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Acronyms

AC	alternating current
AES	Alternative Evaluation Study
AFR	Application Filing Requirements
ALF	assisted living facility
Applicants	Northern States Power Company, (Xcel Energy), Dairyland Power Cooperative (Dairyland), and Wisconsin Public Power Energy, Inc. (WPPI)
Application	the Application for a Certificate of Public Convenience and Necessity to the Public Service Commission of Wisconsin
ASNRI	Areas of Special Natural Resource Interest
ATC	American Transmission Company
ATF	Advisory Task Force
Badger-Coulee Project	a 345 kV transmission line from La Crosse to the Madison area
BGEPA	Bald and Golden Eagle Protection Act
BMP	best management practice
BNSF	Burlington Northern Santa Fe
CAO	confined animal operation
CapX2020	CapX2020 Transmission Expansion Initiative
CFR	Code of Federal Regulations
CN	Canadian National
C&NW	Chicago and North Western
Commission	Public Service Commission of Wisconsin
CON	Certificate of Need
CPCN	Certificate of Public Convenience and Necessity
CWA	Clean Water Act
Dairyland	Dairyland Power Cooperative
DATCP	Wisconsin Department of Agriculture, Trade and Consumer Protection
dbh	diameter breast height
EF	electric field
EHS	extra high strength
EIS	environmental impact statement
EMF	electric and magnetic fields
EPRI	Electric Power Research Institute
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission

FPCP	Farmland Preservation Credit Program
GIS	geographic information system
GPS	geographic positioning system
GRR	Great River Road
GWh	gigawatt hour
HVTL	high voltage transmission line
IBA	Important Bird Area
JCSP	Joint Coordinated System Plan
kV	kilovolt
kV/m	kilovolts per meter (measurement for electric fields)
LDC	local distribution company
LGU	local government unit
LODF	Line Outage Distribution Factor
LSE	La Crosse Municipal Airport
MAP	Museum Archaeology Program
MBTA	Migratory Bird Treaty Act
MCS	Macro Corridor Study
MEQB	Minnesota Environmental Quality Board
MF	magnetic field
mG	milliGauss (measurement for electric fields)
MISO	Midwest Independent System Operator
MPUC	Minnesota Public Utilities Commission
MRPC	Mississippi River Parkway Commission
MTEP	Midwest Transmission Expansion Plan 2008
MVA	megavolt-amperes
MVAC	Mississippi Valley Archaeological Center
MVAR	megavolt amperes reactive
MVP	Multi-Value Project
MW	megawatt
MWEX	the transmission grid in the western portion of the state, along with interface loading levels across the Minnesota-Wisconsin border
NAIP	National Agricultural Imagery Program
NEPA	National Environmental Policy Act
NESC	National Electric Safety Code
NEV	neutral to earth
NFDC	FAA National Flight Data Center
NHI	Natural Heritage Inventory
NOI	Notice of Intent

NPDES	National Pollution Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWR	National Wildlife Refuge
NWFR	National Wildlife and Fish Refuge
OES	Minnesota Office of Energy
OHWM	ordinary high water mark
OPGW	optical ground wire
PDA	Project Development Agreement for the Hampton-Rochester-La Crosse 345 kV Transmission System Improvement Project
PNW	priority navigable water
Project	La Crosse Segment of the Hampton-Rochester-La Crosse 345 kV Transmission System Improvement Project
PSCW	Public Service Commission of Wisconsin
Q1 corridor	Dairyland 161 kV Q1 transmission line
RECB	Regional Expansion Criteria and Benefits
RES	Renewable Energy Standard
RGOS	Regional Generation Outlet Study
ROW	right-of-way
RPA	Route Permit Application (Minnesota)
RPS	Renewable Portfolio Standard
RPU	Rochester Public Utilities
RUS	Rural Utilities Service
WI-#	Wisconsin State Highway (followed by number)
SHPO	State Historic Preservation Office
SMART	Strategic Midwest Area Renewable Transmissions Study
SMMPA	Southern Minnesota Municipal Power Agency
SPCC	spill prevention, control and countermeasure
SWPPP	storm water pollution prevention plan
TCEA	Transmission Capacity Exchange Agreement
TCSB	temporary clear span bridge
TID	Tax Increment District
TSD	Technical Support Document
TSSR	Transmission Studies Summary Report (March 2011)
UNT	unnamed tributary
URGE	uniform rating of generating equipment
USC	U.S. Code
US	United States

US-#	U.S. Highway (followed by highway number)
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
~~Vision Plan~~	~~Technical Update: Identifying Minnesota's Electric Transmission Infrastructure Needs (May 2005) (updated October 2005)~~
WDNR	Wisconsin Department of Natural Resources
WGS	Wisconsin Geological Survey
WHO	World Health Organization
WHPD	Wisconsin Historic Preservation Database
WI-#	Wisconsin State Highway (followed by number)
WisDOT	Wisconsin Department of Transportation
WI-MRPC	Wisconsin Mississippi River Parkway Commission
WMA	Wildlife Management Area
WNHI	Wisconsin Natural Heritage Inventory
WPDES	Wisconsin Pollution Discharge Elimination System
WPPI	Wisconsin Public Power Inc.
WTM	Wisconsin Transverse Mercator
WWI	Wisconsin Wetland Inventory

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Introduction and Overview

A. Proposal Summary

Northern States Power Company, a Wisconsin corporation (Xcel Energy), Dairyland Power Cooperative (Dairyland), and WPPI Energy (WPPI) (collectively, the Applicants) propose to construct a new 345 kilovolt (kV) transmission line between Hampton, Minnesota; Rochester, Minnesota: and La Crosse, Wisconsin and two new 161 kilovolt (kV) transmission lines in the Rochester area. The new facilities are needed to meet local community load serving needs in the La Crosse, Wisconsin; Winona, Minnesota; and Rochester, Minnesota areas, to maintain the reliability of the regional electrical system and to support generation outlet. More specifically, the areas in Wisconsin benefiting from the project are Buffalo, Trempealeau and La Crosse Counties, including the communities of Alma, Buffalo City, Fountain City, Arcadia, Galesville, Trempealeau, Holmen, Onalaska, La Crosse and the surrounding rural areas.

In this application (Application), the Applicants seek approval from the Public Service Commission of Wisconsin (PSCW or Commission) and the Wisconsin Department of Natural Resources (WDNR) to construct the Wisconsin portion of the 345 kV line from Alma, Wisconsin to a new transmission substation located near Holmen and associated 161 kV system interconnections at the new substation termed the "La Crosse Project" or "Project". The Project would be approximately 40 to 55 miles long in Buffalo, Trempealeau and La Crosse Counties and, depending on the final route selected, be constructed in the cities of Alma, Buffalo, and Galesville; the towns of Arcadia, Belvidere, Buffalo, Caledonia, Cross, Gale, Glencoe, Holland, Lincoln, Milton, Onalaska, Trempealeau and Waumandee; and the village of Cochrane.

Certificate of Public Convenience and Necessity (CPCN): The Applicants hereby submit this Application for a CPCN to the PSCW pursuant to the requirements of Wis. Stat. §§ 196.49 and 196.491 and Wis. Admin. Code chs. PSC 4,111 and 112.

Utility Permit Application (Part 2): In accordance with Wis. Stat. § 30.025(1s) and Part 1 of the Applicants' Utility Permit Application filed on September 20, 2010, the Applicants hereby submit Part 2 of its Utility Permit Application to WDNR for the permits necessary to construct the proposed Project. The accompanying Technical Support Document (TSD) contains the detailed information required by WDNR to evaluate and issue the required permits.

This Application for a CPCN and WDNR utility permit(s) has been prepared in accordance with the PSCW and WDNR *Application Filing Requirements for Transmission Line Projects in Wisconsin* (Part 2.00), Version 17C (Application Filing Requirements [AFR], issued by the PSCW, WDNR and Department of Agriculture, Trade and Consumer Protection (DATCP) (November 2009).

In addition to a CPCN from the PSCW and permits from the WDNR, the 345 kV transmission line requires a Certificate of Need (CON) and Route Permit from the Minnesota Public Utilities Commission (MPUC). The MPUC granted a CON on May 22, 2009 for the Minnesota portion of the 345 kV line and the 161 kV transmission lines. *In the Matter of the Application of Great River Energy, Northern States Power Company (d/b/a Xcel Energy) and Others for Certificates of Need for the CapX 345 kV Transmission Projects*, Order Granting Certificates of Need with Conditions MPUC Docket No. ET-2, E-002, et al./CN-

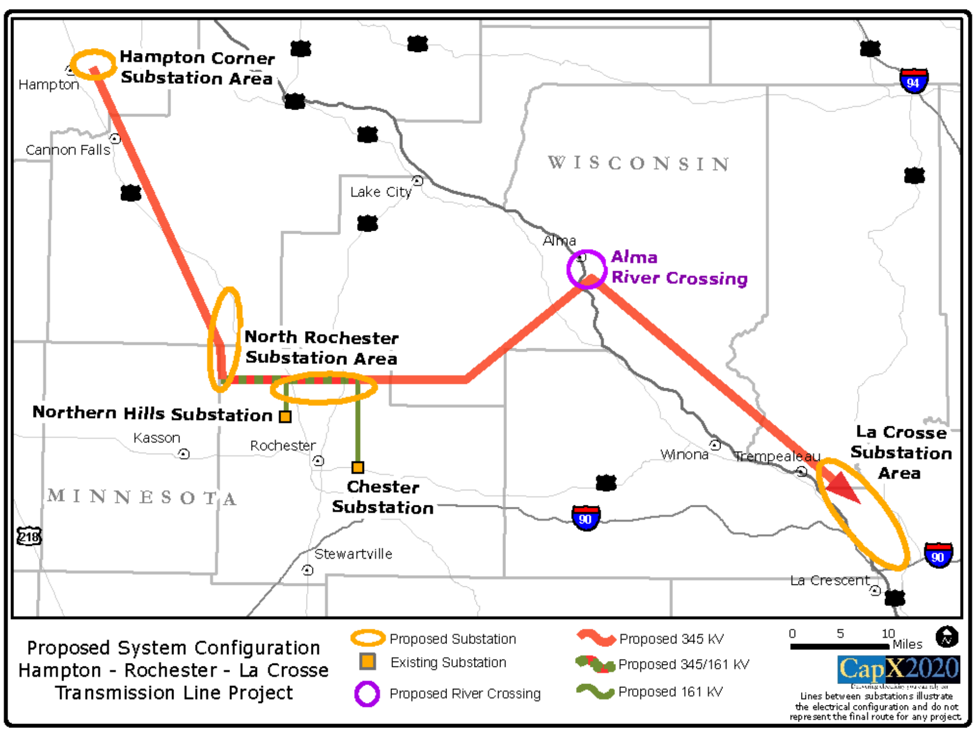
06-1115 (May 22, 2009; as modified, August 10, 2009) (CON Order). A Route Permit Application (RPA) for the Minnesota portion of the 345 kV transmission line and one of the Rochester area 161 kV transmission lines is pending *In the Matter of the Application by Xcel Energy for a Route Permit for the Hampton-Rochester-La Crosse 345 kV Transmission Line Project.*

A federal Environmental Impact Statement (EIS) will also be prepared. The US Department of Agriculture Rural Utilities Service (RUS) is leading this effort in cooperation with the US Fish and Wildlife Service (USFWS) and the US Army Corps of Engineers (USACE).

B. Facilities to be Constructed

The Applicants propose to construct the 345 kV transmission line between Minnesota and Wisconsin, crossing the Mississippi River at Alma, Wisconsin. The Minnesota portion of the 345 kV transmission line would be constructed as 345 kV double-circuit capable so that a second 345 kV could be co-located on the same poles if conditions warrant a second circuit in the future, as required in accordance with the Minnesota CON Order (CON Order at 28-30). With the exception of 1.0 to 2.8 miles (depending on the route selected) near the Mississippi River crossing, the Wisconsin portion of the 345 kV transmission line is not proposed to be constructed having the capability of carrying two 345 kV circuits. As described in Section 2.4, the majority of the proposed routes would follow existing 161 kV and/or 69 kV corridors. The new line would be designed to carry the 345 circuit plus the existing transmission line on one pole and the Minnesota portion also includes two new 161 kV transmission lines in the Rochester as shown in Figure 1.

Figure 1:
Hampton-Rochester-La Crosse 345 kV Transmission Project



The Applicants propose to construct the following facilities in Wisconsin for the La Crosse Project.

A 345 kV transmission line from the existing Mississippi River crossing at Alma to the La Crosse area: This line would be approximately 40 to 55 miles long, depending on the final route selected. Three complete route alternatives between Alma and the Holmen area are included in this Application: the Q1-Highway 35 Route, the Arcadia Route and the Q1-Galesville Route. Figure 2 shows the three proposed routes that are included in this Application. This Application also includes an option that could replace a 1.7 mile section of Arcadia Route. The Arcadia-Alma Option is a 1.3 mile segment alternative near the Mississippi River and offers an alternative connection from the river crossing to the Arcadia Route (Figure 3). The three alternative routes and one route option were developed over a period of more than three years. The Applicants undertook a detailed evaluation of end-to-end route impacts for the entire 345 kV transmission line between Hampton, Minnesota and La Crosse, Wisconsin, including alternative Mississippi River crossing options at Winona, Minnesota and between La Crescent, Minnesota and La Crosse, Wisconsin. River crossing options were based on an investigation of the overall study area, regulatory guidance about corridor sharing and routing criteria, extensive agency and landowner input, suitability for construction, cost and electrical system need. More information about these routes can be found in Section 2.4.

The Applicants' routing and engineering personnel analyzed 106 route segments in Wisconsin to develop the Q1-Highway 35 Route, the Arcadia Route, the Q1-Galesville Route and the Arcadia-Alma Option. Route configuration and right-of-way (ROW) sharing information for these routes are presented in Figures 9 through 14 at the end of this section. The Q1-Highway 35 Route is presented in Figures 9 and 10; the Arcadia Route and Arcadia-Alma Option in Figures 11 and 12; and the Q1-Galesville Route in Figures 13 and 14.

