
- The EIS should evaluate a generation alternative that includes wind, biomass, natural gas, or a combination thereof.
- The EIS should address whether a distributed wind network is able to capture wind events and reduce the wind's intermittency as an energy source.
- The EIS should address using conservation and energy efficiency measures rather than building the proposed facilities.

Electrical Communications and Global Positioning System (GPS) Equipment Impacts

- The EIS should evaluate the potential impacts on open-air TV reception, radios, satellite TV reception, and GPS/guidance equipment on farm equipment.

BOOK 1 – PROJECT ALTERNATIVES: ANALYSIS OF IMPACTS AND FEASIBILITY

Minnesota Rule 4410.7035, Subp. 1B requires the Draft EIS to study generation alternatives to transmission project proposals. Analysis of generation alternative must answer the following questions:

- Can the alternative accomplish the same goal as the Applicant's proposed goal? In other words, can the alternative replace the Applicant's proposed transmission project?
- Is the alternative feasible and are the technologies available in the marketplace?
- What are the likely or possible environmental, economic, and social impacts of the alternative?

7.0 BIG STONE TRANSMISSION LINE PROJECT

The first alternative evaluated for Book 1 is the Big Stone Transmission Project as proposed by the Applicants in their Route Permit Application. This section fulfills the requirement of the Department to evaluate the proposed project and associated facilities under Minnesota Rules 4410.7035.

7.1 RIGHT-OF-WAY REQUIREMENTS

The Big Stone Project will require between 46 and 94 miles of 230 kV transmission line and between 51 and 81 miles of 345 kV transmission line in Minnesota. The Applicants will acquire 125 feet of ROW for the 230 kV transmission line and 150 feet for the 345 kV transmission line.

There are opportunities to rebuild existing transmission lines, and in these instances new transmission ROWs will be minimized. Additionally, there are several opportunities to parallel other types of existing ROWs, such as roads and railroads. When existing ROWs are paralleled, less ROW is needed, since it overlaps with the existing ROW corridor. Typically, when paralleling roads and railroads, utilities place the structures approximately 10 feet from the existing ROW, which results in needing 82.5 feet for the 230 kV transmission line and 98.5 for the 345 kV transmission line. The estimated amount of new ROW (i.e. transmission not paralleling existing corridors) for the 230 kV system is between 2.4 and 352 acres. The 345 kV system would require approximately 6.7 to 530 acres of new ROW (Appendix D). Appendix E.9 and Appendix E.12 identify typical ROW requirements for the project.

7.2 SIZE AND TYPE OF STRUCTURES

The proposed structures for the project are wood or steel H-frame or steel single pole davit arm structures. The 230 kV structures are between 70 and 100 feet in height. The 345 kV structures are between 80 and 120 feet in height. Typical spans are approximately 700 feet for the 230 kV transmission line and approximately 800 feet for the 345 kV transmission line. Maximum spans are typically 1,000 feet.

Impacts associated with transmission line structures are typically limited to the footprint of the structure. A conservative estimate of permanent impacts is 500 square feet per pole (1,000 square feet per H-frame structure) for both 230 kV and 345 kV transmission lines. Temporary impacts from construction are typically 20,000 square feet per pole for 230 kV structures and 25,000 square feet per pole for 345 kV structures. Temporary impacts include soil disturbance erecting structures and stringing transmission lines. Appendix E.1 through Appendix E.8 represent the potential typical structures for the proposal.

7.3 ELECTRIC AND MAGNETIC FIELDS

7.3.1 ELECTRIC FIELDS

Voltage on any wire (conductor) produces an electric field in the area surrounding the wire. The electric field associated with HVTLs extends from the energized conductors to other nearby objects, such as the ground, towers, vegetation, buildings, and vehicles. The electric field from a transmission line gets weaker with increasing distance from the transmission line. Nearby trees and building material also greatly reduce the strength of transmission line electric fields.

The intensity of electric fields is related to the voltage of the transmission line. The substations and transmission lines associated with the Big Stone Transmission Line Project will produce electric fields in their immediate vicinity. Section 14.5 describes the predicted levels in greater detail.

7.3.2 MAGNETIC FIELDS

Current passing through any conductor, including a wire, produces a magnetic field in the area around the wire. The magnetic field associated with HVTLs surrounds the conductor and decreases rapidly with increasing distance from the conductor.

The question of whether exposure to power frequency [60 Hertz (Hz)] magnetic fields can cause biological responses, or even health effects, has been the subject of considerable research for the past three decades. The most recent and exhaustive reviews of the health effects from power

frequency fields conclude that the evidence of health risk is weak. The National Institute of Environmental Health Sciences (NIEHS) issued its final report, *NIEHS Report on Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields,* on June 15, 1999, following 6 years of intensive research. NIEHS concluded that there is little scientific evidence correlating extra low frequency electromagnetic field (EMF) exposures with health risk.

The substations and transmission lines associated with the Big Stone Transmission Line Project will produce magnetic fields in their immediate vicinity. Section 14.5 describes the predicted levels in greater detail.

Mitigation

The Big Stone Transmission Line Project would avoid and minimize the public's exposure to electric and magnetic fields by maximizing the distance to homes. No other mitigation is proposed.

7.4 NOISE IMPACTS

The Minnesota Pollution Control Agency (MPCA) has established standards for the regulation of noise levels. The land use activities associated with residential, commercial, and industrial land have been grouped together into Noise Area Classifications (NAC) (Minnesota Rule 7030.0050). Each NAC is then assigned both daytime (7 a.m. to 10 p.m.) and nighttime (10 p.m. to 7 a.m.) limits for land use activities within the NAC (Minnesota Rule 7030.0040). Table 2 shows the MPCA daytime and nighttime limits in dBA for each NAC. The limits are expressed as a range of permissible dBA within a one hour period; L_{50} is the dBA that may be exceeded 50 percent of the time within an hour, while L_{10} is the dBA that may be exceeded 10 percent of the time within an hour. Residences, which are typically considered sensitive to noise, are classified as NAC 1.

Table 2
MPCA Noise Limits by Noise Area Classification

Noise Area Classification	Daytime		Nighttime	
	L50	L10	L50	L10
1	60	65	50	55
2	65	70	65	70
3	75	80	75	80

Noise concerns for this project may be associated with both the construction and operation of the energy transmission system. Transmission conductors and transformers at substations produce audible noise under certain conditions. The level of noise, or its loudness, depends on conductor

conditions, voltage level, and weather conditions. Noise emission from a transmission line occurs during heavy rain and wet conductor conditions. In foggy, damp, or rainy weather conditions, transmission lines can create a subtle crackling sound due to the small amount of electricity ionizing the moist air near the wires. During heavy rain, the general background noise level is usually greater than the noise from a transmission line. In addition, very few people are out near the transmission line during rainstorms. For these reasons, audible noise is not noticeable during heavy rain. During light rain, dense fog, snow, and other times when there is moisture in the air, the proposed transmission lines will produce audible noise higher than rural background levels but similar to household background levels. During dry weather, audible noise from transmission lines is an imperceptible, sporadic crackling sound.

The substations and transmission lines associated with the Big Stone Transmission Line Project will produce nominal noise. Section 14.3 describes the predicted levels in greater detail.

Mitigation

The Big Stone Transmission Line Project would avoid and minimize the public's exposure to substation and transmission line noise by maximizing the distance to homes. No other mitigation is proposed.

7.5 VISUAL IMPACTS

In general, aesthetic impacts are dependent on the response of the viewer. Viewer response is based on the sensitivity and exposure of the viewer to a particular viewshed. Sensitivity relates to the magnitude of the viewer's concern for the viewshed, while exposure is a function of the type, distance, perspective, and duration of the view. Sensitivity can be described in terms of "levels of sensitivity." Three levels of sensitivity can be used to identify potential impact areas:

- Low Visual Sensitivity – motorists viewing transmission lines from the perspective of the roads they traverse
- Moderate Visual Sensitivity – recreationalists, such as bird watchers, hikers, hunters, and other individuals, whose activity is specific to and who are sensitive to a finite geographic location, and who are sensitive to human-made structures and their impact on the natural environment
- High Visual Sensitivity – residential viewers who own property within 500 feet of the proposed route alignments and are concerned about the structures and how they impact the view of the natural environment

The preferred structures for the transmission line will be wood H-frames, which are shorter than single circuit, steel pole structures, but are wider and utilize two poles. The proposed 230 kV structures are between 70 and 100 feet in height and the 345 kV structure are between 80 and 120 feet in height. The structures for the existing 115 kV transmission lines in the project area are wood H-frames that vary between 50 and 80 feet high depending on the terrain and land elevation. Typically, these structures are 60 to 65 feet high.

Homes within 500 feet of the route alignment would be the most likely to have their viewshed affected by the construction of a transmission line, and are therefore considered potentially high visual sensitivity resources.

The Big Stone Transmission Line Project may involve constructing transmission lines adjacent to moderate sensitivity resources, such as U.S. Highway 75, the Big Stone National Wildlife Refuge, WPAs and WMAs. The primary visually sensitive area is the Minnesota River in the Granite Falls area along MN Highway 23. In contrast with the majority of the alignment, this area is characterized by wooded areas, a diverse ecological setting, high recreational value, and the presence of the Minnesota River (which is a State-listed wild and scenic river in this area). River bluffs and the river valley dominate the viewshed. The visual sensitivity of this portion of the corridor is tempered, however, by the presence of human-made features, especially five transmission line crossings of the Minnesota River at the Granite Falls Substation.

There are opportunities to rebuild existing 115 kV transmission lines with 230 kV or 345 kV transmission lines. The visual impacts from rebuilding along existing corridors would be minimal and would not result in perceptible changes to the viewshed. Building transmission lines along new alignments would be a contrast to surrounding land uses and could produce perceptible visual impacts.

Mitigation

Landowners will be consulted to identify concerns related to the transmission line and aesthetics. In general, mitigation includes enhancing positive effects as well as minimizing or eliminating negative effects. Potential mitigation measures include:

- Structures will be placed at the maximum feasible distance from residences within the limits of structure design.
- Location of structures, ROW, and other disturbed areas will be determined by considering input from landowners or land management agencies to minimize visual impacts.

- Care shall be used to preserve the natural landscape; construction and operation shall be conducted to prevent any unnecessary destruction, scarring, or defacing of the natural surroundings in the vicinity of the work.
- To the extent practicable, rivers shall be crossed in the same location as existing transmission lines.
- To the extent practicable, existing transmission lines will be reconductored and/or double-circuited to the extent that such actions do not violate sound engineering principles or system reliability criteria.
- To the extent practicable, new transmission lines will parallel existing transmission lines and other ROWs to the extent that such actions do not violate sound engineering principles or system reliability criteria.
- Structures will be placed at the maximum feasible distance from highway and trail crossings within limits of structure design.

7.6 AIR QUALITY IMPACTS

Transmission lines and substations do not produce significant amounts of air pollutants. Section 15.1 of this EIS contains an analysis of the potential for ozone and nitrogen oxide production from transmission lines. During construction, it is possible that fugitive dust can be created resulting from soil disturbance and released into the atmosphere. The entire project area is in attainment with National and Minnesota Ambient Air Quality Standards for all criteria pollutants.

Section 4.1.2 of the Federal Draft EIS discusses air quality impacts from the Big Stone II Plant. The EIS determined that no significant impacts to air quality would occur as a result of the plant. A few modeled criteria pollutant emissions levels are expected to slightly increase over existing levels, but the modeled levels will be well within the National Ambient Air Quality Standards and Prevention of Significant Deterioration (PSD) increments, and/or less than PSD significance levels. Therefore, the plant is not expected to adversely affect criteria pollutant levels in either nearby or distant areas.

Table 4.1-6 in the Federal Draft EIS identifies the actual Big Stone I mercury emissions as 189.6 lb/yr in 2004. Carbon dioxide emissions are expected to increase over existing levels with construction of the Big Stone II Plant. The existing Big Stone I boiler emitted 4.23 million tons of CO_2 in 2004. The projected emissions of CO_2 from the proposed plant's boiler are an average of approximately 4.7 million tons per year. Super-critical combustion technology selected for the Big Stone II Plant will help minimize CO_2 emissions. The super-critical combustion

technology for the proposed project is three to four percent more efficient and would result in lower CO_2 emissions per megawatt hour (MWh) of electrical energy output as compared to the sub-critical boiler technology (Western 2006).

Mitigation

No air quality impacts are anticipated from the operation of the transmission line. To minimize or avoid temporary impacts from fugitive dust, Best Management Practices (BMPs) will be used:

- Oil and other petroleum derivatives will not be used for dust control. Speed limits will be enforced, based on road conditions, to reduce dust problems.
- Equipment and vehicles that show excessive emissions of exhaust gases due to poor engine adjustments, or other inefficient operating conditions, will not be operated until repairs or adjustments are made.
- Burning or burying waste materials on the ROW will not be permitted and all waste materials shall be disposed at permitted waste disposal areas or landfills.
- The emission of dust into the atmosphere during construction will be minimized to the extent practical during the manufacturing, handling, and storage of concrete aggregate. Methods and equipment will be used as necessary for the collection and disposal or prevention of dust during these operations. The methods of storing and handling cement and cement additives will also include means of minimizing atmospheric discharges of dust.

There are a variety of measures that will be implemented to minimize emissions and air quality impacts associated with the construction of the Big Stone II Plant and the continued operation of Big Stone I. A summary of the measures are as follows (Western 2006):

- Compliance with the NO_x emission standards would be achieved by using low NO_x burners and Selective Catalytic Reduction (SCR) to control NO_x emissions from the Big Stone II Plant. The over-fire air system on Big Stone I would be operated more aggressively to reduce NO_x emissions. NO_x emissions from the existing and proposed plants combined are proposed to be limited to less than 16,448 tons per year in the PSD construction permit application for the proposed project.
- Compliance with SO_2 emission standards would be achieved by ducting the exhaust gases from both the existing and proposed plants' boilers through the Wet Flue Gas Desulfurization (WFGD) system that would be common to both

units. SO_2 emissions from the existing and proposed plants combined are proposed to be limited to less than 13,278 tons per year in the PSD permit application for the proposed project.

- In a May 31, 2006, letter to the South Dakota Department of Environment and Natural Resources, the Applicants agreed to "voluntarily commit to a site-wide cap of 189 lb/yr provided the facilities are allowed a period of 3 years after commercial operation date to test and implement commercially available, technically feasible mercury emissions control measures" (Appendix F.1). This commitment requires that both Big Stone I and the Big Stone II Plant only emit mercury equal to the 2004 emission level at Big Stone I.

7.7 IMPACTS ON WATER QUALITY

Impacts to water quality from transmission lines are typically short-term impacts related to construction activities. In most cases surface water resources can be spanned. These include streams, wetlands, and lakes. In cases where these areas cannot be spanned (i.e. wetlands) a conservative permanent impact footprint would be approximately 500 square feet per pole (1,000 square feet per H-frame structure). Additionally, structures would be placed to span 100-year floodplains wherever feasible, and substations would not be constructed in floodplains if possible. If any floodplains cannot be spanned, the small cross section of the structures will not affect flood elevations and will not result in an impact. Sections 15.2 and 15.3 of this EIS give more detail about potential impacts to water resources for each potential route.

Section 4.2.2.3 of the Federal Draft EIS discusses potential impacts to water quality from the Big Stone II Plant. NO_x and SO_2 emissions are expected to be equal to or less than existing emission levels. In addition, the Applicants have committed to a voluntary site-wide cap of 189 lb/yr provided the facilities are allowed a period of 3 years after commercial operation date to test and implement commercially available, technically feasible mercury emissions control measures. Since NO_x, SO_2 and mercury emissions are not expected to increase as a result of operation of the Big Stone II Plant, the plant is not expected to impact mercury or other pollutant levels in Minnesota waters.

Mitigation

Erosion control and sedimentation BMPs will be used during construction of the transmission lines and substations to prevent and minimize sediment from reaching water resources. Construction activities would be carried out to prevent spillage of contaminants into water resources, such as refilling and storage of fuels, transmission oils, or other such hazardous materials that would take place away from surface water features. Heavy equipment will not be

driven through streams and other water features to the extent practicable. Applicable permits from stream and wetland crossings will be obtained.

7.8 IMPACTS ON NATURAL AND WILDLIFE RESOURCES

Given the high (greater than 90 percent of land cover) level of agriculture in the project area, construction of the Big Stone Transmission Line Project is not expected to significantly affect previously-undisturbed habitat. There are several opportunities for rebuilding along existing transmission line corridors, which would minimize impacts to vegetation and wildlife habitat. The majority of the remainder of the routes would be along roadways adjacent to agricultural fields. Therefore, impacts to undisturbed habitat would be minimized.

Possible impacts to birds, such as collisions and electrocution, could result from construction of the project. Section 15.4 of this EIS discusses avian issues in greater detail. Impacts to fish and mussel populations found in streams in the project area would be avoided by spanning streams and rivers.

There are DNR natural communities, surveyed prairies, managed areas such as the Big Stone National Wildlife Refuge, WMAs, and WPAs, as well as documented occurrences of State and Federal listed species throughout the project area. Section 15.6 of this EIS provides more information on the prairies, natural communities, and rare species for each route. Section 15.5 and the tables in Appendix B and Appendix G identify the WMAs, WPAs, and other wildlife habitat for each route.

In general, natural communities, prairie remnants, and managed areas will be avoided. If avoidance is not possible, impacts to the resource will be minimized by maximizing the span and reducing the number of structures. The area of the routes between the South Dakota border and Canby has several natural resources concerns, such as Mound Springs Scientific and Natural Area (SNA) and WMA, surveyed prairie areas, and potential USFWS easements. This portion of the route would not follow an existing transmission line, therefore, routing would need to be carefully placed to avoid and minimize impacts to the unique resources in the area. It is also possible that structures will need to be placed in bedrock outcrop communities in the Granite Falls area.

Mitigation

Sections 15.4, 15.5, and 15.6 of this EIS discuss specific mitigation measures for impacts to vegetation, wildlife, and rare and unique resources, respectively. In general, natural communities will be spanned by the transmission lines. If complete avoidance is not feasible, the appropriate agencies (DNR and/or USFWS) will be consulted in order to determine

minimization and mitigation measures. A survey for rare and unique species will be conducted prior to construction, and areas found to have such species will be avoided wherever feasible. Coordination with the agencies will continue in order to determine the best avoidance and mitigation measures for rare and unique resources. Avian issues will be addressed by working with the DNR and USFWS to identify any areas that may require marking transmission line shield wires and/or to use alternate structures to reduce the likelihood of collisions. Additionally, where appropriate, mats will be used to avoid compacting soils. Areas disturbed due to construction activities will be restored to pre-construction contours and will be reseeded with a DNR-recommended seed mix that is free of noxious weeds.

7.9 SOCIAL AND ECONOMIC IMPACTS

Short-term impacts to socioeconomic resources will be relatively minor. The construction, operation, and maintenance of the transmission line will not affect socioeconomic resources along the route.

Construction of the transmission line will create permanent impacts to agriculture, removing land from production. For the 230 kV transmission lines, 7 to 15 acres of impact are anticipated, whereas 8 to 13 acres of impact are anticipated for the 345 kV transmission lines. This accounts for approximately 0.001 percent of acres of land in production in the counties along the 230 kV routes, and between 0.001 and 0.002 percent of acres of land in production in the counties along the 345 kV routes.

Other impacts related to socioeconomics are primarily positive. The relatively short-term nature of the project construction and the relatively small number of workers who will be provided from outside of the project area should result in short-term positive economic impacts in the form of increased spending on lodging, meals, and other consumer goods and services. It is not anticipated that the project will create new permanent jobs, but it will create temporary construction jobs that will provide a one-time influx of income to the area. No permanent net change in workforce is projected.

If local contractors are used for portions of the construction, total wages and salaries paid to contractors and workers in surrounding counties will contribute to the total personal income of the region. Additional personal income will be generated for residents in the region and the State by circulation and recirculation of dollars paid out as business expenditures and State and local taxes.

Expenditures made for equipment, energy, fuel, operating supplies, and other products and services benefit businesses in the counties where the project is located. Indirect impacts may

occur through the increased capability of the electric system to supply energy to commercial and industrial users, which will contribute to the economic growth of the region.

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

Socioeconomic impacts resulting from the project will be primarily positive with increased tax revenue and an influx of wages and expenditures made at local businesses during construction.

The construction of the transmission line to Granite Falls at 345 kV will increase the capacity of the transmission line. In turn, this will allow additional generation in the region access to the transmission system. This increase in capacity affords the opportunity for commercial and industrial projects in the region to have a reliable electrical system to potentially meet their needs.

Mitigation

Impacts to socioeconomics are primarily positive. Mitigation measures related to socioeconomic impacts will include:

- The movement of crews and equipment will be limited to the ROW to the greatest extent possible, including access to routes. The contractor will limit movement on the ROW so as to minimize damage to grazing land, crops, or property and will avoid marring the land. If, during construction, movement outside of the ROW is necessary, permission will be obtained and any crop damage will be paid to the landowner.
- When weather and ground conditions permit, all deep ruts that are hazardous to farming operations and to movement of equipment will be obliterated or compensation will be provided as an alternative if the landowner desires. Such ruts will be leveled, filled, and graded, or otherwise eliminated in an approved manner. In hay meadows, alfalfa fields, pastures, and cultivated productive lands, ruts, scars, and compacted soils will have the soil loosened and leveled by scarifying, harrowing, discing, or other approved methods. Damage to ditches, tile drains, irrigation systems, terraces, roads, and other features of the land will be corrected. The land and facilities will be restored as nearly as practicable to their original conditions.

- ROW easements will be purchased through negotiations with each landowner affected by the project and payment will be made of full value for crop damages or other property damage during construction or maintenance as negotiated.
- Construction will be scheduled during periods when agricultural activities would be minimally affected or the landowner will be compensated accordingly.
- Fences, gates, and similar improvements that are removed or damaged will be promptly repaired or replaced.
- Landowners will be compensated for any damage to drain tiles and irrigation systems.

8.0 NO BUILD OPTION

As required by Minnesota Rules 4410.7035, Subp. 1B, a no build alternative to the proposed project was evaluated. Since there is a possibility that the Big Stone II Plant could be constructed regardless of whether the PUC approves the transmission facilities as proposed, the EIS evaluates a second No Build Option that considers the impacts with Big Stone II in operation, but no transmission constructed in Minnesota.

8.1 RIGHT OF WAY REQUIREMENTS

8.1.1 NO BUILD (WITHOUT BIG STONE II)

No additional ROW would be required for new transmission lines for this no build option. The existing Ortonville to Morris 115 kV transmission line is nearing the end of its service life and would need to be rebuilt regardless of whether or not the Big Stone II Plant is constructed. It is possible that additional ROW would be necessary for this rebuild if the existing ROW is found to be deficient.

8.1.2 NO BUILD (WITH BIG STONE II)

Under this no build option, no new ROW would be required in Minnesota for direct transmission of electricity out of the Big Stone II Plant. Additional ROW associated with new transmission lines in other states would be necessary. Similar to the no build scenario without the Big Stone II Plant, the existing Morris line will need to be rebuilt, and additional ROW may be necessary. Additionally, although direct transmission lines would not be built in Minnesota, the addition of load in the region created by the Big Stone II Plant may necessitate upgrades of existing lines in Minnesota. These upgrades may require additional ROW as well.

8.2 SIZE AND TYPE OF STRUCTURES

8.2.1 NO BUILD (WITHOUT BIG STONE II)

Under this no build option, no new structures types would be used. It is likely that the rebuild of the existing Morris line would use structures similar to the existing type.

8.2.2 NO BUILD (WITH BIG STONE II)

Similar to the No Build (without Big Stone II) Option, the structures used in the Morris line rebuild would likely be similar to the existing structures. Structures used for the new transmission lines built in other states would likely be similar to those described above for the 230 kV and 345 kV transmission structures associated with the Big Stone Transmission Line Project. It is also likely that structures used in any upgrades of existing transmission lines that

are necessary in Minnesota would be similar to the existing structures, but depending on the easement and whether the transmission line will be reconductored or rebuilt, may require additional ROW. Depending on the current utility design standards, any rebuilt transmission lines may require a slightly larger footprint, but would likely be similar to existing structures.

8.3 ELECTRIC AND MAGNETIC FIELDS

8.3.1 NO BUILD (WITHOUT BIG STONE II)

Under this no build option, no changes to existing electric and magnetic fields would occur.

8.3.2 NO BUILD (WITH BIG STONE II)

Under this no build option, no measurable changes to existing electric and magnetic fields would occur associated with the rebuild of the Morris line. Any necessary upgrade to existing transmission lines in Minnesota may result in a slight measurable increase in EMF. Levels would be expected to be similar to those shown in Section 14.5 of this EIS, depending on the voltage of the transmission line.

Mitigation would be the responsibility of the utility owning the transmission line that is upgraded. BMPs will be used by the responsible utility in regards to EMF.

8.4 NOISE IMPACTS

8.4.1 NO BUILD (WITHOUT BIG STONE II)

Under this no build option, no changes to existing noise levels would occur.

8.4.2 NO BUILD (WITH BIG STONE II)

Under this no build option, no measurable changes to existing noise levels would occur associated with the rebuild of the Morris line. Any necessary upgrade to existing transmission lines in Minnesota may result in an imperceptible increase in noise. Levels would be expected to be similar to those shown in Section 14.3 of this EIS, depending on the voltage of the transmission line.

Due to the nominal changes in noise, no mitigation would be necessary.

8.5 VISUAL IMPACTS

8.5.1 NO BUILD (WITHOUT BIG STONE II)

Under this no build option, no impacts to existing visual resources would occur. The rebuilding of the Morris line would not be expected to create a perceptible change to the viewshed because similar structures would likely be used.

8.5.2 NO BUILD (WITH BIG STONE II)

Under this no build option, no impacts to existing visual resources would occur in Minnesota. The rebuilding of the Morris line would not be expected to create a perceptible change to the viewshed because similar structures would likely be used. Any additional necessary upgrades to existing transmission lines may involve changing the structure types (rebuild) or changes the conductor so that it is slightly larger than the existing conductor (reconductor). Impacts to the viewshed due to rebuilding or reconductoring the existing transmission line would be relatively minor.

8.6 AIR QUALITY IMPACTS

8.6.1 NO BUILD (NO BIG STONE II)

Under this no build option, no changes to existing emissions of criteria pollutants or CO_2 would occur.

8.6.2 NO BUILD (WITH BIG STONE II)

Even if the transmission line is not constructed there are air quality impacts associated with Big Stone II. Under this scenario, not building transmission in Minnesota does not eliminate those impacts. See Section 7.6 for a discussion of air quality impacts.

Mitigation

See Section 7.6 for a discussion of mitigation related to air quality impacts for the No Build (with Big Stone II) Option.

8.7 IMPACTS ON WATER QUALITY

8.7.1 NO BUILD (NO BIG STONE II)

Under this no build option, short-term impacts to water resources could result from construction activities associated with rebuilding the Morris line. A portion of this transmission line runs adjacent to or crosses lakes and wetlands. In most cases these features would be spanned with

the rebuild. In cases where existing structures are in wetlands, it is likely that the new structures would likewise be placed in these resources. This option would not be expected to result in new impacts to water resources.

8.7.2 NO BUILD (WITH BIG STONE II)

Effects of the Big Stone II Plant on water quality are described above in Section 8.7.1 Effects would be the same for this no build option.

Potential effects resulting from rebuilding the Morris line would be the same as described for the No Build (without Big Stone II) Option. Additionally, construction associated with any necessary upgrades to existing lines in Minnesota may result in short-term impacts to water resources. Areas where existing structures are in wetlands and a rebuild of the transmission line is necessary, structures will likely be replaced in-kind. If the structures require a larger footprint, slight increases in permanent wetland impacts may be necessary. In the case of transmission lines being reconductored, no change in permanent wetland impacts is anticipated.

8.8 IMPACTS ON NATURAL AND WILDLIFE RESOURCES

8.8.1 NO BUILD (WITHOUT BIG STONE II)

Under this no build option, no impacts to vegetation and wildlife resources would occur. Rebuilding the Morris line would not be expected to negatively impact wildlife habitat because it would be rebuilt along an existing, previously-disturbed corridor.

8.8.2 NO BUILD (WITH BIG STONE II)

Similar to the No Build (without Big Stone II) Option, this alternative would have minimal impacts to vegetation and wildlife resources within Minnesota. Rebuilding the Morris lines, and construction associated with any necessary upgrades to existing transmission lines in Minnesota, may result in minimal impacts to habitat. These impacts would not be expected to negatively impact wildlife habitat because they would occur along an existing, previously-disturbed corridor.

Mitigation

Mitigation for potential impacts to birds would be similar to those listed above for the Big Stone Transmission Line Project, but would be dependent on the responsible utility.

8.9 SOCIAL AND ECONOMIC IMPACTS

8.9.1 NO BUILD (WITHOUT BIG STONE II)

Under this no build option, the positive socioeconomic impacts identified in Sections 6.1.2.6, 6.2.2.6, 7.1.2.6, 7.2.2.6, 8.1.2.6, and 8.2.2.6 of the Route Permit Application in Minnesota would not be realized. Without the construction of the Big Stone II Plant and the associated transmission lines, it is possible that the Applicants' Minnesota service areas would not keep up with projected load growth and may have a less reliable transmission system. By not improving the reliability in the region, the potential for local economies to improve economic development is reduced. Furthermore, without the construction of the transmission lines, the additional capacity that could be used to tie in growing industries in the project area, such as wind power and ethanol, would not be available.

8.9.2 NO BUILD (WITH BIG STONE II)

Similar to the No Build (without Big Stone II) Option, some of the positive socioeconomic impacts in Minnesota would not be realized. However, if the plant were constructed, some of the short-term economic impacts resulting from the plant construction (goods and services) could be realized, due to the rural nature and limited resources in the area. As stated in the No Build (without Big Stone II Option), the potential economic benefits in Minnesota would be difficult to realize without a transmission system with additional capacity and reliability.

Short-term socioeconomic impacts from rebuilding the Morris line and any other necessary upgrades to Minnesota transmission lines would be similar to those listed above for construction of the Big Stone Transmission Line Project, including short-term influx of workers and construction dollars.

9.0 WIND/RENEWABLE AND GAS GENERATION

The EIS Scoping Decision calls for analysis of a combination of wind generation resources combined with natural gas generation as an alternative to building the proposed Big Stone Transmission Line Project. This section describes the typical environmental impacts associated with that alternative.

The environmental impacts and economic reasonableness of a wind-gas scenario compared to the proposed Big Stone Transmission Line Project are heavily dependent on a number of site-specific factors, such as the availability of a large natural gas pipeline, adequate wind resources, sufficient transmission capacity, and proximity to customers. The Department has used information from previous energy facility permitting and MISO transmission planning documents to determine likely environmental impacts from a wind and natural gas generation alternative.

The wind and natural gas generation alternative assumes the following generation and associated infrastructure as an alternative to the proposed Big Stone Transmission Line Project:

- Construction of 747 MW of wind generation capacity and transmission line upgrades in Minnesota in locations and quantities identified by the MISO's Group 4 Interconnection Study (ABB, 2005).
- Construction of a 250 to 650 MW capacity, state-of-the-art natural gas combined cycle generation facility and associated pipeline and transmission infrastructure similar to the Mankato Energy Center and the Faribault Energy Park generation facilities recently completed or under construction in Minnesota.

These and similar facilities have an established track record of regulatory review and permitting in Minnesota, thus possible impacts are easily obtained. The MISO's Group 4 wind interconnection study provides detailed transmission interconnection requirements for a large, representative quantity of wind energy under development in Minnesota. The transmission additions or rebuilds identified in the MISO's Group 4 interconnection studies are almost exclusively located in Southern Minnesota.

The impacts of transmission lines required for the alternative are likely to be similar to previously permitted transmission projects and similar in many aspects to the proposed Big Stone Transmission Line Project. However, without specific routes to analyze, it is difficult to make a direct comparison of impacts with the Big Stone Transmission Line Project.

In general, impacts and mitigation measures are expected to be consistent with those outlined in route permit environmental review documents prepared by the Environmental Quality Board (EQB) or Department in recent years. Table 3 lists permitting cases that are expected to have transmission line impacts and mitigation measures similar to the wind/gas alternative due to their geographic proximity to the Group 4 projects, and similar size and type of projects.

Table 3
Transmission Line Projects with Similar Expected Environmental Impacts

Transmission for Wind	Transmission lines for Combustion Turbine Combined Cycle (CTCC)
Buffalo - Ridge to White 115 kV (EQB 04-84-TR-XCEL)	Mankato Energy Center (EQB 04-76-PPS CALPINE)
Split Rock - Lakefield Jct. 345/115 kV (EQB 03-73-TR-XCEL)	Faribault Energy Park (EQB 02-48-PPS-FEP)
Lakefield - Fox Lake 161 kV (EQB 03-64-TR-XCEL)	

9.1 RIGHT OF WAY REQUIREMENTS

9.1.1 WIND FACILITIES

Minnesota's site permitting process for large wind energy conversion systems measures direct land impact from wind facilities as the acres of land disturbed by wind turbine foundations, access roads, and electrical systems. These impacts are permanent, project-life impacts, not temporary impacts during the construction process; they do not include the total size of the project area, wind rights, or view shed of the wind facility.

Table 4
Historic Direct Land Impacts of Wind Farms in Minnesota

Permitted Project	MW Capacity	Acres Direct Impact	Acres/MW
MinnDakota Wind	100.0	44	0.44
HighPrairie Wind	99.0	65	0.66
Jeffers Wind Energy Center	60.0	16	0.27
Fenton Wind Power Plant	205.5	65	0.32
Trimont Wind I	100.5	40	0.40
Stoneray Power Partners	105.0	32	0.30
Total	670	262	0.40
Projected Land Impact of Group 4 Projects	747.0	297	0.40

Table 4 illustrates that based on land impact figures from recently permitted wind projects in Minnesota, wind facilities require approximately 0.4 acres of land impacts for each megawatt of nameplate capacity. The estimated direct land impact of 747 MW of wind energy and associated facilities (excluding transmission) is approximately 300 acres.

9.1.2 NATURAL GAS COMBINED CYCLE

Direct land use impacts of the natural gas combined cycle facility envisioned in the Wind/Gas Alternative were estimated based on past site permits for combined cycle natural gas facilities in Minnesota, assuming the facility uses a new site. Direct land use correlates to actual size of disturbed area for the power plant site.

Table 5
Land Use of Natural Gas Combined Cycle Facilities

Permitted Project	MW Capacity	Acres Direct Impact	Acres/MW
Mankato Energy Center	655	25	0.04
Faribault energy park	250	37	0.03

9.1.3 TRANSMISSION FOR GROUP 4 WIND

The MISO's Group 4 wind interconnection study concludes that adding 747 MW of wind capacity will require significant new transmission additions for interconnection (MISO, 2006).

The Group 4 study provides a representative example of the requirements for 747 MW of wind energy in Minnesota. However, it assumes all previously queued projects are constructed, including the Big Stone transmission and generation projects. There are no MISO models that provide transmission requirements for large additions of wind energy in Minnesota without assuming the addition of the Big Stone Transmission Line and generation facilities. If the Big Stone Transmission Line and/or generation projects are not built, transmission requirements for Group 4 wind energy projects would likely change.

Table 6
Estimated Wind HVTL Mileage (New or Rebuilt)

HVTL Segment	Mileage	Number of Circuits
Lake Yankton to Marshall SW 115 kV	10 to 15 (BRIGO)	3
Lyon County to Minnesota Valley 115 kV	29.1	2
Storden to S.Storden to Heron Lake 161 kV	10.1 S. 11.9 N Storden	2
Heron Lake to Lakefield Junction 161 kV	17.2	2
Total	66.4 to 73.2	

Table 6 provides an estimate of the approximate length of transmission required for Group 4 facilities. With the exception of Lake Yankton to Marshall SW, mileage estimates are based on current transmission line segment lengths between these existing substations. The Lake Yankton to Marshall SW segment estimate is taken from the Xcel Energy Notice Plan for a Certificate of Need for the Buffalo Ridge Incremental Generation Outlet (BRIGO) transmission lines currently before the PUC (Minnesota Public Utilities Commission, 2006). It is likely that the new (or upgraded) transmission line mileages estimated above will deviate from these lengths upon further engineering, reliability, and routing studies.

Several segments above have a second circuit between the end point substations. To provide a simple mileage of the second circuit, the length of the existing transmission line between the named substations was doubled. MISO does not provide analysis of the lengths of new ROW required, nor recommendations for double circuiting the required second circuits. Reliability requirements may or may not allow for double circuits for such segments.

Finally, the electrical transmission and distribution system in the general vicinity of the Storden, Heron Lake, and Lakefield Junction transmission substations is undergoing extensive study for wind energy expansion, reliability, and load growth (Minnesota Transmission Owners, 2005; ABB, 2005). Such studies and proposals may differ considerably from the MISO's Group 4 recommendations and may change the impacts.

9.1.4 GAS PLANT TRANSMISSION

Natural gas facilities similar to MEC and FEP are typically sited in locations in close proximity to HVTLs and natural gas pipelines, as well as in locations near the load center served. This is done to minimize the construction costs and impacts of natural gas pipelines and transmission lines. This practice is consistent with recent site permits for such facilities in Minnesota. The EIS assumes that such siting factors would be followed in the Wind/Gas Alternative, therefore, minimizing use of transmission and pipeline ROW needed. Transmission infrastructure for natural gas plants is highly dependant on site and size.

The HVTL portion of the Wind/Gas Alternative is highly dependant on the location, timing, and point of interconnection. The EIS assumes that the transmission required for the natural gas portion of the alternative is less than 10 miles. Without an unbuilt, combined cycle natural gas facility located in Minnesota with a publicly available interconnection study in the MISO queue, it is difficult to identify general locations and transmission requirements for adding additional combined cycle natural gas generation facilities to the system.

