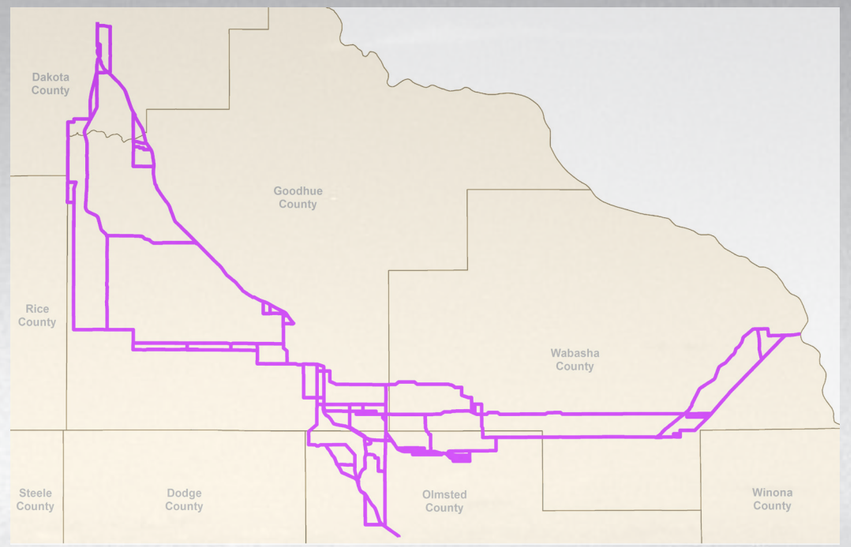
CapX Hampton-Rochester-La Crosse 345kV and 161kV Transmission Lines Project

Draft Environmental Impact Statement



March 2011

Responsible Governmental Unit

Office of Energy Security
85 7th Place East, Suite 500
St. Paul, MN 55101-2198

OES Representative

Matthew Langan
State Permit Manager

Energy Facility Permitting
(651) 296-2096

Project Applicant

Xcel Energy Company
414 Nicollet Mall
Minneapolis, MN 55401

Project Representative

Thomas G. Hillstrom
Supervisor
Siting and Permitting, Xcel Energy
1-800-238-7968

Abstract

The Public Utilities Commission (Commission) is considering the project proposed by Xcel Energy – on behalf of its CapX2020 co-owners Dairyland Power, Rochester Public Utilities, WPPI Energy and Southern Minnesota Municipal Power Agency – to construct and operate a 345 kilovolt and a 161 kilovolt transmission line between Hampton, Minnesota, Rochester, Minnesota, and La Crosse, Wisconsin. The portion of the project within the state of Minnesota would traverse parts of Dakota, Goodhue, Olmsted and Wabasha counties, with one potential route alternative that runs along the Rice-Goodhue county border. The project also includes the construction and operation of a new substation in an area between Zumbrota and Pine Island, Minnesota.

This draft environmental impact statement (draft EIS) evaluates the portion of the line in the state of Minnesota only, and was produced to satisfy the state of Minnesota environmental review requirements for the project.

Additional information on the project is available in the project application listed in the references chapter of this draft EIS. Other material related to this docket is available online at: http://energyfacilities.puc.state.mn.us/Docket.html?Id=25731, or on the eDockets website at https://www.edockets.state.mn.us/EFiling/search.jsp (enter the docket year "09" and number "1448").

This draft EIS was released on March 21, 2011. Comments on the draft EIS will be accepted until April 29, 2011. Comments should be sent by email, facsimile, or U.S. mail to:

Matthew Langan, State Permit Manager
Office of Energy Security, Minnesota Department of Commerce
85 7th Place East, Suite 500
St. Paul, MN 55101-2198
Fax: (651) 297-7891
Email: matthew.langan@state.mn.us

Following the comment period, the draft EIS will be revised to incorporate comments and a final EIS will be issued.

This document can be made available in alternative formats (i.e., large print or audio) by calling 651-296-0391 (voice.) Persons with hearing or speech disabilities may call us through Minnesota Relay at 1-800-627-3529 or by dialing 711.