Appendix A includes the required impact tables for these alternative routes. Appendices B through D include maps showing the location of the alternative routes and substation facilities, local infrastructure, the location of sensitive sites, parcel boundaries, environmental features and access plans.

A new substation (Briggs Road Substation): A new Briggs Road transmission substation would be constructed as part of the Project. The major substation equipment is described in Section 2.1.4 of this Application. This substation would allow the new 345 kV transmission line to connect to the existing transmission lines in the La Crosse area. A preferred and alternate substation site has been identified near US Highway (US)-53 and Briggs Road in the town of Onalaska, near Holmen. Regardless of the route selected, the existing Xcel Energy Tremval-Mayfair 161 kV line and the existing Dairyland Alma-La Crosse (Q1) 161 kV line would need to be rerouted a short distance to the proposed Briggs Road Substation. Figures 4 and 5 show how these lines would connect to the preferred substation location. Initial construction of the substation area would occupy approximately 10 acres; the ultimate layout would require an additional 2 acres. The Applicants propose to acquire a parcel of approximately 40 acres to accommodate the substation, a buffer and line connections

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Figure 2:
Alternative Routes Included in Application

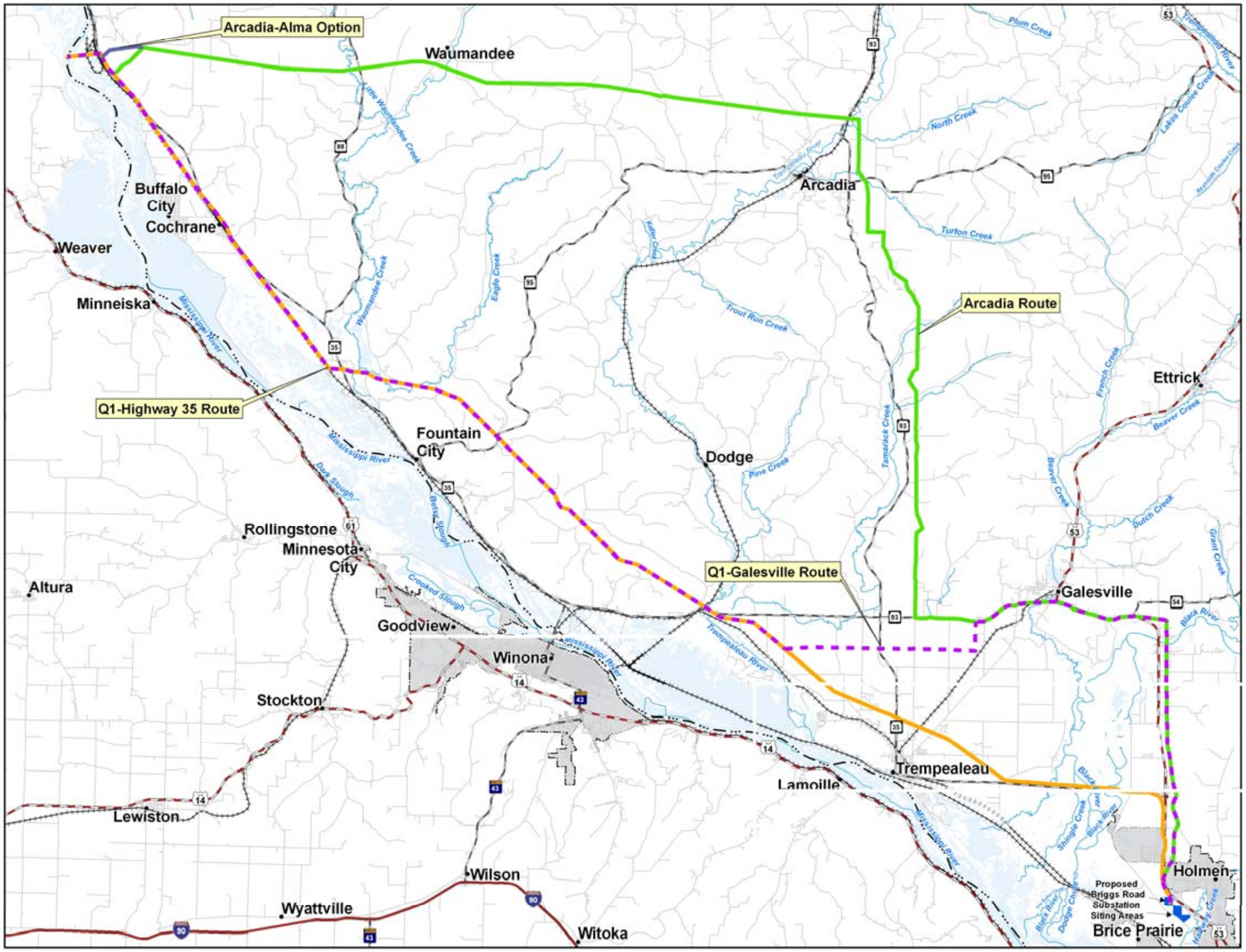

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Figure 3:
1.3-Mile Arcadia-Alma Option Located at the Northern End of the Arcadia Route

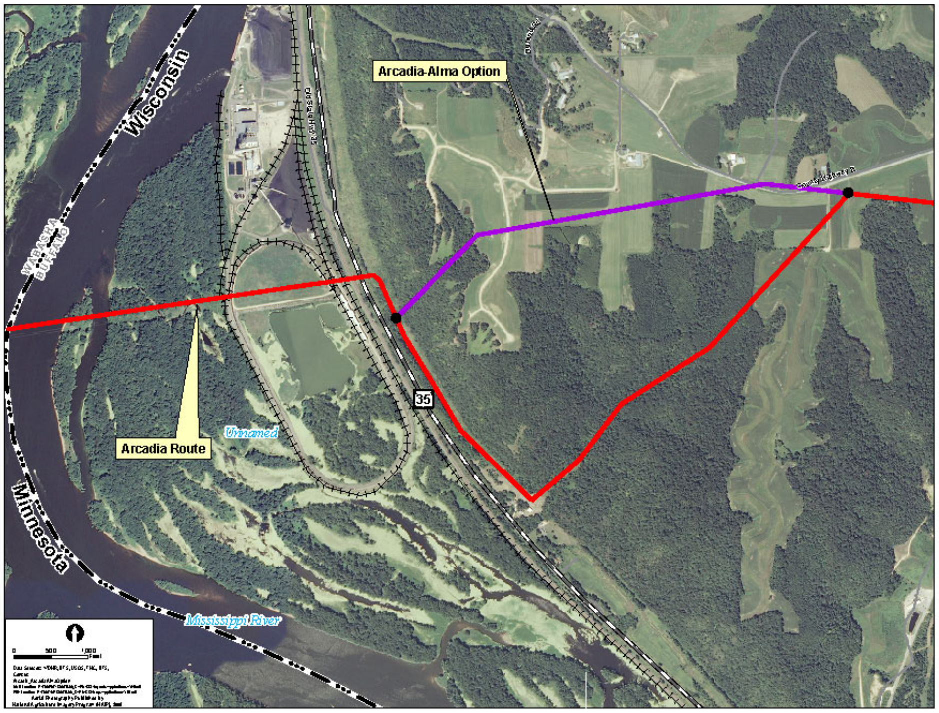


Figure 4:
Tremval-Mayfair 161 kV and existing Dairyland Alma to La Crosse (Q1) Reroute of under 1 Mile for Arcadia and Q1-Galesville Routes (See Appendix K for more detail)

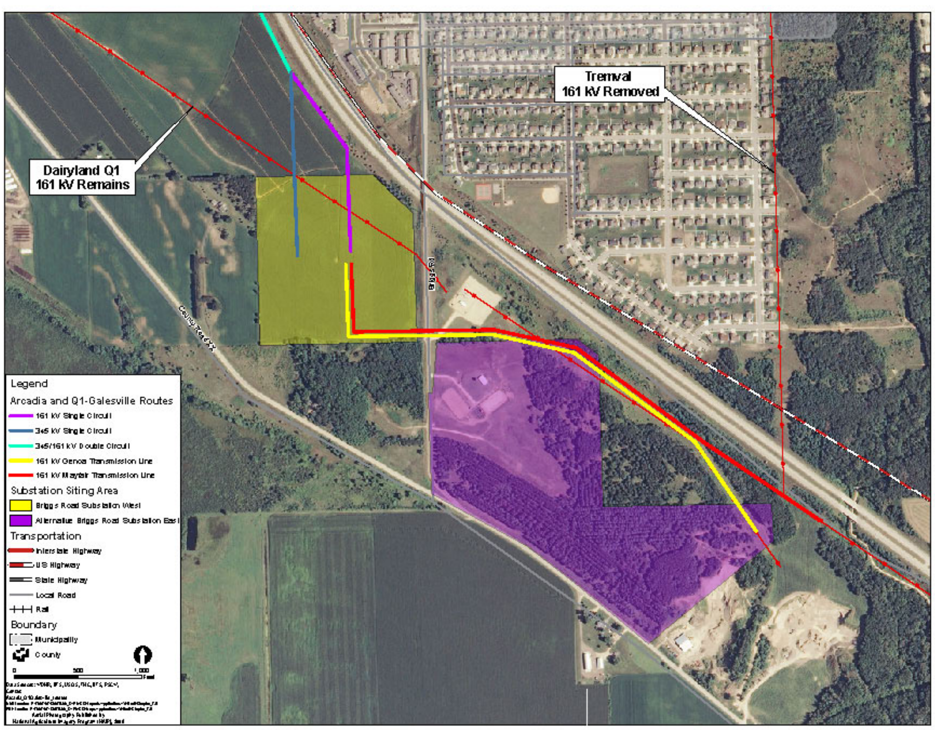
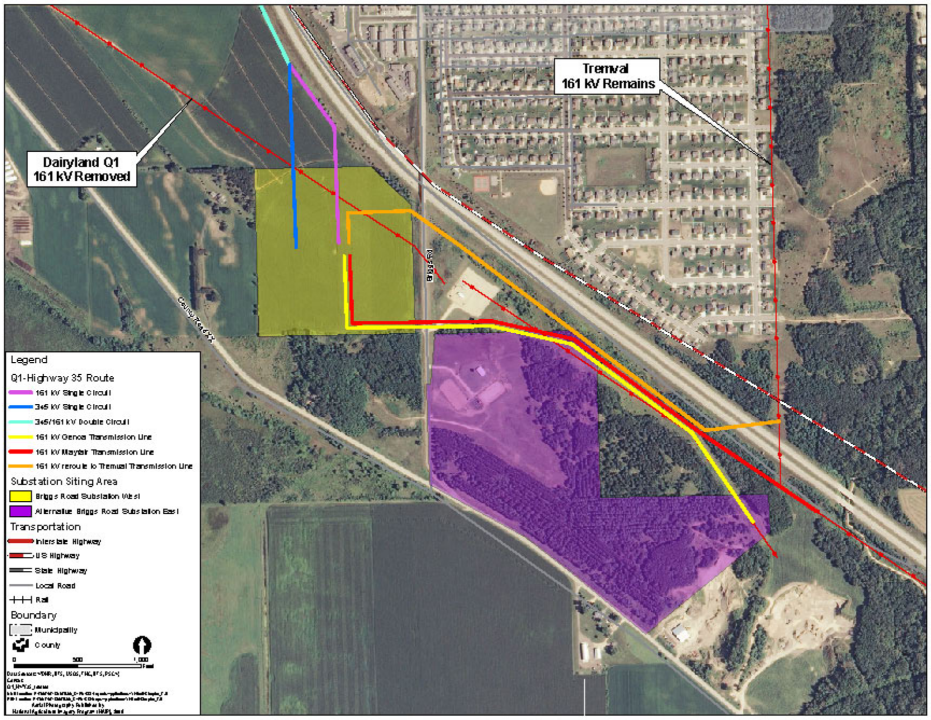


Figure 5:
Tremval-Mayfair 161 KV and existing Dairyland Alma to La Crosse (Q1) Reroute of under 1 Mile for Q1-Highway 35 Route (See Appendix K for more detail)