The MEC required 3.8 miles of transmission lines and 3.5 miles of natural gas pipeline to be built prior to interconnection.

The Faribault Energy Park was required to replace wires (reconductor) on about 20 miles of transmission line and build less than 1 mile of new transmission line for interconnection to the high voltage system. Less than 1 mile of natural gas pipeline was also built for the FEP facility.

9.2 SIZE AND TYPE OF STRUCTURES

9.2.1 WIND FACILITIES

The wind facilities are assumed be utility scale, using state-of-the-industry wind turbine generators in the 1 to 3 MW nameplate capacity range. Minnesota regulators have reviewed and issued site permits for a number of wind projects using such turbines. These turbines are from 70 to 105 meters in height at the hub, typically have 70 to 90 meter rotor diameters and use a single, steel monopole design. Electrical and communications lines are typically buried underground through farm fields until they reach the electrical collector lines. The 34.5 kV collector lines are typically overhead to a project substation. The substation provides a location for delivery of energy to the buyer. Voltage step up to transmission level (115 kV and higher) is assumed to take place at utility owned high voltage substations.

9.2.2 NATURAL GAS COMBINED CYCLE

The natural gas combined cycle generation facility impacts would be similar to or identical to the MEC and the FEP and would be similar in structure size, type and location.

MEC and FEP both utilize combustion turbines, a heat recovery steam generator (HRSG), cooling towers, wastewater management facilities, facility buildings, a natural gas pipeline, electric transformers and a switchyard. MEC also uses supplemental duct firing. The MEC facility site is approximately 25 acres; the FEP site is approximately 37 acres.

The height of the tallest structures, the HRSG stack, would be approximately 200 feet in height. The design of the facilities utilized several structures in the 70- to 120-foot range in height. Both MEC and FEP are sited in areas zoned for industrial use.

9.2.3 TRANSMISSION FOR GROUP 4 WIND

Typical structures for the 115 kV and 161 kV transmission lines required for Group 4 wind were assumed to be either single pole or H frame structures in wood or steel. The use of materials and structure types varies upon many factors including; location, cost of structures, engineering and reliability considerations, and land use along the ROW. Several similar transmission line projects specifically serving wind energy interconnection have been proposed and permitted in Minnesota in recent years. Impacts would be similar or identical to these permitting cases (Minnesota Environmental Quality Board, 2005; Minnesota Environmental Quality Board, 2004).

The transmission lines for Group 4 wind projects would be shorter in height, spaced closer together, and would require more structures (poles) per mile than the Big Stone Transmission Line Project. The land-based impacts of the alternative are expected to be similar to the Big Stone Transmission Line Project because both projects would require transmission routes primarily in rural, agricultural areas. It is not possible to determine if the Group 4 transmission requirements would be new construction, upgrades of existing transmission lines, or if new ROW is required.

9.2.4 GAS PLANT TRANSMISSION

The structures for transmission lines associated with a natural gas combined cycle facility are assumed to be consistent with the MEC and FEP projects, and will be dependant on the voltage required, design, and location of such transmission lines. Ten miles of transmission would likely

include single or H-frame structures in wood or steel. As stated in Section 9.2.3, the land-based impacts are expected to be similar.

9.3 ELECTRIC AND MAGNETIC FIELDS

Wind facilities, CCCT facilities, and transmission lines all produce EMF. However, EMF exposure near these types of facilities drops significantly with distance from the facilities. In no cases will generation facilities be located within a few hundred feet of residences due to the requirement to site facilities far enough away from homes to assure compliance with MPCA noise standards.

The alternative assumes similar EMF levels that are described in Section 14.5 and similar to the Buffalo to White, Lakefield to Fox Lake, and natural gas projects (Minnesota Environmental Quality Board, 2005; Minnesota Environmental Quality Board, 2004).

9.4 NOISE IMPACTS

Each of the project types in the Wind/Gas Alternative generates noise. Transmission noise impacts are expected to be similar to the proposed Big Stone Transmission Line Project and discussed in Section 14.3. Wind and natural gas generation facilities noise impacts are described below.

Wind and wind turbines emit noise. In Minnesota, site permits for wind facilities require that the developer meet the MPCA's noise exposure limits found in Minnesota Rule chapter 7030.0040. The rules require that a project must not emit noise exceeding 50 dBA measured at residences. The Minnesota wind site permitting process has found that the nearest a wind turbine can be built to homes while meeting noise rules is more than 500 feet and reaches 1,000 feet for some turbine models.

In real world terms, during a moderately windy day, one would expect ambient noises such as wind flowing through vegetation to be louder than a wind facility nearby.

Natural gas facilities also generate noise and are required to meet the same noise limit rules as wind facilities. In the MEC and FEP permitting cases, both projects were located at least 800 feet from residences and were expected to meet the MPCA noise limits.

9.5 VISUAL IMPACTS

Each type of facility in the Wind/Gas Alternative has a visual impact, although visual impacts are difficult to measure and are very subjective. One person's eyesore is another person's scenic vista. Impacts from various types of facilities are hard to accurately describe and assess.

The visual impacts of the alternative's transmission requirements are likely to be consistent with the proposed Big Stone Transmission Line Project as discussed in Section 14.4. However, the use of 115 kV and 161 kV transmission lines in the alternative may be shorter in height and spaced closer together, which is more consistent with the EQB permitted Buffalo Ridge to White and Lakefield to Fox Lake transmission projects. The proposed project, the permitted projects referenced, and the alternative would all use primarily agricultural areas for transmission line routing.

Wind facilities can be seen from miles away. In some locations, such as the Buffalo Ridge, one can view the concentrated wind development along the highest portions of the ridge for miles. Some people enjoy the view of wind turbines, while others dislike the view. Some towns, such as Lake Benton, have used wind turbine development as a marketing tool to draw tourists to the area to view wind turbines. In other cases, although not yet experienced in Minnesota, governmental units and the public have objected to or blocked wind facilities due to visual objections.

Natural gas generating plants are typically developed in industrial areas and typically fit into the surrounding development. The most visible impact are plumes from stack emissions or cooling towers. At times, plumes may be seen for miles around depending on plant operation, design and weather conditions. Such impacts are periodic and the impacts can be subjective from person to person (Minnesota Environmental Quality Board, 2005; Minnesota Environmental Quality Board, 2004).

9.6 IMPACTS ON AIR QUALITY

The primary difference between the air impacts of the proposed Big Stone Transmission Line Project and the Wind/Gas Alternative relate to the natural gas combined cycle generation facility. Wind energy facilities do not emit air pollution. The transmission required for the alternative is assumed to have the same air quality impacts as the proposed Big Stone Transmission Line Project.

The alternative assumes the same air quality impacts identified in the Environmental Assessments (EAs) in the MEC and FEP permitting dockets. The table below provides

maximum permitted emissions on an annual basis in tons as allowed in the MPCA air permits for the permitted facilities (Minnesota Environmental Quality Board, 2005; Minnesota Environmental Quality Board, 2004).

Table 7
Total Facility Potential to Emit Summary

	PM tpy	PM10 tpy	SO_2 tpy	NO_x tpy	CO tpy	VOC tpy	H_2SO_4 tpy	Single HAP tpy	Total HAPs tpy
Mankato Energy Center	207	198	134	368	3,999	599	20.2	9.54	23.08
Faribault Energy Park	361	361	132	124	696	459	4.6	Formaldhyde 5.86	10.94

9.7 IMPACTS ON WATER QUALITY

Some water quality impacts may result from the wind and natural gas generation alternative, due to the increase in impervious surface, potential discharge of wastewater, and protection construction impacts. For the gas facility, innovative use of wastewater and stormwater treatment options exist, such as the use of municipal gray water or use engineered wetlands for water discharge. Water quality impacts from natural gas generation facilities are dependent on the source of coolant water, method of wastewater treatment, and discharge. Natural gas generation facilities do not emit mercury so no additional mercury would be emitted into the air or deposited in Minnesota waters.

Wind plants do not discharge pollutants to water bodies, although some construction practices may have temporary water quality impacts. The PUC requires wind developments to prevent and mitigate any water quality impacts when constructing such facilities. This includes minimizing the erosion and sedimentation of soil into surface waters.

Transmission water quality impacts are expected to be similar to those discussed in Section 7.7 and the impacts discussed in the Buffalo to White and Lakefield to Fox Lake transmission projects (Minnesota Environmental Quality Board, 2005; Minnesota Environmental Quality Board, 2004).

9.8 IMPACTS ON NATURAL AND WILDLIFE RESOURCES

Several studies conducted on wind generation facilities in Minnesota found very low levels of avian and bat impacts (Johnson et. al., 2002 and 2003). Additional concerns associated with wind facilities are the fragmentation of native prairie and impacts to endangered species. Again, the Minnesota permitting process for wind energy has required minimization of such impacts,

consultation and cooperation with wildlife officials, and mitigation and restoration of habitat if impacted.

Natural gas facilities have few impacts on wildlife and are assumed in the alternative to be consistent with previously-permitted projects. Of the two reference projects recently permitted in Minnesota, the MEC facility was sited in a former gravel pit and the FEP facility converted agricultural land in a new industrial and commercial zoned area. These facilities disturb small tracts of land in areas compatible with industrial and commercial uses. Wildlife impacts from habitat loss are unlikely (Minnesota Environmental Quality Board, 2005; Minnesota Environmental Quality Board, 2004).

Impacts from the alternative's transmission lines are expected to be similar to the Big Stone Transmission Line Project (see Section 7.8) and the Buffalo to White and Lakefield to Fox Lake transmission line projects (Minnesota Environmental Quality Board, 2005; Minnesota Environmental Quality Board, 2004).

9.9 SOCIAL AND ECONOMIC IMPACTS

The Wind/Gas Alternative may have a local ownership component which may provide financial rewards and risks, or utilities may choose to own these types of facilities. Labor, materials, food, and lodging will provide temporary construction related income to nearby and regional businesses. Operations and maintenance personnel will be required to operate these facilities and possibly live in areas nearby, providing additional jobs. Taxes paid by the facilities will round out long-term economic impacts to governmental units.

Social and economic impact from the alternative's transmission lines would be similar to the Big Stone Transmission Line Project (Section 7.9) and the Buffalo to White and Lakefield to Fox Lake transmission line projects.

10.0 DISTRIBUTED GENERATION/DEMAND SIDE MANAGEMENT

The scope also calls for the EIS to consider a Distributed Generation (DG) alternative to serve the stated needs of the proposed project. DG technologies can be either renewable or non-renewable and the operating characteristics of those technologies result in some DG technologies being better suited than others for meeting capacity needs. This section describes the DG alternative and the impacts associated with it.

As has been previously-mentioned in this environmental document, the Applicants have proposed two transmission line routes and alternatives to each of the preferred options. The purpose of these routes will be to transmit power from the BSP II to the load centers that are served by the individual project partners. The amount of energy that each project partner would take from the plant is outlined in Table 8.

Minnesota's site permitting process for large wind energy conversion systems measures direct land impact from wind facilities as the acres of land disturbed by wind turbine foundations, access roads, and electrical systems. These impacts are permanent, project-life impacts, not temporary impacts during the construction process; they do not include the total size of the project area, wind rights, or view shed of the wind facility.

Because the number of MW that will be transmitted to the Applicants' service areas under the proposed project has been specified, it is possible to investigate the ability of DG to meet those needs. The DG alternative is intended to meet the Applicants' stated needs. Compared to what would be ultimately delivered to the Applicants' service territories the DG alternative would generate like amounts of energy near the Applicants' load centers indicated in Appendix A.4.

When considering the proposed Big Stone Transmission Line Project there are additional benefits that are not captured when considering a DG alternative. These may include increased electrical reliability, a greater ability to buy power from the wholesale market, or improving the stability of the grid in a particular area (all of which are stated objectives of this project).

10.1 DISTRIBUTED GENERATION DEFINITION

There are many definitions of what constitutes a DG facility. Often DG is described as small scale generation (up to 10 MW in size) that is sited close to where the electricity is used. On September 28, 2004, the Minnesota PUC issued its Order establishing generic standards for utility tariffs for interconnection and operation of DG facilities (Minnesota Public Utilities Commission, 2004). This order established standards for utilities to interconnect DG facilities and required all retail electric power utilities to file a distribution tariff consistent with the

guidelines in the Order. While the Order was specifically for DG facilities with a capacity of no more than 10 MW, there is no place within the Order, or the legislation that initiated the process establishing DG standards, that defines DG facilities as limited to facilities no larger than 10 MW.

While the Minnesota DG tariff represents a single option available to utility customers, it does not restrict the customer from negotiating with a utility either a different tariff rate or a different size of facility. Thus, for the purposes of this analysis, the size of the alternative was not restricted. Restricting size to 10 MW can hamper the feasibility of the alternative by removing any economies of scale that might be achieved by employing larger sizes of DG.

10.1.1 TECHNOLOGIES

Renewable DG Technologies

Renewable technologies are those technologies that utilize a renewable fuel for electricity generation. The most common renewable generation technologies are hydroelectric dams and wind turbine generators, although wind turbine generators are more often considered to be a renewable DG technology. New hydroelectric facilities are not being considered as part of this alternative due to the difficulty of siting this technology in new applications. While there may be opportunities for small hydro applications, or the repowering of older hydroelectric facilities, there are not sufficient opportunities for these technologies to be considered as feasible for the alternative under consideration.

Wind

Wind turbine generators are enjoying favorable public policies that continue to encourage further development of this resource in Minnesota and the surrounding states. Wind turbine generators convert the energy available in the wind to rotational energy that is then converted to electrical energy through a series of gearboxes. Currently there is more than 700 MW of wind energy capacity installed throughout the State. It is anticipated that this number will grow significantly in the coming years as both the Xcel Energy mandates and the Renewable Energy Objective are implemented. It is anticipated that most State policies calling for increases in renewable energy sales from utilities will be met by wind as it is the least cost renewable resource available.

Biomass

Biomass is a renewable fuel that is comprised of a variety of sources and can be used in a number of different generation technologies.

Minnesota Statutes §216b.2411 defines "biomass" as follows:

- Methane or other combustible gases derived from the processing of plant or animal material
- Alternative fuels derived from soybean and other agricultural plant oils or animal fats
- Combustion of barley hulls, corn, soy-based products, or other agricultural products
- Wood residue from the wood products industry in Minnesota or other wood products, such as short-rotation woody or fibrous agricultural crops
- Landfill gas, mixed municipal solid waste, and refuse-derived fuel from mixed municipal solid waste.

There are several techniques that lend themselves to the utilization of biomass for electrical generation; to date the method that has been most utilized is direct combustion of the fuel to generate steam and drive an electric steam turbine generator. There are several boiler technologies that can be utilized in the direct combustion of biomass feedstocks, including stoker-fired boilers, bubbling fluid bed boilers, and circulating fluid bed boilers. The technology employed will be based on the individual characteristics of a particular project, as well as the economic considerations. Each technology type will achieve the same end of steam generation to drive an electric steam turbine generator.

Anaerobic digestion refers to the microbial processing of plant or animal material to generate methane, which is then utilized in an electrical generator, such as a reciprocating engine, microturbine, or other prime mover. Anaerobic digestion is used extensively throughout the country in waste water treatment facilities. More recently there has been increasing interest in employing anaerobic digestion to process animal waste from farm applications, such as dairy or hog manure. In Minnesota there are two on-farm, anaerobic digestion facilities that have incorporated anaerobic digestion to deal with dairy waste. These facilities have a total electrical generating capacity of 375 kilowatts (kW). The 375 kW represents the combined generating capacity of the Northern Plains Dairy (240 kW) and the Haubenschild Dairy Farm (135 kW).

In 2003, the Department's State Energy Office released a report entitled *Minnesota's Potential for Electricity Production Using Manure Biogas Resources,* which provides a basic assessment of the feasibility and potential of using animal wastes in anaerobic digesters to create electricity in Minnesota (Minnesota Department of Commerce, 2003). The report indicates a theoretical potential of 116 MW of capacity if all available manure resources were exploited. It is possible

that additional capacity could be generated if food processing waste was also considered as a potential resource.

Landfill gas is another potential source of fuel for electrical generation from a reciprocating engine or microturbine. There are numerous projects in Minnesota and throughout the country that have utilized landfill gas in electrical generation applications. Landfill gas is produced as organic waste is broken down by anaerobic bacteria. The primary energy component in landfill gas is methane, which can be captured for use in generation applications. According to the Environmental Protection Agencies Landfill Methane Outreach Program there is more than 1,000 MW of electrical generation capacity fueled by landfill gas throughout the country, and 24.2 MW of capacity in Minnesota.

More recent technology advancements provide the ability to utilize biomass by first gasifying the fuel in a reduced oxygen environment. The result of this process is a low British Thermal Unit (BTU) syngas. The syngas can then be utilized in a gas turbine or steam generator in conjunction with a steam turbine. Because of the tremendous potential that exists for the utilization of biomass resources, it is almost certain that new processes and technologies will be developed to more efficiently capture the energy contained within these resources. However, for the purposes of this alternative, consideration of DG fueled by biomass resources will be limited to combustion, anaerobic digestion, and gasification.

Biodiesel

In addition, the use of a biofuel, such as biodiesel in a diesel engine generator can also be considered a renewable DG technology. Diesel engine generators are a mature technology and utilization of biodiesel as a fuel in these generators requires little or no modification to the equipment. One concern regarding the use of biodiesel as a way of meeting baseload needs is that operational cost may be prohibitive. The utilization of ethanol as a fuel for DG technologies has been previously considered and dismissed as a viable option in the development of a DG alternative for the Monticello Independent Spent Fuel Storage Installation (Minnesota Public Utilities Commission, 2005).

Non-Renewable DG

Non-renewable DG includes combustion gas turbines, reciprocating engines, and internal combustion engines. These technologies utilize natural gas, diesel fuel, or fuel oil as an energy input for electrical generation. All are mature technologies that have been used by utilities and utility customers in a wide range of applications. Often integrating these technologies can allow higher efficiencies to be achieved. One integration strategy is to capture the waste heat generated in the production of electricity and use that heat in an industrial process or to provide

some other thermal need. This configuration is known as combined heat and power (CHP), and can result in an overall fuel efficiency of more than 70 percent.

10.2 PREVIOUS DISTRIBUTED GENERATION ALTERNATIVE ANALYSES

10.2.1 ANALYSIS OF BASELOAD GENERATION ALTERNATIVE, BURNS, AND MCDONNELL

In their *Analysis of Baseload Generation Alternatives* Burns and McDonnell completed for Otter Tail Power, they do not consider a DG alternative such as the one that is being proposed herein. The only 100 percent renewable alternative that is considered is a 100 percent biomass plant fueled by a 100 percent dedicated wood crop (hybrid willow). In their analysis, Burns and McDonnell assume a 50 MW biomass facility having a heat rate of 14,000 BTU/kilowatt hour (kWh) Higher Heating Value (MISO et. al, 2004). In their conclusions, Burns and McDonnell state the following:

> *The 50 MW biomass plant is not economically viable for baseload energy production due to higher construction costs and higher fuel costs. A larger scale biomass plant to take advantage of economies of scale in construction costs is not practical. A lower cost renewable option would be to co-fire a percentage of the heat input of the 600 MW Big Stone II Generating Unit with a wood residue, wood crop, or agricultural waste. A five percent co-fire on a heat input basis would represent the equivalent of a 30 MW biomass plant.*

10.2.2 FEDERAL DRAFT EIS

The Federal Draft EIS states the following with regards to alternatives analyzed for this project:

> *Analysis conducted by the Co-owners considered alternative power generation technologies, including wind energy, solar power and biomass, atmospheric circulating fluidized bed, Integrated (Coal) Gasification Combined Cycle, combined cycle gas turbine (CCGT), wind plus CCGT, and demand side management. Results of the alternatives analysis determined that coal-fired, super-critical boiler technology was the only technology that meets the Co-owners needs for reliable baseload operations and reasonable long- term economic costs.*

Additionally, the Federal Draft EIS states the following, with regards to the transmission project:

> *Transmission constraints in MAPP have severely limited many utilities' access to any surplus power that may be available for purchase. Some utilities have experienced situations where they have identified an economic purchase, only to find that they cannot secure transmission service to deliver the energy from the seller's system to the buyer's system. Transmission improvements of the proposed*

Big Stone II Transmission Line Project would reduce risks of energy delivery shortfalls within central Minnesota.

While a DG alternative may have the ability to provide electrical energy to the various load centers, there is no evidence to suggest that a DG alternative will be able to alleviate the transmission constraints in the MAPP system. This represents a serious challenge to the feasibility of the DG Alternative.

10.2.3 MONTICELLO DG ALTERNATIVE

The DG alternative that was developed in the case of the Monticello Independent Spent Fuel Storage Installation (ISFSI) was developed as an alternative to replacing the generation capacity of the Monticello Nuclear Generating Plant (MNGP). There are a number of differences between the MNGP DG Alternative and any potential DG alternative for the Big Stone Transmission Line Project. The primary difference is that in the case of MNGP, the Department considered replacing an existing baseload generation resource with a sufficient amount of renewable DG. Under the MNGP DG Alternative there was not an analysis of the DG alternative to meet the capacity needs of the facility. The focus was to develop the most reasonable DG alternative to replace the generation capacity on an energy basis. In that case, the proposed DG alternative consisted of the following resources:

- 100 MW of biodiesel fueled generation
- 250 MW of biomass fueled generation
- 10 MW of generation produced by biogas that is the product of anaerobic digestion
- 300 MW of 36 percent capacity factor wind energy
- 200 MW of 26 percent capacity factor wind energy
- 25 MW of hydroelectric generating capacity

In the case of the MNGP DG Alternative that was developed by the Department, the alternative was determined to be roughly $2.7 billion more than the baseline of keeping the MNGP facility operating by adding an ISFSI. In the case of the BSP II, the DG Alternative represents an alternative to construction of transmission line facilities to deliver power from the Big Stone II Generating Facility to a number of utility service areas in Minnesota. While there are significant differences between the Big Stone Transmission Line Project and the MNGP ISFSI project, these numbers illustrate the difficulty of developing the feasible DG Alternative.

10.3 THE BIG STONE II DG SCENARIO

In order to identify how a DG alternative for this particular project might look, it is necessary to review the energy needs of each utility partner in this project. In total, utilities operating in Minnesota are expected to receive just under 400 MW of energy capacity as part of the proposed project. The breakdown of this energy need by utility is shown in Table 8. As such, a DG alternative of roughly 400 MW has been developed for consideration.

Table 8
Energy Capacity Breakdown by Participating Utilities

	Percent Ownership	MW	Percent Minnesota Load	MW to Minnesota Load
MRES	25	150	57	86
OTP	19	115.8	100	116
MDU	19	115.8	0	0
GRE	19	115.8	100	116
SMMPA	8	46.8	100	47
CMMPA	5	30	100	30
Heartland	4	25.2	0	0
Total				394

Resource requirements are a key consideration in choosing which type of DG technologies could meet a particular application. This is particularly true for renewable DG technologies. Thus, in developing the DG alternative it was necessary to look at potential locations of these technologies. Appendix A.4 indicates those areas where alternative DG technologies would need to be sited in order to meet the stated needs of the participating utilities. The letters correspond to a number of load centers that would be supplied with energy from the proposed project. The areas of interest are not limited to those counties in which the load centers are located, but also would include the surrounding counties.

Due to the number of participating utilities, as well as the large area that can be considered for this project, there are a number of different scenarios that could be developed that meet the needs of the participating utilities. For that reason, it makes sense to discuss the ability of DG to generally meet the needs of the proposed project as well as the challenges that will accompany any DG alternative for this project.

The DG scenario that has been developed for this project is outlined in Table 9. The intent of this exercise is to present what an alternative may look like, not to develop the alternative as it

would be implemented. There are a number of variations of this alternative that could be considered, which would be based on the ability to site the DG facilities in the areas of interest and the particular resources that would be available in those areas. The biomass component could include anaerobic digestion, combustion, and, potentially, gasification. The diesel component could be fueled with either petroleum diesel fuel or biodiesel.

Table 9
Summary of DG Alternative Scenario for the Big Stone HVTL Project

Summary	MW	Capacity Factor (percent)	Accreditation Factor	Accredited Capacity	MWh
Wind	277	32.5	13.5	37	788,619
Diesel	62	85.0	100.0	62	461,652
Gas Turbine	203	85.0	100.0	203	1,511,538
Biomass	39	70.0	100.0	39	239,148
Landfill Gas	15	85.0	100.0	15	111,690
DSM	36	33.6	100.0	36	105,961
Total	632			392	3,218,608

The breakdown of this alternative by specific geographic locations is presented in Table 10 through Table 16.

Table 10
DG Alternative for the Beltrami Area (A)

Beltrami (A)	MW	Capacity Factor (percent)	Accreditation Factor (percent)	Accredited Capacity	MWh
Wind		32.5	13.5		
Diesel			100.0		
Gas Turbine	20	85.0	100.0	20	148,920
Biomass	25	70.0	100.0	25	153,300
Landfill Gas		85.0	100.0		
DSM	4	33.6	100.0	4	11,773
Total	49			49	313,993

Table 11
DG Alternative for the Clay Area (B)

Clay (B)	MW	Capacity Factor (percent)	Accreditation Factor (percent)	Accredited Capacity	MWh
Wind	50	36.9	13.5	7	161,622
Diesel					
Gas Turbine	48	85.0	100.0	48	357,408
Biomass			100.0		
Landfill Gas		85.0	100.0		
DSM	6	33.6	100.0	6	17,660
Total	104			61	536,690

Table 12
DG Alternative for the Kandiyohi Area (C)

Kandiyohi (C)	MW	Capacity Factor (percent)	Accreditation Factor (percent)	Accredited Capacity	MWh
Wind	35	37.4	13.5	5	114,668
Diesel	33	85.0	100.0	33	245,718
Gas Turbine					
Biomass			100.0		
Landfill Gas	5	85.0	100.0	5	37,230
DSM	4	33.6	100.0	4	11,773
Total	77			47	409,390

Table 13
DG Alternative for the Lyon Area (D)

Lyon (D)	MW	Capacity Factor (percent)	Accreditation Factor (percent)	Accredited Capacity	MWh
Wind	20	43.2	13.5	3	75,686
Diesel	13	85.0	100.0	13	96,798
Gas Turbine					
Biomass	10	85.0	100.3	10	74,460
Landfill Gas		85.0	100.0		
DSM	2	33.6	100.0	2	5,887
Total	45			28	252,831

Table 14
DG Alternative for the Olmsted Area (E)

Olmsted (E)	MW	Capacity Factor (percent)	Accreditation Factor (percent)	Accredited Capacity	MWh
Wind	125	37.4	13.5	17	409,530
Nat'l Gas Recip Eng	7	85.0	100.0	7	52,122
Gas Turbine	110	85.0	100.0	110	819,060
Biomass		85.0	100.0		
Landfill Gas	5	85.0	100.0	5	37,230
DSM	15	33.6	100.0	15	44,150
Total	262			154	1,362,092

Table 15
DG Alternative for the Stevens Area (F)

Stevens (F)	MW	Capacity Factor (percent)	Accreditation Factor (percent)	Accredited Capacity	MWh
Wind	12	42.7	13.5	2	44,886
Diesel	4	85.0	100.0	4	29,784
Gas Turbine					
Biomass	4	85.0	100.0	4	29,784
Landfill Gas		85.0	100.0		
DSM	1	33.6	100.0	1	2,943
Total	21			11	107,398

Table 16
DG Alternative for the Benton Area (G)

Stevens (G)	MW	Capacity Factor (percent)	Accreditation Factor (percent)	Accredited Capacity	MWh
Wind	35	34.6	13.5	5	106,084
Nat'l Gas Recip Eng	5	85.0	100.0	5	37,230
Gas Turbine	25	85.0	100.0	25	186,150
Biomass		85.0	100.0		
Landfill Gas	5	85.0	100.0	5	37,230
DSM	4	33.6	100.0	4	11,773
Total	74			44	378,467

The capital cost of the alternative is shown in Table 17 and Table 18, with Table 18 showing the capital cost of the alternative without the wind component. Ownership structures under the alternative will not be addressed, as it is outside the scope of this analysis. Whether the alternative would be owned by the individual Applicants or by independent power producers selling to the utility under a negotiated power purchase agreement will depend on the economic considerations of the individual utilities and project locations.

Table 17
Capital Cost of the Proposed DG Alternative

Rough Capital Cost Estimate			
Technology	**MW**	**Capital Cost ($/kW)**	**Total Capital Cost**
Wind	277	$ 1,167.00	$ 323,259,000.00
Diesel	62	$ 831.00	$ 51,522,000.00
Gas Turbine	203	$ 385.00	$ 78,155,000.00
Biomass	39	$ 1,809.00	$ 70,551,000.00
Landfill Gas	15	$ 1,544.00	$ 23,160,000.00
DSM	36		
Total Capital Cost			$ 546,647,000.00

Table 18
Capital Cost of the Proposed DG Alternative Excluding Wind

Rough Capital Cost Estimate (Excluding Wind – Assume it is an Energy Cost)			
Technology	**MW**	**Capital Cost ($/kW)**	**Total Capital Cost**
Wind	277		
Diesel	62	$ 831.00	$ 51,522,000.00
Gas Turbine	203	$ 385.00	$ 78,155,000.00
Biomass	39	$ 1,809.00	$ 70,551,000.00
Landfill Gas	15	$ 1,544.00	$ 23,160,000.00
DSM	36		
Total Capital Cost			$ 223,388,000.00

Source: Table 38 Cost and Performance Characteristics of New Central Station Electricity Generation Technologies Assumptions to the Annual Energy Outlook (U.S. Energy Information Administration) Overnight Capital Cost, including contingency factors, excluding regional multipliers, and learning effects. Interest charges are also excluded. These represent costs of new projects initiated in 2005.

10.4 RIGHT OF WAY REQUIREMENTS

It is probable that the proposed alternative would require upgraded transmission capacity in some form. The cost of these upgrades have not been factored into the analysis, and a much more thorough study would have to be undertaken to determine what the transmission impacts would be. Such a study would require that a more detailed analysis of the location, type, and size of the alternatives be conducted.

The ROW required for the wind and gas components of the DG scenario are similar to that described in the Wind/Gas Alternative. The remainder of the scenario would include minor ROW requirements to accommodate the footprint of the facility.

10.5 SIZE AND TYPE OF STRUCTURES

As stated in Section 10.4, a more detailed analysis of the alternative would be required to determine the size and type of the transmission and wind/gas generation facilities. The remainder of the scenario would be similar in size to common industrial facilities and may include a stack with a height dependent on the capacity and facility type.

10.6 ELECTRIC AND MAGNETIC FIELDS

All electric generation and transmission technologies produce EMF. As stated in Section 9.3, EMF exposure near these types of facilities drops significantly with distance from the facilities. In no cases will generation facilities be located within a few hundred feet of residences due to the requirement to site faculties far enough away from homes to assure compliance with MPCA noise standards.

10.7 NOISE IMPACTS

Each of the project types in the DG alternative generates noise. Transmission noise impacts are expected to be similar to the proposed Big Stone Transmission Line Project and discussed in Section 7.4.

All the project types would be required to meet the MPCA noise requirements. The MPCA has established standards for the regulation of noise levels. The land use activities associated with residential, commercial and industrial land have been grouped together into NAC. See Minnesota Rule 7030.0050. Each NAC is then assigned both daytime (7 a.m. to 10 p.m.) and nighttime (10 p.m. to 7 a.m.) limits for land use activities within the NAC. See Minnesota Rule 7030.0040. Table 19 shows the MPCA daytime and nighttime limits in dBA for each NAC. The limits are expressed as a range of permissible dBA within a 1-hour period. L_{50} is the dBA that may be exceeded 50 percent of the time within 1 hour, while L_{10} is the dBA that may

be exceeded 10 percent of the time within 1 hour. Residences, which are typically considered sensitive to noise, are classified as NAC 1.

Table 19
MPCA Noise Limits by Noise Area Classification (dBA)

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

Due to the dispersed nature of the scenario, the technologies of the DG alternative would have potential impacts on a larger number of people than a facility in a single location.

10.8 VISUAL IMPACTS

The visual impacts will primarily be similar to the wind and gas facilities, as described in Section 9.5. Due to the dispersed nature of the scenario, the technologies of the DG alternative would have potential impacts on a larger number of people than a facility in a single location.

10.9 IMPACTS ON AIR QUALITY

Air quality impacts for the DG alternative were based on a number of assumptions. The emissions for the Diesel/Biodiesel Alternative are based on a 1,600-kW Caterpillar Diesel generator set (3,416 Diesel Engine) operating on 100 percent diesel. Landfill gas emissions are assumed to have beneficial emissions impact for the following reasons:

- Landfill gas to energy projects result in a reduction in methane migration.
- Landfill gas to energy projects have a net reduction greenhouse gas emissions.
- Landfill gas to energy projects result in a reduction of volatile organic compounds that would otherwise migrate to ground water or the air.

Landfill gas is assumed to have an energy content of 500 BTU/ft^3.

Emissions of CO_2 are based on emissions factors available from the Department of Energy, Energy Information Administration's Voluntary Reporting of Greenhouse Gasses Program (http://www.eia.doe.gov/oiaf/1605/coefficients.html).

Natural gas emissions factors for a simple cycle combustion are as follows:

- SO_2: 0.6 lbs/million ft^3,
- NO_x: 100 lbs/million ft^3,
- Hg: 0.0000026 lb/million ft^3.

The emissions factors were taken from the Wisconsin Department of Natural Resources (http://www.dnr.state.wi.us/org/aw/air/registry/quantexamples/example5.html).

Table 20
Estimated Air Impacts of Distributed Generation Technologies

	Wind	Diesel/Biodiesel	Natural Gas	Biomass	Landfill Gas
Capacity	277	62	203	39	15
Estimated Annual Fuel Consumption	0	32.3 million gallons	14.7 million MCF	169,600 tons	2.2 billion standard cubic feet
NO_x	0	7043 tpy	736.8 tpy	465.06 tpy	*
SO_2	0	114.7 tpy	4.4 tpy	42.45 tpy	*
PM_{10}	0	109.37 tpy	-	83.45 tpy	*
CO	0	942.4 tpy	-	834.47 tpy	*
VOC	0	-	-	13.32 tpy	*
Pb	0	-	-	0.09 tpy	*
Mercury	0	-	0.04 pounds/year	-	*
CO_2	0	361,760 tpy	888,489 tpy	181,286 tpy	125,495 tpy

Source: Minnesota Biomass – Hydrogen and Electricity Potential, February 2005, National Renewable Energy Laboratory. http://www.moea.state.mn.us/p2/forum/MNbiomass-NREL.pdf

10.10 IMPACTS ON WATER QUALITY

Impacts to water quality are similar to the Wind/Gas Alternative (Section 9.7).

10.11 IMPACTS ON NATURAL AND WILDLIFE RESOURCES

The site disturbance related to the DG Alternative could cause some habitat loss for wildlife and loss of native vegetation. The exception would be landfill gas facilities that are located on closed landfills. These are typically disturbed environments. The DG Alternative wind and gas facilities would have similar impacts described in Section 9.8.

Any potential water quality-related impacts on vegetation and wildlife would be mitigated under the requirements of DNR and NPDES permits.

10.12 SOCIAL AND ECONOMIC IMPACTS

Social and economic impacts are similar to the Wind/Gas Alternative (Section 9.9). Depending on the type of technology employed, a variety of niche industries could be developed to serve the fuel supply for the generation needs. This would include such things as agricultural wood and waste harvesting, aggregation, processing and transportation. Other benefits include developing markets for products that have little or no value. Examples of this include agricultural residues, where wood waste and food processing byproducts become valuable. Biodiesel fuel generation has the ability to enhance the market opportunities of biodiesel fuel as well as the potential to lead to new plant development to capitalize on the increased demand of fuel generation. This is such as the case with landfill gas and agricultural residues.

11.0 FEASIBILITY AND AVAILABILITY OF ALTERNATIVES

11.1 BIG STONE TRANSMISSION LINE PROJECT

The transmission studies that have been completed by the Applicants conclude that from an electrical performance standpoint, the proposed Big Stone Transmission Line Project is the best of the alternatives evaluated for providing an interconnection to the Big Stone II Plant, meeting projected load growth, and transmitting power to the Applicants' service areas. The main conclusion of the Big Stone Interconnection Study is that either a new transmission line to Morris and a new transmission line to Granite Falls or a new transmission line to Willmar and a new transmission line to Granite Falls would be a feasible method to interconnect the Big Stone II Plant generator into the regional power grid. In either case, a new transmission line to Granite Falls is necessary to distribute the power. Construction materials for structures, conductors, and substation expansion are regionally available to construct the Big Stone Transmission Line Project.

11.2 NO BUILD OPTION

11.2.1 NO BUILD (WITHOUT BIG STONE II)

This no build option would not require any construction materials besides replacement structures for the rebuild of the Morris line. Materials for this rebuild are regionally available.

This alternative is not considered a feasible option from the project need perspective. This option does not meet the need described by the Applicants and the MAPP capacity deficit (MAPP, 2005). Additionally, under this alternative, the transmission system would not support regional transmission planning and would lack the ability for future power transfer capabilities from western Minnesota locations.