List of Preparers

Contributors to this document included:

Matthew Langan, State Permit Manager
Office of Energy Security, Minnesota Department of Commerce

Barr Engineering Company (Barr)

1.0 Summary **1**
1.1 State of Minnesota Review Process 1
1.2 Overview of Draft EIS Contents 2
1.3 Summary of Project Impacts and Route Alternatives 2
2.0 Project Overview **5**
2.1 The Applicant 5
2.2 The Project 5
2.3 Project Purpose 5
2.4 General Route Descriptions 5
2.5 Associated Facilities 5
2.6 Labeling Convention for Route Alternatives 6
2.7 Route Width 7
2.8 Rights-of-Way 7
2.9 Estimated Project Cost 8
2.9.1 Operation and Maintenance 8
2.10 Applicant's Schedule 8
3.0 Regulatory Framework **13**
3.1 Certificate of Need Process 13
3.2 Route Permit Process 13
4.0 Engineering and Operation and Design **15**
4.1 High-Voltage Transmission Line Basics 15
4.2 Conductors 15
4.3 Transmission Line Structures 16
4.4 Rights-of-Way Requirements 16
4.5 Underground Options 17
4.5.1 Undergrounding at River Crossings 18
5.0 Construction **19**
5.1 Applicable State Regulation 19
5.2 Utility Rights-of-Way 19
5.3.1 Construction Impact Areas 19
5.3.2 Mitigation 20
5.4 Substation Construction 20
5.4.1 Expansion of Existing Substations 20
5.5 Cleanup and Restoration 20
5.6 Maintenance 20
6.0 Mississippi River Crossing Analysis **21**
6.1 Crossing the Mississippi River 21
6.1.1 Factors Supporting the Kellogg Crossing 21
6.2 The Mississippi River at Kellogg 23
6.3 Crossing the Mississippi River at Kellogg 24
6.3.1 Aerial River Crossing 24
6.3.2 Underground River Crossing 25
7.0 Affected Environment/Potential Impacts **27**
7.1 Public Health and Safety 27
7.1.1 Electric and Magnetic Fields (EMF) 27
7.1.2 Stray Voltage 33
7.1.3 Induced Currents and Shock Hazards 34
7.1.4 Construction Activities and Equipment 34
7.1.5 Safety 34
7.1.6 Severe Weather 34
7.1.7 Environmental Contamination 34
7.2 Property Values 34
7.2.1 Property Value Concerns 34
7.2.2 Property Value Research 35
7.2.3 Mitigation 36
7.3 Human Settlement 36
7.3.1 Visual and Aesthetic Impacts 37
7.3.2 Noise 37
7.3.3 Proximity to Structures 38
7.3.4 Displacement 38
7.3.5 Tree Groves/Windbreaks 39
7.3.6 Existing Utilities 39
7.3.7 Domestic Water Well Installation/Maintenance 39
7.4 Land Use 39
7.4.1 Local Land Use Control Preempted 39
7.4.2 Project Area Land Use 39
7.4.3 Mitigation 40
7.5 Land-Based Economics 40
7.5.1 Agriculture 40
7.5.2 Forestry 41
7.5.3 Mining 41

7.6 Rare and Unique Natural Resources 41
7.6.1 State and Federally Listed Threatened and Endangered Species 41
7.6.2 Threatened and Endangered Species Habitat 42
7.6.3 Mitigation 43
7.7 Flora and Fauna 43
7.7.1 Flora 43
7.7.2 Fauna 44
7.8 Water Resources 48
7.8.1 State and Federal Regulations 48
7.8.2 Area Hydrology 49
7.8.3 Lakes 49
7.8.4 Surface Flows 49
7.8.5 Floodplains 49
7.8.6 Wetlands 49
7.8.7 Mitigation 50
7.9 Electronic Device Interference 50
7.9.1 Radio Interference 50
7.9.2 Television 50
7.9.3 Internet and Cellular Phones 51
7.9.4 Microwave Communication 51
7.9.5 GPS-Based Agricultural Navigation Systems 51
7.9.6 Mitigation 51
7.10 Cultural Resources 51
7.10.1 Overview of Cultural Resources 51
7.10.2 Mitigation 52
7.11 Transportation and Public Services 52
7.11.1 Roadways 52
7.11.2 Railroads 54
7.11.3 Airports 54
7.12 Recreation 54
7.12.1 Wildlife Management Areas 54
7.12.2 Scientific Natural Areas 54
7.12.3 Richard J. Dorer Memorial Hardwood State Forest 55
7.12.4 Trails 55
7.12.5 Parks (City, County, State, and Federal) 55
7.12.6 Water Bodies 55
7.12.7 Scenic Byways 55
7.12.8 Mississippi River and Upper Mississippi River National Wildlife and Fish Refuge 55
7.12.9 Private Recreational Facilities 55
7.12.10 Mitigation 55
7.13 Air Quality 55
7.13.1 Ozone and Nitrogen Oxides 56
7.13.2 SF_6 and PFC Use in Electricity Transmission and Distribution 56
7.13.3 Construction Emissions 57