C. *Purpose and Necessity*

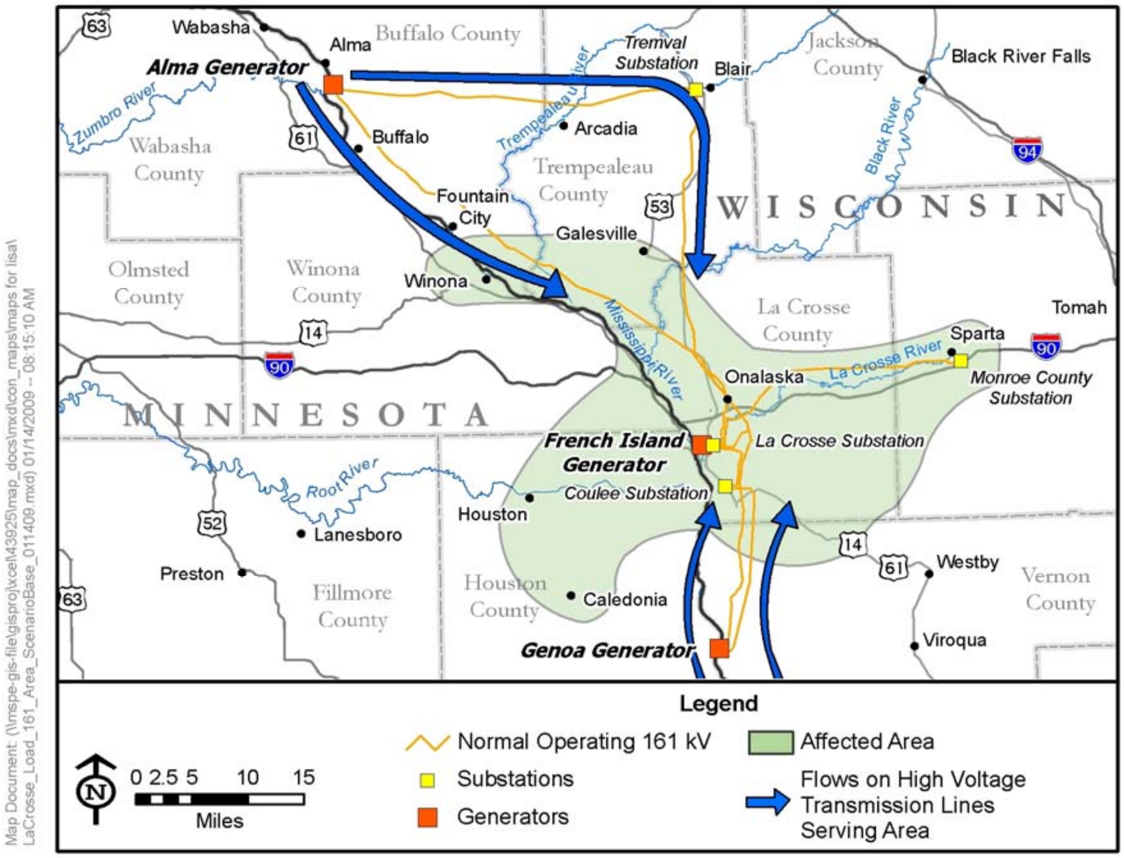
1. Community Reliability Needs

The 345 kV and 161 kV transmission lines are proposed to address the community load serving needs in the La Crosse/Winona and Rochester areas. The Project would increase load serving capability in the La Crosse/Winona areas to 791 megawatt (MW), 300 MW above the projected 2012 level. Based on current growth forecasts, this capacity would meet needs through approximately 2050. The new facilities would also provide additional capacity in Rochester, estimated to serve load through approximately mid-century.

a. *La Crosse/Winona Area*

Xcel Energy and Dairyland (through its member cooperatives) provide electrical service to the La Crosse/Winona area, which includes the cities of La Crosse, Onalaska and Holmen, and extends to include Sparta, Arcadia, Trempealeau, Buffalo City, Cochrane and the surrounding rural areas. In Minnesota, the area includes Winona/Goodview, La Crescent, Houston and Caledonia. The growing demand for electricity in these communities is exceeding the capabilities of the electrical system to reliably deliver power under contingency conditions. The area is served by four primary transmission links or sources of power as depicted in Figure 6.

Figure 6:
Four Primary Transmission Links Serving the La Crosse/Winona Area



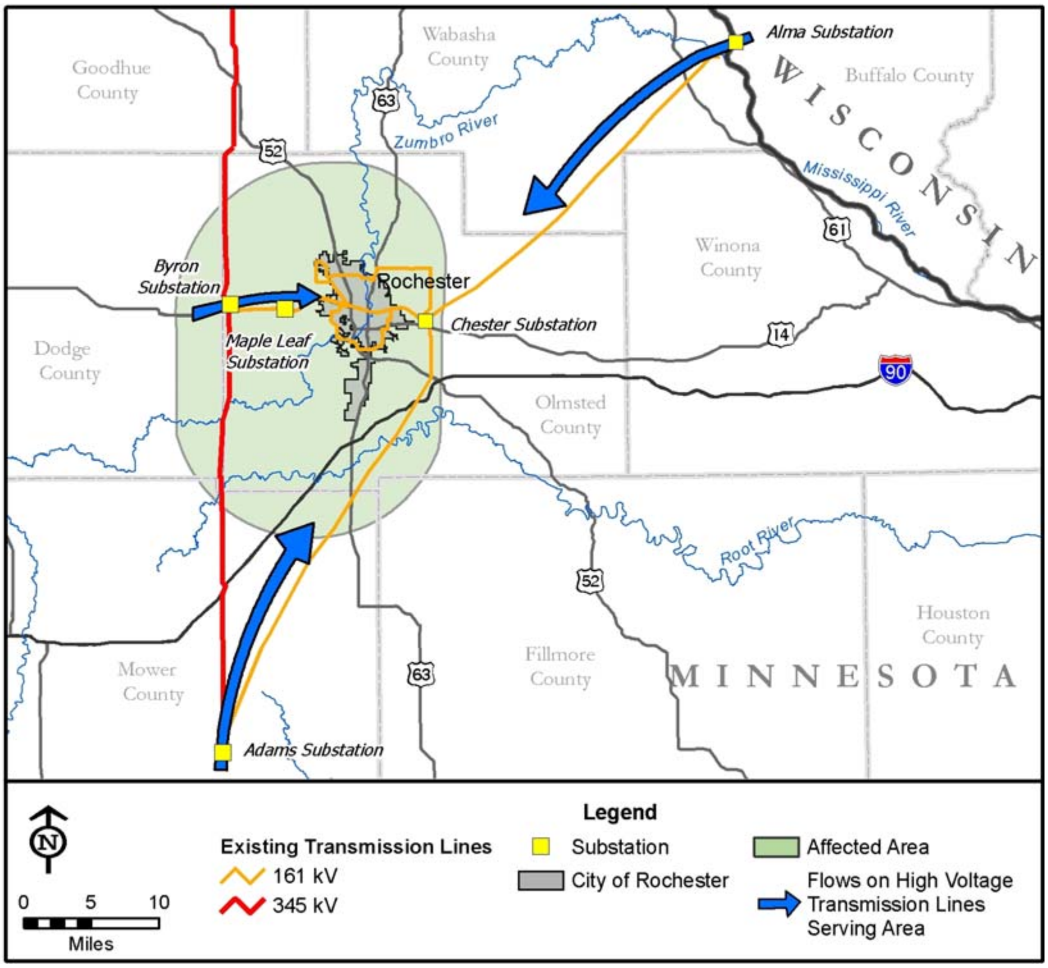
The transmission system's ability to reliably serve these areas depends on the status of local major power plants.

If plants at Genoa and Alma are in operation and a transmission source fails, 470 MW of power demand can be met. Transmission support to the area can drop to as low as 330 MW if the John P. Madgett Station at Alma or Genoa generation is not operating. Local generation at French Island in La Crosse (totaling 70 MW) must be run any time demand exceeds these critical load levels. These critical system conditions are summarized below and discussed in detail in the March 2011 Transmission Studies Summary Report ([TSSR] Appendix E, Section 6, pages 13-23 ~~page 8~~). New high voltage transmission lines (HVTLs) in this area would provide transmission support and alleviate these contingencies. Coincident ~~P~~peak demand reached 447 MW in 2006 and 450.2 MW on August 12, 2010. Additional electrical infrastructure is needed to provide capacity for this growing demand.

b. Rochester Area

Rochester Public Utilities (RPU) is the municipal electric utility serving the city of Rochester. Dairyland and its member, People's Cooperative Services, serve rural customers around the city. The electrical system serving Rochester area communities is similarly reaching capacity. The area is served by three 161 kV transmission lines that connect to the rest of the transmission network: one from the west, one from the northeast and one from the south (Figure 7).

Figure 7:
The Three 161 kV Transmission Lines Serving the Rochester Area



If one of the sources of power into Rochester were to fail, the remaining two transmission sources would be able to deliver only 145 MW of power to area substations. The area's demand for power has exceeded 145 MW by more than 4,000 hours annually since 2005, when the demand exceeded 145 MW for 5,400 hours. To protect against system failure, local generation must be run whenever RPU's demand is expected to exceed 145 MW. With all local generation operating, the system can support up to 362 MW of demand should a transmission source fail. Peak power demand reached 330 MW in 2006, and on August 12, 2010, it reached a coincident peak of 314 MW. New transmission sources are needed to meet increasing demand.

2. Regional Reliability

It has been nearly three decades since the electrical network serving western Wisconsin and southeastern Minnesota has been expanded to any large degree. At the same time, the demand for power has continued to grow. In response to this anticipated growth, the Applicants and eight other load-serving utilities[1] came together to form the CapX2020 Transmission Expansion Initiative (CapX2020) to expand the electrical transmission grid in the region to ensure customers receive continued reliable, low-cost electricity and to increase capacity for new generation sources. Rather than address each emerging transmission issue as it surfaces, planning engineers from several regional utilities decided to examine the regional transmission infrastructure more comprehensively.

Beginning in 2004, the CapX2020 study effort was undertaken to evaluate (at a high level) long-range transmission needs that would be necessary to meet power requirements of regional customers anticipated by the year 2020. A 345 kV line between Hampton and La Crosse was one of the projects identified by the CapX2020 utilities needed to serve future growth.

The 345 kV line from the Twin Cities to Rochester and on to La Crosse will serve as an important first step in a greater regional transmission system build-out. Additional bulk facilities are needed to serve thousands of megawatts of demand anticipated in the region. The Project will not only add 345 kV facilities, the Project will help alleviate a major interface constraint between Minnesota and Wisconsin which will enable transfers between the two states to meet power requirements.

~~(Figure 8). The CapX2020 Utilities published the results of this vision study effort in the Technical Update: Identifying Minnesota's Electric Transmission Infrastructure Needs (May 2005) (updated October 2005) (Vision Plan) Appendix E, Page 274. The Vision Plan[2] focused on growth in electricity demand~~. The Hampton-Rochester-La Crosse 345 kV Transmission Project is one of four high voltage transmission

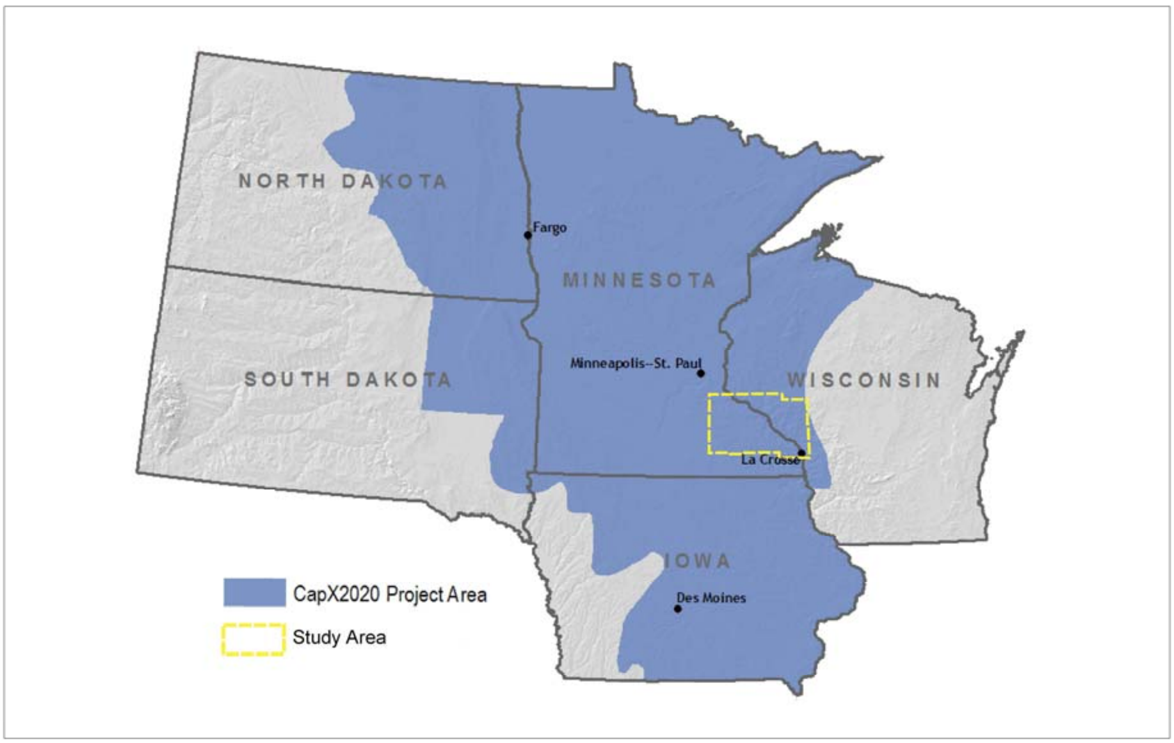
[1] The eight other CapX2020 utilities are: Great River Energy, Minnesota Power, Minnkota Power Cooperative, Missouri River Energy Services, Central Minnesota Municipal Power Agency, Otter Tail Power Company, Rochester Pubic Utilities and Southern Minnesota Municipal Power Agency.

[2] ~~Vision studies look at long-range needs and goals and include the following characteristics: a high level, 50,000-foot review of the electrical system; a blueprint for the future; a 10- to 25-year time horizon; and broad assumptions. Mid-term studies have the following characteristics: a mid-level, 25,000-foot review of the electrical system; identified needs, a 7- to 15-year time horizon; and more certainty in assumptions. Specific studies, which may include load-serving studies and interconnection studies, have the following characteristics: a shorter-term, 5,000-foot review of the electrical system; needs for a specific circumstance; a 1- to 10-year time horizon; and more certainty in assumptions.~~

line projects (Group 1 Projects) that CapX2020 has proposed to increase regional reliability as a result of these study efforts. The other Group 1 Projects are:

- A 345 kV line from Brookings County, South Dakota to Hampton, Minnesota
- A 345 kV line from Fargo, North Dakota to St. Cloud, Minnesota
- A 230 kV line from Bemidji, Minnesota to Grand Rapids, Minnesota

~~Figure 8:~~
~~CapX2020 Study Region Showing Hampton-Rochester-La Crosse Study Area~~



3. Generation Outlet/Renewable Energy Support

The proposed 345 kV and 161 kV transmission lines are also designed to provide the foundation for additional transfer capabilities between Minnesota and Wisconsin and would provide generation support, including support for renewable generation.