11.2.2 NO BUILD (WITH BIG STONE II)

According to Section 6.2.1 of the Certificate of Need Application for this project, 11 options, including the proposed Big Stone Transmission Line Project, were reviewed for interconnecting the proposed Big Stone II Plant with the existing transmission system. As indicated by Table 5 of the Certificate of Need Application, each of the other 10 options would also require transmission lines to be constructed in Minnesota in order to serve the Applicants' service areas. These other options were not reviewed further because they would require more mileage of transmission line than the preferred alternative, which would result in higher costs and environmental impacts, and a less optimal system plan. It is unknown how many miles of transmission line in other states would need to be built in order to properly interconnect the Big

Stone II Plant, but the length would be longer than the options considered in the Certificate of Need Application. Therefore, associated environmental and socioeconomic impacts would have the potential to be larger than the Big Stone Transmission Line Project, especially since the transmission lines in other states would likely be along new utility ROW, whereas the proposed project provides an opportunity to rebuild existing transmission lines. In particular, the Morris Route 1 and Granite Falls Route 1 will include rebuilding the existing transmission line for 99.7 percent and 62.8 percent of the route, respectively.

Similar to the No Build (without Big Stone II) Option, this alternative is not a feasible option to meet the load demands of the Applicants' service areas. Under this alternative, communities in the region would likely experience lowered system reliability and more system losses than under existing conditions as demand grows. Therefore, this is not considered a feasible option from the project need perspective.

As stated above, the Morris line would need to be rebuilt under this alternative, and even though no lines in Minnesota directly connecting to the Big Stone II Plant would be built, it is likely that the additional load in the area would require upgrades of existing transmission lines. The materials for these upgrades and rebuilds are regionally available.

11.3 WIND/RENEWABLES AND GAS GENERATION

The wind and natural gas generation alternative is feasible, it could be constructed. The wind and natural gas technologies analyzed have been constructed in similar quantities in Minnesota. Utilities and developers are able to successfully construct and operate such facilities. However, the wind and natural gas generation alternative does not provide transmission outlet capacity for the proposed Big Stone Transmission Line Project. In other words, the alternative does not provide an interconnection nor delivery path for the proposed BSP II generation facility under review by the South Dakota PUC.

However, the main issue with respect to feasibility of the alternative is cost as compared to the Big Stone Transmission Line Project. The estimated capital costs of the Wind/Gas Alternative are substantially greater than the costs provided by the Applicants of the proposed Big Stone Transmission Line Project. Below are estimates of the capital costs for typical wind and gas facilities compared with the proposed Big Stone Transmission Line Project (United States Energy Information Administration, 2006). These costs do not include operations and maintenance costs.

Table 21
Comparative Costs of Wind/Gas Alternative

Alternative	MW Capacity	Wind/Gas Alternative Estimated Capital Cost [1]	Big Stone Transmission Line Estimated Capital Cost
Alternative Lower Range	400 MW Gas 747 MW Wind	$ 1,118,249,000	$ 93,000,000
Alternative Higher Range	655 MW Gas 747 MW Wind	$ 1,283,414,000	$ 135,000,000

[1] *Source: Table 38 Cost and Performance Characteristics of New Central Station Electricity Generation Technologies Assumptions to the Annual Energy Outlook (U.S. Energy Information Administration).*

11.4 DISTRIBUTED GENERATIONS/DEMAND SIDE MANAGEMENT

Feasibility of the Wind Energy Component of the Alternative

While wind may provide sufficient energy over the course of a year, the inability of the technology to meet capacity needs challenges the resource as a feasible alternative for the proposed project. Wind energy is a tremendous energy resource, for instance a single 1.5 MW turbine operating at a 35 percent capacity factor will generate approximately 4.6 million kWh over the course of a year. This is enough energy to provide the electricity needs of approximately 460 homes. However, if these homes had to rely solely on the energy from this single wind turbine they would find that their electrical needs would not be satisfied at every point during the year. This is due to the variable nature of electrical output from wind turbines. For instance the 1.5 MW turbine that had previously been mentioned will generate between 0 MW and 1.5 MW at any given time during the year and is likely going to generate at a capacity of 1.5 MW for a small percentage of time during that year. Often the wind generates electricity at times when it is not needed (from a load standpoint) or does not generate electricity when there is a load to be served. The seasonal variation of wind energy causes wind turbines to produce more energy during the spring and fall months, when the resource is at its peak, and less energy during the summer months. This illustrates the difficulty of having wind serve capacity needs, especially under the context of a DG alternative for a baseload energy resource.

Feasibility of the Biomass Component of the Alternative

One factor that may limit the feasibility of biomass, especially the application of anaerobically digested methane or biomass derived syngas, is the ability of these fuels to fuel thermal applications. In light of the recent price volatility of heating fuels such as natural gas, propane, and fuel oil it may be likely that instead of generating electricity, a more economically attractive option would be to utilize most of the fuel to offset heating fuel use in industrial applications.

Overall Feasibility of the DG Alternative

While it is feasible that a DG alternative could meet the intent of providing energy to the specific load centers that the Big Stone II Project will serve, it is unlikely at this time that a DG alternative could meet the second objective of the project. Namely, it is unlikely that the alternative could increase transmission capacity and improve reliability of the electric transmission system in the Buffalo Ridge area in Minnesota and South Dakota.

Landfill gas facilities have been widely demonstrated and are technically feasible. Diesel generation technologies are mature technologies that are widely used in utility applications and are feasible for use under this alternative.

However, fuel price volatility may limit the application of non-renewable DG technologies. Petroleum fuels and natural gas have experienced significant price increases and volatility during recent years. The economic uncertainty that accompanies these fuels will limit the feasibility of non-renewable technologies.

In total, the DG alternative as presented is likely not a feasible alternative in that it does not meet the specific needs that will be addressed by the proposed project.

BOOK 2 – TRANSMISSION ROUTE ALTERNATIVES: ANALYSIS OF HUMAN AND ENVIRONMENTAL IMPACTS

Minnesota Rule 4410.7035 requires the EIS to study the transmission project route proposal and route alternatives. This analysis must address the following issues:

- The human and environmental impacts of a project of the type proposed and of the alternatives identified.
- The potential impacts that are project specific.
- Mitigative measures that could reasonably be implemented to eliminate or minimize any adverse impacts identified for the proposed project and each alternative analyzed.
- The feasibility and availability of each alternative considered.
- A list of permits required for the project.

12.0 DESCRIPTION OF ENVIRONMENTAL SETTING

The transmission lines associated with the Big Stone Transmission Line Project are located within the North Central Glaciated Plains section of the Ecological Classification System, within the Minnesota River Prairie and Coteau Moraines subsections. The project area is characterized by glacial features and wide river basins (DNR, 2005a). The routes cross the Minnesota River Basin. The Minnesota River Basin is a wide floodplain that runs northwest and southeast across this portion of the State and is bound to the northeast and southwest by glaciated highlands.

12.1 MORRIS ROUTES

The Morris routes cross Big Stone and Stevens counties and enter the Red River Basin for approximately 9 miles in northern Big Stone County and western Stevens County before continuing in the Minnesota River Basin. Physiography in this area is characteristic of the Minnesota River Prairie Subsection, which is a 60-mile wide, gently rolling region of ground moraines and shallow river basins (DNR, 2005a). This area is characterized by loamy ground moraines with occasional end moraines and lake plains. These routes pass through a large area of glacial pothole wetlands and lakes northeast of Ortonville in Big Stone County. Elevations generally range between 960 and 1,150 feet. The lowest elevation is 951 feet near the southeast, and the highest elevation is 1,175 feet in Moonshine Township

12.2 WILLMAR ROUTES

The Willmar routes cross Big Stone, Swift, and Kandiyohi counties and are within the Minnesota River Prairie Subsection. The routes are within the Minnesota River Basin except for the

easternmost 7.5 miles, which are within the Upper Mississippi River Basin. Physiography in this area is characteristic of the Minnesota River Prairie Subsection as described above. The lowest elevation is 943 feet near the southwest end, and the highest elevation is 1,253 feet in the east end.

12.3 GRANITE FALLS ROUTES

The Northern Glaciated Plains Section contains two distinct subsections which the routes pass through. The majority of the corridor is within the Minnesota River Prairie Subsection which is described above. The southwestern portion of the routes enters the Coteau Moraines Subsection, a high glacial land form which extends along the southern border of the Minnesota River Prairie. Rolling moraine ridges are common across the Coteau Moraines in the region of the routes. The Coteau Moraine Subsection is separated from the Minnesota River Prairie by a steep escarpment which passes through the southwest corner of the Granite Falls routes. Elevations generally range between 900 and 1,550 feet across the project area. The lowest elevation is 900 feet near Granite Falls, and the highest elevation is 1,550 on the western edge of the routes.

13.0 REJECTED "MN TRUNK HIGHWAY 7 ROUTE" OPTION

An alternative to the Granite Falls Routes, the "MN Trunk Highway 7 Route," was suggested during scoping but rejected from detailed analysis. This alternative would extend south to southeast from Ortonville towards Appleton following the Minnesota River and MN Trunk Highway 7, and then turn southeast, following the Minnesota River and U.S. Highway 59 and U.S. Highway 212 to Granite Falls. The route is more direct than the proposed Granite Falls routes and would be less expensive to construct. However, the presence of population centers along the route, such as Odessa, Correll, Appleton, Milan, Watson, and Montevideo, as well as environmental constraints along the Minnesota River, would constrain routing possibilities. Therefore, this alternative was not carried forward for further consideration in either the Route Permit Application or the Federal EIS process.

14.0 IMPACTS ON HUMAN SETTLEMENT

14.1 SOCIOECONOMIC

14.1.1 AFFECTED ENVIRONMENT

Detailed information on the socioeconomics of the project area can be found in the Route Permit, Application in Sections 6.1.2, 6.2.2, 7.1.2, 7.2.2, 8.1.2 and 8.2.2. In general, the counties that the routes cross have a lower percentage of racial minorities (ranging from 1.6 to 9.3 percent) than Minnesota overall (10.6 percent). According to 2000 U.S. Census data, the per capita income within the counties ranges from $15,708 in Big Stone County to $19,627 in Kandiyohi County, lower than the Minnesota State average of $23,198. Within these counties, the percent of people living below poverty levels is higher than the Minnesota State average of 7.9 percent, ranging from 8.4 percent in Swift County to 13.6 percent in Stevens County. The project routes occur in areas that generally have lower percentages of minority and low-income populations than the counties and state as a whole.

Most of the land (more than 90 percent) in the counties is used for agriculture. Within the cities in these counties, other industries, such as manufacturing, retail, construction, and public and private services, all contribute to the local economies.

Morris Routes

Both Morris routes cross the same four Block Groups, the most detailed level for which economic data is available. Within the Block Groups crossed by the routes, the percentage of minority populations is approximately 1.6 percent, the per capita income is approximately $15,990, and the percentage of the population below the poverty level is approximately 10.1 percent. These values are consistent for the area around the existing Johnson Junction Substation and its proposed expansion site as well.

Willmar Routes

Both Willmar routes cross the same eleven Block Groups. Within the Block Groups crossed by the routes, the percentage of minority populations is approximately 12.3 percent, the per capita income is approximately $17,040, and the percentage of the population below the poverty level is approximately 7.5 percent.

Granite Falls Routes

Granite Falls Route 1 and Route 2 cross the same five Block Groups. Within the Block Groups crossed by the Granite Falls Route 1 and Route 2, the percentage of minority populations is

approximately 4.8 percent, the per capita income is approximately $18,150 and the percentage of the population below the poverty level is approximately 10.6 percent.

Granite Falls Route 3 and Route 4 cross the same seven Block Groups (including the five Block Groups crossed by Granite Falls Routes 1 and 2). Within the Block Groups crossed by the Granite Falls Route 3 and Route 4, the percentage of minority populations is approximately 3.7 percent, the per capita income is approximately $17,350, and the percentage of the population below the poverty level is approximately 10.8 percent.

Canby Substation Alternatives

The values described above for Granite Falls Routes 1, 2, 3, and 4 are consistent for the area around the existing Canby Substation and its proposed relocation sites (Alternatives A, B, C, and D) as well.

14.1.2 IMPACTS

Because the general socioeconomic background is similar for the all the routes, potential impacts from the proposed transmission lines are not expected to differ, with the exception of permanent impacts to agricultural land.

Short-term impacts to socioeconomic resources will be relatively minor. The construction, operation, and maintenance of the transmission line will not have a significant effect on socioeconomic resources along the route.

Agricultural land will be temporarily removed from production during transmission line construction. Permanent agricultural land conversion is associated with the transmission line structures and is estimated at approximately 7.0 acres for Morris Route 1, 7.3 acres for Morris Route 2, 13.6 acres for Willmar Route 1, 15.2 acres for Willmar Route 2, 8.5 acres for Granite Falls Route 1, 9.0 acres for Granite Falls Route 2, 12.6 acres for Granite Falls Route 3, and 13.0 acres for Granite Falls Route 4. Permanent agricultural land conversion associated with substation expansion or relocation is estimated at 3.7 acres for the Johnson Substation and 6.3 acres for the Canby Substation and Alternatives. Landowner compensation will be established by individual lease agreements. In general, agricultural areas surrounding transmission line structures will still be accessible to farming. Landowners will be consulted on locating structures in order to allow for navigation around structures and minimize impacts to farming. Landowners will also be consulted to determine known locations of drain tiles and irrigation systems so that impacts can be avoided and minimized. Project construction will not cause additional impacts to leading industries within the corridors.

Construction activity would require approximately 40 full-time personnel per route. Of the 40 personnel, approximately 25 employees will be needed during transmission line construction and additional workers will be required for substation construction. Additionally, part-time personnel may also be needed during the construction of the project.

Section 7.9 of this document provides more detail on the potential short term and long term benefits to the regional economy that could result from construction of the project.

Property values for parcels of land crossed by or adjacent to the proposed transmission lines are not anticipated to significantly change. Literature reviews indicate that although value losses up to 20 percent have been reported (EPRI, 2003), study results are highly dependent on methodology and location. Numerous studies have found that property values in parcels neighboring transmission lines are more dependent on traditional assessment categories, such as location, house size, and amenities, rather than the presence of a transmission line. Impacts are the greatest for agricultural lands where the transmission lines interfere with cultivating paths and spraying practices, high-end vacation properties, and small homesteads. Loss of value for residential parcels results from concern about health and visual impacts. However, impacts typically diminish within 10 years of transmission line construction. Positive impacts to property values can occur when transmission line ROWs are allowed to be cultivated or developed into recreational areas (Cowger, 1996 and Wisconsin Public Service Commission, 2000). A further discussion of the impact of transmission lines on property values can be found in the Split Rock to Lakefield Junction EIS submitted in January 2005.

14.1.3 MITIGATION

Mitigation measures will not differ between routes and will include those measures listed in Section 7.9 of this document.

14.2 DISPLACEMENT

14.2.1 AFFECTED ENVIRONMENT

Displacement is not anticipated for the project. Displacement occurs when a home is located at a distance that will interfere with the safe operation of the transmission line.

Since the transmission lines are greater than 200 kV, there may be instances where property is purchased per Minnesota Statute 116C.63, Subd. 4 (sometimes referred to as “Buy the Farm”). This allows the property owner the option of having the property that the route crosses to be

purchased at the fair market value of the land. This option is the landowner's choice and it is difficult to determine which, if any, will elect it.

14.2.2 IMPACTS

Table 22 identifies the distance of homes to the proposed transmission line. No displacement is required.

Table 22
Route Distance to Homes

Route	Number of Houses within 100 feet of Route	Houses More than 100 feet, Less than 300 feet of Route
Morris Route 1	1	8
Morris Route 2	1	9
Willmar Route 1	1	28
Willmar Route 2	1	16
Granite Falls Route 1	1	3
Grantie Falls Route 2	1	12
Granite Falls Route 3	2	5
Granite Falls Route 4	1	14

14.2.3 MITIGATION

Mitigation measures will not differ between routes. Landowners will be consulted to make route and substation siting adjustments to avoid displacement. No displacement is anticipated for any of the routes or associated facilities and therefore, no mitigation is necessary.

14.3 NOISE

14.3.1 AFFECTED ENVIRONMENT

The background noise is similar for all routes. The primary land use along the routes is rural agricultural land. Typical noise sensitive receptors along the routes will include residences, churches, schools, and parks where either sleep or prolonged outdoor activities occur. Current average noise levels in these areas are typically in the 30 to 40 dBA range and are considered acceptable for residential land use activities. Ambient noise in rural areas is commonly made up of rustling vegetation and infrequent vehicle pass-bys. Higher ambient noise levels, typically 50

to 60 dBA, will be expected near roadways, urban areas, and commercial and industrial properties in the project area.

14.3.2 IMPACTS

Morris, Willmar, and 230 kV Portion of Granite Falls Routes

The general noise impacts are similar for the all the 230 kV routes. The proposed transmission line was modeled using the Bonneville Power Administration CFI8X model to evaluate audible noise from HVTLs. Where possible, the model was executed as a worst-case scenario benchmark to ensure that noise was not under-predicted. This involved adjusting the orientation of phase angles. The single circuit 230 kV transmission line was modeled on both H-frame and davit arm tangent structures. The analysis relied on the assumptions presented in Table 23.

Table 23
Assumed Parameters for 230 kV Single Circuit Structures

Parameter	230 kV H-Frame	230 kV Davit Arm	230 kV H-Frame 1272 ACSR	230 kV H-Frame 954 ACSS	230 kV Davit Arm 1272 ACSR	230 kV Davit Arm 954 ACSS
Conductor Diameter (inches)	1.345	1.345	1.345	1.196	1.345	1.196
Phase Angle Orientation (degrees)	240, 120, 0	240, 120, 0	240,120,0	240,120,0	240,120,0	240,120,0
Line Current (A)	1,300	1,300	1,300	1,300	1,300	1,300
Line to Neutral Voltage (kV)	132.79	132.79	132.79	132.79	132.79	132.79
Conductor Horizontal Locations (feet, relative to center)	-20, 0, 20	-19, 14, -14	-20, 0, 20	-20, 0, 20	-19, 14, -14	-19, 14, -14
Conductor Vertical Locations (feet, relative to ground)	42	52, 62, 72	42	42	52, 62, 72	52, 62, 72

The predicted audible noise from the 230 kV transmission lines is presented in Table 24. No exceedences of the MPCA daytime and nighttime limits are predicted at the nearest sensitive receptors.

Table 24
Predicted Audible Noise from 230 kV Transmission Lines (dBA)

Conductor Size	Distance from center of transmission line corridor (feet)								
	-300	-200	-100	-50	0	50	100	200	300
H-Frame, 230 kV transmission line with 954 ACSS	34	36	39	43	44	43	39	36	34
Single Pole Davit Arm, 230 kV transmission line with 954 ACSS	33	35	38	41	41	40	37	35	33
H-Frame, 230 kV transmission line with 1272 ACSR	32	34	37	40	42	40	37	34	32
Single Pole Davit Arm, 230 kV transmission line with 1272 ACSR	31	33	36	38	39	38	35	32	30

The general noise impacts are similar for all of the 345 kV routes. The proposed 345 kV transmission line was modeled using the same methodology as described above for the 230 kV transmission line. This involved adjusting the orientation of phase angles. The single circuit 345 kV transmission line was modeled on both H-frame and davit arm tangent structures. The analysis relied on the assumptions presented in Table 25.

Table 25
Assumed Parameters for 345 kV Single Circuit Structures

Parameter	345 kV H-Frame 954 ACSS	345 kV Davit Arm 954 ACSS	345 kV H-Frame 1272 ACSR	345 kV Davit Arm 1272 ACSR
Conductor Diameter (inches)	1.196	1.196	1.345	1.45
Phase Angle Orientation (degrees)	240, 120, 0	240, 120, 0	240,120,0	240,120,0
Line Current (A)	1,300	1,300	1,300	1,300
Line to Neutral Voltage (kV)	199.19	199.19	199.19	199.19
Conductor Horizontal Locations (feet, relative to center)	-22, 0, 22	-24, 19, -19	-24, 19, -19	-24, 19, -19
Conductor Vertical Locations (feet, relative to ground)	60	52, 64, 77	52, 64, 77	52, 64, 77

The predicted audible noise from the 345 kV transmission lines is presented in Table 26. No exceedences of the MPCA daytime and nighttime limits are predicted at the nearest sensitive receptors.

Table 26
Predicted Audible Noise from Proposed 345 kV Transmission Lines Operated at Maximum Capacity (dBA)

Conductor Size	Distance from center of transmission line corridor (feet)								
	-300	-200	-100	-50	0	50	100	200	300
H-Frame, 345 kV transmission line with bundled 954 ACSS	38	40	43	45	46	45	43	40	38
Single Pole Davit Arm, 345 kV transmission line with bundled 954 ACSS	35	37	40	43	43	41	39	36	35
H-Frame, 345 kV transmission line with bundled 1272 ACSR	36	38	41	43	44	43	41	38	36
Single Pole Davit Arm, 345 kV transmission line with bundled 1272 ACSR	33	35	38	41	41	39	37	34	33
H-Frame, 345 kV transmission line operated at 230 kV with bundled 954 ACSS	17	19	22	24	25	24	22	19	17
Single Pole Davit Arm, 345 kV transmission line operated at 230 kV with bundled 954 ACSS	14	16	19	22	22	20	18	15	13
H-Frame, 345 kV transmission line operated at 230 kV with bundled 1272 ACSR	15	17	20	22	23	22	20	17	15
Single Pole Davit Arm, 345 kV transmission line operated at 230 kV with bundled 1272 ACSR	12	14	17	20	20	18	16	13	11

14.3.3 MITIGATION

Mitigation measures will not differ between routes. To avoid and minimize construction noise, internal combustion engines associated with construction activities will be fitted with approved mufflers and spark arresters.

14.4 AESTHETICS

14.4.1 AFFECTED ENVIRONMENT

Aesthetic resources are the various elements of the landscape that contribute to the visual character of a place. These elements can be either natural or human-made and include objects, vistas, and viewsheds. Examples of scenic resources could include outstanding natural features, dramatic vantage points, or pristine landscapes.

The visual character and quality in the project area are characterized by open agricultural fields with rolling hills broken by large lakes and wetland complexes. Dispersed residential areas and existing transmission lines are also part of the human-made elements in the vicinity of the routes. Elevations range between 830 and 1,710 feet above sea level. The highest elevations occur around the Coteau des Prairies Plateau, along the Minnesota and South Dakota border, and the Alexandria Moraine.

Transmission lines and substations alter the visual landscape. Aesthetic impacts, to a certain extent, differ according to an individual's values or viewer response. Viewer response is the psychological reaction of a person to visible changes in the viewshed and is based on the sensitivity and exposure of the viewer to that viewshed. Sensitivity relates to the magnitude of the viewer's concern for a viewshed. Exposure is a function of the type of view seen, as well as the distance, perspective, and duration of the view. The term exposure may also refer to the number of people exposed to a particular view.

Viewer characteristics and sensitivity are described in three sensitivity levels:

- Low Visual Sensitivity: most motorists who would see transmission lines at limited locations from roads that they traverse
- Moderate Visual Sensitivity: Some recreationalists, such as bird watchers, hikers and/or recreationalists whose activity is specific to a finite geographic location, who are sensitive to a finite geographic location and who are sensitive to human-made structures and their impact on the view of the natural environment
- High Visual Sensitivity: Residential viewers who own property within 500 feet of the proposed routes and are concerned about transmission structures and how they impact the view of the natural environment

The preferred structures for the transmission line will be wood H-frames, which are shorter than single circuit, steel pole structures, but are wider and utilize two poles. The H-frame structures are between 70 and 100 feet in height and have a permanent impact of 1,000 square feet. The single pole structures are between 80 and 120 feet in height. The structures for the existing 115 kV transmission line are wood H-frames that vary between 50 and 80 feet high depending on the terrain and land elevation. Typically, these structures are 60 to 65 feet high.

Several locations within the vicinity of the routes that are visually sensitive have been identified due to their visual quality, uniqueness, cultural significance, or viewer characteristics.

Morris Routes

The dominant visual characteristic of the Morris routes is agricultural land, which comprises over 90 percent of the land use. The highest elevations occur in Big Stone County around the Alexandria Moraine.

Areas of low visual sensitivity along the Morris routes include the cities of Ortonville, Big Stone Lake, Chokio, Alberta, and Morris and U.S. Highway 75. The transmission lines and associated Ortonville and Morris substations will be difficult or unable to be viewed from the downtowns of the cities along the route alignments. There are approximately 48 miles of existing 115 kV transmission lines located in this corridor. U.S. Highway 75 was designated by the 2001 Minnesota Legislature as the "King of Trails" for its historic features and opportunities for recreation along the byway.

Areas of medium visual sensitivity along the Morris routes include several areas of USFWS wetlands and grassland easements, State-managed lands, the Big Stone National Wildlife Refuge along the Minnesota River in Ortonville, and several WMAs and WPAs along County Road 12. The visual characteristics of these areas include natural landscapes with gently rolling hills, grasslands, native prairie remnants, large wetlands, and open lakes. The Refuge, WMAs, and WPAs provide habitat for waterfowl and recreational opportunities. An existing 115 kV transmission line parallels County Road 12 as it heads north toward the City of Johnson.

Johnson Junction 230/115 kV Substation

The proposed substation expansion will accommodate the 230 kV Morris transmission line from the Big Stone 230 kV Substation and will be constructed adjacent to the existing switch station. There are no visually sensitive areas in the vicinity of the substation.

Willmar Routes

The dominant visual characteristic in the vicinity of the Willmar routes is agricultural land, which comprises over 95 percent of the land use. The highest elevations in the route vicinity are in Kandiyohi County around the Alexandria Moraine.

Areas of low visual sensitivity along the Willmar routes include the City of Ortonville, U.S. Highway 75, and Wagonga Lake.

An area of medium visual sensitivity along the Willmar routes is the Big Stone National Wildlife Refuge along the Minnesota River in Ortonville. The visual characteristics of this area include natural landscapes with gently rolling hills, grasslands, native prairie remnants, large wetlands, and open lakes.

Granite Falls Routes

The dominant visual characteristics in the vicinity of the Granite Falls routes are the dramatic geologic, botanical, recreational, and urban features that are found in the Minnesota River Valley and surrounding bluffs. Five transmission lines cross the Minnesota River at the Minnesota Valley Substation location and an additional five transmission lines cross the river at the Granite Falls Substation location. There are approximately 122 miles of existing transmission lines, with voltages that range from 69 kV to 230 kV in size, located in the vicinity of the Granite Falls routes between the State border and Granite Falls.

Areas of low visual sensitivity along the Granite Falls routes include the cities of Canby, St. Leo, Hazel Falls, and Granite Falls.

Areas of medium visual sensitivity along the Granite Falls routes include the Minnesota River Valley National Scenic Byway and the Minnesota River. The 287-mile byway includes portions of MN Trunk Highway 7, U.S. Highway 212, and MN Highway 67 in Ortonville and Granite Falls and offers recreational, visual, and cultural opportunities. Views of existing and proposed transmission lines from these scenic byways will depend on distance and topography. The Minnesota River, a Wild and Scenic River, along MN Highway 23 near Granite Falls is a visually sensitive area due to the vegetation, biological diversity, recreational value, number of residences, and number of viewers on MN Highway 23.

Canby Substation Alternatives

Modifications to the existing Canby 115/41.6 kV Substation are required to accommodate the Granite Falls transmission lines. However, relocation of the substation to a new site is proposed, as the existing substation does not have room for additional equipment and the current equipment

is reaching the end of its useful life. The existing site is also located within the floodplain of Canby Creek and is close to U.S. Highway 75. There are no visually sensitive areas in the vicinity of the existing substation or any of the proposed alternatives.

14.4.2 IMPACTS

Morris Route 1

Morris Route 1 follows existing highways, county/township roads, and transmission line corridors. The majority of the surrounding land use is agricultural. Morris Route 1 will have limited impact on the aesthetics in the corridor because the existing transmission line is being upgraded without the addition of a new transmission line to the viewshed. There are four communities within 1 mile of the route: Alberta, Chokio, Johnson, and Ortonville. Morris is more than 3 miles from the eastern end of Morris Route 1 and it will be difficult to view the transmission line from Morris. The degree to which the structures are visible from Alberta, Chokio, and Johnson will vary depending on the proximity of the transmission line to each town, as well as elevation. The proposed transmission line, much like the existing transmission line, will not be visible from downtown Ortonville. However, residents on the southern and eastern outskirts of Ortonville will likely be able to see the transmission line.

A part of the route parallels MN Trunk Highway 7 and crosses U.S. Highway 75. The Big Stone National Wildlife Refuge is within 1 mile of Morris Route 1 and two WMAs (Otrey and Prairie) are located within 1,000 feet of the proposed route alignment. These areas would be considered moderate to high visual sensitivity resources.

Homes within 500 feet of the route alignment would be the most likely to have their viewshed affected by the construction of a transmission line and are therefore considered potentially high visual sensitivity resources. Review of field data and aerial photography indicates that 16 homes are located within 500 feet of the Morris Route 1 alignment. The proposed transmission line structures would be wood H-frames between 70 and 100 feet high.

Morris Route 2

The potential aesthetic impacts from Morris Route 2 are essentially the same as for Morris Route 1, with the exception that 22 homes are located within 500 feet of the Morris Route 2 alignment.

Johnson Junction 230/115 kV Substation

No long-term aesthetic impacts are anticipated from expansion of the existing substation to the south. Most of the impacts will be short-term and limited to those travelers along the section road who are passing the facility. One home is located within 500 feet to the east of the existing and proposed substation. This residence has a treed windrow along the north and west sides of

the home and this vegetation feature blocks the view of the substation from the house. It is anticipated that this same windrow will block the view of the expanded substation.

Willmar Route 1

Willmar Route 1 follows existing roadway ROWs, section lines, and half-section lines in a landscape that is dominated primarily by agriculture. The western portion of Willmar Route 1 is relatively near the Big Stone National Wildlife Refuge, Ortonville, and U.S. Highway 75, each of which would be considered medium to high visual sensitivity areas. The central portion of Willmar Route 1 follows U.S. Highway 12 to a point roughly 3 miles west of Danvers. The eastern portion of the route follows county and local road ROWs, as well as half-section lines, to the Willmar Substation roughly ½ mile south of Willmar. The easternmost 10 miles of the route follows the alignment of an existing 69 kV transmission line. Most of these portions of the route alignment would be considered low sensitivity visual resources, except where residences are present within 500 feet of the alignment. Review of field data and aerial photography indicates that 57 residences are located within 500 feet of the Willmar Route 1 alignment.

There are seven communities within 1 mile of the route alignment, including Willmar, Kerkhoven, Murdock, DeGraff, Danvers, Odessa, and Ortonville. The degree to which the structures are visible will vary from town to town and depends on the proximity of the transmission line to each town, as well as elevation. The highest elevations are at the eastern end of the route in the Alexandria Moraine near Willmar. The proposed transmission line route is south of Willmar, east and north of Kerkhoven, east and north of Murdock, south and west of DeGraff, south of Danvers, and south of Ortonville. Residents on those edges of the respective towns would likely be able to see the transmission line. The transmission line would not be visible from downtown Willmar or downtown Ortonville.

Similar to Morris Routes 1 and 2, the proposed transmission line structures would be wood H-frames between 70 and 100 feet high.

Willmar Route 2

The potential aesthetic impacts from Willmar Route 2 are essentially the same as for Willmar Route 1. Exceptions include the following:

- Only two communities are within 1 mile of Willmar Route 2; Ortonville, and Willmar.
- The route alignment runs north to south approximately 5 miles west of Danvers, then runs east to west roughly 5 miles south of Willmar Route 1.

- The route alignment follows approximately 4 miles of existing 69 kV transmission line west of Willmar.
- A total of 43 homes were identified within 500 feet of the route alignment.
- Two communities, Willmar and Ortonville, are within 1 mile of the route alignment. Holloway is 1.5 miles from the route. However, the degree to which the structures are visible will vary from town to town and depends on the proximity of the transmission line to each town, as well as elevation.

Granite Falls Route 1

Granite Falls Route 1 runs primarily through agricultural land. Between Canby and Granite Falls, the route would be rebuilt on an existing 115 kV transmission line. St. Leo and Hazel Run are also located within 1 mile of the route. The primary visually sensitive area is the Minnesota River in the Granite Falls area along MN Highway 23. In contrast with the majority of the alignment, this area is characterized by wooded areas, a diverse ecological setting, high recreational value, and the presence of the Minnesota River (which is a State listed, wild and scenic river in this area). River bluffs and the river valley dominate the viewshed. The visual sensitivity of this portion of the corridor is tempered, however, by the presence of human-made features, especially five transmission line crossings of the Minnesota River at the Granite Falls Substation.

Review of field data and aerial photography identified nine homes within 500 feet of Granite Falls Route 1.

Preferred structures would be wood H-frame structures ranging from 80 to 120 feet high west of Hazel Run. East from the Hazel Run vicinity to the Granite Falls Substation, the preferred structure would be wood H-frame structures ranging from 70 to 100 feet high.

Granite Falls Route 2

The potential aesthetic impacts from Granite Falls Route 2 are essentially the same as for Granite Falls Route 1, with the exception that 27 homes are located within 500 feet of the Granite Falls Route 2 alignment.

Granite Falls Route 3

Granite Falls Route 3 runs primarily through agricultural land. An existing 115 kV transmission line runs parallel to the route alignment approximately 1 mile to the east of the north to south section of the route in Lac Qui Parle County. Between Canby and Granite Falls, the route would be rebuilt on an existing 115 kV transmission line. St. Leo, Marietta, and Hazel Run are also located within 1 mile of the route. The primary visually sensitive area is the Minnesota River in the Granite Falls area along MN Highway 23. In contrast with the majority of the alignment, this area is characterized by wooded areas, a diverse ecological setting, high recreational value, and the presence of the Minnesota River (which is a State listed, wild and scenic river in this area). River bluffs and the river valley dominate the viewshed. The visual sensitivity of this portion of the corridor is tempered, however, by the presence of human-made features, especially five transmission line crossings of the Minnesota River at the Granite Falls Substation.

Review of field data and aerial photography identified 14 homes within 500 feet of Granite Falls Route 3.

West from the Hazel Run vicinity to the South Dakota border, the preferred structure would be wood H-frame structures ranging from 80 to 120 feet high. East from the Hazel Run vicinity to the Granite Falls Substation, the preferred structure would be wood H-frame structures ranging from 70 to 100 feet high.

Granite Falls Route 4

The potential aesthetic impacts from Granite Falls Route 4 are essentially the same as for Granite Falls Route 3, with the exception that 29 homes are located within 500 feet of the Granite Falls Route 4 alignment, and the alignment is greater than 1 mile away from Marietta.

Canby Substation

No long-term aesthetic impacts are anticipated for the relocation of the substation from its existing location. Most of the impacts will be short-term and limited to those travelers along nearby roads, including U.S. Highway 75, who are passing the facility. No residences are located within 500 feet of the existing substation or any of the proposed alternatives.

14.4.3 MITIGATION

Mitigation measures will not differ between routes. Although the transmission line will be a contrast to surrounding land uses, landowners will be consulted to identify concerns related to the transmission line, substation expansion, and aesthetics. Section 7.5 of this document describes these mitigation measures in greater detail.

14.5 HUMAN HEALTH AND SAFETY

14.5.1 AFFECTED ENVIRONMENT

Stray Voltage

Stray voltage is a natural phenomenon that occurs between two contact points in any animal confinement area where electricity is grounded. By code, electrical systems, including farm systems and utility distribution systems, must be grounded to the earth to ensure continuous safety and reliability. Inevitably, some current flows through the earth at each point where the electrical system is grounded. At these points, a low level of voltage, called neutral-to-earth voltage (NEV) develops. When NEV is measured between two objects that may be simultaneously contacted by an animal, it is frequently called stray voltage. Stray voltage is not electrocution, ground current, EMFs, or earth current. It only affects farm animals that are confined in areas of electrical use. It does not affect humans.

Electric and Magnetic Fields (EMF)

Voltage on any wire (conductor) produces an electric field in the area surrounding the wire. The electric field associated with HVTLs extends from the energized conductors to other nearby objects, such as the ground, towers, vegetation, buildings, and vehicles. The electric field from a transmission line gets weaker with increasing distance. Nearby trees and buildings also greatly reduce the strength of transmission line electric fields. The intensity of electric fields is associated with the voltage of the transmission line and is measured in kilovolts per meter (kV/m). Transmission line electric fields near the ground are designated by the difference in voltage between two points (usually 1 meter apart).

Current passing through any conductor, including a wire, produces a magnetic field in the area around the wire. The magnetic field associated with transmission lines surrounds the conductor and decreases rapidly with increasing distance from the conductor. The magnetic field is expressed in units of magnetic flux density, expressed as gauss (G). The question of whether exposure to power frequency (60 Hz) magnetic fields can cause biological responses or even health effects has been the subject of considerable research for the past three decades. The most recent and exhaustive reviews of the health effects from power frequency fields conclude that the evidence of health risk is weak. The NIEHS issued its final report, *NIEHS Report on Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields,* on June 15, 1999, following 6 years of intensive research. NIEHS concluded that there is little scientific evidence correlating extra low frequency EMF exposures with health risks.

The EQB has addressed the matter of EMF with respect to new transmission lines in a number of separate dockets over the past few years. See e.g., Docket Nos. 03-64-TR-Xcel (the Lakefield 161 kV transmission line); 03-73-TR-Xcel (the Buffalo Ridge 345 kV transmission line); 04-84-Tr-Xcel (the Buffalo to White 115 kV transmission line); and 04-81-TR-Air Lake-Empire (a 115 kV transmission line in Dakota County). The findings of the EQB and the discussion in the EAs prepared on each of those projects are pertinent to this issue with respect to the transmission lines proposed here. Documents from those matters are available on the PUC webpage at http://energyfacilities.puc.state.mn.us.