8.0 Segment Analysis: Potential Impacts and Mitigation Strategies 59
8.0.1 Intrepreting Route Alternative Impact Numbers/Graphs 59
8.1 Segment 1 - Hampton Substation to North Rochester Substation 61
8.1.1 Description of Route Alternatives - Hampton to North Rochester Substation 62
8.1.2 Environmental Setting - Hampton to North Rochester Substation 80
8.1.3 Socioeconomic Setting - Hampton to North Rochester Substation 80
8.1.4 Analysis of Route Alternatives for the Hampton to North Rochester Substation 80
8.1.4.1 Public Health and Safety - Analysis of Segment Alternatives for the Hampton to North Rochester Substation Segment 80
8.1.4.2 Property Values - Analysis of Segment Alternatives for the Hampton to North Rochester Substation Segment 80
8.1.4.3 Human Settlement - Analysis of Segment Alternatives for the Hampton to North Rochester Substation Segment 80
8.1.4.4 Land Use Compatibility - Analysis of Segment Alternatives for the Hampton to North Rochester Substation Segment 83
8.1.4.5 Land Based Economies - Analysis of Segment Alternatives for the Hampton to North Rochester Substation Segment 85
8.1.4.6 Rare and Unique Resources - Analysis of Segment Alternatives for the Hampton to North Rochester Substation Segment 86
8.1.4.7 Flora and Fauna - Analysis of Segment Alternatives for the Hampton to North Rochester Substation Segment 89
8.1.4.8 Water Resources - Analysis of Segment Alternatives for the Hampton to North Rochester Substation Segment 91
8.1.4.9 Electronic Interference - Analysis of Segment Alternatives for the Hampton to North Rochester Substation Segment 94
8.1.4.10 Cultural Resources - Analysis of Segment Alternatives for the Hampton to North Rochester Substation Segment 94
8.1.4.11 Transportation and Public Services - Analysis of Segment Alternatives for the Hampton to North Rochester Substation Segment 95
8.1.4.12 Recreation Resources - Analysis of Segment Alternatives for the Hampton to North Rochester Substation Segment 99
8.1.4.13 Air Quality - Analysis of Segment Alternatives for the Hampton to North Rochester Substation Segment 101