In Wisconsin, the transmission grid in the western portion of the state, along with interface loading levels across the Minnesota-Wisconsin border limit the ability to interconnect new generation in Minnesota as well as generation from points further west. In several regional studies planning engineers have identified the lack of 345 kV facilities between Minnesota, La Crosse and points east as the impediment to further transfers of generation resources between Minnesota and Wisconsin. The American Transmission Company, LLC (ATC) announced on July 26, 2010 its intentions to construct a 345 kV transmission line from La Crosse to the Madison area (Badger-Coulee Project), which would help address this issue. When the Badger-Coulee Project and the Hampton-Rochester-La Crosse 345 kV Transmission Project are completed, it is anticipated that the transfer capability between Minnesota and Wisconsin would increase.

The need for an enhanced regional grid is also driven by the need for significant infrastructure to support renewable energy generation development. One of the many drivers for increased reliance on renewable energy is the Renewable Portfolio Standard (RPS). This legislation requires Wisconsin utilities to meet a gradually increasing percentage of their retail sales with qualified renewable resources. Wisconsin set a goal that by the end of 2015, 10 percent of the electric energy consumed in the state must be produced by renewable resources, Wis. Stat. § 196.378(2)(a).

Minnesota has similarly implemented renewable energy legislation, the Renewable Energy Standard (RES). See Minn. Stat. § 216B.1691. RES imposes standards on public utilities providing electrical service, generation and transmission cooperative electric associations, municipal power agencies and power districts to generate or procure sufficient renewable energy. Each electric utility's direct retail energy sales, or energy sales to distribution utilities selling energy to Minnesota retail customers, must meet the following standards: (1) 12 percent by 2012; (2) 17 percent by 2016; (3) 20 percent by 2020; and (4) 25 percent by 2025, Minn. Stat. § 216B.1691, subd. 2a(a). Xcel Energy Minnesota must meet a 30 percent standard by 2025, Minn. Stat. § 216B.1691, subd. 2a(b).

D. Study Work

The Hampton-Rochester-La Crosse 345 kV Transmission Project was initially developed through local and regional studies beginning in 2004. In 2009-2010, study work and analyses were undertaken to assess the identified needs. This study work, set forth in the TSSR, Appendix E to this Application and summarized in Section 2.1.3, recommended the Hampton-Rochester-La Crosse 345 kV Project to meet the community reliability, regional reliability and generation support needs.

~~The Hampton-Rochester-La Crosse 345 kV Transmission Project was developed through local and regional studies beginning in 2004. Updated study work and analysis in 2009 confirmed that it was the best performing option to address the identified needs. These studies are all included in the TSSR, Appendix E to this Application and summarized in Section 2.1.3.~~

E. Route Development Process

The CPCN process requires that the Applicant propose at least two routes for transmission lines. The PSCW will make the final route determination based on a comprehensive record and public comment that will be developed during the CPCN proceedings.

The bulk of this Application describes the designated routes and alternatives that were considered. The Applicants determined the proposed routes after more than three years of careful study and significant public involvement and input. The public involvement process included multiple rounds of informational open houses, routing workshops and federal public scoping meetings. The public was notified of these meetings by direct mail and newspaper notices.

The Applicants also consulted with county, city and town governments; state agencies such as the PSCW, WDNR, Wisconsin Department of Transportation (WisDOT); federal agencies such as the USFWS, UUSACE and other interested parties. These meetings went beyond state and federal requirements and were conducted to ensure the public and agencies had the opportunity to provide input on routes before this CPCN Application was submitted.

As the PSCW considers this Application, the public and agencies will again have the opportunity to provide input during the state permitting process. These opportunities will include participating in public meetings and providing statements in the public hearings and contested case proceedings that will be part of the CPCN process.

In developing the proposed routes, the Applicants were guided by the routing criteria that are set forth in Wisconsin law and comments provided by the public at open houses. These criteria were analyzed to determine routes that minimize overall impacts. The criteria include but are not limited to:

- Sharing existing ROWs such as transmission lines, roads, railroads, and other existing corridors. Wisconsin statutes place a priority on using existing ROWs with a top priority on use of existing transmission corridors.
- If existing ROWs were not available or not used, use of property lines and agricultural field boundaries were used to minimize impacts.
- Proximity to homes.
- Potential impacts to agriculture, forestry, tourism, mining, and other land-based economies.
- Potential impacts to the natural environment, including wildlife, flora and fauna, and rare and unique natural resources.
- Designs that maintain electrical system reliability.

The routes presented in this Application seek to balance of all of the relevant criteria across the Project study area.

The Applicants developed three routes from the Mississippi River crossing at Alma to an endpoint location near Holmen. The proposed 345 kV routes, including the crossing at the Mississippi River, are described in the following paragraphs. Table 1 presents the routes, the amount of corridor sharing and other key criteria.

Table 1 (Revised):
Corridor Sharing and Route Comparison

Resource	Q1-Highway 35 Route	Arcadia Route	Q1-Galesville Route
Percent (miles) following existing transmission line[1]	71.2 percent (30.6 miles)	72.4 percent (39.6 miles)	58.4 percent (28.2 miles)
Percent (miles) following road or rail, but not transmission line	22.3 percent (9.6 miles)	17.6 percent (9.6 miles)	20.4 percent (9.9 miles)
Percent (miles) not following existing corridors	6.5 percent (2.8 miles)	10.0 percent (5.5 miles)	21.2 percent (10.3 miles)
Total length of route (miles)	43 miles	54.8 miles	48.4 miles
Residences within 300 feet	74	102	109
Wetland impact by route (acres of fill due to pole placement)	0.13 acres	0.14 acres	0.10 acres
Conversion/change in wetland type from forested to non-forested within ROW	47.7 acres	37.5 acres	33.4 acres
Cost	$194,590,000	$224,355,000	$202,065,000

[1] Sometimes shares with road or railroad corridor in addition to sharing with transmission corridor, see Table 1A (Appendix A).

1. Mississippi River Crossing

For the 345 kV transmission line between Minnesota and Wisconsin, the Mississippi River is a major constraint. The Applicants identified four potential river crossing locations:

- Alma, Wisconsin, where an existing 161 kV/69 kV double-circuit transmission line crosses the river.
- Winona, Wisconsin, where an existing 69 kV transmission line built to 161 kV specifications crosses the river.
- Between La Crescent, Minnesota and La Crosse, Wisconsin, where an existing 69 kV transmission line built to 161 kV standards crosses the river.
- Trempealeau, Wisconsin, which does not have an existing transmission line, but is where Lock and Dam No. 6 is located; the crossing could occur at a narrow section of the river containing several islands that could support transmission line poles.

The Trempealeau crossing was eliminated early in the analysis because the other three Mississippi River crossing options followed existing transmission line corridors across the river. The Trempealeau crossing would require a new transmission line crossing of the river and a new crossing of the USFWS Upper Mississippi Wildlife and Fish Refuge. The USFWS advised that it was unlikely a Special Use Permit could be issued because USFWS regulations do not allow new divisions of refuge property. Furthermore, field review also showed more residences than initially identified through aerial photographs along the Mississippi River on the Wisconsin side of the Trempealeau crossing. Accordingly, the remainder of the river crossing analysis discussion focused on the Alma, Winona and La Crescent/La Crosse crossings.

Route alternatives were then developed for each of the remaining three river crossing options and impacts were compared both within the specific river crossing area and overall impacts from Hampton to La Crosse. The Applicants concluded that a crossing at Alma, Wisconsin where Dairyland's Alma Generating Plant and existing transmission lines are already located, resulted in the least environmental and land use impacts. Details regarding this analysis are contained in the Mississippi River Crossing Analysis (Appendix F).

The key factors that support the Alma crossing are:

- In Wisconsin, there are two existing transmission line corridors that provide routing opportunities from the Alma crossing to the La Crosse area.
- Routes to the Alma crossing on the Minnesota side of the river follow an existing transmission line corridor through the hills along the river where other crossings would require creation of a new 10 to 15-mile transmission corridor through steep river bluff terrain.
- The Alma crossing would result in the shortest crossing of the Mississippi River floodplain and the Upper Mississippi River National Wildlife and Fish Refuge as well as the least wetlands impacts.
- The USFWS has stated a preference the Alma crossing over the other two crossings.
- The La Crescent/La Crosse crossing would require relocation of an existing business to establish an endpoint substation or would require routing the 345 kV line through the La Crosse Marsh wetland.

The Applicants, in consultation with USFWS, also developed multiple designs for the crossing of the Mississippi River to provide the best options available to minimize impacts on refuge lands. Appendix F presents detailed design options for the immediate area of the Mississippi River crossing at Alma. These design options demonstrate the tradeoffs between pole height and width of the footprint. Included are designs for which the Applicants believe there would be minimal or no incremental environmental impact to the river area and would reduce potential impacts to birds when compared to the existing transmission line.

The Applicants' analysis regarding Wisconsin routes focused on existing road and transmission line corridors consistent with the siting priorities law, Wis. Stat. § 1.12(6) and state routing criteria.

The next step in the route development process was to identify potential routes within the identified corridors and to gather stakeholder input on these routes. All routes proposed in this Application begin on the northwest end at Alma and connect at a new Briggs Road Substation near the intersection of US-53 and Briggs Road in the town of Onalaska, near Holmen.

2. Great River Road and Black River Floodplain

The primary existing transmission corridor between Alma and La Crosse is the Dairyland 161 kV Q1 transmission line (Q1) corridor, which was identified as a potential route corridor termed the Q1 Route early in the route development process. The northern 8 miles of this corridor is near Wisconsin Highway 35 (WI-35), which is designated as the Great River Road, an area along which the Wisconsin Department of Transportation (WisDOT) holds scenic easements. The WDNR, WisDOT and USFWS have concerns with the Q1 Route, including aesthetic and environmental impacts along the Great River Road/WI-35 and permit ability of the route across federal lands and state wetland areas in the Black River floodplain.

The Applicants worked to identify an alternative to the Q1 Route that would avoid both aesthetic impacts to the Great River Road/WI-35 and impacts related to crossing the Black River floodplain. The Applicants identified three potential routes that avoided portions of the Q1 corridor: the Blair Route, the Bluff Route and the Arcadia Route. These routes and the Applicants' routing processes are described in Section 2.2 of this Application. The Blair and Bluff routes were not carried forward. The Arcadia Route was carried forward as an alternative to the Q1 Route.

The Blair Route was eliminated because it would require additional length, which in turn, would result in additional impacts and increased cost compared to the Arcadia and Q1 routes. Compared to the Arcadia Route, the Blair Route would add approximately 5 miles in length, cost an additional $13 million and was not fully independent of the Arcadia Route, sharing 22.7 miles of the same corridor between the villages of Alma and Arcadia. Compared to the Q1 Route, the Blair Route would be 15 miles longer and cost an additional $30 million.

The Bluff Route was studied to avoid the Great River Road/WI-35 south of Alma. The route was eliminated in November 2009 because it did not follow an existing linear corridor which would require many poles to be placed in agricultural fields and would create a new corridor through wooded bluffs.

The Arcadia Route remains to provide an alternative that avoids the Great River Road/WI-35 south of Alma. The Arcadia Route is 54.7 miles, beginning at the crossing of the Mississippi River at Alma and ending at the proposed Briggs Road Substation. Like the Q1 Route, it crosses the Mississippi River at Alma, and proceeds east toward Waumandee and Arcadia, then turns south towards Galesville and Holmen. The Arcadia Route is a combination of existing Dairyland 161 kV transmission corridor, existing Dairyland 69 kV corridor, existing Xcel Energy 161 kV corridor and roadways. The Arcadia Route avoids both the aesthetic impacts to the Great River Road/WI-35 and the Black River floodplain, but is the longest of the three proposed routes and has greater impacts to agriculture land use and homes.

The Arcadia-Alma Option is a 1.3-mile segment alternative near the Mississippi River and offers an alternative connection from the river crossing to the Arcadia Route. It crosses the Mississippi River at the same location as the Arcadia Route and follows a short portion of the existing 161 kV corridor prior to diverting up the bluff through a forested area, some agricultural land and a rural residential development, prior to reconnecting with the existing 161 kV corridor and the Arcadia Route.

A significant constraint along the original Q1 Route is the Black River and its forested floodplain between Trempealeau and Holmen. The Black River floodplain is up to 3 miles wide and approximately 7 miles long just northwest of the route's endpoint in Holmen. Regardless of route selected for the La Crosse Project, the proposed 345 kV line must cross the Black River to connect into the 161 kV system serving the La Crosse area. Only one Black River crossing location, adjacent to the US-53 crossing of the Black River (Hunters Bridge) east of Galesville, would not require crossing of wetlands. Two of the three routes presented in this Application (Arcadia and Q1-Galesville) share this crossing location.

Because the Arcadia and Q1-Galesville Routes share 14 miles of common corridor, including an area of higher residential impacts, the Applicants saw the need to develop at least one route across the Black River floodplain wetlands and identified three existing corridors that could be used: the existing Q1 line, the GRR/WI-35 and an existing 69 kV line near the Seven Bridges Trail.

The WDNR expressed concerns with any route that goes through the Black River floodplain wetlands. The Q1 Route goes through USFWS refuge lands at the Black River. The Applicants met with USFWS several times to discuss the Black River area and presented detailed construction plans, access routes, itemizations of tree clearing needs and a range of four different pole types to minimize impacts. A construction plan was developed that includes measures that minimize temporary and permanent impacts to the wetlands, including vibratory caisson foundations that do not require excavation or the use of concrete or other fill in the wetlands. The Applicants also offered mitigation in the form of exchanging an existing easement across the Mississippi River near the Trempealeau National Wildlife Refuge (NWR) for a permit to cross the USFWS refuge on the existing Dairyland Q1 ROW. After examining all the measures proposed to minimize impacts, the USFWS indicated that the Q1 Route was not permittable for the new 345 kV line under its rules governing what compatible uses are allowed in refuge lands.