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

- 118. No significant impacts on human health and safety are anticipated from the project. There is at present insufficient evidence to demonstrate a cause and effect relationship between EMF exposure and any adverse health effects. The EQB has not established limits on magnetic field exposure and there are no Federal or Minnesota health-based exposure standards for magnetic fields. There is uncertainty, however, concerning long-term health impacts, and the Minnesota Department of Health, the EQB, and Xcel Energy all recommend a "prudent avoidance" policy in which exposure is minimized.
- 119. In previous routing proceedings, the EQB has imposed a permit condition on HVTL permits limiting electric field exposure to 8 kV/m at 1 meter above ground. This permit condition was designed to prevent serious hazard from shocks when touching large objects, such as semi trailers or large farm equipment under extra high voltage transmission lines of 500 kV or greater. Predicted electric field densities are less than half of the 8 kV/m permit condition for both the 345 kV transmission line and the 115 kV transmission line.
- Other than the "prudent avoidance" standard widely accepted in Minnesota, there is no standard for magnetic field data as set forth in the EIS. In general, the data shows that the strength of the magnetic field decreases rapidly as one moves away from the center line, and it reaches approximate background levels about 300 feet or less from the transmission lines. According to Xcel Energy, the maximum calculated ground level magnetic field directly below the transmission line, expected for the 345 kV transmission line when it is conducting electricity under average operating conditions, is approximately 68 milligauss, and 113 milligauss at peak operating conditions. The maximum calculated ground level magnetic field expected for the 115 kV

> transmission line when it is conducting electricity under average operating conditions is approximately 87 milligauss directly below the transmission line, and 146 milligauss at peak operating conditions. The only two states that have established standards are Florida (a 150-milligauss limit) and New York (a 200-milligauss limit). The maximum magnetic field expected from the two new lines is within those limits.
>
> *(Findings 118 and 119, Findings of Fact, Conclusions, and Order Issuing Route Permit for Construction of Two High Voltage Transmission Lines, One Substation, and Related Facilities, dated June 16, 2005, at 31, footnotes omitted.)*

While the general consensus is that electric fields pose no risk to humans, the question of whether exposure to magnetic fields can potentially cause biological responses or even health effects continues to be the subject of research and debate. In addressing this issue, the public, interested customers, and employees will be provided information on EMF to assist them in making an informed decision about EMF. Measurements will be provided to landowners, customers, and employees who request them. In addition, "prudent avoidance" guidance has been followed, as suggested by most public agencies. This includes using structure designs that minimize magnetic field levels and attempting to site facilities in locations with lower residential densities.

Airports

There are several municipal airports located throughout the project area. The safety zones and vertical clear zones associated with airport runways control the height of structures, such as transmission line poles, in order to maintain safe take-off and landing environments.

Radio Frequency Devices

Transmission lines can interfere with radio frequency (RF) devices, such as GPS units, TV antenna and satellite dishes, radio, cellular phones, C/B and ham radios, and wireless internet connections. Although problems have been documented since the inception of electronic communication technologies, both systems can and do effectively coexist. When a transmission line is energized, an EMF is present close to the transmission line. The strength of the field will decrease logarithmically with distance. Most transmission lines transmit their energy utilizing alternating current (AC) at a frequency if 60 Hz, which is below the operating range of most RF devices. Interference is caused by various harmonics of the 60 Hz frequency. Such situations are typically the result of faulty transmission line components that cause unintended arcing. Examples of other interference sources include cracked and dirty insulators, loose conductor and grounding hardware, lightning-damaged components, and corroded or scarred conductors. AM

radio, due to the frequency band, is the most susceptible to interference from 60 Hz transmission lines.

Roads

Portions of all transmission line routes will be located along roads in the project area. Effects of construction, staging, and stringing operations on traffic patterns are discussed in Section 14.8 in this document. Safety concerns regarding the placement of transmission line structures along roads must be considered. Requirements for clear zones and roadside obstructions vary based on traffic volume, design speed, roadside geometry, radius of horizontal curve, presence of a curb, and presence of urban or rural roads, collectors, arterials, or freeways. For low volume local roads, which are typical of those in the project area, the American Association of State and Highway and Transportation Officials (AASHTO) recommends, "at locations where a clear recovery area of 2 meters (6.6 feet) or more in width can be provided at low cost and with minimum social/environmental impacts, provision of such a clear recovery area should be considered" (AASHTO, 2001). However, ASSHTO also notes that where constraints make this recommendation impractical, clear recovery areas of less than 2 meters (6.6 feet) may be used. Other factors, such as the presence of vehicles wider than 2.6 meters (8.5 feet), such as farm equipment, may impact clear recovery area determinations. The necessary clear zone required for transmission lines installed along roadways will be determined on a pole by pole basis. The Minnesota Department of Transportation (Mn/DOT) Road Design Manual Part I and Part II Chapter 4 and other resources will be used for this determination.

14.5.2 IMPACTS

Stray Voltage

Stray voltage has been raised as a concern on some dairy farms because it can impact operations and milk production. Problems are usually related to the distribution and service lines directly serving the farm or the wiring on a farm. In those instances when transmission lines have been shown to contribute to stray voltage, the electric distribution system directly serving the farm or the wiring on a farm was directly under and parallel to the transmission line. These circumstances are considered in installing transmission lines and can be readily mitigated. No stray voltage issues are anticipated with any of the routes.

Electric Fields

Table 27 shows the predicted electrical fields for each type of conductor with a 230 kV transmission line when operated at maximum capacity levels. Table 27 is applicable to all Morris and Willmar routes.

Table 27
Predicted Electric Fields from Proposed 230 kV Transmission Lines Operated at Maximum Capacity (kV/m)

Conductor Size	Distance from center of transmission line corridor (feet)										
	-300	-200	-100	-50	-30	0	30	50	100	200	300
H-Frame, 230 kV transmission line with 954 ACSS	0.02	0.05	0.30	1.1	1.4	0.5	1.4	1.1	0.3	0.05	0.02
Single Pole Davit Arm, 230 kV transmission line with 954 ACSS	0.02	0.06	0.2	0.7	1.0	0.6	0.7	0.7	0.3	0.07	0.03
H-Frame, 230 kV transmission line with 1272 ACSR	0.02	0.05	0.3	1.1	1.5	0.5	1.5	1.1	0.3	0.05	0.02
Single Pole Davit Arm, 230 kV transmission line with 1272 ACSR	0.02	0.06	0.2	0.8	1.0	0.6	0.8	0.7	0.3	0.07	0.03

Table 28 shows the peak electric field density for each of the routes, distance to nearest residence, and predicted electric field density at that distance.

Table 28
Peak Electric Field Density – 230 kV Routes

Route	Peak Density (kV/m)	Distance to Nearest Residence (feet)	Predicted at Residence (kV/m)
Morris 1	1.5	170	0.05 – 0.3
Morris 2	1.5	59	0.2 – 1.1
Johnson Substation	1.5	500	< 0.02
Willmar 1	1.5	82	0.2 – 1.1
Willmar 2	1.5	87	0.2 – 1.1

Table 29 shows the predicted electrical fields for each type of conductor for the 345 kV Granite Falls transmission lines when operated at maximum capacity levels.

Table 29
Predicted Electric Fields from Proposed Transmission Lines Operated at Maximum Capacity (kV/m)

Conductor Size	Distance from center of transmission line corridor (feet)										
	-300	-200	-100	-50	-30	0	30	50	100	200	300
Single Pole Davit Arm, 345 kV transmission line with bundled 954 ACSS	0.06	0.1	0.6	1.8	2.2	1.2	1.6	1.5	0.7	0.2	0.07
H-Frame, 345 kV transmission line with bundled 1272 ACSR	0.04	0.1	0.7	1.6	1.5	0.3	1.5	1.6	0.7	0.1	0.04
Single Pole Davit Arm, 345 kV transmission line with bundled 1272 ACSR	0.06	0.1	0.6	1.8	2.2	1.2	1.6	1.6	0.7	0.2	0.07
H-Frame, 345 kV transmission line operated at 230 kV with bundled 954 ACSS	0.03	0.09	0.4	1.0	1.0	0.2	1.0	1.0	0.4	0.09	0.03
Single Pole Davit Arm, 345 kV transmission line operated at 230 kV with bundled 954 ACSS	0.04	0.1	0.4	1.2	1.5	0.8	1.1	1.0	0.5	0.1	0.04
H-Frame, 345 kV transmission line operated at 230 kV with bundled 1272 ACSR	0.03	0.09	0.5	1.0	1.0	0.2	1.0	1.0	0.5	0.07	0.02
Single Pole Davit Arm, 345 kV transmission line operated at 230 kV with bundled 1272 ACSR	0.04	0.09	0.4	1.2	1.5	0.8	1.1	1.0	0.5	0.1	0.05

Table 30 shows the peak electric field density for each of the Granite Falls routes, distance to the nearest residence, and predicted electric field density at that distance.

Table 30
Peak Electric Field Density – 345 kV Routes

Route	Peak Density (kV/m)	Distance to Nearest Residence (ft)	Predicted at Residence (kV/m)
Granite Falls 1	2.2	328	< 0.07
Granite Falls 2	1.5	82	0.4 – 1.8
Granite Falls 3	1.5	114	0.07 – 0.7
Granite Falls 4	1.5	125	0.07 – 0.7
Canby Substation	1.5	1,530	< 0.02
Canby Alt A	1.5	1,660	< 0.07
Canby Alt B	1.5	3,030	< 0.07
Canby Alt C	1.5	1,160	< 0.07
Canby Alt D	1.5	2,650	< 0.07

All predicted levels are significantly less than the maximum limit of 8 kV/m. This standard was designed to prevent serious hazard from static discharge when touching large objects, such as farm equipment, which have been parked under HVTLs of 500 kV or greater.

Magnetic Fields

Table 31 shows the predicted magnetic fields for each type of conductor with a 230 kV transmission line. Table 31 is applicable to all Morris and Willmar routes. The predictions were calculated using the transmission line amperage maximum capacities, which conservatively over-predict the magnetic fields that will be generated under normal operation.

Table 31
Predicted Magnetic Field from Proposed 230 kV Transmission Lines Operated at Maximum Capacity (milligauss)

Conductor Size	Distance from center of transmission line corridor (feet)								
	-300	-200	-100	-50	0	50	100	200	300
H-Frame, 230 kV transmission line with 954 ACSS	4.5	10	37	105	212	105	37	10	4.5
Single Pole, 230 kV transmission line with 954 ACSS	4.0	8.7	29	71	113	63	28	8.5	4.0
H-Frame, 230 kV transmission line with 1272 ACSR	3.3	7.2	26	75	152	75	26	7.2	3.3
Single Pole, 230 kV transmission line with 1272 ACSR	2.9	6.2	21	51	81	45	20	6.1	2.8

Table 32 shows the peak magnetic field measurement under the transmission line centerline for each of the routes, distance to nearest residence, and predicted magnetic field measurement at that distance.

Table 32
Peak Magnetic Field Measurements – 230 kV Lines

Route	Peak Measurement (milligauss)	Distance to Nearest Residence (ft)	Predicted Measurement at Residence (milligauss)
Morris 1	212	170	6.1 – 37
Morris 2	212	59	20 – 105
Johnson Substation	212	500	< 4.5
Willmar 1	212	82	20 – 105
Willmar 2	212	87	20 – 105

Table 33 shows the predicted magnetic fields for each conductor type for the 230 kV Granite Falls transmission lines. The predictions where calculated using the transmission line amperage maximum capacities, which conservatively over-predict the magnetic fields that will be generated under normal conditions. When the Granite Falls transmission line is energized from 230 kV to 345 kV, a decrease in magnetic field is predicted due to a decrease in the amperage carried by the conductor at the higher voltage.

Table 33
Predicted Magnetic Field from Proposed 345 kV Transmission Lines Operated at Maximum Capacity (milligauss)

Conductor Size	Distance from center of transmission line corridor (feet)								
	-300	-200	-100	-50	0	50	100	200	300
H-Frame, 345 kV transmission line with bundled 954 ACSS	9.8	21	71	160	250	160	71	21	9.8
Single Pole, 345 kV transmission line with bundled 954 ACSS	10	22	72	154	214	137	68	22	10
H-Frame, 345 kV transmission line with bundled 1272 ACSR	7.0	15	51	114	179	114	51	15	7.0
Single Pole, 345 kV transmission line with bundled 1272 ACSR	7.4	16	51	110	153	98	48	16	7.4

Table 34 shows the peak magnetic field measurement under the transmission line centerline for each of the routes, distance to nearest residence, and predicted magnetic field measurement at that distance. The levels at the residences nearest the proposed transmission line routes are below guidelines followed in other states.

Table 34
Peak Magnetic Field Measurements – 230 kV Lines

Route	Peak Measurement (milligauss)	Distance to Nearest Residence (ft)	Predicted Measurement at Residence (milligauss)
Granite Falls 1	250	328	< 10
Granite Falls 2	250	82	48-100
Granite Falls 3	250	114	15-72
Granite Falls 4	250	125	15-72
Canby Substation	250	1530	< 10
Canby Alternative A	250	1660	< 10
Canby Alternative B	250	3030	< 10
Canby Alternative C	250	1160	< 10
Canby Alternative D	250	2650	< 10

Airports

Morris Routes 1 and 2

The Ortonville Municipal Airport is approximately ½ mile north of Morris Routes 1 and 2. The route alignment crosses two runway approach areas of the Ortonville Municipal Airport. At present, Ortonville Municipal Airport has one paved runway (16-34) and one grass runway (4-22). Both have a 20:1 approach slope. Segment M-1 runs east to west along the south side of the airport and Segment M-2 runs north to south along the east side of the airport. Segment M-1 passes within the horizontal zone on the south side. The horizontal zone limits the height of structures to 1,252 feet mean sea level (MSL), approximately 150 feet above the ground surface. Segment M-1 also passes through the south approach zone of the 16-34 runway. At the point that it crosses, structures are limited to approximately 1,270 feet MSL, which is approximately 170 feet above the ground surface.

The Ortonville Municipal Airport has plans to extend the 16-34 runway to the north by 583 feet. The south end will not change. The approach slope will change from 20:1 to 40:1. Under this airport improvement scenario, Segment M-1 would cross the south approach zone of 16-34 at a point where structures are limited to approximately 1,180 feet (80 feet above ground surface). If a transmission line was placed along U.S. Highway 75, the north approach zone would limit the height of structures along U.S. Highway 75 to approximately 1,170 feet (70 feet above ground surface). As proposed, transmission line and structure removal for Morris Routes 1 and 2 will not change or disrupt the Ortonville Municipal Airport safety or aircraft approach surface and primary zone.

Willmar Route 1

Two airports are located within the vicinity of Willmar Route 1. The Willmar Municipal Airport is located near the Segment W-16 alignment of Willmar Route 1. The outer safety zone of this airport does not cross the Segment W-16 alignment. The Appleton Airport is located south of the Segment W-3 alignment of Willmar Route 1. The route alignment is outside of the buffer zone and there are no ordinances applicable to the proposed transmission line.

Willmar Route 2

Two airports are located within the vicinity of Willmar Route 2. The Willmar Municipal Airport is located near segment W-16 of Willmar Route 2. The outer safety zone of this airport does not cross Segment W-16. The Benson Airport is located north of segment W-10 and the route is outside of any zones and there are no ordinances applicable to the proposed transmission line. The Benson Airport is located outside of any zones and there are no ordinances applicable to the proposed transmission line.

Granite Falls Routes 1 and 3

One airport is located in the vicinity of the Granite Falls Routes 1 and 3. The Canby Airport is located near segments G-30, G-31, and G-32 and the Canby substation. These segments would be affected by Airspace Obstruction Zoning, and the portion of these segments located within Sections 21, 22, and 25, Township 115N, Range 45W would also be affected by Land Use Safety Zoning.

Granite Falls Routes 2 and 4

Two airports are located in the vicinity of the Granite Falls routes. The Granite Falls Airport is located near Segment G-50 but is outside of any ordinance zones. The route would be within the 10,000-foot buffer in the future, as a part of the planned Granite Falls Airport expansion. The Canby Airport is located near segments G-29 and G-32 and the Canby Substation. These segments would be affected by Airspace Obstruction Zoning, and the portion of these segments located within Sections 22 and 25, Township 115N, Range 45W would also be affected by Land Use Safety Zoning.

Radio Frequency Devices

The public frequently uses RF devices in home and work environments. RF devices are even used by utility employees within high voltage substations. In most cases, transmission lines and RF devices coexist with very few problems, although loss of connection can occasionally occur. Interference problems are becoming less common due to improved communication equipment designs, which shield and filter external electromagnetic noise sources. Utility system components have also improved to prevent such noise sources from developing.

Roads

Impacts to human health and safety are not anticipated from transmission line structures located beside roads. The structures will be placed outside of the ROW.

14.5.3 MITIGATION

Mitigation measures for human health and safety will not differ between routes, with the exception of airports. Proper safeguards will be implemented for construction and operation of the facility. The project will be designed with local, State, Rural Utilities Service (RUS), and National Electrical Safety Code (NESC) standards regarding clearance to ground, clearance to crossing utilities, clearance to buildings, strength of materials, and ROW widths. Construction crews and/or contract crews will comply with local, State, RUS, and NESC standards regarding installation of facilities and standard construction practices. Established safety procedures will be followed during and after installation of the transmission line. This will include clearing signage during all construction activities.

The proposed transmission line and substations will be equipped with protective devices to safeguard the public if an accident occurs and a structure or conductor falls to the ground. The protective devices are breakers and relays located where the transmission line connects to the substation. The protective equipment will de-energize the transmission line should such an event occur. In addition, the substation facilities will be fenced and access limited to authorized personnel.

Additionally, when crossing roads or railroads during stringing operations, guard structures will be utilized to eliminate traffic delays and provide safeguards for the public.

Because predicted EMF levels at adjacent residences are below guidelines (with the exception of Granite Falls Route 2, where the magnetic field could be at or slightly above Florida's guideline), no mitigation is necessary or proposed.

Coordination with local government representatives and the Federal Aviation Administration (FAA) would occur to address any conflicts between Morris Routes 1 and 2 and the proposed new runway approach safety zones for the Ortonville Municipal Airport. Coordination would also be necessary with local officials to address any conflicts with the Canby Municipal Airport (Granite Falls Routes 1, 2, 3 and 4) and Granite Falls Municipal Airport (Granite Falls Routes 2 and 4).

Electronic equipment and trained personnel will be available to detect and identify problem components and interference sources. The Federal Communications Commission (FCC) Part 15 regulations govern electrical noise caused by utility-owned equipment and require electric utilities to correct interference sources. When interference is reported, skilled utility technicians can usually identify and remediate the source.

14.6 RECREATION

14.6.1 AFFECTED ENVIRONMENT

There are a variety of outdoor recreational opportunities along each of the routes, including snowmobiling, biking, hiking, canoeing, boating, fishing, camping, swimming, hunting, and nature observation.

14.6.2 IMPACTS

The table in Appendix H summarizes the recreational opportunities by route for the project and identifies the affected environment and potential impacts within areas of the routes. When there is a rebuild of an existing transmission line, the structures will likely be placed in an existing transmission corridor and structure for structure replacement will occur in sensitive areas where feasible. This approach will minimize impacts to previously-undisturbed habitat. However, wider spans of transmission lines are possible and the number of structures along the route or in sensitive areas may be decreased overall.

14.6.3 MITIGATION

As stated above, impacts will be minimized. If direct impacts cannot be avoided, the Applicants should work with the regulatory agency to minimize and mitigate impacts. Potential mitigation measures will include those described in Section 14.4.3 since the primary impacts will be visual.

14.7 PRIME FARMLAND

14.7.1 AFFECTED ENVIRONMENT

Table 35 is a summary of land used for agriculture and land used for soil listed as prime farmland.

Table 35
Land Use Summary

Route	Percent of Land Used for Agriculture	Percent of Soil Listed as Prime Farmland
Morris Route 1	95	96
Morris Route 2	95	96
Willmar Route 1	97	95
Willmar Route 2	97	97
Granite Falls Route1	98	95
Granite Falls Route 2	98	92
Granite Falls Route 3	98	95
Granite Falls Route 4	98	92

14.7.2 IMPACTS

The project will result in permanent and temporary impacts to farmland. Permanent impacts to prime farmland will occur as a result of structure placement along the route or the transmission

line. During construction, temporary impacts, such as soil compaction and crop damages within the ROW, are likely to occur.

Table 36
Prime Farmland Impacts

Route	Permanent Impacts to Agricultural Lands (acres)	Percent of Permanent Impact Occurring on Prime Farmland	Temporary Impacts to Agricultural Lands (acres)	Staging Areas and Stringing Set Up Areas on Temporarily Impacted Land (acres)
Morris Route 1	6.7	96.0	236.2	9.0
Morris Route 2	7.0	95.0	232.8	8.0
Willmar Route 1	13.0	95.6	457.0	16.0
Willmar Route 2	14.8	97.5	522.6	18.0
Granite Falls Route 1	8.0	95.0	338.0	9.0
Granite Falls Route 2	8.6	94.2	359.0	13.0
Granite Falls Route 3	11.9	95.0	503.0	15.0
Granite Falls Route 4	12.5	95.4	524.0	7.0

Permanent impacts to prime farmland would be approximately 3.7 acres for the Johnson substation construction, and approximately 6.3 acres for the Canby Substation alternatives (all substation sites are located on 100 percent prime farmland or farmland of statewide importance).

14.7.3 MITIGATION

Mitigation measures will not differ between routes. The Route Permit Application states that landowners will be consulted to minimize impacts to prime farmland and farming operations along the route. By aligning the transmission lines along section and field lines, impacts can be minimized. Landowners commented at the public meetings that they would prefer structures as close to the field lines and roadways as possible. The landowners will be compensated for any crop damage or soil compaction that may occur during construction. Additionally, a Farmland Protection Policy Act/Farmland Conversion Impacts Rating for prime farmland will be completed in cooperation with the Natural Resource Conservation Service (NRCS).

14.8 TRANSPORTATION AND INFRASTRUCTURE

14.8.1 AFFECTED ENVIRONMENT

The transportation network that will be used to develop and maintain the project is comprised of largely rural "farm-to-market" or section line roadways along with various county and trunk highways. Few urban areas exist within the study area. Four of the primary cities are Granite Falls, Morris, Ortonville, and Willmar. Various active railroad lines service the area and are also present within the proposed alignments.

The capacity of any roadway is dependent on many factors, as documented in the Highway Capacity Manual. Based on typical peak hour percentages, trucks, terrain, and access spacing, the functional capacity of a rural two-way two-lane highway is between 4,000 and 6,000 vehicles per day. Traffic data were obtained from existing mapping resources prepared by counties with the aid of the Mn/DOT. Historical crash data were obtained from Mn/DOT, which uses a joint database with the Department of Public Safety. Railroad data were obtained via information provided for government use by each rail carrier and by HDR Engineering, Inc (HDR).

Morris Routes

In general, these route alignments are located in rural areas served by highways with relatively low traffic volume. A summary of the average daily traffic on an annualized basis is documented in Table 37. Given the functional capacity limits of 4,000 and 6,000 vehicles per day, congestion is not a primary factor on any of the roadways along the routes.

Table 37
Existing Average Annual Daily Traffic (AADT) – Morris Routes 1 and 2

Highway Route	Jurisdiction	AADT
U.S. Highway 75	Mn/DOT	2,450
U.S. Highway 12	Mn/DOT	1,230 – Rural 3,600 – Ortonville
County Highway 12	Big Stone County	340
County Highway 21	Big Stone County	320
County Highway 6	Big Stone County	195
County Highway 10	Big Stone County	185
Trunk Highway 28	Mn/DOT	1,150
County Highway 13	Stevens County	385
County Highway 9	Stevens County	435
County Highway 7	Stevens County	210

Source: County Highway AADT Map(s); Mn/DOT 2005

Proposed County Highway 5-year Capital Improvement Projects along the Morris routes were reviewed for possible impacts. No projects identified would alter the ROW of the existing facility.

Two active rail lines are located along the route alignments, as documented by Table 38. Temporary and permanent easements for both construction and transmission line operation would be required from the BNSF. Construction activities would be regulated by the carrier and any disruptions to rail service would require approval by the carrier.

Table 38
Active Rail Lines – Morris Routes 1 and 2

Operator	Subdivision	Segment	Classification
BNSF	Appleton	Benson to Aberdeen	Main Line
BNSF	Browns Valley	Morris to Beardsley	Branch Line

Source: Mn/DOT

The route alignments cross two runway approach areas of the Ortonville Airport. At present, Ortonville Airport has one paved runway (16-34) and one grass runway (4-22). Both have a 20:1 approach slope. Segment M-1 runs east to west along the south side of the airport and Segment M-2 runs north to south along the east side of the airport. Segment M-1 passes within the

horizontal zone on the south side. The horizontal zone limits the height of structures to 1,252 feet above mean sea level (amsl), or approximately 150 feet above the ground surface. Segment M-1 also passes through the south approach zone of the 16-34 runway. At the point that is crosses, structures are limited to approximately 1,270 feet amsl, or approximately 170 feet above the ground surface. The Ortonville Airport has plans to extend the 16-34 runway to the north by 583 feet. The south end will not change, but the approach slope will change from 20:1 to 40:1. Under this airport improvement scenario, Segment M-1 would cross the south approach zone of 16-34 at a point where structures are limited to approximately 1,180 feet amsl, or 80 feet above the ground surface. The north approach zone would limit the height of some structures along U.S. Highway 75 to approximately 1,170 feet amsl, or 70 feet above the ground surface.

Willmar Routes

In general, Willmar Routes 1 and 2 are located in rural areas served by highways with relatively low traffic volume. A summary of the average daily traffic on an annualized basis is documented in Table 39. Congestion is not a primary factor on any of the roadways within this corridor with the exception of U.S. Highways 12 and 75 and Trunk Highway 23. U.S. Highway 75 and Trunk Highway 23 are operating near capacity levels south of Willmar and interruption of service to these highways should be minimized.

Table 39
Existing Average Annual Daily Traffic (AADT) – Willmar Routes 1 and 2

Highway Route	Jurisdiction	AADT
U.S. Highway 75	Mn/DOT	2,450
U.S. Highway 12	Mn/DOT	700 Rural 3,600 Ortonville 4,150 West of Willmar
County Highway 21	Big Stone County	250
County Highway 25	Big Stone County	160
County Highway 1	Swift County	165
County Highway 5	Swift County	225
MN Highway 119	Mn/DOT	380
US Highway 59	Mn/DOT	1,650
County Highway 17	Swift County	385
MN Highway 29	Mn/DOT	1,200
County Highway 31	Swift County	290
County Highway 33	Swift County	670
County Highway 35	Swift County	550

Highway Route	Jurisdiction	AADT
County Highway 6	Swift County	420
County Highway 1	Kandiyohi County	325
County Highway 5	Kandiyohi County	1,550
MN Highway 23	Mn/DOT	5,100

Source: County Highway AADT Map(s); Mn/DOT 2005

Proposed County Highway 5-year Capital Improvement Projects along the Willmar routes were reviewed for possible impacts. No projects identified would alter the ROW of the existing roadways with the exception of a potential improvement slated for 2007 or 2008. Willmar Route 2 will cross along the eastern end of the project located in Kandiyohi County along CSAH 19 from CSAH 5 to U.S. Highway 71. The area will be regraded and resurfaced.

Three active rail lines are located along these route alignments, as documented in Table 40. Temporary and permanent easements for both construction and transmission line operation will be required by the BNSF. Construction activities will be regulated by the BNSF and any impacts to rail service will require approval by the carrier.

Table 40
Active Rail Lines along Willmar Routes 1 and 2

Operator	Subdivision	Segment	Classification
BNSF	Appleton Sub	Benson-Aberdeen	Main Line
BNSF	Morris Sub	Willmar-Breckenridge	Main Line
BNSF	Wayzata Sub	Willmar-Minneapolis Jct.	Main Line

Source: Mn/DOT

Granite Falls Routes

In general, these route alignments are located in rural areas served by highways with relatively low traffic volume. A summary of the average daily traffic on an annualized basis is documented in Table 41 for highways common to all Granite Falls route alignments. Given the functional capacity limits of 4,000 and 6,000 vehicles per day, congestion is not a primary factor on any of the roadways along the routes.

Table 41
Existing Average Annual Daily Traffic (AADT) – Granite Falls Routes 1 - 4

Highway Route	Jurisdiction	AADT
County Highway 43	Yellow Medicine County	395
County Highway 14	Yellow Medicine County	260
County Highway 13	Yellow Medicine County	460
County Highway 11	Yellow Medicine County	510
County Highway 8	Yellow Medicine County	305
County Highway 4	Yellow Medicine County	405
County Highway 3	Yellow Medicine County	370
U.S. Highway 75	Mn/DOT	1,200
MN Highway 67	Mn/DOT	1,300
U.S. Highway 212	Mn/DOT	4,000
MN Highway 59	Mn/DOT	1,300

Source: County Highway AADT Map(s); Mn/DOT 2005

Proposed County Highway 5-year Capital Improvement Projects along the Granite Falls routes were reviewed for possible impacts. No projects identified would alter the ROW of the existing facility.

Three active rail lines are located along all of the Granite Falls Routes, as documented by Table 42. Temporary and permanent easements for both construction and utility line operation would be required from both the BNSF and the Twin Cities & Western Railroad. Construction activities would be regulated by each carrier and any disruptions to rail service would require approval by the carrier.

Table 42
Active Rail Lines – Granite Falls Routes 1 through 4

Operator	Subdivision	Segment	Classification
BNSF	Hanley Falls Sub	Hanley Falls-Madison	Branch Line
BNSF	Marshall Sub	Sioux City-Willmar	Main Line
Twin Cities & Western Railroad	N/A	Appleton-(Twin Cities)	Main Line

Source: Mn/DOT

All routes would be affected by Airspace Obstruction Zoning and Land Use Safety Zoning for the Canby Municipal Airport. The Granite Falls Municipal Airport is located near Granite Falls Routes 1 and 3. The route alignments would not pass through any ordinance zones, but would be located within a future 10,000-foot buffer area.

In addition to the highways common to Granite Falls Routes 1 through 4, Granite Falls Routes 1 and 2 span County Highway 15. County Highway 15 has an average annual daily traffic of 280 vehicles per day and is under Yellow Medicine County jurisdiction. In general, these routes are located in rural areas served by highways with relatively low traffic volume.

In addition to the highways common to Granite Falls Routes 1 through 4, Granite Falls Routes 3 and 4 span four highways, as documented in Table 43. In general, these routes are located in rural areas served by highways with relatively low traffic volume.

Table 43
Existing Average Annual Daily Traffic (AADT) – Granite Falls Routes 3 and 4

Highway Route	Jurisdiction	AADT
County Highway 7	Lac qui Parle County	415
County Highway 12	Lac qui Parle County	30
MN Highway 40	Mn/DOT	560
County Highway 30	Lac qui Parle County	320
County Highway 40	Lac qui Parle County	180

Source: County Highway AADT Map(s); Mn/DOT 2005

In addition to the railways common to Granite Falls Routes 1 through 4, Granite Falls Routes 3 and 4 span two BNSF railroad lines, as documented in Table 44. Temporary and permanent easements for both construction and utility line operation would be required from the BNSF. Construction activities would be regulated by the carrier and any disruptions to rail service would require approval by the carrier.

Table 44
Active Rail Lines – Granite Falls Routes 3 and 4

Operator	Subdivision	Segment	Classification
BNSF	Appleton Sub	Benson to Aberdeen	Main Line
BNSF	Watertown Sub	Appleton to Yale	Branch Line

Source: Mn/DOT

14.8.2 IMPACTS

Temporary access for the construction of the new transmission lines within any of the corridors and variations would require a 20-foot-wide access trail constructed within the transmission line ROW or by short spur trails from the existing road network to the ROW. Temporary guard structures would be used to string conductor over existing roads and railroads. The structures typically consist of directly imbedded poles with a horizontal cross piece to support the conductor at sufficient height above traffic. Temporary traffic impacts associated with equipment include material delivery and worker transportation. No impacts to County Highway 5-year Capital Improvement Projects are anticipated. If Willmar Route 2 is chosen, coordination with the Kandiyohi Highway Department will occur to assure no impacts to their 5-year plans. Single pole construction would require the use of foundations along many transmission line segments where lateral forces are expected to be relatively high. Construction of foundations typically requires boring/excavation of a 6- to 12-foot diameter by 20-foot deep hole, installation of steel reinforcement, and installation of a steel mounting cap. Concrete requirements range from 25 to 100 cubic yards per structure, to be provided by 5 to 6 concrete trucks. Consequently, the use of single pole structures would require substantially more truck traffic than H-frame construction.

Access to modify or relocate the existing substations would be from existing roads and would only cause minor and temporary disruption to traffic.

It is estimated that construction of the transmission line and substation modifications would require 40 full-time employees with 25 devoted to transmission line construction and 15 to substation modifications. Part-time personnel may also be needed. Given the small number of workers and construction vehicles, traffic disruptions would be minimal and localized.

After the implementation of the mitigation measures, the construction of the proposed transmission lines and modifications to substations would involve short-term localized traffic delays. The impacts resulting from construction and operation of the proposed transmission lines and modifications to substations would be less than significant for transportation.

14.8.3 MITIGATION

During transmission line and substation modification construction activities, delays to railroad operations due to construction vehicles or equipment crossing tracks would be avoided. Construction will be coordinated with railroad operators.

Conductors and overhead wire stringing operations would use guard structures to eliminate delays. When appropriate, pilot vehicles will accompany the movement of heavy equipment. Traffic control barriers and warning devices will be used when appropriate. All necessary provisions will be made to conform to safety requirements for maintaining the flow of public traffic. Construction operations will be conducted to offer the least possible obstruction and inconvenience to public traffic. The construction contractor would be required to plan and execute delivery of heavy equipment in such a manner that would avoid traffic congestion and reduce likelihood of dangerous situations along local roadways.

14.9 MINING AND FORESTRY

14.9.1 AFFECTED ENVIRONMENT

Morris Routes

Morris Routes 1 and 2 occur in what was historically the Prairie Grassland Region of Minnesota. The primary tree cover in the project area is associated with waterways and homesteads. No economically important forest resources are within the project area, which includes the Johnson Junction Substation expansion site. A detailed description of the mining resources can be found in Section 6.1.3.4 of the Route Permit Application. Notable mining resources in the area include the quaternary sands and gravels present in glacial outwash deposits. An inactive gravel pit is located west of Morris Route 1 in Big Stone County (NE ¼ of Section 18 in Malta Township). The potential exists for developable Precambrian bedrock resources, such as quarry grade metamorphic stone, at the southern/western terminus of the route alignment where the Minnesota River has eroded into the overlying deposits.

Willmar Routes

Willmar Routes 1 and 2 occur in what was historically the Prairie Grassland Region of Minnesota. The primary tree cover in the project area is associated with waterways and homesteads. No economically important forest resources are within the project area. A detailed description of the mining resources can be found in Section 7.1.3.4 of the Route Permit Application. Several aggregate sites are clustered south of Willmar Route 1 around U.S. Highway 12 on the western side of Swift County. They include two abandoned gravel pits, two active private gravel pits, and two Mn/DOT gravel pits.

Granite Falls Routes

The Granite Falls Routes are primarily grassland. The primary tree cover in the project area is associated with waterways and homesteads. No economically important forest resources are within the project area, which includes the existing Canby Substation and the alternative locations. A detailed description of the mining resources can be found in Section 8.1.3.4 of the

Route Permit Application. No sand and gravel mining operations or rock quarries were identified along any of the Granite Falls route alignments, but aggregate site and rock quarries are located in the vicinity of Granite Falls at the eastern end of the proposed transmission line.

14.9.2 IMPACTS

Shelterbelt impacts along the proposed transmission lines are listed in Table 45. The Applicants' preferred alternatives have the least impact to shelterbelts. Overall, the preferred alternative would impact approximately 12.0 acres, whereas the other alternatives would impact 15.8 to 35.5 acres.

Table 45
Shelterbelt Impacts Along Routes

Route	Impacted Forest (acres)
Morris 1	6.9
Morris 2	9.2
Willmar 1	20.2
Willmar 2	9.7
Granite Falls 1	5.1
Granite Falls 2	13.9
Granite Falls 3	6.6
Granite Falls 4	15.3
Johnson Junction Substation	0.0
Canby Substation Alternatives	0.0

No impacts to active mining or quarrying operations are anticipated to result from any of the proposed route alignments.

14.9.3 MITIGATION

Clearing of shelterbelts will be limited to the amount necessary to permit the safe and reliable operation of the transmission line. Construction staging areas will be located and arranged so as to preserve trees and vegetation to the maximum possible extent. Unless otherwise agreed upon by the landowner, all storage and construction buildings, including concrete footings and slabs, and all construction materials and debris will be removed from the site once construction is complete. The area will be regraded as required so that all surfaces drain naturally, blend with natural terrain, and are left in a condition that will facilitate natural revegetation, provide for proper drainage, and prevent erosion. Clearing for access roads will be limited to only those

trees necessary to permit the passage of equipment. Temporary access roads will be restored. Native shrubs that will not interfere with the safe operation of the transmission line will be allowed to reestablish in the ROW.

As no impacts to active mining or quarrying operations are anticipated, no mitigation measures are necessary.

14.10 ECONOMIC DEVELOPMENT

14.10.1 AFFECTED ENVIRONMENT

The Minnesota Department of Employment and Economic Development identifies western Minnesota as an area with trends of declining populations. The proposed alternatives are in areas of Minnesota with declining populations, with the exception of the Willmar alternative. Big Stone, Chippewa, Lac qui Parle, Stevens, and Yellow Medicine counties show a change in populations between 1990 and 2000 between -1.1 to -9.6 percent. In contrast, Kandiyohi and Swift counties showed population growth, with a change of 6.3 and 11.5 percent, respectively (Minnesota Department of Trade and Economic Development, 2005).

There are several educational institutions in the region that could be used to train the workforce for commercial and industrial development that could potentially occur in these regions. There are three consolidated community and technical colleges, a State University, and a University of Minnesota Campus in the region (Minnesota Department of Employment and Economic Development, 2005).