8.2 Segment 2 - North Rochester Substation to Northern Hills Substation 102
8.2.1 Description of Route Alternatives - North Rochester Substation to Northern Hills Substation 103
8.2.2 Environmental Setting - North Rochester Substation to Northern Hills Substation 117
8.2.3 Socioeconomic Setting - North Rochester Substation to Northern Hills Substation 117
8.2.4 Analysis of Segment Alternatives for North Rochester Substation to Northern Hills Substation 117
8.2.4.1 Public Health and Safety - Analysis of Segment Alternatives for North Rochester Substation to Northern Hills Substation Segment 117
8.2.4.2 Property Values - Analysis of Segment Alternatives for North Rochester Substation to Northern Hills Substation Segment 117
8.2.4.3 Human Settlement - Analysis of Segment Alternatives for North Rochester Substation to Northern Hills Substation Segment 117
8.2.4.4 Land Use Compatibility - Analysis of Segment Alternatives for North Rochester Substation to Northern Hills Substation Segment 120
8.2.4.5 Land Based Economies - Analysis of Segment Alternatives for North Rochester Substation to Northern Hills Substation Segment 122
8.2.4.6 Rare and Unique Resources - Analysis of Segment Alternatives for North Rochester Substation to Northern Hills Substation Segment 123
8.2.4.7 Flora and Fauna - Analysis of Segment Alternatives for North Rochester Substation to Northern Hills Substation Segment 125
8.2.4.8 Water Resources - Analysis of Segment Alternatives for North Rochester Substation to Northern Hills Substation Segment 127
8.2.4.9 Electronic Interference - Analysis of Segment Alternatives for North Rochester Substation to Northern Hills Substation Segment 129
8.2.4.10 Cultural Resources - Analysis of Segment Alternatives for North Rochester Substation to Northern Hills Substation Segment 129
8.2.4.11 Transportation and Public Services - Analysis of Segment Alternatives for North Rochester Substation to Northern Hills Substation Segment 131
8.2.4.12 Recreation Resources - Analysis of Segment Alternatives for North Rochester Substation to Northern Hills Substation Segment 133
8.2.4.13 Air Quality - Analysis of Segment Alternatives for North Rochester Substation to Northern Hills Substation Segment 135
8.3 Section 3 - North Rochester Substation to Mississippi River 136
8.3.1 Description of Route Alternatives - North Rochester Substation to Mississippi River 137
8.3.2 Environmental Setting - North Rochester Substation to Mississippi River 150
8.3.3 Socioeconomic Setting - North Rochester Substation to Mississippi River 150
8.3.4 Analysis of Segment Alternatives for North Rochester Substation to Mississippi River 150
8.3.4.1 Public Health and Safety - Analysis of Segment Alternatives for North Rochester Substation to Mississippi River 150
8.3.4.2 Property Values - Analysis of Segment Alternatives for North Rochester Substation to Mississippi River 150
8.3.4.3 Human Settlement - Analysis of Segment Alternatives for North Rochester Substation to Mississippi River 150
8.3.4.4 Land Use Compatibility - Analysis of Segment Alternatives for North Rochester Substation to Mississippi River 152
8.3.4.5 Land Based Economies - Analysis of Segment Alternatives for North Rochester Substation to Mississippi River 154
8.3.4.6 Rare and Unique Resources - Analysis of Segment Alternatives for North Rochester Substation to Mississippi River 155
8.3.4.7 Flora and Fauna - Analysis of Segment Alternatives for North Rochester Substation to Mississippi River 159
8.3.4.8 Water Resources - Analysis of Segment Alternatives for North Rochester Substation to Mississippi River 161
8.3.4.9 Electronic Interference - Analysis of Segment Alternatives for North Rochester Substation to Mississippi River 164
8.3.4.10 Cultural Resources - Analysis of Segment Alternatives for North Rochester Substation to Mississippi River 164
8.3.4.11 Transportation and Public Services - Analysis of Segment Alternatives for North Rochester Substation to Mississippi River 166
8.3.4.12 Recreation Resources - Analysis of Segment Alternatives for North Rochester Substation to Mississippi River 168
8.3.4.13 Air Quality - Analysis of Segment Alternatives for North Rochester Substation to Mississippi River 171
8.4 Mississippi River Crossing at Alma 172
8.4.1 Description of Crossing and Structure Options 172
8.4.2 Environmental Setting 173
8.4.3 Socioeconomic Setting 173
8.4.4 Analysis of Alternatives 173
8.5 Substations 182
8.5.1 North Rochester Substation 182
8.5.1.1 Resources within Vicinity of Proposed Substation Siting Locations 182
8.5.2 Northern Hills Substation 182
9.0 Required Permits and Approvals 185
9.1 Federal Permits and Approvals 185
9.2 Minnesota State Permits and Approvals 185
9.3 Minnesota Local Permits and Approvals 186
9.4 Other Approvals 186
10.0 References 187

List of Appendices

Appendix A: Detailed Map Supplement (not included here)
Appendix B: GIS Data Sources
Appendix C: Minnesota Office of Energy Security Right-of-way and Easement Fact Sheet
Appendix D: Detailed River Crossing Information
Appendix E: Agricultural Impact Mitigation Plan
Appendix F: Rare and Unique Natural Resources
Appendix G: Cultural Resources
Appendix H: Segment 1 Summary Tables
Appendix I: Segment 2 Summary Tables
Appendix J: Segment 3 Summary Tables
Appendix K: Scoping Decision Document

List of Tables

2.9 1 Estimated Transmission line construction costs, 345 kV applicant's preferred route and alternate route

2.9 2 Estimated transmission line construction costs, 161 kV applicant's preferred route and alternate route

2.9-3 Substation modifications and construction cost estimate

4.3-1 Proposed structure design summary

6.1-1 Factors supporting the Alma crossing

7.1.1.1-1 International electric field guidelines

7.1.1.1-2 State electric field regulations or guidelines

7.1.1.1-3 Calculated Electric Fields (kV/m) for proposed transmission line designs (3.28 feet aboveground)

7.1.1.2-1 Calculated magnetic fields (mG) for proposed transmission line designs (3.28 feet aboveground)

7.1.1.2-2 Calculated magnetic fields (mG) for proposed transmission line designs (3.28 feet aboveground assumed 600 MVA loading)

7.1.1.2-3 International magnetic field guidelines

7.1.1.2-4 State magnetic field regulations or guidelines

7.3.2-1 Noise: comparison of modeled noise levels to state noise limits

7.7.2.1-1 SGCN key habitats in the project area by ECS subsection

7.7.2.1-1 Summary of SGCN, key habitats and key habitat use by ECS subsection

7.13.1-1 Ozone: comparison of modeled concentrations to state and national air quality standards