In response to USFWS's permitting determination and WDNR concerns, the Applicants further analyzed an alternative Q1 Route alignment that crosses the Black River floodplain along the Great River Road/WI-35 termed the Q1-Highway 35 Route, which is proposed in this Application. The Q1-Highway 35 Route is 43 miles long and shares the Dairyland Q1 161 kV transmission line corridor to a point where the route runs parallel to WI-35 across the Black River floodplain. The proposed line would then proceed south adjacent to US-53 for approximately 3.1 miles to the proposed Briggs Road Substation. To minimize aesthetic impacts to the Great River Road/WI-35 the route is located north of road through the Black River floodplain. To minimize and mitigate impacts to the Great River Road/WI-35 and to the Black River floodplain, the Applicants propose to:

- Locate poles just outside of the highway ROW and scenic easements, approximately 350 feet north of the Great River Road/WI-35. This alignment, developed in consultation with WisDOT, would allow for a tree buffer that would act as visual screening between the proposed transmission line and the Great River Road/WI-35.
- Remove the existing Dairyland Q1 161 kV transmission line from its current alignment and carry it with the proposed 345 kV line. The Applicants are also working to determine the feasibility of removing the existing 69 kV line from its location crossing the Black River near the Seven Bridges Trail and consolidating it with the new 345 kV line and the relocated Q1 161kV line at the

proposed location north of the Great River Road/WI-35. The Q1-Highway 35 Route could potentially result in the removal of two existing transmission line corridors crossing the Black River and consolidate them along with the proposed line adjacent to the existing highway corridor.

Also in response to specific WDNR concerns about crossing the Black River along the Q1 Route, the Applicants developed the Q1-Galesville Route. The Q1-Galesville Route is 48.4 miles long, beginning at the Mississippi River crossing at Alma and ending at the proposed new Briggs Road Substation. The first part of this route follows the Q1 alignment. It then connects with the Arcadia Route alignment to the proposed new Briggs Road Substation. The Great River Road/WI-35 impacts would be similar as described for the Q1 Route above. In this proposal the existing 69 kV and 161 (Q1) kV lines would remain in their present locations in the Black River floodplain.

As part of the route development process and in response to WDNR concerns regarding impacts to the Black River floodplain, the Applicants evaluated six additional route configurations in the Black River area. These alternatives were comprised of various combinations of the Q1 Route with the Galesville section of the Arcadia Route. Four route options were developed as discussed in Section 2.2 and evaluated to develop the Q1-Galesville Route. The three routes options not proposed in this Application resulted in a higher number of homes within 300 feet, posed significant engineering challenges in fitting the line between homes and the highway, and would have resulted in as many as 12 highway crossings in a 7-mile stretch, or the removal of several homes.

Two additional route options not carried forward in this Application were proposed by the WDNR and WisDOT to address potential impacts to the Great River Road/WI-35. The Wisconsin State Highway 88 (WI-88) Connector follows WI-88 and was suggested by WisDOT as a 15-mile alternative to the northernmost 10 miles of the original Q1 Route. It would connect the Arcadia Route to the Q1 Route and would avoid the northernmost 10 miles of the Q1 Route. The Applicants are not proposing the WI-88 Connector because it is significantly longer than the Q1 routes and only 4 miles shorter than the Arcadia Route. Other available routes, such as the Arcadia Route, share transmission ROW that is a higher priority siting corridor, per Act 89, and avoid the Great River Road/WI-35. There are constructability, cost and aesthetic complications for this corridor due to the curvy nature of the road; the southern portion of the route would result in impacts to the Great River Road/WI-35, following the Q1 corridor through a residential neighborhood in the town of Milton that is avoided by other routes. Given these facts, particularly that the Arcadia Route provides an alternative that avoids the Great River Road/WI-35 and utilizes an existing transmission corridor, routes such as WI- 88 were not carried forward in the Applicants' route development process.

The Arcadia Ettrick Route was suggested by WDNR as a potential substitute for the Q1-Highway 35 Route. It relies on an 8-mile connector segment following a 69 kV line between the Arcadia Route and the Blair Route. Using this connector segment yields a route that is approximately 55 miles long. Because this route is approximately 12 miles longer than the Q1-Highway 35 Route, it was not considered a reasonable substitute for the Q1-Highway 35 Route.

F. Long-Term Planning Considerations

The Applicants believe the Project is justified on local community reliability benefits alone, even if no future 345 kV or higher transmission line projects are constructed. However, the proposed 345 kV transmission line is designed to facilitate further build out of the regional 345 kV system under a variety of future scenarios. It would help strengthen the backbone bulk system to support a higher voltage overlay under any reasonable set of assumptions. The proposed 345 kV would also provide possible additional generation interconnections and, as noted, help facilitate and increase Minnesota to Wisconsin power transfers.

The endpoints of the La Crosse Project in Alma and La Crosse also support further 345 kV transmission developments in Wisconsin. The Alma crossing location provides the option of potential 345 kV connections to the north (e.g. Eau Claire) to the east (e.g. Blair, Jackson County, and the I-94 corridor) or an additional tie to the south (e.g. La Crosse), and the potential to interconnect to the 161 kV hub at Alma. The termination at a Briggs Road Substation provides the flexibility needed for the La Crosse area connection for ATC's proposed 345 kV project between the Madison area and La Crosse.

In addition, analyses aimed at identifying a high voltage (e.g. 765 kV) overlay transmission system for delivering large amounts of generation from points west uniformly call for enhancement of the 345 kV transmission system serving the region. Indeed, the Strategic Midwest Area Renewable Transmissions Study (SMART)[3] and Green Power Express plans identify the Hampton-Rochester-La Crosse 345 kV Transmission Project as an important underlying facility. The interregional Joint Coordinated System Plan (JCSP)[4] also included the La Crosse Project as an underlying facility. Similarly, in the Regional Generation Outlet Study (RGOS) released by the Midwest Independent System Operator (MISO) on November 19, 2010, MISO evaluated six scenarios to deliver high levels of renewable generation to load pockets within and outside the MISO footprint. All six scenarios included the Hampton-Rochester-La Crosse 345 KV project as an important underlying facility. The La Crosse Project further supports build out of the 345 kV transmission system in Wisconsin.

G. Owners

The Briggs Road Substation would be owned solely by Xcel Energy. The 345 kV transmission lines would be owned jointly by the Applicants in accordance with CapX2020 agreements. In February 2007, the Applicants executed a Project Development Agreement (PDA) for the Project. Appendix G contains a copy of the PDA. The PDA provides a contractual framework for the development phase of the Project. During this development phase, the participating utilities agreed to determine the interconnection/termination points of each project, the recommended alignment of the proposed

[3] SMART Study was developed by developed by Electric Transmission America – a transmission joint venture of subsidiaries of American Electric Power and MidAmerican Energy Holdings Company – American Transmission Company, Exelon Corporation, NorthWestern Energy, MidAmerican Energy Company – a subsidiary of MidAmerican Energy Holdings Company – and Xcel Energy.

[4] The JCSP study was released by MISO, SPP, PJM, TVA and MAPP.

configuration and the scope of the project; estimate the cost and schedule; and engage in other necessary project related studies or analyses. Xcel Energy is designated the project manager and is the lead utility for obtaining the required state and federal regulatory approvals and would construct the Project if approved.

In capital-intensive projects of this nature, it is understandable that participants desire to achieve sufficient regulatory certainty (e.g. cost-recovery, routing and conditions) before finalizing capital expenditure commitments. Accordingly, once state, federal and other regulatory decisions are made, final ownership will be determined. Each of the Applicants anticipates that it will become an owner. If a participant does not elect to invest in the Project, the agreement has established procedures by which other participants, including third parties, may take on the non-elected investment percentage share.

Agreements pertaining to the construction, operation, ownership and maintenance of each line are in the process of being negotiated, and participants would continue to refine the commercial arrangements among the participants as the regulatory processes proceed.

The current Project development percentages (and potential/non-binding ownership percentages) for this Project are shown in Table 2.

Table 2:
Potential Ownership Percentages

Participating Utility	Applicable Project Development Percentage	Ownership Interest in Wisconsin
Xcel Energy	64 percent	Yes
SMMPA	13 percent	No
Dairyland Power Cooperative	11 percent	Yes
RPU	9 percent	No
WPPI Energy	3 percent	Yes
TOTALS:	100 percent	

H. Project Cost

The estimated cost of the La Crosse Project in Wisconsin is as follows, depending on the transmission line route selected by the PSCW:

- Q1-Highway 35 Route: $194,590,000
- Arcadia Route: $224,355,000
- With Arcadia-Alma Option: $222,659,000
- Q1-Galesville Route: $202,065,000

Project costs are estimated and shown in greater detail in Section 2.1.7 of the TSD.

I. Construction Schedule

Based on our projections of when permits would be issued construction is planned for January 2013 through December 2015. Additional information concerning the proposed construction is provided in Section 2.1.8 of the TSD.

J. Environmental Impacts

This Project is categorized as a Type I action pursuant to Wis. Admin. Code § PSC 4.10(1) for which an EIS is required. With this Application, the Applicants are providing the information necessary to permit the PSCW and WDNR to prepare an EIS. Please refer to the information provided in Sections 2.4 and 2.10 of the TSD and the associated supporting information.

In accordance with Wis. Stat. § 30.025 (1s), the Applicants submit the detailed environmental information in the attached TSD and Appendices to support the WDNR Utility Permit Application.

The Applicants also request that the PSCW determine the amount of the environmental impact fee required as well as the appropriate distribution of the amount of such fee to the counties, towns and villages as required. See Wis. Stat. § 196.491(3)(gm). The Applicants have determined that certain information is necessary to assist the Commission in determining the fee required. Tables showing this information are provided in Appendix H.

K. Entities Affected By the Project

Several federal, state, regional and local units of government are affected by the Project. Any required permits would be obtained prior to construction of the new facilities, as discussed in Section 2.9.3 of the TSD. Mailing lists in the prescribed format for potentially affected landowners, public property landowners, government officials, local media contacts, libraries and other interested parties requiring Project notification are provided in Appendix I.

L. Property Owners Affected

Appendix I provides a list of landowners along the alternative routes.

M. Cost of Operation and Reliability of Service

The new transmission lines would improve the regional performance of the electrical system, increase the load serving capability of the local electrical system in the La Crosse/Winona and Rochester areas and provide generation support. The Applicants believe that construction of the proposed 345 kV and 161 kV transmission lines is the most appropriate means for meeting our obligation to provide reliable service. The proposed facilities would meet the needs identified and not provide capacity in excess of present and projected future requirements.

N. Correspondence and Pleadings Concerning this Application are to be Sent to:

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O. Conclusion

The PSCW will determine whether this Application is complete and, if so, begin the public review process. It is anticipated that a public scoping meeting will be held. An administrative law judge will preside at a contested case hearing, which will include public and technical hearings. The PSCW determines the final route.

As part of the CPCN process, the PSCW will conduct an environmental review and prepare a state EIS. The EIS will be considered by the PSCW in making its decision. Public participation is encouraged during all of these proceedings.

Based on the material contained and referenced in this joint Application and any subsequent material requested by the Commission or its staff related to this joint Application, the Applicants request that the PSCW issue a CPCN and any other approvals necessary, authorizing the construction of the transmission facilities as described herein and in the manner set forth.

The Applicants also request that WDNR issue all the permits and authorizations that may be required to construct the transmission facilities in the manner described in this joint Application within 30 days after PSCW issues its decision on the CPCN Application, pursuant to Wis. Stat. § 30.025(4).

Respectfully submitted this 3rd of January 2011.