Due to the wind resources (Appendix A.3) and common agricultural commodities (i.e. corn), the area is poised to attract businesses that will utilize these resources (Minnesota Department of Agriculture, 2006). In particular, a number of generation and power delivery projects have been proposed or developed in the region related to wind resources, and industries utilizing agricultural resources, such as ethanol plants, have been recently constructed. Many of these developments are in response to legislation, including Minnesota Statutes §41A.09, which sets the production goals for ethanol in the State (480,000,000 gallons in 2008) and Minnesota Statutes §216B.1691, which requires utilities to make a good faith effort to have 10 percent of their electric energy to retail customers be generated by eligible energy technologies by 2015 (eligible energy technologies are defined in Minnesota Statutes §216B.1691, Subd. 1A).

Wind farm projects reviewed by the State in 2005 and 2006 include:

- High Prairie Wind Farm I, LLC (MN Docket No. PT 6528/WS-06-91)
- MinnDakota Wind Project (MN Docket No. PT 6530/WS-06-157)
- Fenton Wind Power Plant (MN Docket No. PT6499/WS-05-1707)
- Stoneray Wind Power Plant (MN Docket No. 05-90-LWECS-Stoneray)

As of April 2006, the Minnesota Department of Agriculture identified four ethanol plants in the region: Morris, Benson, Granite Falls, and Marshall. Due to the growth in the ethanol sector, approximately 148 million bushels of corn were processed into ethanol in Minnesota in 2005. Projected corn use for ethanol is expected to grow to approximately 213 million bushels by 2012 (Minnesota Department of Agriculture, 2006). As stated in the Route Permit Application, corn is one of the primary crops in each of the counties crossed by the project.

The Minnesota Chamber of Commerce identifies a reliable and affordable supply of electricity as a critical aspect of development in Minnesota since electricity is a significant operating cost for Minnesota businesses (2006). The wind power, ethanol production, and other industries or commercial businesses will require access to a reliable and affordable transmission system for economic development viability in the region. A study by LaCommare and Eto estimated the national cost of power interruptions at approximately $79 billion annually based on best available information. This study found that the total annual cost could vary from $22 billion to more than $135 billion (2004). A separate study found that in particular, any industries using electricity for "cleanroom" operation (i.e. semiconductor manufacturing, pharmaceuticals, hospitals, medical devices, etc.) require large amounts of reliable energy due to the need for regulation of operating environments (Eto, et. al., 2001). In the project area, there are existing facilities, such as the Granite Falls Municipal Hospital, that require reliable energy for their cleanroom operations. Power outages result in significant economic losses for companies. For example, an 18-hour power outage at a fabrication facility in Texas cost the company about $1.5 million (Eto, et. al., 2001). There are several recent studies that have outlined concerns regarding the lack of new transmission capacity available to meet consumer (residential, commercial, and industrial) demand (Minnesota Department of Commerce, 2004; Hirst, 2004). Additionally, utilities in Minnesota have been conducting regional planning studies to identify ways to increase capacity. The Big Stone Transmission Line Project is a part of this proposal.

14.10.2 IMPACTS

The PUC is currently assessing the need for the proposal. The PUC is evaluating whether the construction of the proposed transmission line will provide the necessary additional transmission

capacity and will increase the reliability in the region. Access to a reliable transmission system with capacity on the system will provide opportunities for businesses to interconnect or utilize energy on the transmission line system in the region. This in turn could lead to additional jobs in areas with declining populations, such as the Morris and Granite Falls transmission lines. A transmission line to Willmar will continue to support the growth in Kandiyohi and Swift counties.

14.10.3 MITIGATION

Because the impacts to economic development will be positive, no mitigation measures are necessary or proposed.

14.11 ARCHEOLOGICAL AND HISTORIC RESOURCES

14.11.1 AFFECTED ENVIRONMENT

An overview of known archaeological and historic resources within the vicinities of the routes was conducted (Palmer et al. 2005a, 2005b). For this overview, information on known archaeological and historic resources in the corridors was gathered from the State Historic Preservation Office (SHPO) in St. Paul, Minnesota. Public Land Survey (PLS) maps, showing natural, archaeological, and historic conditions during the latter half of the 19th century, were reviewed as a world-wide web-based resource from the Minnesota Land Management Information Center. Other archival and environmental resources were available at repositories in Minneapolis, Minnesota and on the world-wide web.

A windshield survey of selected portions of the routes was performed in 2005. During the survey, all townships were visited and selected buildings within the routes were photographed. Visited towns and cities in Minnesota included Alberta, Chokio, Danvers, DeGraff, Granite Falls, Hazel Run, Johnson, Murdock, Odessa, Ortonville, Saint Leo, and Willmar.

The previously-identified archaeological and historic resources on file at the SHPO were digitized into Geographic Information Systems (GIS). The resources were then projected to show spatial relationships between the archaeological and historic resources and the proposed routes. Two spatial parameters were used in this discussion: archaeological resources within 500 feet of the proposed routes and historic standing structures within 1 mile of the proposed routes. Detailed descriptions of these resources can be found in archaeological and historic resource overviews prepared by Palmer et al. (2005a, 2005b).

14.11.2 IMPACTS

The table below identifies the previously identified cultural resources potentially impacted for each route.

Table 46
Resources Potentially Impacted for Each Route

Route	Number of Previously Inventoried Structures	PLS	Archeological Resources and Site Number(s)
Morris Routes 1 and 2	137	Railroad (St. Paul and Pacific Railroad), multiple unnamed trails/roads and farmsteads	Earthwork (1) 21BS0008
Willmar Route 1	167	Railroad segments, several unnamed trails/roads, and multiple farms/structures	Earthwork (1); pre-contact lithic scatter and possible cemetery 21BS008; 21SW0013
Willmar Route 2	117	Railroad segments, several unnamed trails/roads, and multiple farms/structures	Earthwork (1) 21BS0008
Granite Falls Route 1	103	Railroad alignments, trails/roads, farms/structures, miscellaneous features, and the boundaries of the Upper Sioux Reservation	Earthwork (2) 21CP0011a; 21CP0011
Granite Falls Route 2	93	Railroad alignments, trails/roads, farms/structures, miscellaneous features, and the boundaries of the Upper Sioux Reservation	n/a
Granite Falls Route 3	129	Railroad alignments, trails/roads, farms/structures, miscellaneous features, and the boundaries of the Upper Sioux Reservation	Earthwork (2) 21CP000a; 21CP0011
Granite Falls Route 4	97	Railroad alignments, trails/roads, farms/structures, miscellaneous features, and the boundaries of the Upper Sioux Reservation	n/a

14.11.3 MITIGATION

The project requires the preparation of an EIS directed by Western. In addition, Western will also function as the lead Federal agency for compliance with Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended. Western is currently preparing a Programmatic Agreement (PA) to guide the Section 106 compliance process throughout the project, particularly with regard to a definition of Area of Potential Effects (APE), once the routes for the transmission lines are determined. The APE, to be agreed upon in the PA, will be applied to the selected routes; the APE will be subject to a Phase I cultural resources inventory, including field investigation and additional archival review.

Archaeologists will design a survey methodology to document the existing conditions within the APE, identify existing archaeological resources within that area, provide recommendations for National Register of Historic Places (NRHP) eligibility of archaeological and historic resources within the APE and offer recommendations for archaeological site avoidance, impact minimization, or mitigation if necessary.

Every effort will be made to avoid impacts to identified archaeological and historic resources. In the event that an impact would occur, Western would determine the nature of the impact in consultation with the SHPO and invited consulting parties (particularly Native American Tribes and other State and federal permitting or land management agencies) on whether or not the resource was eligible for listing in the NRHP. While avoidance of the resource would be a preferred action, mitigation for project-related impacts on NRHP-eligible archaeological and historic resources may include an effort to minimize project impacts on the resource and/or additional documentation through data recovery.

Western will integrate into the PA a discovery plan to be in place, should previously-unknown archaeological resources or human remains be inadvertently encountered during construction along the route. The plan will outline the framework for handling such discoveries in an efficient and legally compliant manner. The discovery plan may include the following topics: construction contractor training, identification of resources in the field, contact information for OTP-designated professionals to address a discovery, procedures for avoidance, and associated tasks in the event of work stoppage in a construction area. With regard to a discovery of human remains, procedures would be followed to ensure that the appropriate authorities would become involved quickly and in accordance with local and State guidelines (Minnesota Statute 307).

15.0 IMPACTS ON NATURAL ENVIRONMENT

15.1 AIR QUALITY

15.1.1 AFFECTED ENVIRONMENT

The background air quality is similar for all routes and is described below.

Climate

Western Minnesota has a generally flat landscape consisting primarily of agricultural lands. Winds tend to blow stronger and more consistently in this region than they would in other parts of Minnesota. This leads to good dispersion conditions for pollutant emissions.

This particular area of the State can see notable temperature extremes throughout the year. Summer temperatures can routinely top 90 degrees Fahrenheit (°F), while winter temperatures can routinely drop below -20°F.

Temperature inversions can occur anytime of year due to nighttime radiational cooling or large-scale weather systems, causing cool air to get trapped near the ground. This can cause some discomfort among individuals who are sensitive to air pollutants because pollutants are not dispersed effectively during these conditions. However, temperature inversions are not a frequent and long-lived occurrence and typically do not last more than a day or two in this area. Given the low density of existing emissions sources in the region, pollutant levels during inversions do not typically approach levels of concern.

Air Quality Data

The entire area encompassing the routes is currently in attainment with National and Minnesota Ambient Air Quality Standards for all criteria pollutants. No State or Federal ambient air quality monitoring sites exist within the counties along the routes. The nearest monitoring site is in St. Cloud, Minnesota in Stearns County.

Corona and nitrogen oxide emissions are the primary air quality concerns related to transmission lines. Corona can produce ozone and oxides of nitrogen in the air surrounding the conductor. Corona consists of the breakdown or ionization of air which normally occurs within a few centimeters or less of the conductor. It occurs when the electric field intensity, or surface gradient, on the conductor exceeds the breakdown strength of air. Usually some imperfection, such as a scratch on the conductor or a water droplet, is necessary to cause corona.

Ozone forms naturally in the lower atmosphere from lightning discharges and from reactions between solar ultraviolet radiation and air pollutants, such as hydrocarbons, from auto emissions. The natural production rate of ozone is directly proportional to temperature and sunlight, and inversely proportional to humidity. Thus humidity (or moisture), the same factor that increases corona discharges from transmission lines, inhibits the production of ozone. Ozone is a very reactive form of oxygen and combines readily with other elements and compounds in the atmosphere.

The U.S. Environmental Protection Agency (EPA) promulgated regulations on the permissible concentrations of ozone and oxides of nitrogen (62 Federal Register 38856). The national standard is 0.08 parts per million (ppm) on an 8-hour averaging period [40 Code of Federal Regulations (CFR) Part 50]. The Minnesota State Ambient Air Quality Standard is 0.08 ppm based upon the fourth-highest 8-hour daily maximum average in 1 year (Minnesota Rules 7009.0080).

15.1.2 IMPACTS

Because the general air quality is similar for the all the routes, potential impacts from the proposed transmission lines are not expected to differ.

Studies designed to monitor the production of ozone under transmission lines have generally been unable to detect any increase in ozone levels (Jeffers, 1999; USDOE 1996). Given this, there will be no measurable impacts relating to ozone in the corridors. Temporary and localized impacts to air quality may occur during construction due to the disturbance of soil, which raises fugitive dust particles.

15.1.3 MITIGATION

Mitigation measures will not differ between routes. Temporary impacts from fugitive dust will be minimized or avoided by using BMPs. Specific mitigation measures detailed in Section 7.6 of this document would be used.

15.2 WATER QUALITY, SOILS AND GEOLOGY

15.2.1 AFFECTED ENVIRONMENT

Water Quality

Morris Routes

The Morris routes lie within the Minnesota River (Headwaters), Mustinka River Watershed of the Red River of the North Basin, and the Pomme de Terre River Watershed of the Minnesota River Basin. Surface water flows generally north within the Mustinka River Basin in northern Big Stone County and far western Stevens County. Along the rest of the routes, water generally flows south and west toward the Minnesota River. Surface water resources include the Minnesota River and tributaries to the Mustinka and Pomme de Terre rivers (many of which have been ditched), county ditches, and scattered lakes. There is a large complex of lakes within the west half of Otrey Township in Big Stone County.

Willmar Routes

The Willmar routes lie within the Minnesota River (Headwaters), Chippewa River, and Pomme de Terre River watersheds of the Minnesota River Basin (MPCA 2005). Surface water flows generally south and west toward the Minnesota River. Surface water resources along the routes alignment include the Pomme de Terre and Chippewa rivers and associated tributaries, county ditches, and scattered lakes.

Granite Falls Routes

The Granite Falls routes lie within the Minnesota River (Granite Falls) and Lac Qui Parle watersheds of the Minnesota River Basin. Surface water flows generally north and east toward the Minnesota River, except in the area east of the Minnesota River by the Granite Falls Substation, where surface water flows generally south and west. Surface water resources in the vicinity of the Granite Falls routes include the Lac Qui Parle River and its tributaries, county ditches, tributaries to Cobb Creek and Florida Creek, Palmer Creek, and the Minnesota River. Streams near South Dakota have generally been left in their natural, meandering condition, while most of the tributaries within the eastern portion of the routes have been ditched.

Soils

NRCS Soil Survey data was reviewed to describe the soil resources in the vicinity of the routes. Soils are generally grouped into categories known as associations. A soil association has a distinctive pattern of soils, relief, and drainage and is a unique natural landscape. Typically, an association consists of one or more major soils and some minor soils.

Morris Routes

The principal soil associations found along the Morris routes include the Aazdahl-Hamerly-Parnell (36.2 percent), Hattie-Fulda-Quam (27.9 percent), Heimdal-Sisseton-Svea (21.2 percent), and Formdale-Langhei-Aazdahl (12.2 percent). The Johnson Junction Substation is located on the Barnes-Langhei-Hamerly soil association. A general description of these soils and others found along the routes can be found in Section 3.3 of the Federal EIS.

Willmar Routes

The principal soil associations found along the Willmar Routes include the Wadenhill-Sunburg-Delft (22.9 percent), Winger-Vallers-Hamerly (14.4 percent), Marysland-Arverson-Hecla (12.0 percent), Tara-Parnell-Hamerly (11.4 percent), Colvin-Tara-Spicer (10.0 percent), Heimdal-Sisseton-Svea (7.5 percent), and Egeland-Marysland-Estelline (6.1 percent). A general description of these soils and others found along the routes can be found in Section 3.3 of the Federal EIS.

Granite Falls Routes

The principal soil associations found along the Granite Falls Routes include the Canisteo-Ves-Normania (34.9 percent), Forman-Aastad-Buse (16.9 percent), Peever-Forman-Tonka (10.2 percent), Heimdal-Sisseton-Svea (9.3 percent), and Burr-Du Page-Calco (5.1 percent). The existing Canby Substation is located on Burr-Calco soils. Alternatives A, B, C, and D are located on Sverdrop, Burr-Calco, Ves-Stroden, and Forman soils, respectively. A general description of these soils and others found along the routes can be found in Section 3.3 of the Federal EIS.

Geology

The uppermost bedrock within the project area is of the Cretaceous age. Depth to bedrock varies throughout the route alternatives, but is generally between 100 to 400 feet. There are areas of exposed bedrock in the Minnesota River Valley. The bedrock is covered by Pleistocene-age glacial deposits associated with the Des Moines Lobe, and in the northern portions of the Morris routes, with the Wadena Lobe. These deposits include ground and stagnation moraines (composed of till) and sand and gravel outwash.

15.2.2 IMPACTS

Water Quality

The transmission line will span Public Waters Inventory (PWI) rivers, streams, and ditches, as well as impaired waters along the route. During construction, there is the possibility of sediment reaching surface waters as the ground is disturbed by excavation, grading, and construction traffic. However, once the project is completed, it will have no impact on surface water quality.

The Clean Water Act requires states to publish, every 2 years, a list of streams and lakes that are not meeting their designated uses because of excess pollutants (impaired waters). The list, known as the 303(d) list, is based on violations of water quality standards. Table 47 lists the impaired waters that will be crossed by the proposed transmission lines.

Table 47
Impaired Waters Along Routes

Impaired Water	Reason for Impairment	Route Segments
Minnesota River	Mercury, fecal coliform	W1, W2, GF1, GF2, GF3, GF4
Stony Run	Biota	M1, M2, W1, W2
Pomme de Terre River	Fecal coliform, low dissolved oxygen (DO), turbidity	W1, W2
Judicial Ditch #8	Biota	W1, W2
Chippewa River	Mercury, fecal coliform	W1, W2
Lac Qui Parle River	Mercury, fecal coliform, low DO	GF1, GF2, GF3, GF4

The Minnesota River is listed as a National Park Service (NPS) Nationwide River Inventory (NRI) River. The NRI lists over 3,400 river segments that the NPS has determined have "outstandingly remarkable" natural or cultural resources. Categories used to determine eligible river segments include: scenery, recreation, geology, fish, wildlife, prehistory, history, cultural values, and others. Under a 1979 Presidential Directive, Federal agencies need to seek to avoid and mitigate impacts to NRI riverways. The Minnesota River is listed for its scenic, recreational, wildlife, and historic values in the section crossed by the route (NPS 2005).

Morris Routes

Morris Route 1 has five PWI crossings as described in Table 14 of the Route Permit Application. Morris Route 2 has eight PWI crossings as described in Table 19 of the Route Permit Application. There are no PWI streams or ditches located within 1 mile of the existing Johnson Junction Substation and proposed expansion area. No impacts to surface water quality are anticipated along the Morris routes.

Willmar Routes

Willmar Route 1 has eight PWI crossings as described in Table 28 of the Route Permit Application. Willmar Route 2 has 19 PWI crossings as described in Table 33 of the Route Permit Application. No impacts to surface water quality are anticipated along the Willmar routes.

Granite Falls Routes

Granite Falls Route 1 has 21 PWI crossings as described in Tables 49 and 53 of the Route Permit Application. Granite Falls Route 2 has 24 PWI crossings as described in Tables 64 and 67 of the Route Permit Application. Granite Falls Route 3 has 35 PWI crossings as described in Tables 51 and 53 of the Route Permit Application. Granite Falls Route 4 has 32 PWI crossings as described in Tables 65 and 67 of the Route Permit Application. Additionally, local government advisors have identified the Spring Creek area as an important water resource that would be crossed by Granite Falls Routes 2 and 4. No impacts to surface water quality are anticipated along the Granite Falls routes.

Canby Substation Alternatives

One PWI stream, Yellow Medicine County Ditch #8, is located approximately 2,000 feet west of the existing substation. This stream is a ditched portion of Canby Creek. A non-PWI, intermittent, unnamed stream runs along the east side of the existing substation between two fields. No impaired waters are located within 1 mile of the existing substation. The existing substation is also within the 100-year floodplain of Canby Creek.

Canby Creek, a PWI stream, is within 0.6 miles of Alternative A, 400 feet of Alternative B, and 0.7 miles of Alternative C. Additionally, an unnamed tributary to Canby Creek, a PWI stream, is located 0.8 miles from Alternative B. Alternative D is ½ mile from the PWI stream, Lazarus Creek, and 200 feet from an unnamed tributary to that stream that is also a PWI stream. Alternative B is within the 100-year floodplain of Canby Creek. No impaired waters are located within 1 mile of Alternatives A, B, C, or D.

Soils

Table 48 describes the temporary and permanent impacts to soils along the proposed transmission line routes. Temporary impacts include soil compaction within the ROW during construction as well as the use of staging and stringing setup areas.

Table 48
Temporary and Permanent Impacts to Soils

Route	Temporary Impact (acres)	Permanent Impact (acres)
Morris 1	246	7.0
Morris 2	245	7.3
Willmar 1	478	13.6
Willmar 2	536	15.2
Granite Falls 1	357	8.5
Granite Falls 2	382	9.0
Granite Falls 3	530	12.6
Granite Falls 4	553	13.0
Johnson Junction Substation	3.7	3.7
Canby Substation Alternatives	6.3	6.3

Geology

Minimal surficial and subsurface disturbances will occur for all the proposed routes. No impacts to geology are anticipated.

15.2.3 MITIGATION

Water Quality

A Section 10 Permit will be obtained from the U.S. Army Corps of Engineers (USACE) for the Minnesota River crossing. Utility crossing permits will be obtained from the DNR for any PWI water crossed.

Sound water and soil conservation practices will be maintained during construction and operation of the project to protect topsoil and adjacent water resources and minimize soil erosion. Construction will be completed according to National Pollution Discharge Elimination System (NPDES) permit requirements. Practices may include the following:

- Containment of stockpiled material away from stream banks and lake shorelines.
- Stockpiling and respreading topsoil.
- Reseeding and revegetating disturbed areas as required by the NPDES permit.
- Implementing erosion and sediment controls as required by the NPDES permit.
- Structures and disturbed areas will be located 300 feet from rivers and lakes, where practical.
- Waste water from concrete batching or other construction operations will not enter streams or other surface waters without using turbidity control methods. Waste waters discharged will be free of settleable material.

If Granite Falls Routes 2 or 4 are chosen, the transmission line will span Spring Creek. The BMPs listed above will prevent any water quality impact to this resource.

Soils

As stated above, sound soil conservation practices will be maintained during construction and operation to minimize erosion of soils. Landowners will be compensated for any soil compaction that may occur during construction.

Geology

Because no impacts to geology are anticipated, no mitigation is proposed.

15.3 GROUNDWATER AND WETLANDS

15.3.1 AFFECTED ENVIRONMENTS

Groundwater

Depth to groundwater varies throughout the area, from zero feet in the Minnesota River Valley and lacustrine areas, up to 100 feet in some areas of uplands. The Minnesota well database lists wells associated with rural residences scattered throughout the project area. In general, groundwater within the project area is derived from sand and gravel outwash aquifers, either buried or near the surface. Isolated aquifers within cretaceous deposits also can produce limited amounts of groundwater.

Wetlands

Wetland and riparian resources in the vicinity of the routes were identified by reviewing USFWS NWI and land cover data and the DNR PWI maps. There are many wetlands located in the project area. In general, the routes lie in what is termed the Prairie Pothole Region, an area where recent glaciation resulted in gently rolling topography scattered with shallow, isolated wetland basins. The majority of the wetlands are palustrine emergent type wetlands (isolated wetlands with emergent vegetation such as cattails), except in Kandiyohi County, where lacustrine type wetlands (associated with lakes) are also very common. Because the route alternatives are predominantly agricultural (greater than 90 percent), pristine wetland areas are relatively rare. In general, seasonal variations in precipitation and groundwater recharge determine the wetland elevations.

Wetlands impacts are subject to regulation under Section 404 of the Clean Water Act, providing that such wetlands meet the definition of Waters of the United States (33 CFR 328). The USACE determines if wetlands are considered Waters of the Unites States, and therefore under USACE jurisdiction. In Minnesota, all wetlands are regulated under the Wetland Conservation Act (WCA) (Minnesota Statutes §1036.222-.2373) requiring coordination with the Minnesota Board of Water and Soil Resources and Section 404 of the Clean Water Act by the USACE. Public Waters Wetlands are also regulated by the DNR per Minnesota Statutes §103G.005, Subd. 15a.

15.3.2 IMPACTS

Groundwater

Minor, localized, short-term dewatering may occur during construction and placement of the transmission line structures. Impacts to groundwater resources are not expected to result from construction of the transmission line.

Wetlands

Background information on wetland crossings can be located in the Route Permit Application under Tables 15, 20, 28, 34, 50, 52, 54, 66, and 68.

Temporary impacts to wetlands may occur if they need to be crossed during construction of the transmission line. No staging or stringing set up areas will be placed adjacent to water resources, as practical.

Background information on impacts and mitigation can be located in the Route Permit Application under Sections 6.1.5.5., 6.2.5.5, 7.1.5.5, 7.2.5.5, 8.1.5.5, 8.2.5.5., 9.1.2.5, 9.2.2.5, 9.4.2.5, 9.6.2.5, and 9.9.1.5.

Table 49
Wetland Impacts

Route	Segments with Potential Impacts	Amount of Permanent Impact per H-frame Structure (square feet)[2]	Total Amount of Permanent Impact for all Segments (square feet)	Total Amount of Temporary Impact for all Structures (square feet)
Morris Route 1	M-I, M-5, M-17	1,000	3,000	60,000
Morris Route 2	M-1	1,000	1,000	20,000
Willmar Route 1[1]	W-12B	1,000	1,000	20,000
Willmar Route 2	W-12B, W-19, W-29	1,000	3,000	60,000
Granite Falls Route 1	G-45	1,000	1,000	25,000
Granite Falls Route 2	G-46	1,000	1,000	25,000
Granite Falls Route 3	G-45	1,000	1,000	25,000
Granite Falls Route 4	G-46, G-46	1,000	2,000	50,000

[1]*Attempts will be made to shift the route to avoid placing any structures in the wetland, if possible.*
[2]*Impacts for single pole structures are approximately 500 square feet per structure.*

15.3.3 MITIGATION

Sound water and soil conservation practices will be maintained during construction and operation of the project to protect topsoil and adjacent water resources and minimize soil erosion. Construction will be completed according to NPDES permit requirements. Practices may include:

- Containment of stockpiled material away from stream banks, wetlands, and lake shorelines.
- Stockpiling and respreading topsoil.
- Reseeding and revegetating disturbed areas as required by the NPDES permit.
- Implementing erosion and sediment controls as required by the NPDES permit.
- Major disturbance of individual wetlands and drainage and irrigation systems will be avoided during construction. This will be done by spanning wetlands and drainage and irrigation systems, where possible. When it is not possible to span the wetland, several options will be used during construction to minimize impacts.
- When possible, construction will be scheduled during frozen ground conditions.
- Crews will attempt to access the wetland with the least amount of physical impact to the wetland (i.e., shortest route).
- The structures will be assembled on upland areas before they are brought to the site for installation, when practical.
- When construction during winter is not possible, construction mats will be used where wetlands would be impacted. Additionally, an all-terrain construction vehicle is available, which is designed to minimize soil impact in damp areas.
- Wetlands impacted will be restored as required by the USACE and the WCA.

15.4 FISH AND WILDLIFE

15.4.1 AFFECTED ENVIRONMENT

Habitat adjacent to each of the routes is primarily cultivated land. Fish and wildlife habitats are primarily State and Federally owned land or easements and also include several perennial and

ephemeral streams. The State and Federal lands are typically managed habitats for game and nongame animals. Detailed information on wildlife in and along the routes can be found in Sections 6.1.5.4, 6.2.5.4, 7.1.5.4, 7.2.5.4, 8.1.5.4, and 8.2.5.4 in the Route Permit Application. Each route has wildlife typical of agricultural settings with managed habitats forming a patchwork of habitats on the landscape.

The project is located in the Minnesota River Valley and is recognized as a major flyway for migrating birds. More than 320 species of birds have been recorded in the Minnesota River Valley. The Migratory Bird Treaty Act (MBTA) of 1918 (16 USC 703-712) governs the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests. Such actions are prohibited unless authorized under a valid permit. This law applies to migratory birds native to the U.S. and its territories. It does not apply to non-native migratory birds or resident species that do not migrate on a seasonal basis.

Additionally, the 1940 Bald and Golden Eagle Protection Act (16 USC 668-668C) specifically prohibits the taking or possession of and commerce in bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*), either alive or dead, or any part, nest, or egg of these eagles. Special exceptions to this prohibition may be granted by a permit from the Secretary of the Interior for scientific or exhibition purposes, for religious purposes of Native American tribes, or for the protection of wildlife or other interests.

15.4.2 IMPACTS

There is minimal potential for the displacement of wildlife and loss of habitat from construction of the route. Wildlife that inhabit natural areas could be impacted in the short-term within the immediate area of construction. The distance that animals will be displaced will depend on the species. Additionally, these animals will be typical of those found in agricultural and urban settings and should not incur population level effects due to construction.

Raptors, waterfowl, and other bird species may also be affected by the construction and placement of the transmission lines. Avian collisions are a possibility after the completion of the transmission line. Waterfowl are typically the most susceptible to transmission line collision. In general, the closer a transmission line is to waterfowl habitat, such as wetlands and open water, or if the transmission line is between habitat and feeding areas, such as agricultural fields, the more likely it is that waterfowl collisions will occur. Appendix G lists the WPAs, WMAs, and DNR PWI lakes and wetlands within 1 mile of the proposed alternative route segments. A 1-mile buffer was used because waterfowl collisions are reported to be negligible at distances

greater than 1 mile from these heavily used feeding areas or habitat (Avian Power Line Interaction Committee, 1994).

Additionally, electrocution of large birds, such as raptors, is a concern typically related to distribution lines. Electrocution occurs when birds with large wingspans come in contact with either two conductors or a conductor and a grounding device. The transmission line design standards provide adequate spacing to eliminate the risk of raptor electrocution. As such, electrocution is not a concern related to the project. The following is a summary of potential avian impacts for the project.

Morris Route 1

The DNR and USFWS recently released (June 2005) the results of a joint assessment for the conservation of wetlands and grasslands in Minnesota, which identify grassland and wetland habitat priorities for wildlife conservation. Information on this study can be found in Section 6.1.5.4 of the Route Permit Application. The high priority areas are identified on Appendix B.15.

The high priority areas for both wetland and grassland habitat along the route are in segments M-1, M-2, M-3, and portions of M-5 alignments (USFWS and DNR 2005).

The USFWS has also reintroduced several populations of prairie chickens (*Scientific name*) (a State species of special concern) within 1 mile of Morris Route 1. Sections 25, 26, and 36 of Big Stone Township contain signed areas of prairie chicken habitat and specific lookouts. There is a USFWS documented booming ground, or lek, in Section 25, where adult prairie chickens congregate communally on breeding display grounds in the spring. In general, these sites correspond to areas that have been determined by the DNR to have outstanding biodiversity significance. Although the proposed route will go relatively near prairie chicken nesting areas, it is a rebuild of an existing transmission line and therefore should not increase opportunities for predation over existing levels. In fact, with the proposed structures, longer spans are anticipated, decreasing the number of potential perching sites.

There are two colonial waterbird rookeries within 1 mile of Morris Route 1 in Big Stone County. One of the documented rookeries contains western grebe *(Aechmophorus occidentalis,)* and the other contains double-breasted cormorants *(Phalacrocorax auritus)* (Minnesota Natural Heritage and Nongame Wildlife Program 2005). Because of the high density of birds in such rookeries, any disturbance to the site has the potential to impact the reproductive success of large portions of a species' population.

As identified by the joint assessment, segments M-1, M-2, M-3, and the southern portion of M-5 pass through areas with a higher potential for avian conflicts with the transmission line. The DNR and USFWS will continue to be consulted to address their concerns regarding this area.

Morris Route 2

There is a colonial waterbird rookery with western grebes near Morris Route 2. Additionally, the prairie chicken populations identified above are also in the vicinity of Morris Route 2. As identified by the joint assessment, segments M-1, M-2, M-4, M-6, and a portion of M-8 pass through areas with a higher potential for avian conflicts with the transmission line. The DNR and USFWS will continue to be consulted to address their concerns regarding this area.

Johnson Junction 230/115 kV Substation

The proposed substation expansion will accommodate the 230 kV Morris transmission line from the Big Stone 230 kV Substation and will be constructed adjacent to the existing switch station. The proposed substation expansion area is agricultural land, which provides habitat for some common species. Examples include the house mouse (*Mus musculus*), and Virginia opossum (*Didelphis virginiana*). No WMAs, WPAs, Wildlife Refuges, priority habitats (grasslands and wetlands), or rookeries are located near the substation project area.

The substation is not expected to impact the fish or wildlife of the substation project area.

Willmar Route 1

The high priority areas shown in the DNR and USFWS joint assessment are identified in Appendix B.15 and are generally limited to the western end of the route. The high priority areas for both wetland and grassland habitat along the routes are in Segment G-W, W-2, and W-3 alignments (USFWS and DNR 2005).

Information on this study can be found in Section 6.1.5.4 of the Route Permit Application. The DNR and USFWS will continue to be consulted to address their concerns regarding these areas.

Willmar Route 2

The high priority areas shown in the DNR and USFWS joint assessment are identified in Appendix B.15 and are generally limited to the western end of the route. The high priority areas for both wetland and grassland habitat along the routes are in Segment G-W and W-1A alignments (USFWS and DNR 2005).

The DNR and USFWS will continue to be consulted to address their concerns regarding these areas.

There is one colonial waterbird rookery within 1 mile of the Segment W-2 alignment in the Big Stone National Wildlife Refuge. Green heron (*Butorides virescens*) inhabit this rookery (Minnesota Natural Heritage and Nongame Wildlife Program 2005). Because of the high density of birds in such rookeries, any disturbance to the site has the potential to impact the reproductive success of large portions of a species' population. There are also two documented freshwater mussel concentration sites within 1 mile of the Segment W-2 alignment within the Big Stone National Wildlife Refuge.

Granite Falls Routes 1 and 3

Information on the joint assessment for the conservation of wetlands and grasslands study can be found in Section 6.1.5.4 of the Route Permit Application. The high priority areas are identified in Appendix B.15. The following identifies those areas which the route crosses high priority areas (USFWS and DNR 2005):

- Route 1: Segment G-14 and G-15A alignments
- Route 3: Segment G-61, G-63, G-69, and G-70 alignments
- Routes 1 and 3: Segment G-21, G-45, G-50, and G-53 alignments

The DNR and USFWS will continue to be consulted to address their concerns regarding these areas.

There are two mussel sampling sites in the Minnesota River within one mile of Segments G-50 and G-53, along Granite Falls Routes 1 and 3 (Minnesota Natural Heritage and Nongame Wildlife Program 2005).

Granite Falls Routes 2 and 4

Information on the joint assessment for the conservation of wetlands and grasslands study can be found in Section 6.1.5.4 of the Route Permit Application. The high priority areas are identified on Appendix B.15. The following identifies those areas which the route crosses high priority areas (USFWS and DNR 2005):

- Route 2: Segment G-14 and G-16 alignments
- Route 4: Segment G-55, G-56, G-57, and G-58 alignments
- Routes 2 and 4: Segment G-24, G-26, G-45, G-52, and G-53 alignments

The DNR and USFWS will continue to be consulted to address their concerns regarding these areas.

There is one colonial bird nesting site within 1 mile of Segment G-58 containing great blue herons (*Ardea herodias*). There is one mussel sampling site in the Minnesota River within 1 mile of Segment G-53 along Granite Falls Routes 2 and 4.

Canby Substation

Modifications to the existing Canby 115/41.6 kV Substation are required to accommodate the Granite Falls transmission lines. The existing substation is surrounded by agricultural land, which provides habitat for some common species. Examples include the house mouse (*Mus musculus*) and Virginia (*Didelphis virginiana*) opossum. No WMAs, WPAs, Wildlife Refuges, priority habitats (grasslands and wetlands), or rookeries are located near the existing substation project area or Canby Substation alternatives A, B, and C. Alternative D is within 1 mile of areas classified as a priority habitats by a joint assessment of the DNR and USFWS.

Expansion at the existing substation or relocation to alternative locations A, B, and C are not expected to impact the fish and wildlife of the project area. Relocation to alternative location D would have a higher potential for impacting fish and wildlife.

15.4.3 MITIGATION

Mitigation measures will not differ between routes. To mitigate possible impacts to wildlife within WMAs and WPAs, these habitats will be spanned wherever feasible. In areas where complete spanning is not possible, the number of structures placed in high quality wildlife habitat will be minimized, and the DNR and USFWS will be consulted to come up with appropriate mitigation. Additionally, where appropriate, mats will be used to avoid compacting the soils. Areas disturbed due to construction activities will be restored to pre-construction contours and will be reseeded with a DNR-recommended seed mix that is free of noxious weeds.

Avian issues will be addressed by working with the DNR and USFWS to identify any areas that may require marking transmission line shield wires and/or to use alternate structures to reduce the likelihood of collisions.

15.5 VEGETATION

15.5.1 AFFECTED ENVIRONMENT

Morris Routes 1 and 2, Willmar Routes 1 and 2 (with the exception of eastern Swift County and southwestern Kandiyohi County), and Granite Falls Routes 1, 2, 3, and 4 are located within the Northern Glaciated Plains Ecoregion. The native vegetation in this ecoregion is transitional

between tall and shortgrass prairie. Potential natural vegetation in the Northern Glaciated Plains Ecoregion is described in Section 6.1.5.4 of the Route Permit Application.

Along Willmar Routes 1 and 2, the eastern portion of Swift County, and the southwestern portion of Kandiyohi County are in the Western Corn Belt Plains Ecoregion. Section 7.1.5.3 of the Route Permit Application describes the native vegetation in remnant prairie communities in this ecoregion.

As a result of settlement and farming in the 1800s, much of the vicinity of the project has been converted to agriculture. The dominant plant species in the agriculture areas are corn (*Zea mays),* soybeans (*Glycine max),* and wheat (*Triticum aesitivum).* In the grazed areas, dominant vegetation includes grasses, such as smooth brome (*Bromus inermis)* and sorghum (*Sorghum vulgare).*

Along the routes, there are several areas where natural vegetation is being managed. Managed areas, such as WMAs and WPAs, were analyzed within 1 mile of the route alignment. These resources provide potential habitat for native vegetation, wildlife, and rare and unique resources. A distance of 1 mile was used because studies have shown that impacts to wildlife (particularly waterfowl) are negligible at distances greater than 1 mile from wildlife habitat (Avian Power Line Interaction Committee, 1994).

Noxious weeds (as designated by the CFR, Title 7, Section 360.200, Minnesota Rule 1505.0730 and South Dakota Codified Laws 38-22) are regulated by State and Federal rules. These regulations are designed to stop the spread of plants that are detrimental to the environment, crops, livestock, and/or public health. Section 3.4 and Table 3.4-9 of the Federal EIS list State and local noxious weeds that may be found in the vicinity of the routes.