8.1.3-1 Socioeconomic statistics in Dakota and Goodhue Counties - Segment 1

8.1.4.3-1 Proximity of homes along each proposed route alternative - Segment 1

8.1.4.3-2 Pinch points - Segment 1

8.1.4.6-1 Summary of rare species within 150-foot ROW and one mile of each route alternative - Segment 1

8.1.4.8-1 Acres of wetland within entire proposed 1,000-foot route width of each route alternative - Segment 1

8.1.4.11-1 Residences and structures within widened route width areas along US Hwy 52 - Segment 1

8.2.3-1 Socioeconomic statistics in Goodhue and Olmsted Counties - Segment 2

8.2.4.3-1 Proximity of homes along each proposed route alternative - Segment 2

8.2.4.3-2 Pinch points - Segment 2

8.2.4.6-1 Summary of rare species within ROW and one mile of each route alternative - Segment 2

8.2.4.8-1 Acres of wetland within entire proposed 1,000-foot route width of each route alternative - Segment 2

8.3.3-1 Socioeconomic statistics in Goodhue, Olmsted, and Wabasha Counties - Segment 3

8.3.4.3-1 Proximity of homes along each proposed route alternative - Segment 3

8.3.4.3-2 Pinch points - Segment 3

8.3.4.6-1 (a and b) Summary of rare and unique resources within one mile of each route alternative - Segment 3

8.3.4.8-1 Acres of wetland within entire proposed 1,000-foot route width of each route alternative - Segment 3

8.4.1-1 Comparison of structure heights and required ROW widths for the five configuration options for the crossing of the Mississippi River

List of Figures

2.6-1 "C routes" showing parallel alignment portion

2.6-2 "C routes" showing overlapping portion of Segments 2 and 3

3.3-1 Permit process flow diagram

4.1-1 Major components of typical transmission line

4.2-1 Cross section of a conductor

4.3-1 Structure designs and foundations being proposed for the project

6.1-1 Project area showing approximate path of the Mississippi Flyway relative to the Alma crossing and the three other crossing alternatives considered

6.2-1 Aerial photograph of Mississippi River at the proposed Alma crossing.

7.1.1-1 The electromagnetic spectrum

7.1.1.1-1 Structure variations and calculated electric fields at various distances from the transmission centerline

7.1.1.2-1 Magnetic field of common appliances

7.1.1.2-2 Structural variations and calculated magnetic fields at various distances from transmission centerline (2025 peak flows)

7.3.2-1 Comparison of modeled project noise with noise levels associated with common, everyday noise sources

7.6.1-1 Loggerhead shrike

7.6.1-2 Dwarf trout lily

7.6.1-3 Kitten tails

7.7.2.1-1 North American Mississippi Migratory Flyway, Upper Mississippi River National Wildlife and Fish Refuge, and Important Bird Areas in relation to project area

7.7.2.1-2 Impact categories and percentage of SGCN affected

7.7.2.1-3 Location of CWD-infected deer harvested in late 2010

7.7.2.2-1 Example of a bird flight diverter

7.8.4-1 View of Mississippi River near Alma, Wisconsin

7.10.1-1 Oxford Mill

7.12-1 The Douglas Trail

7.12-2 Lake Zumbro

8.0.1-1 Example figure showing the number of red barns within the 1,000-foot route width of each route alternative

8.1.4.3-1 Proximity of proposed route alternatives to various human settlement features - Segment 1

8.1.4.3-2 Pinch point on route 1P-009 along County Highway 9 in Goodhue County - Segment 1

8.1.4.3-3 Pinch point on route 1P-009 along County Highway 9, west of 41st Avenue in Goodhue County - Segment 1

8.1.4.3-4 Pinch point on route 1P-009 along County Highway 9, east of County Highway 14 in Goodhue County - Segment 1

8.1.4.4-1 Land cover types along each route alternative - Segment 1

8.1.4.5-1 Prime farmland and non-farmland within ROW of route alternatives - Segment 1

8.1.4.5-2 Number of aggregate mines within 1,000-foot route width - Segment 1

8.1.4.6-1 Summary of DNR plant communities and MCBS Sites of Biodiversity Significance within 150-foot ROW of each route alternative - Segment 1

8.1.4.7-1 Vegetation community cover along the P route alternatives - Segment 1

8.1.4.7-2 Vegetation community cover along the A route alternatives - Segment 1

8.1.4.8-1 Number of watercourse, PWI, trout stream, and impaired stream crossings necessary for each route alternative - Segment 1