Northern States Power Company, a Wisconsin corporation

/s/

Michael L. Swenson

President and Chief Executive Officer

WPPI Energy

/s/

Pat Connors

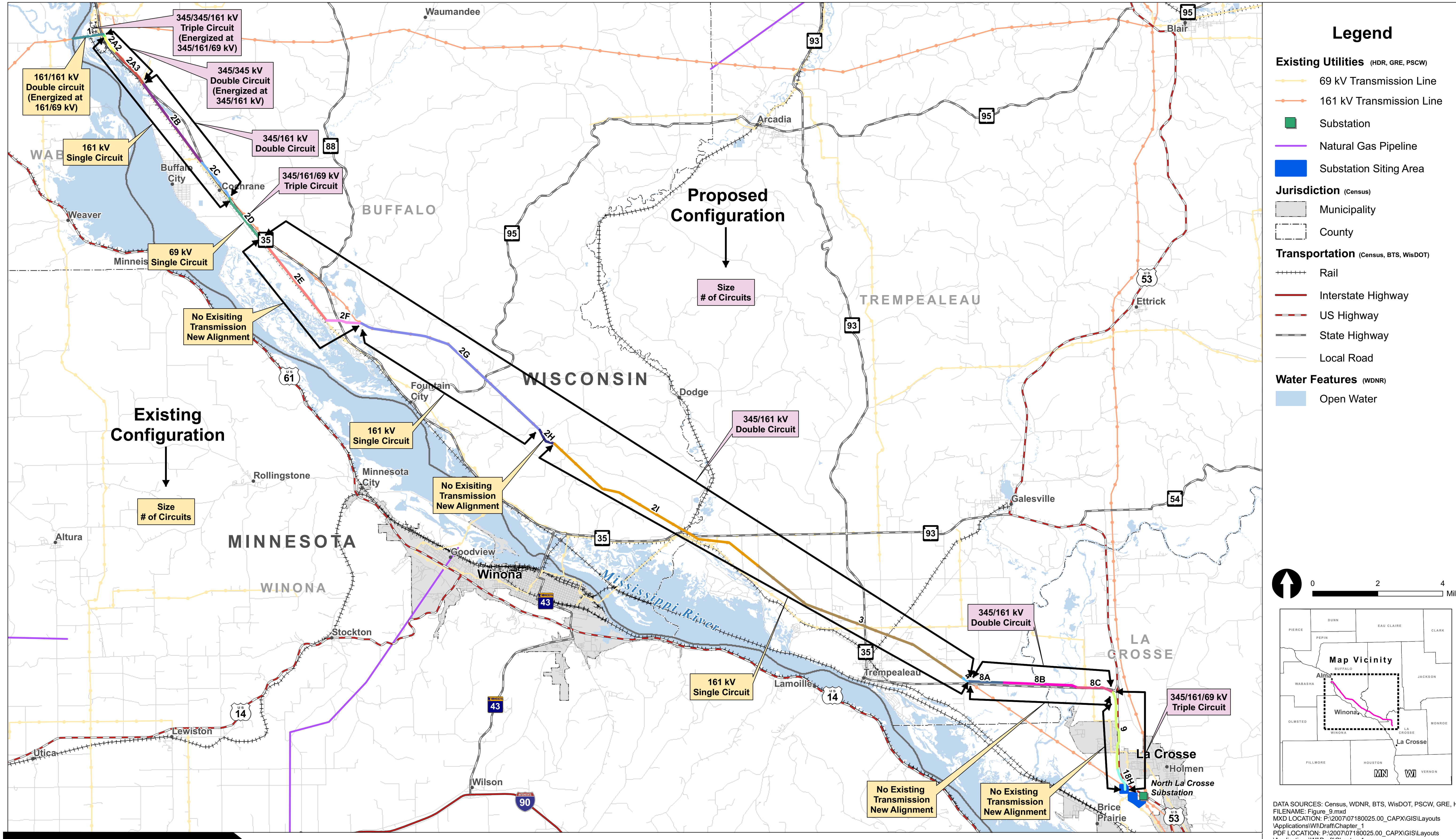
Senior Vice President Power Supply

Dairyland Power Cooperative

/s/

Chuck Callis

Vice President Power Delivery

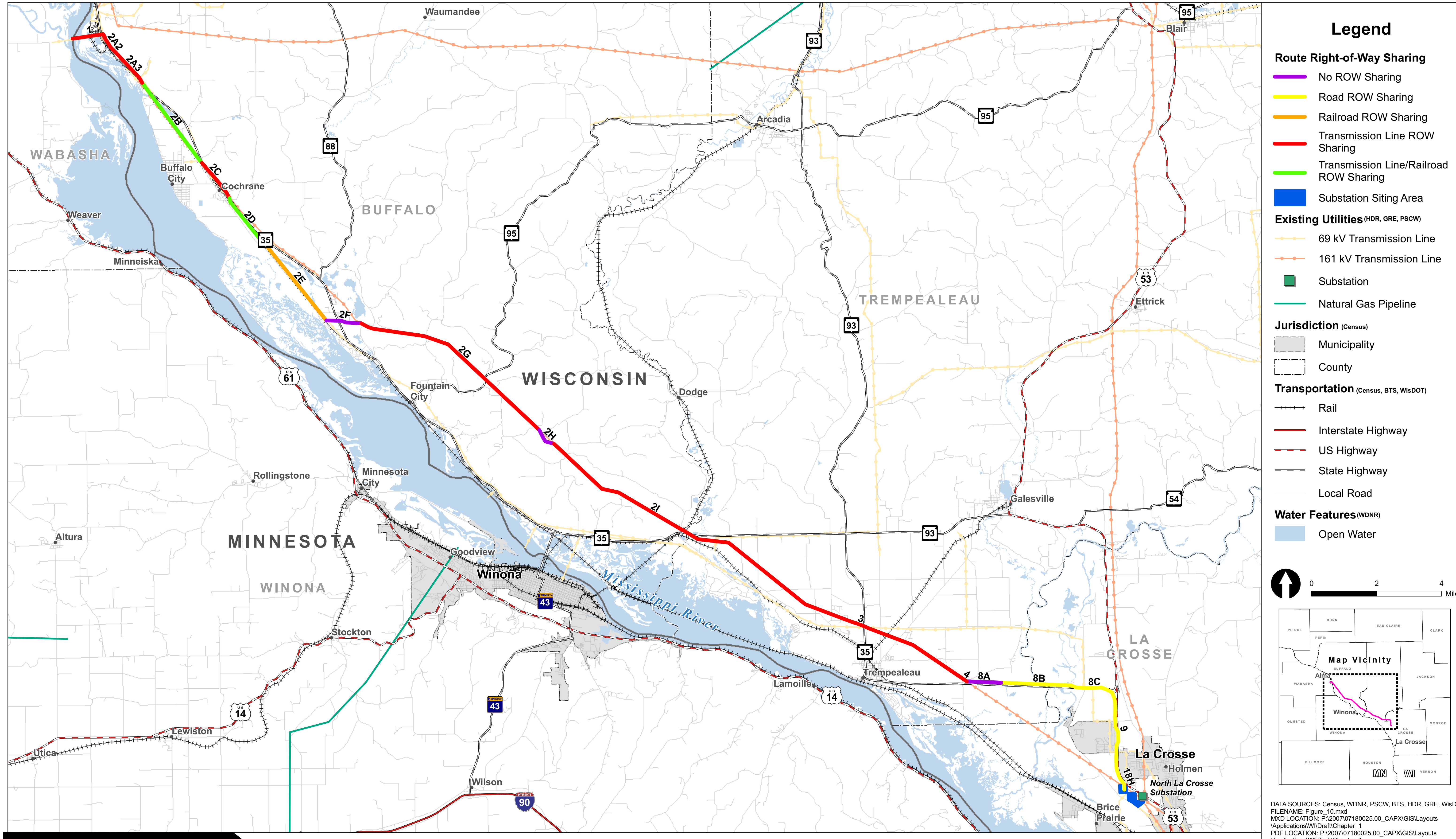


CapX2020

Hampton • Rochester • La Crosse 345 kV Transmission Project

Xcel Energy • Dairyland Power Cooperative • Rochester Public Utilities • WPPI Energy • Southern Minnesota Municipal Power Agency

Figure 9
Q1-Highway 35 Route Configuration
January 2011

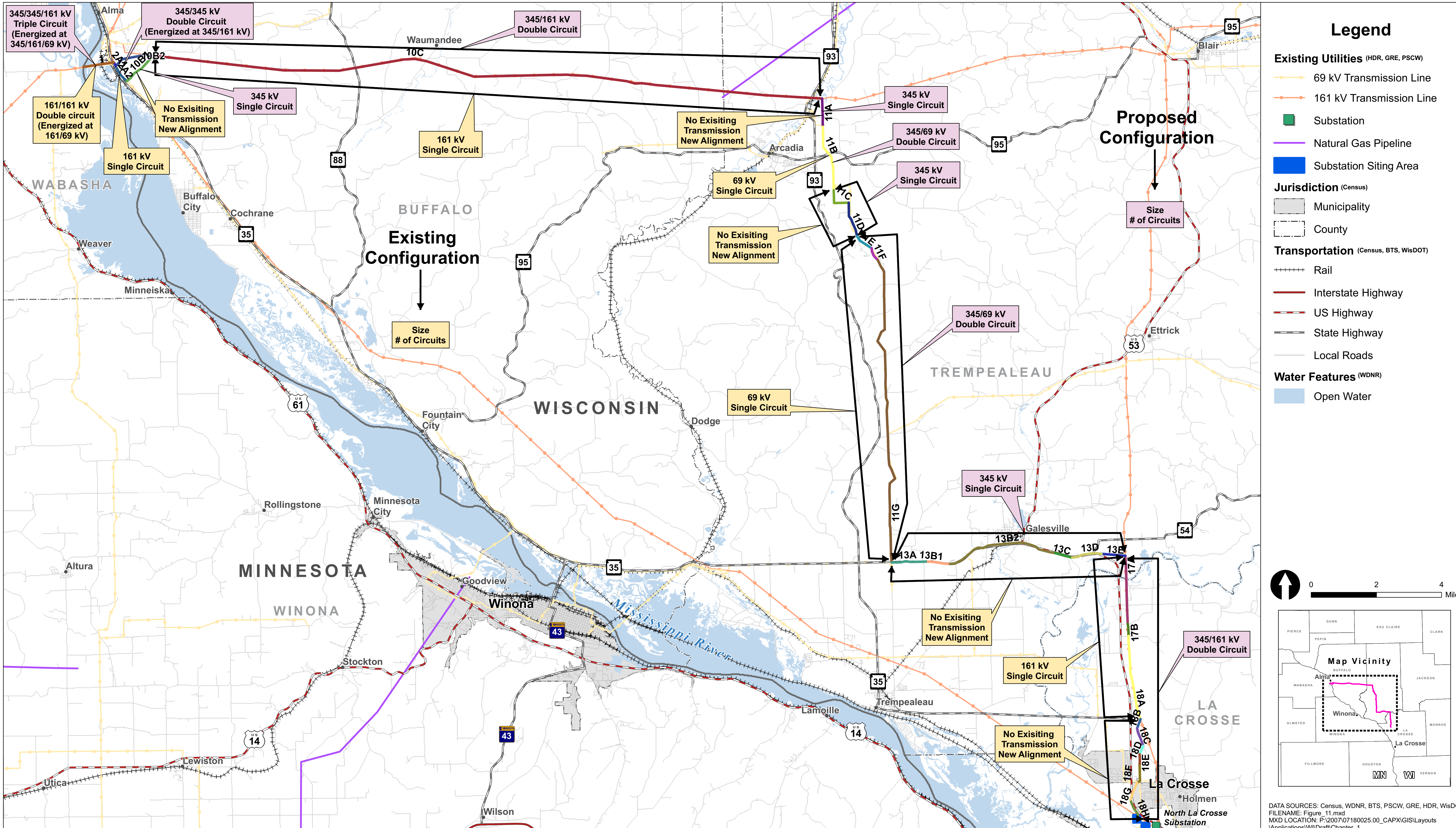


CapX2020

Hampton • Rochester • La Crosse 345 kV Transmission Project

Xcel Energy • Dairyland Power Cooperative • Rochester Public Utilities • WPPI Energy • Southern Minnesota Municipal Power Agency

Figure 10
Q1-Highway 35 Route Right-of-Way Sharing
January 2011

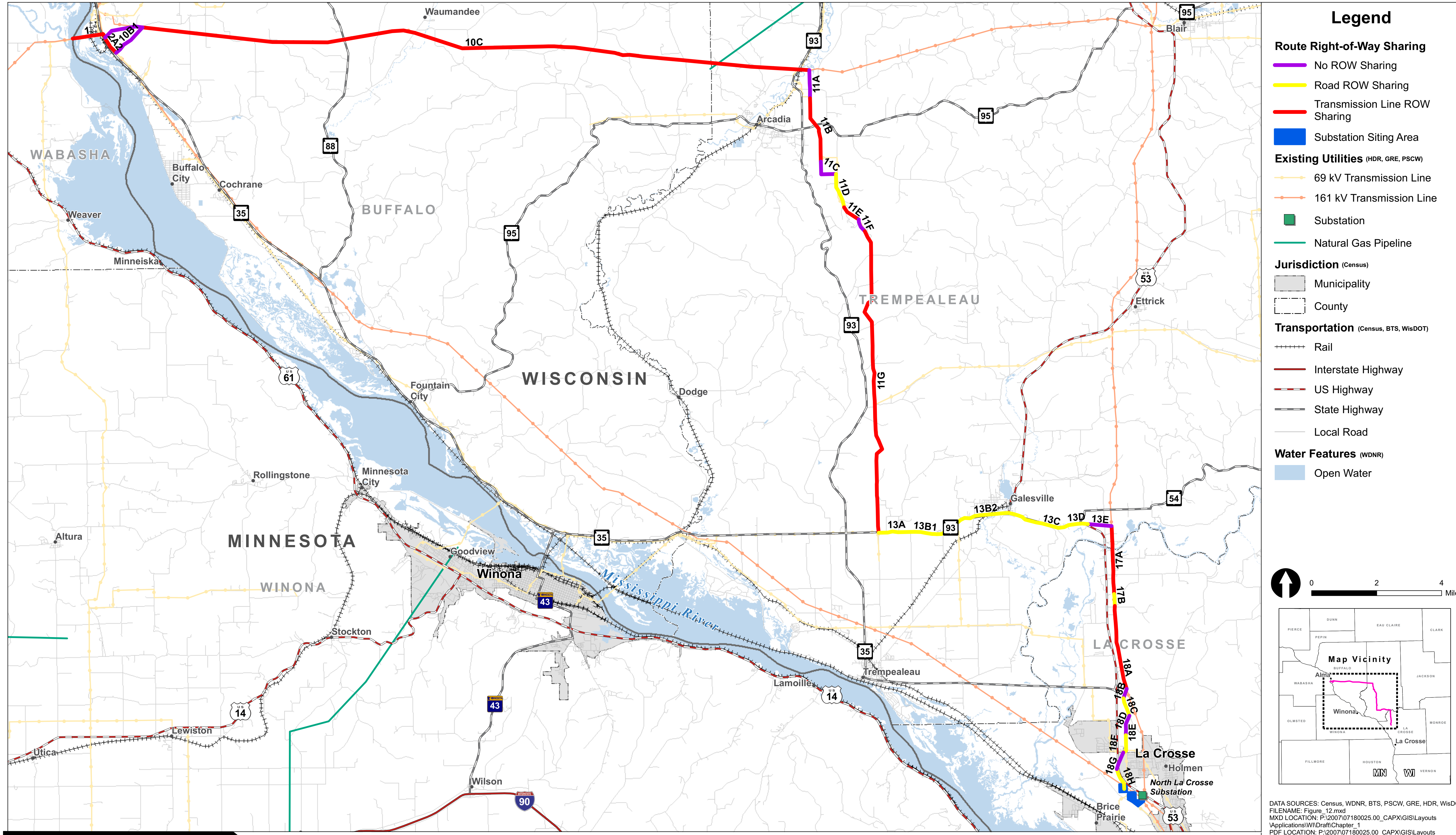


CapX2020

Hampton • Rochester • La Crosse 345 kV Transmission Project

Xcel Energy • Dairyland Power Cooperative • Rochester Public Utilities • WPPI Energy • Southern Minnesota Municipal Power Agency