15.5.2 IMPACTS

Flora within habitats along most of the routes are typical of what will be found in an agricultural setting. Areas containing natural communities will be spanned wherever possible. Any direct impacts to WMAs within the route will be avoided, as practical.

Construction of any of the routes could lead to the introduction or spread of noxious weeds in an area, due to ground disturbance, introduction of contaminated topsoil, and/or vehicles traveling from a contaminated site to an uncontaminated site.

Morris Route 1

The U.S. Geological Survey (USGS) Gap Analysis Program (GAP) land cover types along Morris Route 1 are shown in Table 50. Land cover types are defined in Appendix I of the Route Permit Application.

Table 50
GAP Land Cover – Morris Route 1

Cover Type	Area (acres)	Percent of Route
Agriculture	8,339	94.8
Wetland/Riparian/Open Water	393	4.5
Forest	48	0.5
Shrubland	0.10	0.0
Prairie	15	0.2
Developed	0.10	0.0

Source: USGS, 2004. Upper Midwest GAP Land Cover Data

Along the route, there are several areas where natural vegetation is being managed. Otrey WMA contains marsh vegetation, such as sedges and cattails, with areas of open water interspersed. Prairie WMA is predominantly grassland with an open water lake. The grassland vegetation is likely made up of species found in idle pastureland and grassland, such as smooth brome, but it could include remnants of native prairie species (DNR, 2005b). There are four USFWS WPAs (Prairie, Redhead Marsh, Schultz, and Twin Lakes) located along the route containing wetland and grassland vegetation. The route alignment crosses Twin Lake WPA. Within 1 mile of the route alignment, there are five additional WMAs (Reisdorph, Victory, Thomson, Malta, and Brouillet) and six additional WPAs (Tangen, Jorgenson, Larson Slough, Thomson, Dismal Swamp, and Jacobson).

Along the route alignment, there are approximately 93 acres of USFWS easements. The USFWS holds tillage, cropping, and disturbance rights to the upland, and protects the wetlands on these lands, which are used for waterfowl production. The landowner retains rights to graze and hay land. There are approximately 653 acres of USFWS wetland easements along the route. The USFWS retains the rights to burn, level, and fill all wetlands in these lands. The landowner retains all control over the uplands in these easements.

Within the route, there are 13 native plant communities listed by the DNR: 12 mesic prairie communities and one dry hill prairie community, all in Big Stone County. Within 1 mile of Morris Route 1, there are 37 additional natural communities listed by the DNR (Minnesota

Natural Heritage and Nongame Wildlife Program 2005). DNR data describing railroad prairies was also analyzed for the route. Results of the analysis are given in Section 6.1.6 of the Route Permit Application. Appendix M of the Route Permit Application lists plant species found in these native plant communities. An initial survey was conducted in June 2005 to identify remnant prairies and potential threatened and endangered species habitat. The results of this survey are discussed in Section 6.1.6 of the Route Permit Application.

Since Morris Route 1 will occur along an existing transmission line adjacent to roads and agricultural lands that have been previously disturbed, impacts to native vegetation are anticipated to be minimal. Following is a list of State and Federal lands that are crossed by the proposed transmission line and a summary of the potential impacts to each tract of land.

- Prairie and Redhead Marsh WPAs: No structures are anticipated within the boundary of these resources.
- Twin Lakes WPA: Because the transmission line crosses for a distance greater than 1,000 feet, it is likely that structures will be placed within the resource. Using the maximum span of 1,000 feet, it is estimated that six structures will be placed within the WPA. An easement of 17.6 acres is estimated.
- Schultz WPA: No structures are anticipated within the boundary of this resource. An easement of 4.3 acres is estimated.
- USFWS habitat easements: Approximately 7.3 acres of easements will likely be required.
- No easements within Federally-funded WMAs are anticipated.

Natural communities will be spanned wherever feasible along the route. However, the following communities may have permanent impacts because they cannot be spanned.

- A mesic prairie community along Segment M-2
- A mesic prairie community along Segment M-3

Morris Route 2

The USGS GAP land cover types along Morris Route 2 are shown in Table 51.

Table 51
GAP Land Cover – Morris Route 2

Cover Type	Area (acres)	Percent of Route
Agriculture	9,364	95.4
Wetland/Riparian/Open Water	378	3.8
Forest	55	0.6
Shrubland	5	0.0
Prairie	19	0.2
Developed	0.08	0.0

Source: USGS, 2004. Upper Midwest GAP Land Cover Data

Along the route, there are several areas where natural vegetation is being managed. Otrey WMA contains marsh vegetation, such as sedges and cattails, with areas of open water interspersed. Freed WMA contains grassland and wetland vegetation, Thomson WMA contains marsh with open waters vegetation, and Reisdorph WMA contains grassland and wetland vegetation with several open water lakes (DNR, 2005b). There are four USFWS WPAs (Prairie, Redhead Marsh, Dismal Swamp, and Twin Lakes) located along the route, containing wetland and grassland vegetation. The route alignment does not cross the WMAs or WPAs. Within 1 mile of the route alignment, there is one additional WMA (Thielke Lake) and four additional WPAs (Odden, Bentson Lake, Larson Slough, and Tangen).

Along the route, there are approximately 886 acres of USFWS wetland easements.

Along the route, there are eight native plant communities listed by the DNR: six mesic prairie communities along the Segment M-2 alignment and two mesic prairie communities along the Segment M-4 alignment. Within 1 mile of the proposed route alignment, there are 19 additional natural communities listed by the DNR (Minnesota Natural Heritage and Nongame Wildlife Program 2005). Appendix M of the Route Permit Application describes the plant species found within these natural communities.

Since Morris Route 2 will occur along an existing transmission line and adjacent to roads and agricultural lands that have been previously disturbed, impacts to native vegetation are anticipated to be minimal. Following is a list of State and Federal lands that are crossed by the proposed transmission line and a summary of the potential impacts to each tract of land:

- Twin Lakes WPA: Approximately 0.17 acres of easement will likely be acquired.

- Dismal Swamp WPA: Approximately 1.2 acres of easement will likely be acquired.
- Reisdorph WMA (Federally-funded): Approximately 0.2 acres of easement will be required.
- Thomson WMA (Federally-funded): Approximately 0.3 acres of easement will be required.
- No easements within USFWS wetland or habitat easements are anticipated.

Natural communities will be spanned wherever possible along the route. However, the following communities may have permanent impacts because they cannot be spanned.

- A mesic prairie community along Segment M-2
- A mesic prairie community along Segment M-4

Johnson Junction 230/115 kV Substation

The Johnson Substation is in the Northern Glaciated Plains Ecoregion. The present switch station and surrounding area has been converted to agriculture.

The GAP land cover data classifies the existing and proposed substation areas as cropland although grassland polygons are located adjacent to the northwest and southwest of the proposed expansion site (USGS, 2004).

No DNR WMAs, USFWS WPAs, and/or State or Federal holdings are located within 1 mile of the substation expansion area, although there is an unnamed WPA located approximately 1 mile away. No DNR natural communities are located within 1 mile of the expansion area.

Since the substation expansion will occur on an area that has been previously disturbed, impacts to native vegetation are anticipated to be minimal. No State or Federal land will be affected.

Willmar Route 1

The USGS GAP land cover types along the route alignment are shown in Table 52. Appendix I of the Route Permit Application lists the specific GAP categories that are used for the general cover types shown below.

Table 52
GAP Land Cover – Willmar Route 1

Cover Type	Area (acres)	Percent of Route
Agriculture	19,543	97.3
Wetland/Riparian/Open Water	256	1.2
Forest	186	0.9
Shrubland	106	0.5
Prairie	0	0
Developed	0.06	>0.1

Source: USGS 2004. Upper Midwest GAP Land Cover Data

Within the route, there are several areas where natural vegetation is being managed. Claire Rollings WMA contains grassland, cultivated, and wetland vegetation. The grassland vegetation is likely made up of species found in idle pastureland and grassland, such as smooth brome, but could include remnants of native prairie species. The wetland vegetation likely has emergent, marsh plant species, such as sedges and cattails. Persen WPA is located within the route, containing wetland and grassland vegetation (DNR, 2005b). The route alignment does not cross the WMAs or WPAs.

Along the route alignment, there are approximately 2.5 acres of USFWS habitat easements and 292 acres of wetland easements.

Within the route, there are 14 native plant communities listed by the DNR: two dry hill prairie communities, one wet prairie community, and five rock outcrop communities along the Segment W-2 alignment; two dry hill prairie communities, one mesic prairie community, and one wet prairie community along the Segment W-3 alignment; one mesic prairie community along the Segment W-9 alignment; and one mesic prairie community along the Segment W-12A alignment. Within 1 mile of the route alignment, there are 28 additional natural communities listed by the DNR (Minnesota Natural Heritage and Nongame Wildlife Program 2005). Appendix M of the Route Permit Application lists the plants found within these plant communities. DNR data describing railroad prairies was also analyzed for the route. Segment W-9 parallels a railroad prairie for approximately two miles, Segment W-12A parallels a railroad prairie for approximately 0.5 miles, and Segment W-15 crosses a railroad prairie. More details of the analysis are given in Section 7.1.6 of the Route Permit Application. No impacts to the DNR-listed railroad prairies are expected. Railroad prairies, in general, occur on railroad ROW and Mn/DOT ROW between roadways and rail beds, where the land has not been farmed or significantly disturbed. The route alignment will not be placed in railroad ROW, and structures

will be placed just outside of Mn/DOT ROW. Therefore, no impacts to these prairie communities should result.

Much of Willmar Route 1 is proposed adjacent to roads and agricultural lands that have been previously disturbed. Impacts to native vegetation are anticipated to be minimal. Following is a list of State and Federal lands that are crossed by the proposed transmission line and a summary of the potential impacts to each tract of land.

- Claire Rollings WMA (Federally-funded) will require a 3.8-acre easement.
- No easements within USFWS easements or WPAs are anticipated.
- A surveyed, remnant, wet prairie community along the Segment W-2 alignment could be impacted, since it cannot be spanned.

Willmar Route 2

The USGS GAP land cover types along the route alignment are shown in Table 53. Appendix I of the Route Permit Application lists the specific GAP categories that are used for the general cover types shown below.

Table 53
GAP Land Cover – Willmar Route 2

Cover Type	Area (acres)	Percent of Route
Agriculture	20,845	97.2
Wetland/Riparian/Open Water	290	1.4
Forest	171	0.8
Shrubland	83	0.4
Prairie	1	0.0
Developed	46	0.2

Source: USGS 2004. Upper Midwest GAP Land Cover Data

Along the route, there are several areas where natural vegetation is being managed. Danvers and Sena WMAs contain grassland, cultivated, and wetland vegetation. There are two USFWS WPAs (Menzel and Hillman) located along the route, containing wetland and grassland vegetation (DNR, 2005b). The route alignment does not cross the WMAs or WPAs. Within 1 mile of the route alignment, there are three additional WMAs (Claire Rollings, Cuka, and Tjosaas) and seven additional WPAs, including Redhead Marsh, Krogsrud, Person, Akron, Raymond, Rambow, and Priam.

Along the route there are approximately 3.5 acres of USFWS grassland easements. Similar to habitat easements, the USFWS holds tillage, cropping and disturbance rights to the upland, and protects the wetlands on these lands, which are used for waterfowl production. The landowner retains rights to graze and hay land. In addition, there are approximately 848 acres of USFWS wetland easements along the route alignment.

Along the route, there are nine native plant communities listed by the DNR: three mesic prairie communities and four dry hill prairie communities along the Segment W-1A alignment, and one mesic prairie community and one wet prairie community along the Segment W-29 alignment. Within 1 mile of the route alignment, there are 36 additional natural communities listed by the DNR (Minnesota Natural Heritage and Nongame Wildlife Program 2005). Appendix M of the Route Permit Application lists the plant species found in these natural communities. DNR data describing railroad prairies was analyzed for the route. Results of the analysis are shown in Section 7.2.6 of the Route Permit Application; no railroad prairies occur along Willmar Route 2.

Much of Willmar Route 2 is proposed adjacent to roads and agricultural lands that have been previously disturbed. The impacts to native vegetation are anticipated to be minimal. Following is a list of State and Federal lands that would be crossed by the proposed transmission line and a summary of the potential impacts to each tract of land.

- Hillman WPA: Approximately 1.0 acres of easements will be necessary.
- Sena WMA: Approximately 5.9 acres of easements will be necessary.
- No easements within USFWS habitat easements are anticipated.
- A mesic prairie, associated with Sena WMA, will be impacted by the route along the Segment W-29 alignment. The natural community is mapped on both sides of the roadway. The route alignment is proposed to be on the south side of the road where the community is approximately 1,000 feet wide, which will likely result in one structure within the resource.

Granite Falls Routes

Route 1

The GAP land cover types along the Granite Falls Route 1 alignment are shown in Table 54. The GAP land cover data shows that approximately 98 percent of the land along the proposed route alignment is in agricultural uses. Appendix I of the Route Permit Application lists the specific GAP categories within the general cover types shown below.

Table 54
GAP Land Cover – Granite Falls Route 1

Cover Type	Area (acres)	Percent of Route
Agriculture	1,227	97.6
Wetland/Riparian/Open Water	12	1.0
Forest	18	1.4
Shrubland	0	0.0
Prairie	0	0.0
Developed	0	0.0

Source: USGS 2004. Upper Midwest GAP Land Cover Data.

There are no WMAs within the route. There is one DNR-listed native mesic prairie community along Segment G-14. Within 1 mile of the proposed route alignment, there are seven additional natural communities listed by the DNR, which are all dry hill prairie communities (Minnesota Natural Heritage and Nongame Wildlife Program 2005).

Along the route, there are approximately 38 acres of USFWS grassland easements and 57 acres of USFWS wetland easements. DNR data describing railroad prairies were also analyzed for the route. Results of the analysis are presented in Section 8.1.6 of the Route Permit Application.

Much of the route is proposed along roads adjacent to agricultural lands that have been previously disturbed. The impacts to native vegetation are anticipated to be minimal. Following is a list of State and Federal lands that are crossed by the proposed transmission line and a summary of the potential impacts to each tract of land:

- The remnant prairie community along the route will be spanned, as feasible, and no permanent impacts will occur.
- An approximately 0.7-acre easement within USFWS grassland easements will be necessary.

Route 3

The GAP land cover types along Granite Falls Route 3 are shown in Table 55. The GAP land cover data shows that approximately 98 percent of the land along the proposed route alignment is in agricultural uses. Appendix I of the Route Permit Application lists the specific GAP categories within the general cover types shown below.

Table 55
GAP Land Cover – Granite Falls Route 3

Cover Type	Area (acres)	Percent of Route
Agriculture	7,648	97.5
Wetland/Riparian/Open Water	155	2.0
Forest	39	0.5
Shrubland	0	0.0
Prairie	0	0.0
Developed	0	0.0

Source: USGS 2004. Upper Midwest GAP Land Cover Data.

Along the route, there are several areas where natural vegetation is being managed. Walter WMA contains grassland and marsh vegetation. Indigo WMA is predominantly grassland, with some cultivated land interspersed, and Plantation WMA is predominantly grassland with an open water lake (DNR, 2005b). The route alignment does not cross any of the WMAs.

Along the route, there are approximately 171 acres of USFWS wetland easements.

There are no DNR-listed native plant communities within the route. Within 1 mile of the proposed route alignment, there are 11 natural communities listed by the DNR: four mesic prairies, four wet prairies and three dry hill prairie communities (Minnesota Natural Heritage and Nongame Wildlife Program 2005). Appendix M of the Route Permit Application lists the plant species found within these natural communities. DNR data describing railroad prairies was also analyzed for the route. Results are presented in Section 8.1.6 of the Route Permit Application.

Much of Granite Falls Route 3 is proposed along roads adjacent to agricultural lands that have been previously disturbed. The impacts to native vegetation are anticipated to be minimal. Following is a list of State and Federal lands that are crossed by the proposed transmission line and a summary of the potential impacts to each tract of land:

- Plantation WMA: Direct impacts will be avoided by skirting the western edge. A 3.7-acre easement in Plantation WMA will be necessary.
- Walter WMAs by skirting their western edges.
- No easements within USFWS easements are anticipated.

- Every attempt will be made to avoid placing structures in the surveyed remnant prairie community along Segment G-61 by placing the route along the northern edge of the community.

Routes 1 and 3

The GAP land cover types along Granite Falls Routes 1 and 3 are shown in Table 56. The GAP land cover data shows that approximately 98 percent of the land along the proposed route alignment is in agricultural uses. Appendix I of the Route Permit Application lists the specific GAP categories within the general cover types shown below.

Table 56
GAP Land Cover – Granite Falls Routes 1 and 3

Cover Type	Area (acres)	Percent of Route
Agriculture	12,943	97.6
Wetland/Riparian/Open Water	180	1.5
Forest	43	0.3
Shrubland	32	0.3
Prairie	0	0.0
Developed	34	0.3

Source: USGS 2004. Upper Midwest GAP Land Cover Data.

Along the route, there are several areas where natural vegetation is being managed. Lanners and Omro WMAs have wetland and grassland vegetation (DNR, 2005b). The route alignment crosses Lanners WMA for more than 1,000 feet. There are no USFWS easements along the route alignment.

There are six DNR-listed native plant communities within the route: one dry prairie community and four rock outcrop communities along the Segment G-50 alignment, and one dry prairie community along the Segment G-53 alignment. Within 1 mile of the proposed route alignment, there are 34 additional natural communities listed by the DNR (Minnesota Natural Heritage and Nongame Wildlife Program 2005). Appendix M of the Route Permit Application lists the plant species found in these natural communities. DNR data describing railroad prairies was also analyzed for the route. Results of the analysis are presented in Section 8.1.6 of the Route Permit Application.

Since this portion of the route will occur along an existing transmission line adjacent to roads and agricultural lands that have been previously disturbed, impacts to native vegetation are anticipated to be minimal. Following is a list of State and Federal lands that are currently crossed by the existing transmission line and a summary of the potential impacts to each tract of land:

- Omro WMA: Propose to route the transmission line along the northern edge of the resource. Approximately 0.3 acres of easement is required.
- Lanners WMA: Direct impacts may be necessary. Approximately 6.8 acres of easement within Lanners WMA is required.
- No easements within USFWS easements are anticipated.
- One rock outcrop remnant along the Segment G-50 alignment cannot be spanned and it is likely that three structures will be placed in this community.
- No permanent impacts to DNR-listed natural communities are anticipated, since they are of a width that can be spanned.

Route 2

The GAP land cover types along the Granite Falls Route 2 alignment are shown in Table 57. The GAP land cover data shows that approximately 98 percent of the land along the route is in agricultural uses. Appendix I in the Route Permit Application lists the specific GAP categories for each of the general cover types shown below.

Table 57
GAP Land Cover – Granite Falls Route 2

Cover Type	Area (acres)	Percent of Route
Agriculture	1,894	97.9
Wetland/Riparian/Open Water	7	0.4
Forest	33	1.7
Shrubland	0	0.0
Prairie	0	0.0
Developed	0	0.0

Source: USGS 2004. Upper Midwest GAP Land Cover Data

Along the route, there are several areas where natural vegetation is being managed. There are no WMAs within the route. There is one DNR-listed mesic prairie community along Segment G-14 and three DNR-listed dry hill prairie natural communities along Segment G-16. Within 1 mile of

the route alignment, there are nine additional natural communities listed by the DNR: one mixed emergent marsh (prairie subtype) community and eight dry hill prairie communities (Minnesota Natural Heritage and Nongame Wildlife Program 2005). DNR data describing railroad prairies was also analyzed for the route. Results of the analysis are presented in Section 8.2.6 of the Route Permit Application.

Along the route, there are approximately 38 acres of USFWS grassland easements and 57 acres of USFWS wetland easements.

Much of Granite Falls Route 2 is proposed along roads adjacent to agricultural lands that have been previously disturbed. The impacts to native vegetation are anticipated to be minimal. Following is a list of State and Federal lands that are crossed by the proposed transmission line and a summary of the potential impacts to each tract of land.

No impacts or easements in USFWS easements or Federally-funded WMAs are anticipated.

Route 4

The GAP land cover types along the route are shown in Table 58. The GAP land cover data shows that approximately 98 percent of the land along the route is in agricultural uses. Appendix I of the Route Permit Application lists the specific GAP categories for each of the general cover types shown below.

Table 58
GAP Land Cover – Granite Falls Route 4

Cover Type	Area (acres)	Percent of Route
Agriculture	8,470	98.3
Wetland/Riparian/Open Water	85	1.0
Forest	59	0.7
Shrubland	0	0.0
Prairie	0	0.0
Developed	0	0.0

Source: USGS 2004. Upper Midwest GAP Land Cover Data

Along the route, there are several areas where natural vegetation is being managed. Within the route, Walter WMA contains grassland and marsh vegetation. There are two DNR-listed dry hill prairie natural communities along Segment G-58. Within 1 mile of the route alignment, there are 28 natural communities listed by the DNR: 10 mesic prairies, eight wet prairies and 10 dry hill

prairie communities (Minnesota Natural Heritage and Nongame Wildlife Program 2005). The route alignment crosses Walter WMA. DNR data describing railroad prairies was also analyzed for the route. Results of the analysis are presented in Section 8.2.6 of the Route Permit Application.

Along the route, there are approximately 27 acres of USFWS habitat easements and 117 acres of USFWS wetland easements.

Much of the route is proposed along roads adjacent to agricultural lands that have been previously disturbed. The impacts to native vegetation are anticipated to be minimal. Following is a list of State and Federal lands that are crossed by the proposed transmission line and a summary of the potential impacts to each tract of land.

- Walter WMA: Segment G-56 will avoid permanent impacts to the resource by crossing on the west side of the roadway where it can be spanned and then will cross to the eastern side of the roadway to avoid a wider tract of land on the west. Approximately 2.1 acres of easements will be necessary.
- USFWS easements: Approximately 0.4 acres of easements will be necessary.

Every attempt will be made to avoid placing structures in the natural communities along the route. However, the following communities may have permanent impacts because they cannot be spanned:

- A wet prairie community along Segment G-56
- A mesic prairie community along Segment G-58
- A dry prairie community along Segment G-55
- A wet prairie community along G-56

Routes 2 and 4

The GAP land cover types along the route are shown in Table 59. The GAP land cover data shows that approximately 97 percent of the land along the route is in agricultural uses. Appendix I in the Route Permit Application lists the specific GAP categories for each of the general cover types shown below.

Table 59
GAP Land Cover – Granite Falls Routes 2 and 4

Cover Type	Area (acres)	Percent of Route
Agriculture	11,931	97.4
Wetland/Riparian/Open Water	162	1.3
Forest	106	0.9
Shrubland	53	0.4
Prairie	0	0.0
Developed	0	0.0

Source: USGS 2004. Upper Midwest GAP Land Cover Data

Along the route, there are several areas where natural vegetation is being managed. Omro WMA is located along Granite Falls Routes 2 and 4; it has wetland and grassland vegetation. There are four DNR-listed native plant communities within the route: one dry prairie community and two rock outcrop communities along the Segment G-52 alignment and one dry prairie community along the Segment G-53 alignment. Within one mile of the route alignment, there are 19 additional natural communities listed by the DNR (Minnesota Natural Heritage and Nongame Wildlife Program, 2005). The route alignment does not cross Omro WMA. DNR data describing railroad prairies was also analyzed for the route. Results of the analysis are presented in Section 8.2.6 of the Route Permit Application.

Along the route, there are approximately 22 acres of USFWS wetland easements.

Much of the route is proposed along roads adjacent to agricultural lands that have been previously disturbed. The impacts to native vegetation are anticipated to be minimal. Following is a list of State and Federal lands that are crossed by the proposed transmission line and a summary of the potential impacts to each tract of land.

- Omro WMA: Approximately 0.1 acres of easements will likely be necessary.
- No easements within USFWS easements are anticipated.

Every attempt will be made to avoid placing structures in the natural communities along the route. However, the following communities may have permanent impacts because they cannot be spanned:

- A rock outcrop remnant along the Segment G-52. A maximum of five structures are anticipated, which would result in approximately 5,000 square feet of impacts to the rock outcrop.
- No permanent impacts are anticipated to DNR-listed natural communities.

Canby Substation Alternatives

The Canby Substation is in the Northern Glaciated Plains Ecoregion. The present substation alternatives and surrounding area have been converted to agriculture.

The GAP land cover data classifies the existing and proposed substation areas as cropland (USGS, 2004).

No DNR WMAs, natural communities, USFWS WPAs, and/or State or Federal holdings are located within 1 mile of the existing substation area or Alternatives A, B, C, and D. The Reserve WPA is located approximately 1.5 miles to the southeast of the existing substation location and Alternative A.

Since the substation expansion or relocation to Alternative A, B, C, or D will occur on an area that has been previously disturbed, impacts to native vegetation are anticipated to be minimal. No State or Federal land will be affected by any of the proposed alternatives.

15.5.3 MITIGATION

The DNR and USFWS will continue to be consulted to minimize and avoid impacts to sensitive flora along the route alignment. The approved route will be surveyed for threatened and endangered species and will span any areas found to contain rare species. When native vegetation communities cannot feasibly be spanned, the number of structures will be minimized within these lands. The number of structures and impacts will be minimized by maximizing the span length or replacing existing structures, structure for structure, where applicable. Areas disturbed due to construction activities will be restored to pre-construction contours and will be reseeded as promptly as possible with a seed mix recommended by the local DNR management that is free of noxious weeds. Topsoil taken from sites contaminated with noxious weeds will not be used for grading or other construction processes in uncontaminated sites.

Impacts to WPAs and any Federally-funded WMAs require coordination with the USFWS. A compatibility analysis will need to be performed to show that construction of the transmission line would not interfere with the purpose of the resources (in these cases, providing habitat for wildlife and waterfowl). Coordination will occur with the DNR regarding any impacts or

easements to State lands (WMAs). The DNR and USFWS will continue to be consulted in order to avoid impacts, and if impacts are unavoidable they will be minimized and mitigated in coordination with the DNR and USFWS.

15.6 RARE AND UNIQUE NATURAL RESOURCES

15.6.1 AFFECTED ENVIRONMENTS

As described in Sections 14.7 of this document, the majority of the land in the project area is used for agriculture. The Minnesota DNR Natural Heritage Database was consulted to identify rare and unique natural resources (both species and communities) within 1 mile of the proposed routes. Additionally, field surveys were conducted in 2005 to map remnant prairie communities along the routes. Due to the size of the project and not knowing what route would be chosen, a survey approach was developed and approved by the DNR to identify potential habitats containing threatened and endangered species. The survey identified prairie and rock outcrop communities as the two habitats most likely containing threatened and endangered species near the project area. An initial survey, conducted in June 2005 and October 2005, identified prairies and rock outcrops along the proposed routes.

The DNR Minnesota County Biological Survey (MCBS) data was consulted to determine if there were areas with medium, high, or outstanding biodiversity significance along the proposed route. Areas with medium biodiversity significance are those containing significant occurrences of rare species and/or moderately-disturbed native plant communities and landscape that have a strong potential for recovery. Areas with high biodiversity significance contain sites with very good quality occurrences of the rarest plant communities and/or important functional landscapes. Areas with outstanding biodiversity significance contain the best occurrence of the rarest species; the most outstanding example of the rarest native plant communities and/or the largest, most intact functional landscapes present in Minnesota.

The USFWS was consulted to determine where private prairie bank easements occur, as well as parcels in western Yellow Medicine County that the USFWS would be interested in obtaining easements to include in the Northern Tallgrass Prairie National Wildlife Refuge.

15.6.2 IMPACTS

Many of the rare and unique resources identified along the routes are associated with remnants of prairie land, which were once abundant in this area of Minnesota. Any habitats where native prairie fragments or other unique plant communities have been recorded or could occur will be

spanned, as practical. A survey for special status species will be conducted once a route alignment is approved.

Additionally, several of the listed species are associated with rivers, wetlands, and stream banks and could be impacted by placement of structures in these habitats, or by increased erosion and sedimentation that could occur if BMPs are not employed. However, BMPs will be used; all rivers and streams will be spanned and structures will not be placed in wetland habitats whenever feasible. If impacts to wetlands are unavoidable in areas where rare wetland species occur, a special status species survey would occur in those areas before construction.

Morris Route 1

Table 60 shows the DNR-listed rare and unique resources within 1 mile of Morris Route 1.

A search of the Minnesota DNR Natural Heritage Database identified one instance of a Federal candidate State threatened species [Dakota skipper (*Hesperia dacotae*)], six instances of a State endangered species [Ball cactus (*Escobaria vivipara*)], and 11 species of special concern within 1 mile of the proposed route alignment. Most of the instances identified by the Minnesota DNR Natural Heritage Database occur within the DNR's WMAs along the route alignment. Fifty DNR-listed natural communities are within 1 mile of the proposed route alignment. In addition to the species shown on Table 60, there are several species within 1 mile of the route that are listed on the Minnesota DNR Natural Heritage Database as having "Non" status. These species have no legal status, but data is being gathered for possible future listing. These species are listed in Section 6.1.6 of the Route Permit Application.

Within Morris Route 1 there are 10 areas with moderate biodiversity significance, one area with high biodiversity significance, and four areas with outstanding biodiversity significance. There are no DNR-listed railroad prairies in the vicinity of Morris Route 1.

There are two DNR-listed natural communities (mesic prairie subtypes) wider than 1,000 feet along the proposed route alignment: one along the Segment M-2 alignment and one along the Segment M-3 alignment. These sites correspond to areas listed as having moderate biodiversity significance. The number of structures placed in these areas will be minimized by maximizing the span length or replacing structure for structure. However, because the Dakota skipper is a prairie species, it is possible that habitat could be affected by placing structures in these mesic prairie communities. Many of the special concern species are also associated with prairies and could therefore be affected.

The 2005 survey identified five remnant prairie communities crossed by the Morris Route 1 alignment: one mesic prairie community and one dry prairie community along the Segment M-2 alignment and three mesic prairie communities along the Segment M-3 alignment (GES, 2005). Four of the surveyed remnant prairie communities (the two communities along the Segment M-2 alignment and two of the communities along the Segment M-3 alignment) will likely be impacted by the route because they are wider than 1,000 feet.

There is one USFWS prairie bank easement in the vicinity of Morris Route 1 along the Segment M-2 alignment. The parcel will be avoided.

A summary of potential impacts to Federal and State threatened and endangered species follows.

Ball Cactus

The ball cactus, a State endangered species, occurs in rock outcrops. Along Morris Route 1, all rock outcrops should be spannable, and no impacts to the ball cactus will result.

Dakota Skipper

The Dakota skipper is a prairie obligate species requiring undisturbed native prairie, particularly those areas with abundant mid-height grasses and purple coneflower (*Echinacea angustifolia*). The species has one adult generation per year and adults are active for only 3 to 5 weeks from late June to mid-July. As stated above, prairie habitats will be spanned, as practical. It is possible that habitat could be affected by placing structures in mesic prairie communities if spanning is not feasible. A survey for the Dakota skipper will be conducted during its flight period in potential skipper habitat crossed by the route once an alignment is approved.

Table 60
Rare and Unique Resources – Morris Route 1

Common Name	Number of Occurrences	Scientific Name	Federal Status	MN Status*	State Rank**	Habitat
Dakota Skipper	1	*Hesperia dacotae*	Candidate	THR	S2	Wet prairie and dry prairie dominated by bluestem grasses
Ball Cactus	6	*Escobaria vivipara*	Not Listed	END	S1	Rock outcrops
Red Tailed Prairie Leafhopper	1	*Aflexia rubranura*	Not Listed	SPC	S3	Dry to wet mesic prairie; host plant prairie dropseed
Slender Milk-vetch	1	*Astragalus flexuosus*	Not Listed	SPC	S3	Mesic and dry mesic prarie
Arogos Skipper	1	*Atrytone arogos*	Not Listed	SPC	S3	Undisturbed grasslands, prairies, sand prairies; caterpillar host is big bluestem
Larger Water-starwort	1	*Callitriche heterophylla*	Not Listed	SPC	S3	Shallow water or mud of springs and stream pools
Prairie Mimosa	1	*Desmanthus illinoensis*	Not Listed	SPC	S3	Margins of shallow prairie lakes
Mudwort	2	*Limosella aquatica*	Not Listed	SPC	S3	Stream banks, shallow margins of prairie ponds, and rock pools
Powesheik Skipper	2	*Oarisma powesheik*	Not Listed	SPC	S3	Wet mesic prairie with native grasses, sedges and a significant number of plants in the sunflower family
Tumblegrass	1	*Schedonnardus paniculatus*	Not Listed	SPC	S3	Tallgrass prairies
Regal Fritillary	1	*Speyeria idalia*	Not Listed	SPC	S3	Large grassland areas or lightly grazed pasture lands with prairie remnants. Larval plants are violets.
Colonial Waterbird Nesting Site	2	*Colonial Waterbird Nesting Area*	Not Listed	None	NR	

Common Name	Number of Occurrences	Scientific Name	Federal Status	MN Status*	State Rank**	Habitat
Dry Prairie (Southwest) Hill Subtype	7		Not Listed	None	S2	
Mesic Prairie (Southwest) Subtype	36		Not Listed	None	S2	
Rock Outcrop (Southwest) Subtype	7		Not Listed	None	SNR	

** END – Endangered; THR – Threatened; SPC – Special Concern; None – Terrestrial communities do not have assigned status, but are considered important ecologically.*

*** State rank is assigned to species and terrestrial communities to reflect the extent and condition of that element. Ranks range from 1 – in greatest need of conservation, to 5 – secure under present conditions. NR – not ranked; X – extirpated, species believed to be extirpated from the State; H – historical, species occurred historically in State but has not been verified in the last 20 years.*

Source: Minnesota Natural Heritage and Nongame Wildlife Program. 2005. Threatened Natural Communities and Rare Species List.

Morris Route 2

Table 61 shows the DNR-listed rare and unique resources within 1 mile of Morris Route 2. A search of the Minnesota DNR Natural Heritage Database identified one instance of a State endangered species (ball cactus) and four species of special concern within 1 mile of the route alignment. Most of the instances identified by the Minnesota DNR Natural Heritage Database occur within the DNR's WMAs along the route alignment. Within 1 mile of the proposed route alignment there are 33 DNR-listed natural communities. In addition to the species shown on Table 61, there are several species within 1 mile of the route that are listed on the Minnesota DNR Natural Heritage Database as having "Non" status. These species are listed in Section 6.2.6 of the Route Permit Application.

The 2005 survey identified three remnant prairie communities: one mesic prairie community and one dry prairie community along the Segment M-2 alignment, and one mesic prairie community along the Segment M-4 alignment (GES, 2005).

Within the route, there are seven areas with moderate biodiversity significance, one area with high biodiversity significance, and one area with outstanding biodiversity significance.

There is one DNR-listed natural community (mesic prairie subtype) wider than 1,000 feet along the Segment M-2 alignment. This site corresponds to an area listed as having moderate biodiversity significance. Another area mapped as having moderate biodiversity significance along the Segment M-4 alignment is wider than 1,000 feet. It is likely that structures will be placed in this area. The number of structures placed in these areas will be minimized by maximizing the span length or replacing structure for structure. However, several of the special concern species are prairie species. It is possible that habitat could be affected by placing structures in these mesic prairie communities.

There is one USFWS prairie bank easement in the vicinity of Morris Route 2 along the Segment M-2 alignment. The parcel will be avoided.

Ball cactus

Along Morris Route 2, all rock outcrops should be spannable, thereby avoiding impacts to the ball cactus.

Table 61
Rare and Unique Resources – Morris Route 2

Common Name	Number of Occurrences	Scientific Name	Federal Status	MN Status*	State Rank**	Habitat
Ball Cactus	1	*Escobaria vivipara*	Not Listed	END	S1	Rock outcrops
Larger Water-starwort	2	*Callitriche heterophylla*	Not Listed	SPC	S3	Shallow water or mud of springs and stream pools
Prairie Mimosa	1	*Desmanthus illinoensis*	Not Listed	SPC	S3	Margins of shallow prairielakes
Mudwort	2	*Limosella aquatica*	Not Listed	SPC	S3	Stream banks, shallow margins of prairie ponds, and rock pools
Tumblegrass	1	*Schedonnardus paniculatus*	Not Listed	SPC	S3	Tallgrass prairies
Colonial Waterbird Nesting Site	1	*Colonial Waterbird Nesting Area*	Not Listed	None	NR	
Dry Prairie (Southwest) Hill Subtype	1	Dry Prairie (Southwest) Hill Subtype	Not Listed	None	S2	
Mesic Prairie (Southwest) Subtype	25	Mesic Prairie (Southwest) Subtype	Not Listed	None	S2	
Rock Outcrop (Southwest) Subtype	7	Rock Outcrop (Southwest) Subtype	Not Listed	None	NR	

** END – Endangered; THR – Threatened; SPC – Special Concern; None – Terrestrial communities do not have assigned status, but are considered important ecologically.*

*** State rank is assigned to species and terrestrial communities to reflect the extent and condition of that element. Ranks range from 1 – in greatest need of conservation, to 5 – secure under present conditions. NR – not ranked; X – extirpated, species believed to be extirpated from the State; H – historical, species occurred historically in State but has not been verified in the last 20 years.*

Source: Minnesota Natural Heritage and Nongame Wildlife Program. 2005.