8.1.4.8-2 Acres of forested and non-forested wetland within proposed 150-foot ROW of each route alternative - Segment 1

8.1.4.9-1 Number of communication towers within 1,000-foot route width for each proposed route alternative - Segment 1

8.1.4.10-1 Number of archaeological sites within one-half mile of each route alternative - Segment 1

8.1.4.10-2 Number of historic sites within one-half mile of each route alternative - Segement 1

8.1.4.11-1 Comparison of shared ROW along each route alternative - Segment 1

8.1.4.12-1 Snowmobile trails along each route alternative - Segment 1

8.2.4.3-1 First pinch point along 65th Avenue NW in Olmsted County - Segment 2

8.2.4.3-2 Second pinch point along 65th Avenue NW in Olmsted County - Segment 2

8.2.4.3-3 Third pinch point along 65th Avenue NW in Olmsted County - Segment 2

8.2.4.4-1 Land cover types along each route alternative - Segment 2

8.2.4.5-1 Prime farmland and non-farmland within ROW of proposed route alternatives - Segment 2

8.2.4.6-1 Summary of DNR plant communities and MCBS Sites of Biodiversity Significance within ROW of each route alternative - Segment 2

8.2.4.7-1 Vegetation community cover along the P route alternatives - Segment 2

8.2.4.7-2 Vegetation community cover along the A route alternatives - Segment 2

List of Figures

8.2.4.8-1 Number of watercourse, PWI, trout stream, and impaired stream crossings necessary for each route alternative - Segment 2

8.2.4.8-2 Acres of forested and non-forested wetland within proposed ROW of each route alternative - Segment 2

8.2.4.10-1 Number of archaeological sites within one-half mile of each route alternative - Segment 2

8.2.4.10-2 Number of historic sites within one-half mile of each route alternative - Segment 2

8.2.4.11-1 Comparison of shared ROW along each route alternative - Segment 2

8.2.4.12-1 Length each route alternative follows Douglas State Trail - Segment 2

8.2.4.12-2 Snowmobile trails along each route alternative - Segment 2

8.3.4.4-1 Land cover types along each route alternative - Segment 3

8.3.4.5-1 Prime farmland and non-farmland within ROW of proposed route alternatives - Segment 3

8.3.4.6-1 Summary of DNR plant communities and MCBS Sites of Biodiversity Significance within ROW of each route alternative - Segment 3

8.3.4.7-1 General vegetation community cover along the P route alternatives - Segment 3

8.3.4.7-2 General vegetation community cover along the A route alternatives - Segment 3

8.3.4.8-1 Number of watercourse, PWI, trout stream, and impaired stream crossings necessary for each route alternative - Segment 3

8.3.4.8-2 Acres of forested and non-forested wetland within proposed ROW of each route alternative - Segment 3

8.3.4.9-1 Number of communication towers within 1,000-foot route width for each proposed route alternative - Segment 3

8.3.4.10-1 Number of archaeological sites within one-half mile of each route alternative - Segment 3

8.3.4.10-2 Number of historic sites within one-half mile of each route alternative - Segment 3

8.3.4.11-1 Comparison of shared ROW along each route alternative - Segment 3

8.3.4.12-1 Acres of RJD Forest in 1,000-foot route width - Segment 3

8.3.4.12-2 Snowmobile trails along each route alternative - Segment 3

8.4.1-1 Aerial photograph of Mississippi River crossing and route analysis area

8.4.4-1 GAP land cover types within route at the river crossing site

8.4.4-2 Acres of various resources within the route at the river crossing site

List of Maps

Section 2

2.5-01 Overview Map

2.6-01 Overview of Route Alternatives - Hampton to North Rochester Substation 345 kV Section

2.6-02 Overview of Route Alternatives - North Rochester Substation to Northern Hills Substation 161 kV Section

2.6-03 Overview of Route Alternatives - North Rochester Substation to Mississippi River 345 kV Section

Section 5

5.4-01 North Rochester Substation Area

Section 6

6.1-01 River crossing alternatives considered

6.3.2-01 HPFF Plan and Profile

Section 8

8.0-01 Overview Map

Hampton to North Rochester Substation (Segment 1)