Figure 11
Arcadia Route and Arcadia-Alma Option Configuration
January 2011

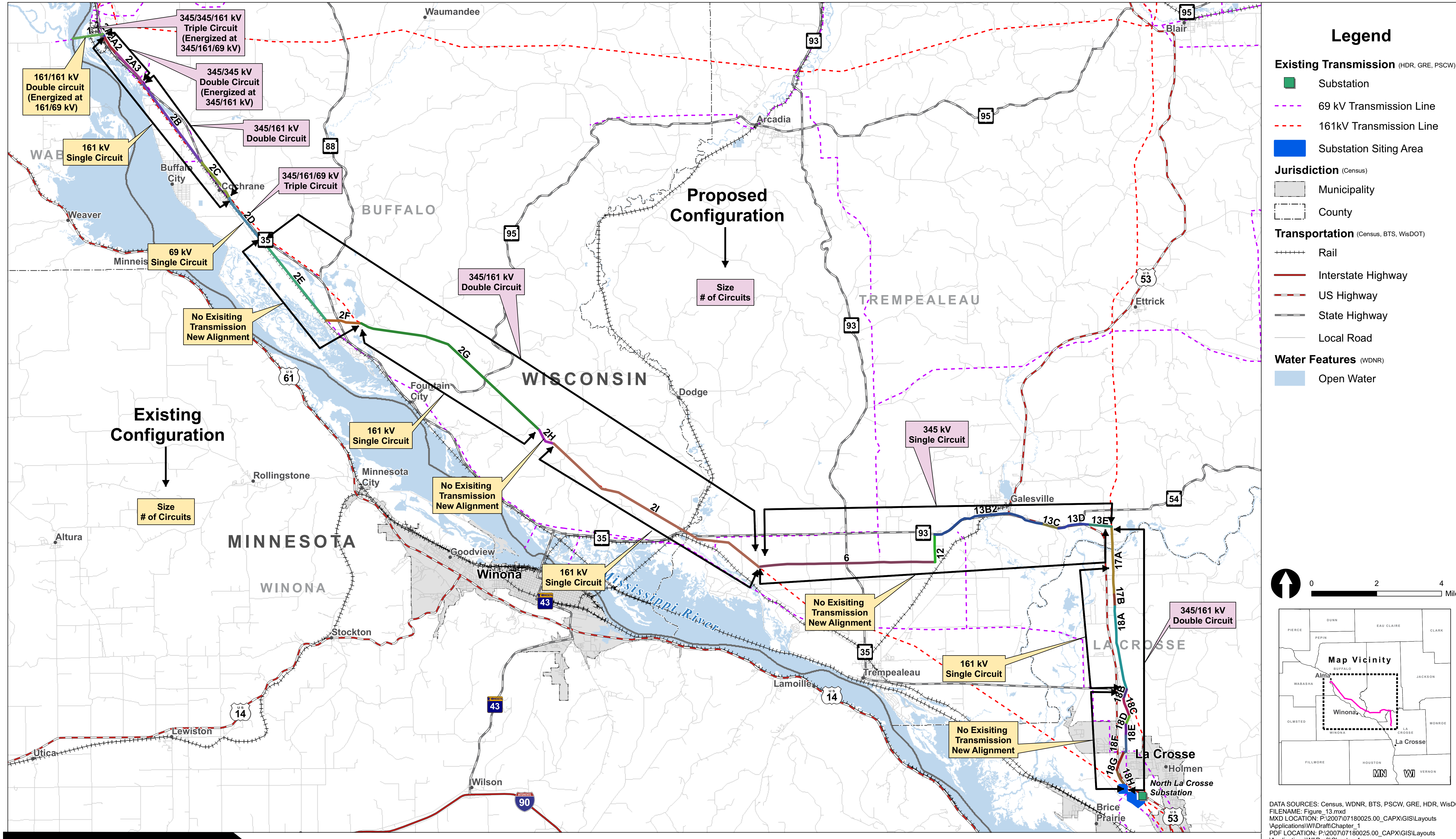


CapX2020

Hampton • Rochester • La Crosse 345 kV Transmission Project

Xcel Energy • Dairyland Power Cooperative • Rochester Public Utilities • WPPI Energy • Southern Minnesota Municipal Power Agency

Figure 12
Arcadia Route and Arcadia-Alma Option Right-of-Way Sharing
January 2011



CapX2020

Hampton • Rochester • La Crosse 345 kV Transmission Project

Xcel Energy • Dairyland Power Cooperative • Rochester Public Utilities • WPPI Energy • Southern Minnesota Municipal Power Agency

Figure 13

Q1-Galesville Route Configuration

January 2011

Information Requirements for Electric Transmission Lines and Substations

This Technical Support Document (TSD) follows the format and guidance contained in the *Application Filing Requirements for Transmission Line Projects in Wisconsin* (Part 2.00), Version 17C (Application Filing Requirements [AFR], issued by the PSCW, WDNR and DATCP (November 2009).

2.1. Engineering Information

2.1.1. Type and Location of Line Construction Required

The Applicants propose to construct a new 345 kilovolt (kV) transmission line between Hampton, Minnesota; Rochester, Minnesota: and La Crosse, Wisconsin and two new 161 kilovolt (kV) transmission lines in the Rochester area. The new facilities are needed to meet local community load serving needs in the La Crosse, Wisconsin; Winona, Minnesota; and Rochester, Minnesota areas, to maintain the reliability of the regional electrical system and to support generation outlet. More specifically, the areas in Wisconsin benefiting from the project are Buffalo, Trempealeau and La Crosse Counties, including the communities of Alma, Buffalo City, Fountain City, Arcadia, Galesville, Trempealeau, Holmen, Onalaska, La Crosse and the surrounding rural areas.

In this Application the Applicants seek approval from PSCW and WDNR to construct the 345 kV line and associated facilities that would be located in Wisconsin termed the La Crosse Project or Project. The 345 kV line is proposed from the Mississippi River crossing at Alma, Wisconsin to a new transmission substation (Briggs Road Substation located near Holmen referred to in early planning documents as a proposed North La Crosse Substation). The 345 kV transmission line would be approximately 40 to 55 miles long in Buffalo, Trempealeau and La Crosse Counties and, depending on the final route selected, be constructed in the cities of Alma, Buffalo, and Galesville; the towns of Arcadia, Belvidere, Buffalo, Caledonia, Cross, Gale, Glencoe, Holland, Lincoln, Milton, Onalaska, Trempealeau and Waumandee; and the village of Cochrane. Xcel Energy would construct all Wisconsin facilities; it is anticipated that the Applicants would jointly own the transmission line and Xcel Energy would own the Briggs Road Substation.

Three alternative routes and one route option are included in this Application. For the most part, these routes utilize existing 161 kV and 69 kV transmission corridors. In such corridors, existing transmission lines would be removed and a new double-circuit transmission line carrying the proposed 345 kV circuit and existing lower voltage circuit would be constructed. Certain distribution lines would require relocation.

The three alternative routes and one route option are identified in Figures 2 and 9 through 14 in the Introduction and Overview Section; Tables 2.1-1 through 2.1-4; and are presented in detail in the CPCN Impact Tables in Appendix A and in the Topographic Maps, General Route Maps, and Environmental Features Maps in Appendices B through D, respectively. The alternative routes included in this Application are the:

- Q1-Highway 35 Route
- Arcadia Route
- Q1-Galesville Route

The Arcadia-Alma Option is a 1.3-mile segment alternative that would replace a 1.7 mile section of the Arcadia Route near the Mississippi River and offers an alternative connection from the river crossing to the Arcadia Route.

Also, regardless of the route selected, the Project includes rerouting the existing Xcel Energy Tremval-Mayfair 161 kV line and the existing Dairyland Alma-La Crosse (Q1) 161 kV line for a short distance to the proposed Briggs Road Substation (Figures 4 and 5).

The 345 kV line would be constructed on steel, self-supporting poles on concrete foundations, except as noted below. Areas requiring alternate designs are:

- The Black River floodplain area of the Q1-Highway 35 Route that would be constructed on vibratory caisson foundations, which do not require excavation or concrete. A hollow pole section is vibrated into the earth using a crane or helicopter-mounted vibratory hammer. The construction plan for this area is included in Appendix J.
- Certain poles in hilly wooded areas of the routes may incorporate guy wires to reduce pole diameter and weight, thereby aiding constructability.
- Segment 2D of the Q1-Galesville Route would include wood poles located mid-span to carry the underbuilt 69 kV line.

2.1.1.1. Q1-Highway 35 Route

The Q1-Highway 35 Route is 43 miles, beginning at the Mississippi River crossing at Alma and ending at the proposed Briggs Road Substation site. The route configuration and ROW sharing are presented in Figures 9 and 10. Route segments are described in Table 2.1-1 based on ROW sharing. More information about this route can be found in Section 2.4.

Table 2.1-1:
Q1-Highway 35 Route Configuration and Segment Summary
(Refer to Figures 9 and 10 in the Introduction and Overview section of this Application)

<table>
<tr><th colspan="4">Q1-Highway 35 Route</th></tr>
<tr><th>Existing/Proposed Configuration</th><th>Segment</th><th>Length (miles)</th><th>Description</th></tr>
<tr><td rowspan="2">Existing
161/161 kV
Double-Circuit
Steel Lattice Poles
(Energized at
161/69 kV)

Proposed
345/345/161 kV
Triple-Circuit
Steel Multipole
(Energized at
345/161/69 kV)</td><td rowspan="2">1</td><td rowspan="2">0.9</td><td>Rebuild of existing Dairyland 161/69 kV line that would be removed and included in new 345/161/69 triple-circuit.</td></tr>
<tr><td>Starts at Wisconsin state boundary in the Mississippi River and follows the existing 161 kV corridor eastward.
Crosses active railroad tracks that comprise part of a Dairyland power plant coal unloading facility before crossing the Great River Road/Wisconsin Highway 35 (GRR/WI-35) and the existing 161 kV transmission corridor.
.</td></tr>
<tr><td rowspan="5">Existing
161 kV
Single-Circuit
Wood H-Frame

Proposed
345/345 kV
Double-Circuit
Steel Monopole
(Energized at
345/161 kV)</td><td rowspan="2">2A1</td><td rowspan="2">0.1</td><td>Rebuild of existing Dairyland 161 kV line that would be removed and included in a new 345/161 kV double-circuit.</td></tr>
<tr><td>Located east of the GRR/WI-35.
Parallels existing transmission line corridors.
Shares a 161/69 kV transmission corridor that has been cleared and maintained adjacent to the edge of forested lands.</td></tr>
<tr><td rowspan="2">2A2</td><td rowspan="2">0.6</td><td>Rebuild of existing Dairyland 161 kV line that would be removed and included in a new 345/161 kV double-circuit.</td></tr>
<tr><td>Located east of the GRR/WI-35.
Parallels existing transmission line corridors.
Shares a 161/69 kV transmission corridor that has been cleared and maintained adjacent to the edge of forested lands.</td></tr>
<tr><td>2A3</td><td>1.2</td><td>Rebuild of existing Dairyland 161 kV line that would be removed and included in a new 345/161 kV double-circuit.</td></tr>
</table>

Q1-Highway 35 Route			
Existing/Proposed Configuration	Segment	Length (miles)	Description
			Located east of the GRR/WI-35. Parallels existing transmission line corridors. Shares a 161/69 kV transmission corridor that has been cleared and maintained adjacent to agricultural areas and the edge of forested lands.
Existing 161 kV Single-Circuit Wood H-Frame Proposed 345/161 kV Double-Circuit Steel Monopole	2B	3.1	Rebuild of existing Dairyland 161 kV line that would be removed and included in a new 345/161 kV double-circuit.
			Located west of the GRR/WI-35 and east of Burlington Northern Santa Fe (BNSF) rail line. Crosses County Road OO, Foegen Road, Herman Street Road and North Main Street, while proceeding in a generally southeast direction. Shares 161 kV transmission corridor that is adjacent to active agricultural lands and rural agricultural development.
	2C	1.4	Rebuild of existing Dairyland 161 kV line that would be removed and included in a new 345/161 kV double-circuit.
			Crosses the GRR/WI-35, Bluff Street, County Road O and a golf course, while generally staying on the east side of the GRR/WI-35. Shares 161 kV transmission corridor that is adjacent to a forest and rural residential area.
Existing 69 kV Single-Circuit Wood Monopole Proposed 345/161/69 kV Triple-Circuit Steel Monopole	2D	1.8	Re-alignment to the Dairyland 69 kV corridor to reduce impacts to homes south of Cochrane and to mitigate aesthetic impacts to the GRR/WI-35. The existing Dairyland 161 kV and 69 kV lines near the GRR/WI-35 would be removed and relocated with the 345 kV line. Portions of a second 69 kV line near the GRR/WI-35 would also be removed.
			Crosses the GRR/WI-35 and BNSF rail line. Shares existing Dairyland 69 kV transmission corridor that passes through active agricultural areas.