Willmar Route 1

Table 62 shows the DNR-listed rare and unique resources within 1 mile of Willmar Route 1. A search of the Minnesota DNR Natural Heritage Database identified two State endangered species (the lichen (*Buellia nigra)* and ball cactus), three State threatened species (mucket mussel, loggerhead shrike (*Lanius ludovicianus*), and hair-like beak-rush) and eight species of special concern within 1 mile of the route alignment. Most of the occurrences identified by the Minnesota DNR Natural Heritage Database are within the DNR's WMAs along the route alignment. Within one mile of the route alignment there are 42 DNR-listed natural communities. In addition to the species shown on Table 62, there are several species within 1 mile of the route that are listed on the Minnesota DNR Natural Heritage Database as having "Non" status. These species are listed in Section 7.1.6 of the Route Permit Application.

The 2005 survey showed that the route alignment crosses four remnant prairie communities: one wet prairie community and rock outcrop community along the Segment W-2 alignment and two dry prairie communities along the Segment W-3 alignment (GES, 2005). There are three DNR-listed railroad prairies along the route: a medium quality wet mesic prairie along Segment W-9, a good quality wet mesic along Segment W-12, and a medium quality wet mesic prairie at the eastern edge of Segment W-15. It is possible that the surveyed remnant wet prairie community along the Segment W-2 alignment could be impacted, since the route alignment crosses it for a distance greater than 1,000 feet.

Within the route, there are six MCBS areas with moderate biodiversity significance and seven areas with high biodiversity significance. There are no USFWS prairie bank easements along the route. One area of high biodiversity significance along the Segment W-2 alignment is wider than 1,000 feet; it is therefore likely that a structure would be placed in this resource.

Two railroad prairie remnants occur within the route. No impacts to the DNR-listed railroad prairies are expected. The route alignment will not be placed in railroad ROW, and structures will be placed just outside of Mn/DOT ROW. Therefore, no impacts to these prairie communities should result.

A summary of potential impacts to Federal and State threatened and endangered species follows.

Ball cactus

Along Willmar Route 1, all rock outcrops should be spannable, thereby avoiding impacts to the ball cactus.

Lichen (Buellia nigra)

The lichen, a State endangered species, occurs in rock outcrops. The rock outcrops along the route alignment should be spannable, and no impacts are expected.

Loggerhead shrike

Dry uplands and shelterbelts and hedgerows are important habitat for loggerhead shrikes, a State threatened species. Shelterbelts and hedgerows will be conserved as possible, and dry prairie communities will be spanned where practical. However, it is possible that shelterbelts or hedgerows may be cleared to ensure the safe and reliable operation of the transmission line according to National Electric Reliability Council (NERC) standards.

Hair-like beak-rush

The hair-like beak-rush, a State threatened species, occurs in calcareous fens. This species could be impacted by placement of structures in these habitats or by increased erosion and sedimentation that could occur if BMPs are not employed. As stated above, wetlands will be spanned wherever feasible. If impacts to wetlands are unavoidable in areas where this species occurs, a survey would occur in those areas before construction.

Table 62
Rare and Unique Resources – Willmar Route 1

Common Name	Number of Occurrences	Scientific Name	Federal Status	MN Status*	State Rank**	Habitat
A Species of Lichen	2	*Buellia nigra*	Not Listed	END	S1	Exposed rocks near hardwood forests
Ball Cactus	12	*Escobaria vivipara*	Not Listed	END	S1	Rock outcrops
Mucket Mussel	1	*Actinonaias ligamentina*	Not Listed	THR	S2	Medium to large rivers in sand and gravel
Loggerhead Shrike	1	*Lanius ludovicianus*	Not Listed	THR	S2	Open country and dry upland prairie where hedgerows, shrubs and small trees occur
Hair-like Beak-rush	1	*Rhynchospora capillacea*	Not Listed	THR	S2	Calcareous fens and bogs
Slender Milk-vetch	2	*Astragalus flexuosus*	Not Listed	SPC	S3	Mesic and dry mesic prairies
Larger Water-starwort	2	*Callitriche heterophylla*	Not Listed	SPC	S3	Shallow water or mud of springs and stream pools
Small White Lady's-slipper	5	*Cypripedium candidum*	Not Listed	SPC	S3	Wet to wet-mesic prairies and calcareous fens
Few-flowered Spike-rush	1	*Eleocharis quinqueflora*	Not Listed	SPC	S3	Calcareous fens
Creek Heelsplitter	1	*Lasmigona compressa*	Not Listed	SPC	S3	Small to medium river in sand and fine gravel
Mudwort	4	*Limosella aquatica*	Not Listed	SPC	S3	Steram banks, shallow margins of prairie ponds, and rock pools
Powesheik Skipper	1	*Oarisma powesheik*	Not Listed	SPC	S3	Wet mesic prairie with native grasses, sedges, and a significant number of plants in the sunflower family
Regal Fritillary	2	*Speyeria idalia*	Not Listed	SPC	S3	Large grassland areas or lightly grazed pasture lands with prairie remnants. Larval plants are violets.

Common Name	Number of Occurrences	Scientific Name	Federal Status	MN Status*	State Rank**	Habitat
Colonial Waterbird Nesting Site	1	Colonial Waterbird Nesting Area	Not Listed	None	NR	
Mussel Sampling Site	2	Freshwater Mussel Concentration Area	Not Listed	None	NR	
Dry Prairie, Southwest Hill Subtype	12		None	None	S2	
Mesic Prairie	19		None	None	S2	
Wet Prairie	4		None	None	S2	
Rock Outcrop	7		None	None	NR	

** END – Endangered; THR – Threatened; SPC – Special Concern; None – Terrestrial communities do not have assigned status, but are considered important ecologically.*

*** State rank is assigned to species and terrestrial communities to reflect the extent and condition of that element. Ranks range from 1 – in greatest need of conservation, to 5 – secure under present conditions. NR – not ranked; X – extirpated, species believed to be extirpated from the State; H – historical, species occurred historically in State but has not been verified in the last 20 years.*

Source: Minnesota Natural Heritage and Nongame Wildlife Program. 2005. Threatened Natural Communities and Rare Species List.

Willmar Route 2

Table 63 shows the DNR-listed rare and unique resources within 1 mile of Willmar Route 2. A search of the Minnesota DNR Natural Heritage Database identified one State threatened species (ball cactus), two State threatened species (mucket mussel and hair-like beak-rush) and 10 species of special concern within 1 mile of the proposed route alignment. Within 1 mile of the proposed route alignment there are 45 DNR-listed natural communities. In addition to the species shown on Table 63, there are several species within 1 mile of the route that are listed on the Minnesota DNR Natural Heritage Database as having "Non" status. These species are listed in Section 7.2.6 of the Route Permit Application.

Initial surveys conducted in June and October 2005 identified four remnant dry prairie communities along the Segment W-1A alignment (GES 2005).

Within the route, there are three areas with moderate biodiversity significance and four areas with high biodiversity significance. There are no DNR railroad prairie communities along Willmar Route 2. There are no USFWS prairie bank easements along the route.

It is possible that one of the DNR-listed natural communities (a mesic prairie associated with Sena WMA) will be impacted by the route along the Segment W-29 alignment. The natural community is mapped on both sides of the roadway; the route alignment is proposed to be on the south side of the road where the community is approximately 1,000 feet wide, and will avoid the north side of the roadway where Sena WMA is located and the natural community is approximately 3,600 feet wide.

A summary of potential impacts to Federal and State threatened and endangered species follows.

Ball cactus

Along Willmar Route 2, all rock outcrops should be spannable, thereby avoiding impacts to the ball cactus.

Hair-like beak-rush

The hair-like beak-rush, a State threatened species, occurs in calcareous fens. This species could be impacted by placement of structures in these habitats or by increased erosion and sedimentation that could occur if BMPs are not employed. As stated above, wetlands will be spanned wherever feasible. If impacts to wetlands are unavoidable in areas where this species occurs, a survey would occur in those areas before construction.

Granite Falls Route 1

Table 64 shows the DNR-listed rare and unique resources within 1 mile of Granite Falls Route 1. A search of the Minnesota DNR Natural Heritage Database identified one instance of a Federal threatened State special concern species (bald eagle), one State endangered species (the lichen *Buellia nigra*), four instances of State threatened species (mucket mussel, elktoe mussel, salamander mussel and Sullivant's milkweed), and seven species of special concern within 1 mile of the proposed route alignment. Many of the instances identified by the Minnesota DNR Natural Heritage Database occur within the DNR's WMAs along the route alignment and near the Minnesota River. Within 1 mile of the proposed route alignment there are 48 DNR-listed natural communities. No impacts to the natural communities are expected to result. In addition to the species shown on Table 64, there are several species within 1 mile of the route that are listed on the Minnesota DNR Natural Heritage Database as having "Non" status. These species are listed in Section 8.1.6 of the Route Permit Application.

There are no areas listed by the DNR MCBS as having medium, high, or outstanding biodiversity significance along the proposed route. There are no DNR-listed railroad prairies along the route. There are no USFWS prairie bank easements along the route.

An initial survey, conducted in June 2005, showed that the route alignment crosses seven remnant prairie communities: one dry prairie community along the Segment G-15A alignment; two mesic prairie communities, one rock outcrop community, and one dry prairie community along the Segment G-50 alignment; and one dry prairie community and one rock outcrop community along the Segment G-53 alignment (GES 2005).

A summary of potential impacts to Federal and State threatened and endangered species follows.

Bald eagle

Bald eagles are most adversely affected by human activities during the breeding and nesting seasons. The DNR has developed seasonal timeframes delineating eagles' critical development periods. February 10th to May 1st is the most critical segment when eagles are involved with courtship, egg-laying, and incubation. Construction noise and activity during critical development periods of bald eagles may cause nest abandonment, premature fledging of young birds, increased stress at a winter roost site, and loss of habitat for nesting and roosting. The documented nest is located approximately 0.24 miles from the route alignment.

Ball cactus

Due to the difficulty of constructing in rock outcrops and the sensitive nature of the plant communities within these areas, construction options are being considered in the rock outcrops

areas near Granite Falls. If impacts to rock outcrops are unavoidable, a survey for the ball cactus will be conducted prior to construction.

Sullivant's milkweed

Sullivant's milkweed is associated with prairies and could be impacted by placement of structures in these habitats. As stated above, prairie habitats will be spanned, as practical. It is possible that habitat could be affected by placing structures in mesic prairie communities if spanning is not feasible. A survey for the milkweed will be conducted in potential habitat impacted by the route once an alignment is approved.

Table 63
Rare and Unique Resources – Willmar Route 2

Common Name	Number of Occurrences	Scientific Name	Federal Status	MN Status*	State Rank**	Habitat
Ball Cactus	6	*Escobaria vivipara*	Not Listed	END	S1	Rock outcrops
Mucket mussel	2	*Actinonaias ligamentina*	Not Listed	THR	S2	Medium to large rivers in sand and gravel
Hair-like Beak-rush	1	*Rhynchospora capillacea*	Not Listed	THR	S2	Calcareous fens and bogs
Larger Water-starwort	2	*Callitriche heterophylla*	Not Listed	SPC	S3	Shallow water or mud of springs and stream pools
Small White Lady's-slipper	3	*Cypripedium candidum*	Not Listed	SPC	S3	Wet to wet-mesic prairies and calcareous fens
Few-flowered Spike-rush	1	*Eleocharis quinqueflora*	Not Listed	SPC	S3	Calcareous fens
Spike mussel	1	*Elliptio dilatata*	Not Listed	SPC	S3	Small to large streams, occasionally lakes, in mud or gravel
Creek Heelsplitter	1	*Lasmigona compressa*	Not Listed	SPC	S3	Small to medium rivers in sand and fine gravel
Black Sandshell	1	*Ligumia recta*	Not Listed	SPC	S3	Medium to large rivers in riffles or raceways in mud and sand
Mudwort	2	*Limosella aquatica*	Not Listed	SPC	S3	Stream banks, shallowmargins or prairie ponds, and rock pools
Powesheik Skipper	1	*Oarisma powesheik*	Not Listed	SPC	S3	Wet mesic prairie with native grasses, sedges and a significant number of plants in the sunflower family
Tumblegrass	1	*Schedonnardus paniculatus*	Not Listed	SPC	S3	Tallgrass prairies
Regal Fritillary	2	*Speyeria idalia*	Not Listed	SPC	S3	Large grassland areas or lightly grazed pasture lands with prairie remnants. Larval plants and violets.
Dry Prairie (Southwest) Hill Subtype	13		Not Listed	None	S2	

Common Name	Number of Occurrences	Scientific Name	Federal Status	MN Status*	State Rank**	Habitat
Mesic Prairie (Southwest) Subtype	20		Not Listed	None	S2	
Wet Prairie	3		Not Listed	None	S2	
Rock Outcrop (Southwest) Subtype	9		Not Listed	None	NR	

** END – Endangered; THR – Threatened; SPC – Special Concern; None – Terrestrial communities do not have assigned status, but are considered important ecologically.*

*** State rank is assigned to species and terrestrial communities to reflect the extent and condition of that element. Ranks range from 1 – in greatest need of conservation, to 5 – secure under present conditions. NR – not ranked; X – extirpated, species believed to be extirpated from the State; H – historical, species occurred historically in State but has not been verified in the last 20 years.*

Source: Minnesota Natural Heritage and Nongame Wildlife Program 2005. Threatened Natural Communities and Rare Species List

Table 64
Rare and Unique Resources – Granite Falls Route 1

Common Name	Number of Occurrences	Scientific Name	Federal Status	MN Status*	State Rank**	Habitat
Bald Eagle	1	*Haliaeetus leucocephalus*	THR	SPC	S3	Forested areas near lakes and rivers
A Species of Lichen	1	*Buellia nigra*	Not Listed	END	S1	Exposed rocks near hardwood forests
Elktoe mussel	2	*Alasmidonta marginata*	Not Listed	THR	S2	Medium to large rivers in sand and gravel
Mucket mussel	1	*Actinonaias ligamentina*	Not Listed	THR	S2	Medium to large rivers in sand and gravel
Salamander Mussel	1	*Simpsonaias ambigua*	Not Listed	THR	S2	Medium to large rivers in mud and gravel, or under flat slabs of rock
Sullivant's Milkweed	1	*Asclepias sullivantii*	Not Listed	THR	S2	Mesic, tallgrass prairie
Black Sandshell	2	*Ligumia recta*	Not Listed	SPC	S3	Medium to large rivers in riffles or raceways in mud and sand
Five-lined Skink	2	*Eumeces fasciatus*	Not Listed	SPC	S3	Granite rock outcrops
Fluted-shell	2	*Lasmigona costata*	Not Listed	SPC	S3	Medium to large rivers in sand and gravel
Missouri Milk-vetch	2	*Astragalus missouriensis*	Not Listed	SPC	S3	Dry, gravelly prairie slopes, often in open soil
Plains Prickly Pear	1	*Opuntia macrorhiza*	Not Listed	SPC	S3	Rocky/sandy soil in grasslands
Spike mussel	2	*Elliptio dilatata*	Not Listed	SPC	S3	Small to large streams, occasionally lakes, in mud or gravel
White Prairie-clover	1	*Dalea candida var. oligophylla*	Not Listed	SPC	S3	Mesic prairie
Mussel Sampling Site	2	*Freshwater Mussel Concentration Area*	Not Listed	None	NR	
Dry Prairie (Southwest) Hill Subtype	16		Not Listed	None	S2	
Mesic Prairie (Southwest) Subtype	5		Not Listed	None	S2	

mmon Name	Number of Occurrences	Scientific Name	Federal Status	MN Status*	State Rank**	Habitat
Rock Outcrop-Dry Prairie Complex	3		Not Listed	None	S2	
Rock Outcrop (Southwest) Subtype	24		Not Listed	None	NR	

** END – Endangered; THR – Threatened; SPC – Special Concern; None – Terrestrial communities do not have assigned status, but are considered important ecologically.*

*** State rank is assigned to species and terrestrial communities to reflect the extent and condition of that element. Ranks range from 1 – in greatest need of conservation, to 5 – secure under present conditions. NR – not ranked; X – extirpated, species believed to be extirpated from the State; H – historical, species occurred historically in State but has not been verified in the last 20 years.*

Source: Minnesota Natural Heritage and Nongame Wildlife Program 2005. Threatened Natural Communities and Rare Species List.

Granite Falls Route 2

Table 65 shows the DNR-listed rare and unique resources within 1 mile of Granite Falls Route 2. A search of the Minnesota DNR Natural Heritage Database identified one instance of a Federal threatened State special concern species (bald eagle), three State threatened species (mucket mussel, elktoe mussel and salamander mussel), and six species of special concern within 1 mile of the route alignment. Most of the instances identified by the Minnesota DNR Natural Heritage Database occur within the DNR's WMAs along the route alignment and along the Minnesota River. Within 1 mile of the route alignment there are 36 DNR-listed natural communities. No impacts to the natural communities are expected to result.

In addition to the species shown on Table 65, there are several species within 1 mile of the route that are listed on the Minnesota DNR Natural Heritage Database as having "Non" status. These species are listed in Section 8.2.6 of the Route Permit Application.

There are no areas listed by the DNR MCBS as having medium, high, or outstanding biodiversity significance along the route. There are no DNR-listed railroad prairies along the route. There are no USFWS prairie bank easements along the route. There are three parcels (one along the Segment G-15A alignment and two along the Segment G-21 alignment) for which the USFWS has expressed interest in acquiring easements to include in the Northern Tallgrass Prairie National Wildlife Refuge. These parcels will be avoided.

An initial survey conducted in June 2005 showed that the route alignment crosses six remnant prairie communities: two dry prairie communities along the Segment G-16 alignment; one rock outcrop community and one dry prairie community along the Segment G-52 alignment; and one dry prairie community and one rock outcrop community along the Segment G-53 alignment (GES 2005).

Bald eagle

Construction noise and activity during critical development periods of bald eagles may cause nest abandonment, premature fledging of young birds, increased stress at a winter roost site, and loss of habitat for nesting and roosting. Areas with known active nests will be avoided, as practical, during critical periods. Construction will be restricted within 1.25 miles of an active nest during critical development periods. The identified nest is approximately 0.24 miles from the route alignment. If an active nest is located along the route, the DNR and USFWS will be consulted to determine appropriate minimization and mitigation procedures.

Table 65
Rare and Unique Resources – Granite Falls Route 2

Common Name	Number of Occurrences	Scientific Name	Federal Status	MN Status*	State Rank**	Habitat
Bald Eagle	1	*Haliaeetus leucocephalus*	THR	SPC	S3	Forested areas near lakes and rivers
Elktoe mussel	1	*Alasmidonta marginata*	Not Listed	THR	S2	Medium to large rivers in sand and gravel
Mucket mussel	1	*Actinonaias ligamentina*	Not Listed	THR	S2	Medium to large rivers in sand and gravel
Salamander Mussel	1	*Simpsonaias ambigua*	Not Listed	THR	S2	Medium to large rivers in mud and gravel, or under flat slabs of rock
Black Sandshell	1	*Ligumia recta*	Not Listed	SPC	S3	Medium to large rivers in riffles or raceways in mud and sand
Fluted-shell	1	*Lasmigona costata*	Not Listed	SPC	S3	Medium to large rivers in sand and gravel
Missouri Milk-vetch	1	*Astragalus missouriensis*	Not Listed	SPC	S3	Dry, gravelly prairie slopes, often in open soil
Pawnee Skipper	1	*Hesperia leonardus pawnee*	Not Listed	SPC	S3	Sandy prairie
Spike mussel	1	*Elliptio dilatata*	Not Listed	SPC	S3	Small to large streams, occassionally lakes, in mud or gravel
White Prairie-clover	1	*Dalea candida var. oligophylla*	Not Listed	SPC	S3	Mesic prairie
Mussel Sampling Site	1	*Freshwater Mussel Concentration Area*	Not Listed	None	NR	
Dry Prairie (Southwest) Hill Subtype	20		Not Listed	None	S2	
Mesic Prairie (Southwest) Subtype	2		Not Listed	None	S2	

Common Name	Number of Occurrences	Scientific Name	Federal Status	MN Status*	State Rank**	Habitat
Mixed Emergen Marsh (Prairie) Subtype	1		Not Listed	None	NR	
Rock Outcrop (Southwest) Subtype	13		Not Listed	None	NR	

** END – Endangered; THR – Threatened; SPC – Special Concern; None – Terrestrial communities do not have assigned status, but are considered important ecologically.*

*** State rank is assigned to species and terrestrial communities to reflect the extent and condition of that element. Ranks range from 1 – in greatest need of conservation, to 5 – secure under present conditions. NR – not ranked; X – extirpated, species believed to be extirpated from the State; H – historical, species occurred historically in State but has not been verified in the last 20 years.*

Source: Minnesota Natural Heritage and Nongame Wildlife Program 2005. Threatened Natural Communities and Rare Species List

Granite Falls Route 3

Table 66 shows the DNR-listed rare and unique resources within 1 mile of Granite Falls Route 3. A search of the Minnesota DNR Natural Heritage Database identified one instance of a Federal threatened State special concern species (bald eagle), one State endangered species (the lichen *Buellia nigra*), six State threatened species (mucket mussel, elktoe mussel, loggerhead shrike, salamander mussel, Sullivant's milkweed and yellow prairie violet) and 10 species of special concern within 1 mile of the proposed route alignment. Many of the instances identified by the Minnesota DNR Natural Heritage Database occur within the DNR's WMAs along the route alignment and near the Minnesota River. Within 1 mile of the proposed route alignment there are 51 DNR-listed natural communities. No impacts to the natural communities are expected to result. In addition to the species shown on Table 66, there are several species within a mile of the route that are listed on the Minnesota DNR Natural Heritage Database as having "Non" status. These species are listed in Section 8.1.6 of the Route Permit Application.

There are no areas listed by the DNR MCBS as having medium, high, or outstanding biodiversity significance along the proposed route. There are no DNR-listed railroad prairies along the route. There are no USFWS prairie bank easements along the route. There are two parcels along the Segment G-21 alignment for which the USFWS has expressed interest in acquiring easements to include in the Northern Tallgrass Prairie National Wildlife Refuge. These parcels will be avoided.

An initial survey conducted in June 2005 showed that the route alignment crosses seven remnant prairie communities: two mesic prairie communities, one rock outcrop community, and one dry prairie community along the Segment G-50 alignment; one dry prairie community and one rock outcrop community along the Segment G-53 alignment; and one dry prairie community along the Segment G-61 alignment (GES 2005).

A summary of potential impacts to Federal and State threatened and endangered species follows.

Bald eagle

Construction noise and activity during critical development periods of bald eagles may cause nest abandonment, premature fledging of young birds, increased stress at a winter roost site, and loss of habitat for nesting and roosting. The documented nest is located approximately 0.24 miles from the route alignment.

Lichen (Buellia nigra)

If construction within outcrops cannot be avoided, surveys will be conducted and the appropriate agencies will be consulted to ensure impacts to listed species are avoided or minimized.

Loggerhead shrike

Dry uplands and shelterbelts and hedgerows are important habitat for loggerhead shrikes, a State threatened species. Shelterbelts and hedgerows will be conserved as possible, and dry prairie communities will be spanned where practical. However, it is possible that shelterbelts or hedgerows may be cleared to ensure the safe and reliable operation of the transmission line according to NERC standards.

Sullivant's milkweed

Sullivant's milkweed is associated with prairies and could be impacted by placement of structures in these habitats. As stated above, prairie habitats will be spanned, as practical. A survey for the milkweed will be conducted in potential habitat impacted by the route once an alignment is approved.

Yellow prairie violet

Yellow prairie violet is associated with dry prairies and could be impacted by placement of structures in these habitats. As stated above, prairie habitats will be spanned, as practical. A survey for the violet will be conducted in potential habitat impacted by the route once an alignment is approved.

Table 66
Rare and Unique Resources – Granite Falls Route 3

Common Name	Number of Occurrences	Scientific Name	Federal Status	MN Status*	State Rank**	Habitat
Bald Eagle	1	*Haliaeetus leucocephalus*	THR	SPC	S3	Forested areas near lakes and rivers
A Species of Lichen	1	*Buellia nigra*	Not Listed	END	S1	Exposed rocks near hardwood forests
Elktoe mussel	2	*Alasmidonta marginata*	Not Listed	THR	S2	Medium to large rivers in sand and gravel
Loggerhead Shrike	1	*Lanius ludovicianus*	Not Listed	THR	S2	Open country and dry upland prairie where hedgerows, shrubs and small trees occur
Mucket mussel	1	*Actinonaias ligamentina*	Not Listed	THR	S2	Medium to large rivers in sand and gravel
Salamander Mussel	1	*Simpsonaias ambigua*	Not Listed	THR	S2	Medium to large rivers in mud and gravel, or under flat slabs of rock
Sullivant's Milkweed	1	*Asclepias sullivantii*	Not Listed	THR	S2	Mesic, tallgrass prairie
Yellow Prairie Violet	2	*Viola nuttallii*	Not Listed	THR	S2	Loose, barren soil on gravelly kame and morainic formations
Black Sandshell	2	*Ligumia recta*	Not Listed	SPC	S3	Medium to large rivers in riffles or raceways in mud and sand
Cutleaf Ironplant	2	*Haplopappus spinulosus*	Not Listed	SPC	S3	Excessively-drained hillsides)often river bluffs, kames, eskers or morainic ridges), in gravelly or sandy soils
Five-lined Skink	2	*Eumeces fasciatus*	Not Listed	SPC	S3	Granite rock outcrops
Fluted-shell	2	*Lasmigona costata*	Not Listed	SPC	S3	Medium to large rivers in sand and gravel
Missouri Milk-vetch	5	*Astragalus missouriensis*	Not Listed	SPC	S3	Dry, gravelly prairie slopes, often in open soil
Pawnee Skipper	1	*Hesperia leonardus pawnee*	Not Listed	SPC	S3	Undisturbed, sandy prairies on Liatris blooms
Plains Prickly Pear	1	*Opuntia macrorhiza*	Not Listed	SPC	S3	Rocky/sandy soil in grasslands

Common Name	Number of Occurrences	Scientific Name	Federal Status	MN Status*	State Rank**	Habitat
Prairie Vole	1	*Microtus ochrogaster*	Not Listed	SPC	S3	Dry, upland prairies
Regal Fritillary	2	*Speyeria idalia*	Not Listed	SPC	S3	Large grassland areas or lightly grazed pasture lands with prairie remnants larval plants are violets.
Spike mussel	2	*Elliptio dilatata*	Not Listed	SPC	S3	Small to large streams, occasionally lakes, in mud or gravel
Mussel Sampling Site	2	Freshwater Mussel Concentration Area	Not Listed	None	NR	
Dry Prairie (Southwest) Hill Subtype	12		Not Listed	None	S2	
Mesic Prairie (Southwest) Subtype	8		Not Listed	None	S2	
Rock Outcrop-Dry Prairie Complex	3		Not Listed	None	S2	
Rock Outcrop (Southwest) Subtype	24		Not Listed	None	NR	
Wet Prairie (Southwest) Subtype	4		Not Listed	None	S2	

** END – Endangered; THR – Threatened; SPC – Special Concern; None – Terrestrial communities do not have assigned status, but are considered important ecologically.*

*** State rank is assigned to species and terrestrial communities to reflect the extent and condition of that element. Ranks range from 1 – in greatest need of conservation, to 5 – secure under present conditions. NR – not ranked; X – extirpated, species believed to be extirpated from the State; H – historical, species occurred historically in State but has not been verified in the last 20 years.*

Source: Minnesota Natural Heritage and Nongame Wildlife Program 2005. Threatened Natural Communities and Rare Species List.

Granite Falls Route 4

Table 67 shows the DNR-listed rare and unique resources within 1 mile of Granite Falls Route 4. A search of the Minnesota DNR Natural Heritage Database identified one instance of a Federal threatened/State special concern species (bald eagle), one instance of a Federal candidate/State threatened species (Dakota skipper), one State endangered species (burrowing owl), six State threatened species (loggerhead shrike, mucket mussel, elktoe mussel, salamander mussel, Wilson's phalarope and yellow prairie violet), and 12 species of special concern within 1 mile of the route alignment. Most of the instances identified by the Minnesota DNR Natural Heritage Database occur within the DNR's WMAs along the route alignment and along the Minnesota River. In addition to the species shown on Table 67, there are several species within 1 mile of the route that are listed on the Minnesota DNR Natural Heritage Database as having "Non" status. These species are listed in Section 8.2.6 of the Route Permit Application.

Within one mile of the route alignment there are 53 DNR-listed natural communities. Every attempt will be made to avoid placing structures in the DNR-listed natural communities along the route. However, there is one wet prairie community along the Segment G-56 alignment and one mesic prairie community along the Segment G-58 alignment that are wider than 1,000 feet. It is therefore probable that structures would need to be placed in these resources. Because the Dakota skipper is a prairie species, it is possible that habitat could be affected by placing structures in these mesic prairie communities. The burrowing owl and Wilson's phalarope also use upland prairie areas for nesting and forage. Yellow prairie violets can be found in dry patches within prairie remnants.

There are no areas listed by the DNR MCBS as having medium, high, or outstanding biodiversity significance along the route. There are no DNR-listed railroad prairies along the route. There are no USFWS prairie bank easements along the route.

An initial survey, conducted in June 2005, showed that the route alignment crosses 11 remnant prairie communities: one rock outcrop community and one dry prairie community along the Segment G-52 alignment; one dry prairie community and one rock outcrop community along the Segment G-53 alignment; one dry prairie community along the Segment G-54 alignment; one dry prairie community and one mesic prairie community along the Segment G-55 alignment; two wet prairie communities along the Segment G-56 alignment; and one mesic prairie community along the Segment G-58 alignment (GES 2005).

A summary of potential impacts to Federal and State threatened and endangered species follows.

Bald eagle

Construction noise and activity during critical development periods of bald eagles may cause nest abandonment, premature fledging of young birds, increased stress at a winter roost site, and loss of habitat for nesting and roosting. The documented nest is located approximately 0.24 miles from the route alignment.

Dakota Skipper

As stated above, prairie habitats will be spanned, as practical. It is possible that Dakota skipper habitat could be affected by placing structures in mesic prairie communities if spanning is not feasible. A survey for the Dakota skipper will be conducted during its flight period in potential skipper habitat crossed by the route once an alignment is approved.

Burrowing owl

The burrowing owl, a State endangered species, occurs in dry prairies and disturbed pastures and prefers areas with ground squirrel populations. As stated above, prairie habitats will be spanned, as practical. It is possible that habitat could be affected by placing structures in mesic prairie communities if spanning is not feasible. If this route is approved, a survey for suitable habitat will occur.

Loggerhead shrike

Dry uplands and shelterbelts and hedgerows are important habitat for loggerhead shrikes, a State threatened species. Shelterbelts and hedgerows will be conserved as possible, and dry prairie communities will be spanned where practical. However, it is possible that shelterbelts or hedgerows may be cleared to ensure the safe and reliable operation of the transmission line according to NERC standards.

Wilson's phalarope

The habitat for Wilson's phalarope, a State threatened species, is wet meadows and shallow marshes. This species could be impacted by placement of structures in these habitats or by increased erosion and sedimentation that could occur if BMPs are not employed. As stated above, BMPs will be used and wetlands will be spanned wherever feasible. If this route is approved, a survey for suitable habitat will occur.

Yellow prairie violet

Yellow prairie violet is associated with dry prairies and could be impacted by placement of structures in these habitats. As stated above, prairie habitats will be spanned, as practical. A survey for the violet will be conducted in potential habitat impacted by the route once an alignment is approved.

Table 67
Rare and Unique Resources – Granite Falls Route 4

Common Name	Number of Occurrences	Scientific Name	Federal Status	MN Status*	State Rank**	Habitat
Bald Eagle	1	*Haliaeetus leucocephalus*	THR	SPC	S3	Forested areas near lakes and rivers
Dakota Skipper	1	*Hesperia dacotae*	Candidate	THR	S2	Wet prairie and dry prairie dominated by bluestem grasses
Burrowing Owl	2	*Speotyto cunicularia*	Not Listed	END	S1	Native, mixed-grass pariries or heavily grazed pastures that are populated with Richardson's ground squirrels
Elktoe mussel	1	*Alasmidonta marginata*	Not Listed	THR	S2	Medium to large rivers in sand and gravel
Loggerhead Shrike	1	*Lanius ludovicianus*	Not Listed	THR	S2	Open country and dry upland prairie where hedgerows, shrubs and small trees occur
Mucket mussel	1	*Actinonaias ligamentina*	Not Listed	THR	S2	Medium to large rivers in sand and gravel
Salamander Mussel	1	*Simpsonaias ambigua*	Not Listed	THR	S2	Medium to large rivers in mud and gravel, or under flat slabs of rock
Wilson's Phalarope	2	*Phalaropus tricolor*	Not Listed	THR	S2	Quiet, shallow pools bordered by wet meadows. The nests are usually located in the wet meadow or adjacent upland prairie areas.
Yellow Prairie Violet	1	*Viola nuttallii*	Not Listed	THR	S2	Loose, barren soil on gravelly kame and morainic formations
Arogos Skipper	1	*Atrytone arogos*	Not Listed	SPC	S3	Undisturbed grasslands, prairies, sand prairies; caterpillar host is big bluestem
Black Sandshell	1	*Ligumia recta*	Not Listed	SPC	S3	Medium to large rivers in riffles or raceways in mud and sand
Cutleaf Ironplant	2	*Haplopappus spinulosus*	Not Listed	SPC	S3	Excessively-drained hillsides (often river bluffs, kames, skers or morainic ridges), in gravelly or sandy soils

Common Name	Number of Occurrences	Scientific Name	Federal Status	MN Status*	State Rank**	Habitat
Fluted-shell	1	*Lasmigona costata*	Not Listed	SPC	S3	Medium to large rivers in sand and gravel
Missouri Milk-vetch	3	*Astragalus missouriensis*	Not Listed	SPC	S3	Dry, gravelly prairie slopes, often in open soil
Powesheik Skipper	1	*Oarisma powesheik*	Not Listed	SPC	S3	Wet mesic prairie with native grasses, sedges and a significant number of plants in the sunflower family
Prairie Moonwort	1	*Botrychium campestre*	Not Listed	SPC	S3	Gravelly dry prairies on north-facing hillsides
Red Three-awn	1	*Aristida purpurea var. longiseta*	Not Listed	SPC	S3	Gravelly dry prairies on steep moraines, fossil beach ridges, kames and eskers
Slender Milk-vetch	1	*Astragalus flexuosus*	Not Listed	SPC	S3	Mesic and dry mesic prairies
Soft Goldenrod	1	*Solidago mollis*	Not Listed	SPC	S3	Dry, gravelly soil in shortgrass prairies
Spike mussel	1	*Elliptio dilatata*	Not Listed	SPC	S3	Small to large streams, occassionally lakes, in mud or gravel
Western Hognose Snake	1	*Heterodon nasicus*	Not Listed	SPC	S3	In western Minnesota, this species occurs in sandy and gravelly areas of fluvial or glacial origins. Throughout its range, this species is also found in grassland, prairie and mixed forest/prairie habitats
Colonial Waterbird Nesting Site	1	*Colonial Waterbird Nesting Area*	Not Listed	None	NR	
Mussel Sampling Site	1	*Freshwater Mussel Concentration Area*	Not Listed	None	NR	
Dry Prairie (Southwest) Hill Subtype	9		Not Listed	None	S2	
Mesic Prairie (Southwest) Subtype	1		Not Listed	None	S2	
Rock Outcrop (Southwest) Subtype	13		Not Listed	None	NR	

Common Name	Number of Occurrences	Scientific Name	Federal Status	MN Status*	State Rank**	Habitat
Wet Prairie (Southwest) Subtype	8		Not Listed	None	S2	

** END – Endangered; THR – Threatened; SPC – Special Concern; None – Terrestrial communities do not have assigned status, but are considered important ecologically.*

*** State rank is assigned to species and terrestrial communities to reflect the extent and condition of that element. Ranks range from 1 – in greatest need of conservation, to 5 – secure under present conditions. NR – not ranked; X – extirpated, species believed to be extirpated from the State; H – historical, species occurred historically in State but has not been verified in the last 20 years.*

Source: Minnesota Natural Heritage and Nongame Wildlife Program 2005. Threatened Natural Communities and Rare Species List.

15.6.3 MITIGATION

The DNR and USFWS will continue to be consulted to minimize and avoid impacts to rare and unique resources along the route alignments. The approved route will be surveyed for threatened and endangered species and any areas found to contain rare species will be spanned. Every attempt will be made to avoid placing structures within prairie remnants, natural communities, and MCBS areas of biodiversity significance. When native communities cannot feasibly be spanned, the number of structures within these lands will be minimized. Areas disturbed due to construction activities will be restored to pre-construction contours and will be reseeded with a seed mix recommended by the local DNR management and is free of noxious weeds.

Areas with known active bald eagle nests will be avoided, as practical, during critical periods. Construction will be restricted within a 1.25 miles of an active nest during critical development periods. If an active nest is located along the route, the DNR and USFWS will be consulted to determine appropriate minimization and mitigation procedures.

Due to the difficulty of constructing in rock outcrops and the sensitive nature of the plant communities within these areas, construction options are being considered in the rock outcrops areas near Granite Falls. If construction within outcrops cannot be avoided, surveys will be conducted and the appropriate agencies will be consulted to ensure impacts to the ball cactus and the Buellia nigra lichen or any other listed species are avoided or minimized.

Additionally, host plants for listed organisms, such as the Dakota skipper and Regal Fritillary, will be preserved and the area will be restored with the appropriate seed mix containing host plants, as applicable.

In the event shelterbelts and hedgerows for a known loggerhead shrike population must be affected, coordination will occur with the DNR on appropriate mitigation.

Streams and wetlands will be spanned along the route, whenever feasible. Whenever it is not feasible to span, a survey will be conducted to determine the presence of special status species and coordination will occur with the appropriate agencies to avoid and minimize any impact. Sound water and soil conservation practices will be maintained during construction and operation of the project to protect topsoil and adjacent water resources and minimize soil erosion and sedimentation.