8.1-01 1P Route Alternative

8.1-02 1A Route Alternative

8.1-03 1A-001 Route Alternative

8.1-04 1A-003 Route Alternative

8.1-05 1A-004 Route Alternative

8.1-06 1B-001 Route Alternative

8.1-07 1B-003 Route Alternative

8.1-08 1B-005 Route Alternative

8.1-09 1P-001 Route Alternative

8.1-10 1P-002 Route Alternative

8.1-11 1P-003 Route Alternative

8.1-12 1P-004 Route Alternative

8.1-13 1P-005 Route Alternative

8.1-14 1P-006 Route Alternative

8.1-15 1P-007 Route Alternative

8.1-16 1P-008 Route Alternative

8.1-17 1P-009 Route Alternative

8.1-18 Alignment Alternatives

8.1-19 Alignment Alternatives

8.1-20 Human Settlement Map

8.1-21 Land Use Compatibility Map

8.1-22 Rare and Unique Natural Resources Map

8.1-23 Flora and Fauna Map

8.1-24 Water Resources Map

8.1-25 Archaeological and Historic Resources Map

8.1-26 Transportation Map

8.1-27 Recreation Map

North Rochester Substation to Northern Hills Substation (Segment 2)

8.2-01 2P Route Alternative

8.2-02 2A Route Alternative

8.2-03 2A-001 Route Alternative

8.2-04 2A-002 Route Alternative

8.2-05 2A-003 Route Alternative

8.2-06 2B-001 Route Alternative

8.2-07 2C3-001-2 Route Alternative

8.2-08 2C3-002-2 Route Alternative

8.2-09 2C3-003-2 Route Alternative

8.2-10 2C3-004-2 Route Alternative

8.2-11 2C3-005-2 Route Alternative

8.2-12 2C3-006-2 Route Alternative

8.2-13 2C3-007-2 Route Alternative

8.2-14 2C3-008-2 Route Alternative

8.2-15 Alignment Alternatives

8.2-16 Human Settlement Map

8.2-17 Land Use Compatibility Map

8.2-18 Rare and Unique Natural Resources Map

8.2-19 Flora and Fauna Map

8.2-20 Water Resources Map

8.2-21 Archaeological and Historic Resourses Map

8.2-22 Transportation Map

8.2-23 Recreation Map

North Rochester Substation to Mississippi River (Segment 3)

8.3-01 3P Route Alternative

8.3-02 3A Route Alternative

8.3-03 3-A-Alma Route Alternative

8.3-04 3-A-Crossover Route Alternative

8.3-05 3-P-Alma Route Alternative

8.3-06 3-P-Zumbro-N Route Alternative

8.3-07 3-P-Zumbro-S Route Alternative

8.3-08 3A-001 Route Alternative

8.3-09 3A-003 Route Alternative

8.3-10 3A-004 Route Alternative

8.3-11 3B-003 Route Alternative

8.3-12 3P-001 Route Alternative

8.3-13 3P-002 Route Alternative

8.3-14 3P-003 Route Alternative

8.3-15 3P-004 Route Alternative

8.3-16 3P-005 Route Alternative

8.3-17 3P-006 Route Alternative

8.3-18 3P-007 Route Alternative

8.3-19 3P-008 Route Alternative

8.3-20 3P-009 Route Alternative

8.3-21 3P-010 Route Alternative

8.3-22 3P-011 Route Alternative

8.3-23 2C3-001-3a Route Alternative

8.3-24 2C3-001-3b Route Alternative

8.3-25 2C3-002-3 Route Alternative

8.3-26 2C3-003-3 Route Alternative

8.3-27 2C3-004-3 Route Alternative

8.3-28 2C3-005-3 Route Alternative

8.3-29 2C3-006-3 Route Alternative

8.3-30 2C3-007-3 Route Alternative

8.3-31 2C3-008-3 Route Alternative

8.3-32 Alignment Alternatives

8.3-33 Human Settlement Map

8.3-34 Land Use Compatibility Map

8.3-35 Rare and Unique Natural Resources Map

8.3-36 Flora and Fauna Map

8.3-37 Water Resources Map

8.3-38 Archaeological and Historic Resourses Map

8.3-39 Transportation Map

8.3-40 Recreation Map

Mississippi River Crossing at Alma

8.4.1-02 Detailed River Crossing Map - Option A

8.4.1-03 Detailed River Crossing Map - Option B

8.4.1-04 Detailed River Crossing Map - Option C

8.4.1-05 Detailed River Crossing Map - Option D

8.4.1-06 Detailed River Crossing Map - Option E

List of Maps

Substations

8.5-01 Hampton Substation Area

8.5-02 North Rochester Substation Area

8.5-03 Northern Hills Substation Area

List of Acronyms

ACGIH	American Conference of Governmental Industrial Hygienists
ACSS	Aluminum Conductor Steel Supported (cables)
AIMP	Agricultural Impact Mitigation Plan
ALJ	Administrative Law Judge
AM	Amplitude Modulated
AMA	Aquatic Management Area
APE	Area of Potential Effect
ATF	Advisory Task Force
AWOS	Automated Weather Observation Stations
BFD	Bird Flight Diverters
BMP	Best Management Practice
BWSR	Minnesota Board of Water and Soil Resources
CCD	Colony Collapse Disorder
Commission	Public Utilities Commission
CON	Certificate of Need
CR	County Road
CREP	Conservation Reserve Enhancement Program
CRP	Conservation Reserve Program
CSAH	County State Aid Highway
CWA	Federal Clean Water Act
CWCS	Comprehensive Wildlife Conservation Strategy
CWD	Chronic Wasting Disease
dB	Decibels
dBA	"A-weighted" sound scale (human hearing) recorded in units of decibels
DME	Distance Measuring Equipment
DNR	Minnesota Department of Natural Resources
DOT	Minnesota Department of Transportation
ECS	Ecological Classification System
EFP	OES Energy Facilities Permitting
EIS	Environmental Impact Statement
ELF	Extremely Low Frequency
EMF	Electromagnetic Field
EMI	Electromagnetic Interference
EPRI	Electric Power Research Institute
EQB	Environmental Quality Board
EU	European Union
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
FEMA	Federal Emergency Management Agency
FM	Frequency Modulated
FMA	Fish Management Area
FNAP	Farmland Natural Areas Project, Dakota County, MN
G	Gauss (mG = milligauss)
GAP	Gap Analysis Program
GBCA	Grassland Bird Conservation Areas
GIS	Geographic Information System
GPS	Global Positioning System
GSM	Global System for Mobile Communications
HPFF	High-Pressure Fluid-Filled Pipe
HU	Hydrologic Unit
HUD	Housing and Urban Development
HVTL	High Voltage Transmission Line
Hwy	Highway
Hz	Hertz
IBA	Important Bird Area
ICD	Implantable Cardioverter Defibrillators
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IEEE	Institute of Electrical and Electronics Engineers
kV	Kilovolt
LGU	Local Government Unit
LULC	Land Use/Land Cover
LUST	Leaky Underground Storage Tank
mA	Milliamps
MCBS	Minnesota County Biological Survey
MDA	Minnesota Department of Agriculture
MES	Master Entity System
MHz	Megahertz
MLCCS	Minnesota Land Cover Classification System
MN	Minnesota
Mn Hwy	Minnesota State Highway
MSIWG	Minnesota State Interagency Working Group
MVA	Megavolt-ampere
MW	Megawatt
MWh	Megawatt hour

NAAQS	National Ambient Air Quality Standards
NAC	Noise Area Classifications
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Corporation
NESC	National Electrical Safety Code
NHIS	Natural Heritage Information System
NHPA	National Historic Preservation Act
NIEHS	National Institute of Environmental Health Sciences
NOP	USDA National Organic Program
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NRPB	National Radiological Protection Board
NWI	National Wetlands Inventory
NWR	National Wildlife Refuge
OES	Office of Energy Security (Department of Commerce)
PCA	Minnesota Pollution Control Agency
PPB	Parts Per Billion
PPSA	Power Plant Siting Act
PSCW	Public Service Commission of Wisconsin
PUC	Public Utilities Commission
PWI	Public Waters Inventory
RIM	Reinvest in Minnesota, MN DNR critical habitat program
RJD Forest	Richard J. Dorer Memorial Hardwood Forest
ROW	Right-of-Way
RPA	Route Permit Application
RUS	U.S. Department of Agriculture Rural Utilities Service
SCGN	Species in Greatest Conservation Need
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SNA	Scientific and Natural Area
SPCC	Spill Prevention, Control, and Countermeasure Plan
SWG	State Wildlife Grants
SWPPP	Stormwater Pollution Prevention Plan
TCP	Traditional Cultural Property
TSR	Township, Section, and Range
US Hwy	U.S. Highway
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USDOE	U.S. Department of Energy
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOR	Very High Frequency Omni-directional Radio Range
WCA	Wetland Conservation Act
WHO	World Health Organization
WMA	Wildlife Management Area
WPA	Waterfowl Production Area
WRP	Wetland Reserve Program
XLPE	Extruded dielectric cable system

This page intentionally left blank.