16.0 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

Unavoidable adverse impacts are typically the physical impacts to the land associated with the project. Mitigation measures will be implemented, as described in previous sections and as identified by regulatory agencies, to minimize these unavoidable adverse environmental affects. The significant unavoidable adverse impacts caused by the proposed routes are minimal, but include impacts to agricultural and aesthetic factors.

16.1 PRIME FARMLAND

Table 68 describes the temporary and permanent impacts that the project will have on prime farmland for each of the proposed route. Temporary impacts are caused by construction, staging, and stringing operations. Permanent impacts result from the placement of structures and access roads. Transmission lines will be aligned along section and field lines wherever possible to minimize impacts to prime farmland.

Table 68
Significant Unavoidable Adverse Impacts to Prime Farmland

Route	Temporary Impact (acres)	Permanent Impact (acres)
Morris 1	236.2	6.7
Morris 2	232.8	7.0
Willmar 1	457.0	13.0
Willmar 2	522.6	14.8
Granite Falls 1	35.3	0.8
Granite Falls 3	200.0	4.7
Granite Falls 1 and 3	303.1	7.2
Granite Falls 2	53.4	1.3
Granite Falls 4	218.5	5.2
Granite Falls 2 and 4	305.2	7.3

Additionally, permanent impacts to prime farmland would be approximately 3.7 acres for the Johnson substation construction, and approximately 6.3 acres for the Canby Substation alternatives (all substation sites are located on 100 percent prime farmland or farmland of statewide importance).

16.2 AESTHETICS

The presence of transmission lines can detract from the visual attractions of an area. Landowners will be consulted to identify concerns. Wherever possible, the proposed transmission lines will be routed alongside existing power lines and section lines, as well as within road, rail, and utility ROWs, to minimize any adverse impacts.

16.2.1 MORRIS ROUTES

Significant unavoidable adverse aesthetic impacts for the Morris Routes may exist for visitors to the Big Stone National Wildlife Refuge, the Otrey and Prairie WMAs, communities within 1 mile, and residences within 500 feet of the proposed route. Morris Route 1 would aesthetically impact Alberta, Chokio, Johnson, and Ortonville, as well as 16 residences. Morris Route 2 would aesthetically impact Alberta, Chokio, Johnson, and Ortonville, as well as 22 residences.

16.2.2 WILLMAR ROUTES

Significant unavoidable adverse aesthetic impacts for the Willmar routes may exist for visitors to the Big Stone National Wildlife Refuge, communities within 1 mile, and residences within 500 feet of the proposed routes. Willmar Route 1 would aesthetically impact Willmar, Kerkhoven, Murdock, DeGraff, Danvers, Odessa, and Ortonville, as well as 57 residences. Willmar Route 2 would aesthetically impact Willmar and Ortonville, as well as 43 residences.

16.2.3 GRANITE FALLS ROUTES

Significant unavoidable adverse aesthetic impacts for the Granite Falls Routes may exist for visitors to the Minnesota River in the Granite Falls area along MN Highway 23, communities within 1 mile, and residences within 500 feet of the proposed routes. Granite Falls Route 1 would aesthetically impact Canby, Granite Falls, St. Leo, and Hazel Run, as well as 9 residences. Granite Falls Route 2 would aesthetically impact Canby, Granite Falls, St. Leo, and Hazel Run, as well as 27 residences. Granite Falls Route 3 would aesthetically impact Canby, Marietta, Granite Falls, St. Leo, and Hazel Run, as well as 14 residences. Granite Falls Route 4 would aesthetically impact Canby, Granite Falls, St. Leo, and Hazel Run, as well as 29 residences.

17.0 IRREVERSIBLE/IRRETRIEVABLE COMMITMENT OF RESOURCES

Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the use of these resources have on future generations. Irreversible effects primarily result from the use or destruction of a specific resource that cannot be replaced within a reasonable time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action. There are few commitments of resources associated with this project that are irreversible and irretrievable, but those that do exist are primarily related to construction. Construction resources that will be used include aggregate resources, concrete, steel, and hydrocarbon fuel. These resources will be used to construct the project. During construction, vehicles will be traveling to and from the site utilizing hydrocarbon fuels. These commitments of resources are similar for all routes proposed.

18.0 PERMITS AND APPROVALS

There are several permits and approvals that must be obtained for the project in addition to the state Route Permit. Below is a list and a brief description of permits and approvals that are required by local, state, and federal governments.

Table 69
Permits Required

Permit	Jurisdiction
Local Approvals	
Road Crossing/ROW Permits	County, Township, City
Lands Permits	County, Township, City
Building Permits	County, Township, City
Overwidth Loads Permits	County, Township, City
Driveway/Access Permits	County, Township, City
Minnesota State Approvals	
Certificate of Need	Minnesota PUC
Route Permit	Minnesota PUC
Cultural and Historic Resources Review	Minnesota SHPO
Endangered Species Consultation	Minnesota DNR – Ecological Services
License to Cross Public Waters	Minnesota DNR – Lands and Minerals
Utility Permit	Mn/DOT
Wetland Conservation Act	BWSR
NPDES Permit	MPCA
South Dakota State Approvals	
Transmission Facility Route Permit	South Dakota PUC
Section 401 Water Quality Certification	South Dakota DENR
Cultural and Historic Resources Review	South Dakota SHPO
Endangered Species Consultation	South Dakota Department of Game, Fish and Parks
Permit to Occupy ROW	Mn/DOT
NPDES Permit	South Dakota DENR

Permit	Jurisdiction
Federal Approvals	
Environmental Impact Statement	Western Department of Energy
Section 106 Review	Western Department of Energy
Regulations for Compliance with Floodplain/Wetlands Environmental Review Requirements	Western Department of Energy
Section 7 Consultation	USFWS
Section 10 Permit	USACE
Section 404 Permit	USACE
Permit to Cross Federal Aid Highway	FHWA
Notice of Proposed Construction (7460-1)	FAA
Notice of Actual Construction or Alteration	FAA
Farmland Protection Policy Act/Farmland Conversion Impact Rating	USDA/NRCS
Spill Prevention, Control and Countermeasure (SPCC) Plan	EPA
USFWS	Compatibilty Analysis of Disturbed Easements/Lands

18.1 LOCAL APPROVALS

Typical local approvals associated with transmission line construction are listed below. Per Minnesota Statutes §116C.61, Subd. 1, the issuance of a route permit is the only approval required to be obtained by the utility; however, the Applicants will work with local governments to address concerns related with these approvals.

Road Crossing/ROW Permits

These permits may be required to cross or occupy county, township, and city road ROW.

Lands Permits

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

Building Permits

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

Over width/Loads Permits

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

Driveway/Access Permits

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

18.2 STATE OF MINNESOTA APPROVALS

Certificate of Need

Prior to issuance of a route permit, a Certificate of Need is required from the PUC.

Route Permit

HVTLs cannot be constructed without a route permit approved by the PUC.

Cultural and Historic Resources Review

A cultural and historic resources review was conducted by the Minnesota SHPO. This review assists the Applicants in identifying potential impacts to cultural and historic resources.

Endangered Species Consultation

The Minnesota DNR Natural Heritage and Nongame Research Program collects, manages, and interprets information about nongame species. Consultation was requested from the department for the project regarding rare and unique species.

License to Cross Public Waters

The Minnesota DNR Division of Lands and Minerals regulates utility crossings over, under, or across any State land or public water identified on the Public Waters and Wetlands Maps. A license to cross Public Waters is required under Minnesota Statutes §84.415 and Minnesota Rules §6135. The Applicants will file these permits once the design of the transmission line is complete and will acquire the permit prior to construction.

Utility Permit

A permit from the Mn/DOT is required for construction, placement, or maintenance of utility lines that occur adjacent or across the highway ROW. The Applicants will file for this permit once the design of the transmission line is complete and will acquire the permit prior to construction.

NPDES Permit

A NPDES permit is required for stormwater discharges associated with construction activities disturbing equal to or greater than one acre. A requirement of the permit is to develop and implement a stormwater pollution prevention plan (SWPPP), which includes BMPs to minimize discharge of pollutants from the site. This permit will be acquired since the construction will cause a disturbance of greater than one acre for the whole of the project.

18.3 STATE OF SOUTH DAKOTA APPROVALS

Transmission Facility Route Permit

A transmission line cannot be constructed without a route permit from the South Dakota PUC. A permit will be applied for as outlined in South Dakota Codified Law 49-41B-11 in the near future. The South Dakota PUC only requires one route to review and approve (or reject). There are two possible locations where the Granite Falls transmission line will cross over from South Dakota into Minnesota, and the Applicants encourage the PUC to cooperatively work with the South Dakota PUC as dictated by Minnesota Statutes §116C.53, Subd.3.

Section 401 Water Quality Certification

This permit is required for fill in jurisdictional waters of the U.S., and is intended to ensure that the project will not impact the stream quality or violate surface water quality standards. The certification is required from the South Dakota Department of Environment and Natural Resources (DENR).

Cultural and Historic Resources Review

A cultural and historic resources review was conducted by the South Dakota SHPO. This review assists the Applicants in identifying potential impacts to cultural and historic resources.

Endangered Species Consultation

The South Dakota Department of Game, Fish and Parks (GFP) Wildlife Diversity Program maintains and inventory, protects, and manages the species and habitats that comprise the biological diversity of South Dakota. Consultation was requested from the department for the project regarding rare and unique species.

Permit to Occupy ROW

This permit is required by the South Dakota Department of Transportation for the Applicants to gain access to the work sites from highway ROW.

NPDES Permit

See Minnesota NPDES permit requirements.

18.4 FEDERAL APPROVALS

Environmental Impact Statement

Interconnection of the Big Stone Transmission Line Project and the associated Big Stone II Plant would incorporate a major new generation resources into Western's transmission system. Western determined that an EIS was required under U.S. Department of Energy NEPA

Implementing Procedures (10 CFR 1021). The EIS will be prepared in accordance with the NEPA and with Western as the lead Federal agency.

Section 106 Review

Section 106 of the National Historic Preservation Act requires Federal agencies to "take into account" the effects of their actions on "historic properties" (i.e., districts, sites, buildings, structures and objects included in or eligible for the NRHP). Section 106 is implemented by following regulations issued by the Advisory Council on Historic Preservation (36 CFR 800). Western is the lead Federal agency for Section 106 compliance. Agency Section 106 responsibilities can be coordinated with the NEPA process by planning for public participation, analysis and review, such that the purposes and requirements of both statutes are met in a timely and efficient manner.

Section 7 Consultation

The USFWS consults with Federal agencies under Section 7 of the Endangered Species Act to ensure the project does not jeopardize listed species or destroy or adversely modify critical habitat.

Section 10 Permit

The USACE regulates impacts to navigable waters of the U.S. The Minnesota River is classified by the USACE as a navigable water, and the Applicants will apply for a permit for each of the crossings proposed for the project.

Section 404 Permit

A Section 404 permit is required from the USACE for discharges of dredged or fill material into waters of the U.S. The Applicants will apply for these permits once a route is awarded for the project.

Notice of Proposed Construction

Notice and approval are required for structures 200 feet in height or the height of the structures would exceed a slope requirement as defined in the FAA Advisory Circular (AC 70/7460-2K). Form 7460-1 is required for the notice.

Notice of Actual Construction or Alteration

This is required to provide the FAA with final construction as-built information for their records, using Form 7460-2.

Farmland Protection Policy Act/Farmland Conversion Impact Rating

The intent of the Farmland Protection Policy Act is to minimize the conversion of farmland to nonagricultural uses by Federal projects. The Applicants will work with Western to meet the requirements of this program.

Spill Prevention, Control and Countermeasure Plan

A Spill Prevention, Control and Countermeasure Plan is required to prevent discharge of oil into navigable waters of the U.S., and is required if the aboveground storage capacity for the substance is greater than 1,320 gallons and there is a reasonable expectation of a discharge into navigable waters of the U.S. The Applicants will update and develop their Spill Prevention, Control and Countermeasure Plan at substations meeting the criteria per 40 CFR 112.

Compatibility Analysis of Disturbed Easements/Lands

This permit is required for work within easements owned by the USFWS. Compatibility is determined in accordance with the National Wildlife Refuge System Improvement Act. A compatible use is a wildlife-dependent recreational use or any other use on lands that in the sound professional judgment of the director will not materially interfere with or detract from the fulfillment of the mission of the USFWS (wildlife conservation) or purposes of the land. The Applicants will work closely with the USFWS on potential impacts to their lands.

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20.0 ABBREVIATIONS

°F	degrees Fahrenheit
AADT	Average Annual Daily Traffic
AASHTO	American Association of State and Highway and Transportation Officials
AC	alternating current
ACSR	aluminum conductor steel reinforced
ACSS	aluminum conductor steel supported
amsl	above mean sea level
APE	Area of Potential Effects
BMP	Best Management Practice
BNSF	Burlington Northern Santa Fe Railway Company
BRIGO	Buffalo Ridge Incremental Generation Outlet
BTU	British Thermal Unit
BWSR	Board of Water and Soil Resources
CCGT	combined cycle gas turbine
CFR	Code of Federal Regulations
CHP	combined heat and power
CSAH	County State Aid Highway
CTCC	Combustion Turbine Combined Cycle
dBa	A-weighted sound level recorded in units of decibels
DENR	Department of Environment and Natural Resources
Department	Department of Commerce
DG	Distributed Generation
DNR	Department of Natural Resources
DO	dissolved oxygen
DSM	Demand Side Management
EA	Environmental Assessment
EIS	Environmental Impact Statement
EFP	Energy Facilities Permitting Unit
EMF	electromagnetic field
EPA	U.S. Environmental Protection Agency
EQB	Environmental Quality Board
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FEP	Faribault Energy Park
G	gauss
GAP	Gap Analysis Program

GIS	Geographic Information Systems
GPS	Global Positioning System
GRE	Great River Energy
HAP	Hazardous Air Pollutant
HRSG	heat recovery steam generator
HVTL	high voltage transmission line
Hz	Hertz
ISFSI	Independent Spent Fuel Storage Installation
kV	kilovolt
kV/m	kilovolts per meter
kW	kilowatt
kWh	kilowatt hour
MAPP	Mid-continent Area Power Pool
MBTA	Migratory Bird Treaty Act
MCBS	Minnesota County Biological Survey
MEC	Mankato Energy Center
MISO	Midwest Independent System Operator
Mn/DOT	Minnesota Department of Transportation
MNGP	Monticello Nuclear Generating Plant
MSL	mean sea level
MW	megawatt
MWh	megawatt hour
MPCA	Minnesota Pollution Control Agency
NAC	Noise Area Classifications
NEPA	National Environmental Policy Act
NERC	National Electric Reliability Council
NESC	National Electrical Safety Code
NEV	neutral-to-earth voltage
NHPA	National Historic Preservation Act
NIEHS	National Institute of Environmental Health Sciences
No Big Stone II	No Build Alternative without Big Stone II Plant
NPDES	National Pollution Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NRI	Nationwide River Inventory
OTP	Otter Tail Power Company
PA	Programmatic Agreement

Pb	Lead
PLS	Public Land Survey
ppm	parts per million
PSD	Prevention of Significant Deterioration
PUC	Public Utilities Commission
PWI	Public Waters Inventory
RF	radio frequency
ROW	right-of-way
RUS	Rural Utilities Service
SCR	Selective Catalytic Reduction
SHPO	State Historic Preservation Office
SNA	Scientific and Natural Area
SWPPP	Stormwater Pollution Prevention Plan
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WCA	Wetland Conservation Act
Western	Western Area Power Administration
with Big Stone II	No Build Alternative with Big Stone II Plant
WFGD	Wet Flue Gas Desulfurization
WPA	Waterfowl Production Area
WMA	Wildlife Management Area
Xcel Energy	Northern States Power dba Xcel Energy

21.0 RESPONSES TO SUBSTANTIVE COMMENTS ON THE DRAFT EIS

The Draft EIS was made available on July 31, 2006. Parties in the Big Stone Transmission Project proceedings and members of the public had until October 31, 2006, to make comments on the draft.

Minnesota Rule 4400.1700, subp. 9 reads in whole:

> **Final EIS.** The EQB shall respond to the timely substantive comments received on the draft environmental impact statement consistent with the scoping decision and prepare the final environmental impact statement. The EQB may attach to the draft environmental impact statement the comments received and its response to comments without preparing a separate document. The EQB shall publish notice of the availability of the final environmental impact statement in the EQB Monitor and shall supply a press release to at least one newspaper of general circulation in the areas where the proposed sites or routes are located.

As allowed, this final EIS does not create a separate document. Also as per the rule, this document has attached comments to the EIS (unique comments and examples of standardized comments are included in this document in Appendix J).

This chapter has been added to the EIS and responds to the comments received. A limited number of comments speak to the description of the project and impacts discussed in Book 2 in the EIS. These comments are addressed in Section 21.1 of this chapter. Also in this section we address minor corrections to the Draft EIS.

Some comments address the alternatives investigated in Book 1. These comments are addressed in Section 21.2 of this chapter.

The bulk of the comments received deal with potential impacts of the Big Stone II plant. Many of these comments appear to address issues specifically excluded in the Scoping Decision; particularly generation alternatives or substitutions at the South Dakota PUC-permitted Big Stone II Plant (see Appendix I, p. 6). However, due to the unique nature of the Big Stone Transmission Project and its assumed relationship to that project, we have also chosen to address to the degree practicable the comments that are not "consistent with the scoping decision." These are addressed in Section 21.3. Conclusions are presented in Section 21.4.

21.1 COMMENTS ON THE PROJECT AND BOOK 2

This section responds specifically to comments on the details of the project. We address those by commenter here, since each commenter has specific issues they have chosen to address. We also address in this section any technical corrections or additions the authors have made to the Draft EIS.

21.1.1 THE APPLICANTS' CHANGES TO THE PROPOSED PROJECT

The Applicants point out two minor changes in the proposed project as described in the Draft EIS: the location of the Canby Substation and the location of the border crossing between South Dakota and Minnesota.

In the prefiled testimony of June 1, 2006 of Darryl Shoemaker and Myron Rader, the Applicants described their proposed change to the location of the Canby Substation. The original plan was to improve the substation at the current site. However, that substation currently sits in a FEMA-designated floodplain. The new proposal moves the site approximately one mile northeast of the existing site. The Applicants favor the new location as it, "is outside the floodplain, is more readily available for maintenance, and the involved landowners have shown an interest in moving the site." A map portraying the new location has been added to Appendix C, Substation Maps.

The Department agrees that the new proposed site is an advantage over the old proposed site given its location in the floodplain. The Department also agrees with the Applicants that there are no "new or different environmental impacts" that result from this change.

In supplemental testimony of October 2, 2006 of Myron Rader, the Applicants offer a slight change in the routing of the border crossing for the proposed Granite Falls line. The change has been made to a address a concern set forth by the U.S. Fish & Wildlife Service to avoid a parcel of land for which they have an opportunity to acquire a grasslands easement in the future. A map portraying the change in the proposed route has been added to Appendix B, Detailed Route Maps.

The Department recognizes that the proposed route change is intended to avoid a specific environmental impact, and, as Mr. Rader notes, "no additional response (is) required from the Department other than to recognize the change in the route."

21.1.2 DEPARTMENT OF ENERGY, WESTERN AREA POWER ADMINISTRATION

Western Area Power Administration (Western) presented a number of minor technical comments and questions on the Draft EIS.

Western believes the descriptions on pages 1 and 2 of the EIS are very specific to the "Morris" line and the "Granite Falls" line. Therefore the heading "Project Description" should be identified as the "Proposed Project." The Department agrees and has made that change on page 1.

Western states that on page 2, "Project Description, Line Two" (the "Granite Falls" line), second bullet, the Draft EIS suggests the line would terminate at Western's Granite Falls Substation or the Minnesota Valley Substation. The Minnesota Valley Substation is actually not under consideration.

The Final EIS reads, "The line would terminate at the Granite Falls substation."

On page 3, Western Area Power "Association" has been corrected to "Administration."

Western points out that on page 5 of the Draft EIS, the first paragraph mentions a 345 kV substation in South Dakota. Western replies, "there has been no mention or discussion of construction of this as a new substation. Due to the uncertainty of the timing of the construction of this new substation, Western's DEIS addresses it in the cumulative impacts section as a reasonably foreseeable future action."

The Department footnotes that comment on page 6 of the Final EIS.

Western describes in their comments additions in Western's EIS to System Alternative 2 described on page 7 of the Draft EIS. The Department had already fleshed out those alternatives in Section 5 of the Draft EIS. However, the Department footnotes the alternative on page 8 of the Final EIS to reference the descriptions in the Western comments in Appendix J.

Western comments that the descriptions on page 22, Morris Substation Modifications and page 26, Granite Falls Substation Modifications in the Draft EIS are incomplete due to ongoing system studies.

The Department has edited Section 5.5 and Section 5.8 of the Final EIS to include the qualifier: "However, system studies are not completed yet, so final modifications and whether they will

require substation expansion are still under review (see Western's DEIS, p. 2-28)." The Department also notes here that any modifications at those Western-owned substations are outside the review of this EIS and are included as informational descriptions only.

Western comments that on page 22 of the Draft EIS in the list of owners of the Willmar Substation, there is a discrepancy with the Federal DEIS, which includes Xcel Energy as a co-owner.

The Department verifies that Xcel Energy is a co-owner of the Willmar Substation and has made that addition on page 22 of the Final EIS.

21.1.3 MINNESOTA DEPARTMENT OF NATURAL RESOURCES

The Department of Natural Resources (DNR) has commented on the Draft EIS (see letter in Appendix J).

The DNR supports the proposed route (Morris 1) from Ortonville to Morris. However, it recommends an alteration to use a short portion of the Morris 2 route near the Prairie Wildlife Management Area to mitigate the impact on the WMA. The DNR also recommends the use of Avian Flight Diverters along this section. The section "represents a primary migratory flight corridor … proposed for possible designation as a State Important Bird Area." The Avian Flight Diverters are recommended as the "best possible mitigation against incidental avian mortality."

While the conclusion of the EIS is that the proposed route is superior to the alternative, the Department does not discount the refinement of the route that would consider the mitigation to the WMA and avian mortality.

The Department EIS refers readers to the complete comment letter and supports the additional opinions on mitigations offered by the DNR in its letter with regards to river crossings and native prairie areas.

21.2 COMMENTS ON THE ALTERNATIVES AND BOOK 1

This section responds to comments on the alternatives and comparisons analyzed in Book 1 of the EIS. They are responded to herein by commenter, since each has specific relevant items of interest on topics addressed in that section.

21.2.1 THE APPLICANTS

The Applicants comment that the same costs used in the Draft EIS should be included in the Final EIS, rather than adjusting for any cost figures which may be presented at the evidentiary hearings. The Applicants admit that new estimates for the Big Stone II facility, subsequent to the numbers available for comparison in the Draft EIS, show significant cost increases since the filing of the applications. They state the costs are "due in most part to inflationary pressures on the cost of materials and labor." They argue that those same influences would have an equal effect on the costs of alternatives examined in the draft.

The Department agrees that inflation of materials costs has impacts on both sides of the equation and, therefore, is not recalculating comparative cost figures in the Final EIS. The Draft EIS discussed the cost of new projects initiated in 2005 using figures from the Energy Information Administration (EIA). The Applicants submitted their original cost estimates in their applications dated in late 2005. This gives a fair comparison. Whether or not there are inflationary factors is not necessarily a relevant issue here. The important argument in this comparison is not the absolute costs but rather the relative costs of one option versus any other. Since there is not an absolute price point at which one alternative is no longer viable, it is far more important to weigh the *comparative* cost impacts of one alternative against another.

An equally salient point is that, while the Applicants appear to be concerned for the most part about increased costs at the Big Stone II facility, the EIS does not directly compare the cost of the Big Stone II facility to other alternatives. The Department addresses why this is so later in the following section.

21.2.2 JOINT INTERVENORS[1]

Questions on the costs included in the wind/gas alternative.

The Joint Intervenors have two fairly straightforward comments about Table 21 in the Draft EIS concerning the estimates of the Big Stone Transmission Project line costs. First, they point out the costs included in the Big Stone application were higher than those included in the table. The Department appreciates notice of this discrepancy and has updated that table on page 73 to include the higher costs.

[1] Joint Intervenors describes a set of organizations that is a party in the Big Stone Transmission Project CN proceeding. "Joint Intervenors" comprises the Izaak Walton League of America-Midwest Office, Fresh Energy, Union of Concerned Scientists, Wind on the Wires, and the Minnesota Center for Environmental Advocacy.

Secondly, Joint Intervenors question the transmission costs used in the table for the Wind/Gas alternative. The following background table is included in this response as an explanation of the costs computed for that table:

Resource	**MW**	**EIA Est. Capacity Cost**	**EIA Est. Variable O&M/kW**	**EIA Est. Fixed O&M/kW**	**Est. total Capital Cost**
Wind (EIA)	747	1,167	0	27.59	$871,749,000
Gas CC (EIA)	655	584	1.88	11.37	$382,520,000
Advanced CC (EIA)	655	575	1.82	10.65	$376,625,000
Gas CC (EIA)	400	584	1.88	11.37	$233,600,000
Advanced CC (EIA)	400	575	1.82	10.65	$230,000,000
Big Stone Transmission Applicant's Est.					$93,000,000 - $135,000,000
747/655 (EIA) Alt Gen Cost					$1,248,374,000
747/400 (EIA) Alt Gen Cost					$1,101,749,000
Alternative Low Range w/ HVTL					$1,118,249,000
Alternative High Range w/ HVTL					$1,283,414,000

The mileage of necessary transmission for the Wind/Gas alternative was estimated at between 66-73 miles. A low end estimate of $250,000 per mile for transmission used the Applicant's own estimate. A high end estimate of $480,000 per mile was calculated using several project applications reviewed by the Department, including Xcel Energy's recent cost estimates for transmission in Southwest Minnesota. This results in a low end figure of $16,500,000 and a high

end figure of $35,040,000. These transmission costs added to the EIA data result in the costs included in Table 21.

Question on the choice of the wind/gas alternative.

Joint Intervenors question the Department's choice of wind/gas alternatives as opposed to ones the Joint Intervenors believe to be better options.

The Department's selection of alternatives considered options to supply energy equivalent to the alleged need in this case. The Department also wanted to put forward a supportable alternative that would not fail reliability tests. The wind/gas alternatives reviewed in the Draft EIS are based on proven technologies, relevant MISO studies, and energy projects permitted by Minnesota regulators during the past decade. The Department did this to provide the Commission a realistic analysis of the likely scope of the alternative, its impacts, mitigation measures, and feasibility.

The Department believes its scenarios were responsibly chosen to represent realistic and viable options.

The Joint Intervenors attempt to make the argument (page 9) that the Department failed to fulfill its Scoping Decision to review options that replace the "proposed generation and transmission." The Department's wind/gas alternative does fulfill the scope by reviewing a generation and transmission proposal designed to supply an amount of energy equal to the alleged need in this case. The Joint Intervenors' argument is based on the cost comparisons of the options, and those concerns are addressed in depth below.

Question on the cost comparison of alternates.

In their main comments, the Joint Intervenors make the assertion that, "In comparing the cost of this project with alternative methods of power generation, the DEIS simply ignores the financial costs of the entire Big Stone II coal plant."

Under this assertion, the Joint Intervenors rely upon the following assumptions: 1) that the DEIS ignores the fact that the Public Utilities Commission has "inextricably linked" the Big Stone II plant and the transmission proposal; and 2) that the DEIS neglects the requirement of the Certificate of Need process to review the costs of the Big Stone II plant. Using these assumptions to defend their assertion, the Joint Intervenors ultimately conclude that the DEIS is inadequate.

An adequacy decision cannot be based on this assertion, however, because the underlying assumptions are misleading. They do not fully examine the intent of the Public Utilities

Commission's position in linking the actions nor do they accurately portray the process of review in the Certificate of Need process. The Department specifically responds to the two numbered assumptions above as follows.

Joint Intervenors' Assumption No. 1: That the Department ignores the "inextricably linked" nature of the Big Stone Transmission Project and the Big Stone II plant.
Joint Intervenors state in their comments:

> The crux of the "independent utility" test under NEPA is whether "each of two projects would have taken place with or without the other." *(see citation on page 4 of the comments)* In this case the PUC has already determined that the Big Stone power line and the Big Stone power plant are "inextricably linked," and thus the transmission proposal necessarily fails the independent utility test.

The Department has always approached the EIS process with the PUC's determination in mind, i.e., that the projects are linked for the purposes of reviewing the Applicants' transmission line proposal. It is clear that the transmission proposal fails an independent utility test. And the EIS does review the Big Stone Transmission Project in association with the Big Stone II plant in Book 1, keeping the PUC's intent in mind when reviewing alternatives. However, as pointed out by Joint Intervenors, the EIS does not include the cost of the Big Stone II plant in its cost comparisons of alternatives to the proposed transmission project.

The reason is that the Big Stone II plant does pass an independent utility test. In a very complex case, the Joint Intervenors insinuate inappropriately throughout their comments that "inextricably linked" means that a PUC denial of a CN and route permit for the proposed transmission would mean that the Big Stone II plant would not be built. That is an unwarranted assumption and a misleading interpretation of the process. The Department responsibly assumes that is not the case.

In this unique case, major decisions are being made under separate state jurisdictions. The State of Minnesota cannot countermand an action of the State of South Dakota. Likewise, the State of South Dakota cannot force the State of Minnesota to build a transmission project to support its actions. The Department cannot assume in the EIS that "inextricably linked" concludes that one state's action or inaction necessarily mandates a particular action by another state.

The Department made its cost comparisons in its review of alternatives in the EIS in light of the fact that the Big Stone II plant can exist independently of the other alternatives reviewed. Because of this fact, Joint Intervenors point out what they view as an imbalance in the review.

However, due to the independent nature of the plant itself, any honest comparative cost analysis would have to either add the cost of the plant to both sides of the comparison or leave it out entirely. The Department chose the latter in its review. Either way, because the plant could exist independent of the outcome of the transmission proceeding, the cost of the plant becomes a wash in any comparison of alternatives.

The Joint Intervenors' implication (page 8) that the Department defined "the objectives of their actions in terms so unreasonably narrow they can be accomplished by only one alternative (i.e., the applicant's proposed project)," is unfounded. The Department can only say that it denies any implication of bias in this case.

Joint Intervenors' Assumption No. 2: That the costs of the Big Stone II plant are not being reviewed.

The Joint Intervenors question whether the EIS neglects the requirement of the CN process to review the costs of the Big Stone II plant? In this case, the Joint Intervenors mistakenly represent the direction of Minnesota Rule 7849.0120 B.2 to be, "The ***DEIS*** is supposed to provide the analysis necessary for the PUC to make these required comparisons." (page 6, emphasis added) In actuality, the direction of the rule is that the process must be informed as to these comparisons. The Department fully analyzes these comparisons in separate testimony.

In this proceeding, the Department is analyzing the comparisons of cost in the need review by a formal inclusion of resource planning in this docket. In his Direct Testimony, Dr. Steve Rakow of the Department quotes Minnesota Statute 216B.243, subd. 3a:

> The Commission may not issue a certificate of need under this section for a large energy facility that…transmits electric power generated by means of a nonrenewable energy source, unless the applicant for the certificate has demonstrated to the Commission's satisfaction that it has explored the possibility of generating power by means of renewable energy sources and has demonstrated that the alternative selected is less expensive (including environmental costs) than power generated by a renewable energy source…

He states, "Based upon this requirement, I conclude that the most reasonable method for analyzing whether the claimed need is better met by non-renewable resources such as BS2 is through reference to the Applicants' resource planning which considers the integrated nature of the system and resulting effects on costs of various alternatives." (Rakow Direct, page 12)

The EIS defers to the Department's own expert witness to provide the appropriate comparison of costs necessary in this proceeding. In this way, the PUC is fully informed of the complete and necessary analysis of estimated costs for the project, thus the intent of Minnesota Rule 7849.0120 B.2 has been fulfilled.

The Joint Intervenors original assertion that "the DEIS simply ignores the financial costs of the entire Big Stone II coal plant," misleads that those costs are not addressed. The financial costs of the plant are addressed separately, and the certificate of need process has been fully informed of the necessary analysis in order for the PUC to "make required comparisons."

21.3 COMMENTS ON THE BIG STONE II PLANT

The section responds to comments regarding the Big Stone II plant. Questions in this section were raised by the Joint Intervenors; members of the public at the hearing sessions held in Benson, Morris, Ortonville, Canby, Granite Falls and St. Paul; and in numerous comments from the public received by the Department through mail and email.

The Department received a large number of this type of comment; including approximately 150 each of two separate preformatted letters and about 200 post card comments from the Sierra Club. (See Appendix J) Since the comments include a similar set of questions, the Department has chosen to respond to the individual issues raised rather than addressing individual commenters separately in this section.

Does the EIS review economic impacts of the Big Stone II plant?

A common opinion represented in comments is that the Draft EIS does not adequately evaluate the economic impacts of the Big Stone plant. Significant concerns were expressed to the potential costs of carbon and mercury taxes and curbs. These comments also included "social and justice issues" related to carbon dioxide and mercury.

The Department does understand externality costs are a significant element in the review of alternatives; a comparison of costs must include environmental costs as part of the equation. Those costs are included in the review using the Public Utilities Commission's established externality values, most recently published in the Commission's April 27, 2005, *Notice of Updated Environmental Externality Values.* (Docket No. E999/CI-00-1636) Again, those comparative costs are being examined through the resource plans included in this record. To date, the Commission does not have established externality values for mercury. However, the Mercury Reduction Act may internalize those costs in future reviews.

Does the EIS review environmental impacts of the Big Stone II plant?

The bulk of the comments address environmental impacts of the proposed Big Stone II plant. This includes the Joint Intervenors' assertion that, "The DEIS fails to consider the global warming impacts of the Big Stone II Coal Plant." The Department in no way minimizes those concerns. The issue of emissions of pollutants and carbon dioxide from generation alternatives is extremely important, and the Department directly addresses greenhouse gases in this docket. In resource planning analysis, the Applicants must incorporate the Commission's externality values for carbon dioxide.

The EIS does not address those impacts directly, however, as the Big Stone II plant and the evaluation of alternatives at that site are under federal government review in the Western EIS. The Western EIS was charged with reviewing the Big Stone II plant and alternatives in the South Dakota PUC proceedings that permitted the plant. Those proceedings have been entered into the record of the Minnesota proceeding by the South Dakota Governor's Office of Economic Development. Additionally, the Western EIS has been incorporated by reference in the Department's EIS.

In order to do the most complete review possible within the time limits of the certificate of need process, the Department EIS does not redundantly review the issues relevant to the federal EIS document. According to the Minnesota Environmental Policy Act (MEPA), Statute 116D.04 subd 2a directs, "The environmental impact statement shall be an analytical rather than an encyclopedic document." The Department had five months to do a complete environmental review, a full analysis of the items in its Scoping Decision, and fulfill all of the hearings and other procedural steps required in the permitting process. Abiding by the direction of MEPA, the EIS did not attempt to expand its volume with data already analyzed in separate reviews.

In subd. 5a (9), MEPA seeks to establish "procedures to reduce paperwork and delay through intergovernmental reviews." This supports the intentional non-duplicative nature of the Western EIS and the Department EIS. That separation is further directed in Minnesota Rule 4410.3900, subp. 1:

> **Cooperative processes.** Governmental units shall cooperate with federal agencies to the fullest extent possible to reduce duplication between Minnesota Statutes, chapter 116D, and the National Environmental Policy Act, United States Code 1976, title 42, sections 4321 to 4361.

The Department pursued the most responsible path to satisfy all federal and state statutes on developing environmental information for this certificate of need proceeding. All relevant and

necessary data are not analyzed in one document. All relevant and necessary data are analyzed in the Federal EIS and State EIS processes. The environmental review as a whole serves as a sufficient source to inform the decisions pending before the Minnesota PUC.

21.4 CONCLUSION

Comments claiming that the EIS is inadequate appear to assume the document should be an encyclopedic volume containing all the information possibly pertinent to evaluating the project. Considering this unique case (1) under multiple jurisdictions, (2) assessing transmission and generation alternatives, and (3) under significant time constraints, no one document can be a complete source to answer every issue possibly under consideration. The EIS does answer the issues within its scope. Department analysis and resource planning contribute in the overall review of cost comparisons of generation alternatives. The Federal EIS addresses environmental impacts of the Big Stone II generation facility.

Minnesota Rule 4410.2800 subp. 4a. states that an EIS is adequate if it:

> addresses the potentially significant issues and alternatives raised in scoping so that all significant issues for which information can be reasonably obtained have been analyzed in conformance with part 4410.2300, items G and H.

Minnesota Rule 4400.1700 subp. 10a. states that the final EIS is adequate if it:

> addresses the issues and alternatives raised in scoping to a reasonable extent considering the availability of information and the time limitations for considering the permit application;

The Department EIS fulfills those rules in its analysis and its incorporated references.

Appendix A
Proposal and Alternatives Maps

Appendix B
Detailed Route Maps

Appendix C
Substation Maps

Appendix D
Impacts Table

Appendix E
ROW/Structures

Appendix F
Mercury Letter

Appendix G
Wildlife Areas within 1 mile of Route Segments

Appendix H
Recreational Resources and Potential Impacts

Appendix I
Scoping Decision

Appendix J
Comments on the Draft EIS

The Applicants (Otter Tail Power, et al.)
Western Area Power Administration
MN Department of Natural Resources
Joint Intervenors (MCEA, et al.)
SD Governor's Office of Economic Development
Windustry
Sample Public Comment Letter 1 (Approximately 150 exact or slightly varied copies)
Sample Public Comment Letter 2 (Approximately 150 exact or slightly varied copies)
Sample Public Comment Postcard (197 copies)