<table>
<tr><th colspan="4">Q1-Highway 35 Route</th></tr>
<tr><th>Existing/Proposed Configuration</th><th>Segment</th><th>Length (miles)</th><th>Description</th></tr>
<tr><td rowspan="4">Existing
No Transmission

345 /161 kV
Double-Circuit
Steel Monopole</td><td rowspan="2">2E</td><td rowspan="2">3.1</td><td>Re-alignment on new corridor to reduce impacts to homes south of Cochrane and to mitigate aesthetic impacts to the GRR/WI-35. The existing Dairyland 161 kV and 69 kV lines near the GRR/WI-35 would be removed and relocated with the 345 kV line. Portions of a second 69 kV line near the GRR/WI-35 would also be removed.</td></tr>
<tr><td>Parallels the BNSF rail line and an existing 69 kV transmission line corridor.
Crosses the GRR/WI-35, Prairie Moon Road and Bechly Road, while crossing active agricultural areas, rural residential and small wetlands.</td></tr>
<tr><td rowspan="2">2F</td><td rowspan="2">1.1</td><td>Connects back to existing Dairyland 161 kV corridor.</td></tr>
<tr><td>New alignment that crosses the GRR/WI-35 and Haney Drive.
Crosses active agricultural land and a wetland.</td></tr>
<tr><td rowspan="2">Existing
161 kV
Single-Circuit
Wood H-Frame and Multipole

Proposed
345/161 kV
Double-Circuit
Steel Monopole
(2 Locations Require Multipoles)</td><td rowspan="2">2G</td><td rowspan="2">6.6</td><td>Rebuild of existing Dairyland 161 kV line that would be removed and included in a new 345/161 kV double-circuit.</td></tr>
<tr><td>Crosses Waumandee Creek Road, County Road G, Guenther Road, WI-95, County Road P and Rocky Ridge Road.
Shares existing 161 kV transmission corridor that crosses a variety of terrain and land uses, including active agriculture, forest and open space..</td></tr>
<tr><td rowspan="2">Existing
No Transmission

Proposed
345/161 kV
Double-Circuit
Steel Multipole</td><td rowspan="2">2H</td><td rowspan="2">0.7</td><td>Minor reroute to aid constructability through wooded, hilly topography.</td></tr>
<tr><td>Located southwest of existing Dairyland 161 kV transmission corridor.
Does not cross any existing roads, nor is it adjacent to development.
Crosses forested terrain. Existing 161 kV alignment would be removed.</td></tr>
</table>

Q1-Highway 35 Route			
Existing/Proposed Configuration	Segment	Length (miles)	Description
Existing 161 kV Single-Circuit Wooden H-Frame (Some Wood Multipoles) Proposed 345/161 kV Double-Circuit Steel Monopole (18 Locations Require Multipoles)	2I	7.5	Rebuild of existing Dairyland 161 kV line that would be removed and included in a new 345/161 kV double-circuit. Crosses Brandhorst Road, Oak Lane, County Road P, the GRR/WI-35, Klein Lane, West Prairie Road and Delaney Road. Shares existing Dairyland 161 kV transmission corridor that crosses an active agricultural area, forest, open space and rural residential areas.
	3	7.2	Rebuild of existing Dairyland 161 kV line that would be removed and included in a new 345/161 kV double-circuit. Crosses Schuh Road, Lehmann Road, Canar Road, Granna Lane, Williamson Lane, Memmer Lane, GRR/WI-35, Schubert Road, County Road K and 11th Street. Shares existing Dairyland 161 kV transmission corridor that crosses an active agricultural area, open space, remnant forest and rural residential areas.
	4	0.2	Rebuild of existing Dairyland 161 kV line that would be removed and included in a new 345/161 kV double-circuit. Crosses County Road M. Shares existing Dairyland 161 kV transmission corridor that crosses active agricultural areas.
Existing No Transmission Proposed 345/161 kV Double-Circuit Steel Multipole	8A	1.1	Existing Dairyland Q1 161 kV line would be removed and included in a new 345/161 kV double-circuit. Possibility of removing existing 69 kV from Seven Bridges area is under consideration and, if implemented, would result in 345/161/69 triple circuit. Parallel to and north of the GRR/WI-35. Crosses County Road M.
	8B	2.3	Existing Dairyland Q1 161 kV line would be removed and included in a new 345/161 kV double-circuit. Possibility of removing existing 69 kV from Seven Bridges area is under consideration and, if implemented, would result in 345/161/69 triple circuit. Parallel to and north of the GRR/WI-35. Crosses the Black River and forested wetlands.

Q1-Highway 35 Route			
Existing/Proposed Configuration	Segment	Length (miles)	Description
	8C	1.1	Existing Dairyland Q1 161 kV line would be removed and included in a new 345/161 kV double-circuit. North of and parallel to the GRR/WI-35 and crosses Amsterdam Prairie Road. Crosses the GRR/WI-35 about 0.10 miles east of Staphorst Lane. Crosses Blackwelder Place on the south side of the GRR/WI-35. Crosses active agriculture, rural residential and open space. Shares an existing Dairyland 69 kV transmission corridor for 0.25 miles.
	9	2.4	Existing Dairyland Q1 161 kV line would be removed and included in a new 345/161 kV double-circuit. Parallel to and west of GRR/US-53. Crosses to the east side of GRR/US-53, 0.30 miles south of Old Na Road. Crosses to the west side of GRR/US-53, 0.25 miles north of County Road MH. Passes through active and inactive agriculture, rural residential and crosses County Road MH.
Existing No Transmission Proposed 345/161 kV Steel Monopole (5 locations require Multipoles)	18H	0.7	Existing Dairyland Q1 161 kV line would be removed and included in a new 345/161 kV double-circuit. Parallel to and west of GRR/US-53. Passes through active agriculture. Connects with the proposed Briggs Road Substation.

2.1.1.2. Arcadia Route and Arcadia-Alma Option

The Arcadia Route is 54.8 miles, beginning at the crossing of the Mississippi River at Alma and ending at the proposed Briggs Road Substation site. The Arcadia Route follows a combination of existing Dairyland 161 kV transmission corridor, existing Dairyland 69 kV corridor, existing Xcel Energy 161 kV corridor and roadways. The route configuration and ROW sharing are presented in Figures 11 and 12. Route segments are described in Tables 2.1-2 and 2.1-3 based on ROW sharing. More information about this route can be found in Section 2.4.

There is an option for a portion of the Arcadia Route (Figures 11 and 12) that consists of a 1.3-mile 345 kV transmission line corridor comprised of Segment 10B2. The Arcadia-Alma Option would replace a 1.7 mile portion of the Arcadia Route that was selected to avoid impacts to a future residential development. Segment 10B2 does not share transmission corridor, but rejoins the existing corridor at Segment 10C.

Table 2.1-2:
Arcadia Route Configuration and Segment Summary
(Refer to Figures 11 and 12 in the Introduction and Overview section of this Application)

Arcadia Route			
Existing/Proposed Configuration	Segment	Length (miles)	Description
Existing 161/161 kV Double-Circuit Steel Lattice (Energized at 161/69 kV) Proposed 345/345/161 kV Triple-Circuit Steel Multipole (Energized at 345/161/69 kV)	1	0.9	Rebuild of existing Dairyland 161/69 kV line that would be removed and included in new 345/161/69 kV triple-circuit. Starts at Wisconsin state boundary in the Mississippi River and follows the existing 161 kV corridor eastward. Crosses active railroad tracks that comprise part of a Dairyland power plant coal unloading facility before crossing the GRR/WI-35 and the existing 161 kV transmission corridor.

Arcadia Route			
Existing/Proposed Configuration	Segment	Length (miles)	Description
Existing 161 kV Single-Circuit Wood H-Frame Proposed 345/345 kV Double-Circuit Steel Monopole (Energized at 345/161 kV) 1 Location Requires a Steel Multipole	2A1	0.1	Rebuild of existing Dairyland 161 kV line to 345/161 kV double-circuit. The existing 161 kV line would be removed and included in a new 345/161 kV double-circuit.
			Located east of the GRR/WI-35. Shares with existing Dairyland 161 kV transmission corridor that has been partially cleared and maintained adjacent to forested woodland.
	2A2	0.6	Rebuild of existing Dairyland 161 kV line to 345/161 kV double-circuit. The existing 161 kV line would be removed and included in a new 345/161 kV double-circuit. If the Arcadia-Alma Option is selected, it would replace this segment of the Arcadia Route.
			Located east of the GRR/WI-35. Shares with existing Dairyland 161 kV transmission corridor that has been partially cleared and maintained adjacent to forested woodland.
Existing No Transmission Proposed 345 kV Single-Circuit Steel Monopole	10B1	1.1	If the Arcadia-Alma Option is selected, it would replace this segment of the Arcadia Route. Arcadia Route Segment 10B1 was selected to reduce potential impacts to future residential development along Segment 10B2 of the Arcadia-Alma Route Option.
			Follows wooded sideslope up to connect with existing 161 kV corridor. Does not cross any roads or agricultural areas, but creates a short new cross-country corridor.

Arcadia Route			
Existing/Proposed Configuration	Segment	Length (miles)	Description
Existing 161 kV Single-Circuit Wood H-Frame Proposed 345/161 kV Double-Circuit Steel Monopole (9 Locations Require Steel Multipoles)	10C	20.7	Rebuild of existing Dairyland 161 kV line to 345/161 kV double-circuit. The existing 161 kV line would be removed and included in a new 345/161 kV double-circuit. Crosses County Road N, Hickory Lane, Blank Hill Road, Belvidere Ridge Road, WI-88, Wojchik Valley Road, County Road E, Rotering Ridge Road, Bremer Ridge Road, Boland Valley Road, County Road C, Boberg Lane, Ben Slaby Lane, Rainey Valley Road, Hickory Hill Road and WI-93. Shares with existing Dairyland 161 kV transmission corridor that crosses active agriculture, forested woodlands, wetlands, Little Waumandee Creek, Waumandee Creek and the Trempealeau River.
Existing No Transmission Proposed 345 kV Single-Circuit Steel Monopole	11A	0.9	New corridor, except for last 242 feet which shares with existing 69 kV corridor and is 345/69 kV double-circuit, similar to Segment 11B. Segment selected to transition south from the Dairyland 161 kV line towards the existing Dairyland 69 kV line. East of WI-93. Does not share existing corridor for most of its length; however, the southern 242 feet shares with an existing 69 kV transmission corridor. Crosses River Valley Road, a stream, wetland and active agricultural area.
Existing 69 kV Single-Circuit Wood Monopole and Multipole Proposed 345/69 kV Double-Circuit Steel Monopole (2 Locations Require Steel Multipoles)	11B	2.0	Rebuild of existing 69 kV line to 345/69 kV double-circuit. Existing 69 kV line would be removed. Shares existing 69 kV transmission corridor as well as creates 600-foot new corridor ROW. Crosses WI-95 and active agricultural lands.

Arcadia Route			
Existing/Proposed Configuration	Segment	Length (miles)	Description
Existing No Transmission Proposed 345 kV Single-Circuit Steel Monopole	11C	0.8	New corridor. Segment selected to avoid homes to the east of the existing 69 kV corridor. Does not cross any roads. Creates a new transmission corridor along property lines, crossing active agricultural lands and forested woodlands.
Existing No Transmission Proposed 345 kV Single-Circuit Steel Monopole	11D	1.1	New corridor, mostly sharing road ROW. Segment selected to avoid homes on east side of Thompson Valley Road and the wetland on the southern portion of the segment. Crosses existing 69 kV transmission corridor at Thompson Valley Road and Rudy Lane. Crosses Edmund Suchla Lane.
Existing 69 kV Single-Circuit Wood Mono and Multipoles Proposed 345/69 kV Double-Circuit Steel Monopole (1 Location Requires Steel Multipole)	11E	0.6	Existing 69 kV alignment removed and combined with proposed 345 kV as 345/69 kV double-circuit. New alignment necessary for construction access. Crosses Thompson Valley Road and partially shares with an existing 69 kV transmission corridor. Partially located in a maintained corridor within forested woodland.

Arcadia Route			
Existing/Proposed Configuration	Segment	Length (miles)	Description
Existing 69 kV Single-Circuit Wood Mono and Multipoles Proposed 345/69 kV Double-Circuit Steel Monopole	11F	0.4	Existing 69 kV alignment on hillside removed and combined with proposed 345 kV as 345/69 kV double-circuit. Segment selected to improve construction access and reduce related impacts since the existing 69 kV line is located on steep hillside.
			West of existing 69 kV transmission corridor. Creates a new corridor and crosses Thompson Valley Road, crossing open space and a forested woodland.
Existing 69 kV Single-Circuit Wood Mono and Multipoles Proposed 345/69 kV Double-Circuit (9 Locations Require Steel Multipoles)	11G	9.6	Existing 69 kV alignment removed and combined with proposed 345 kV as 345/69 kV double-circuit.
			For 0.4 miles, located on an existing 69 kV transmission corridor to aid construction access. Creates a new corridor in this section, crossing open space, then crossing and paralleling Thompson Valley Road. Heads south, utilizing an existing 69 kV transmission corridor. Crosses existing 69 kV transmission corridor near Fox Coulee Road and WI-93. Crosses Norway Valley Road, Amundson Lane, Holcomb Coulee Road, German Coulee Lane, Prondzinski Lane, Fox Coulee Lane, Walsky Lane, WI-93 and parallels Prondzinski and Grover Lanes. Crosses forested woodlands, active agriculture and limited rural residential areas.
Existing No Transmission Proposed 345 kV Single-Circuit Steel Monopole Vertical Configuration	13A	1.1	Segment runs along WI-93/WI-54, jogging from south to north to reduce impacts to homes.
			Shares road corridor along WI-93/WI-54. Crosses WI-93/WI-54 and Wright Drive, passing through active agriculture and a rural residential area.
	13B1	0.6	Segment runs along WI-93/WI-54, jogging from south to north to reduce impacts to homes.
			Shares road corridor along WI-93/WI-54. Crosses Beaver Creek and passes through an active agricultural area, rural residential and small-scale commercial/retail areas.

Arcadia Route			
Existing/Proposed Configuration	Segment	Length (miles)	Description
	13B2	3.5	Segment runs along WI-93/WI-54, jogging from south to north to reduce impacts to homes.
			Shares road corridor along WI-93/WI-54. Crosses Dale Valley Lane, South 15th Street, West Mill Road, Hueston Street, North Main Street and Hilltop Lane, as well as WI-93/WI-54. Crosses Beaver Creek and passes through an active agricultural area, rural residential and small-scale commercial/retail areas.
	13C	0.5	Shares road corridor with WI-93. Segment located on south side of highway to reduce impacts to homes.
			Follows WI-93/WI-54/US-53. Crosses McKeeth Drive and Hogden Road. Passes through an edge of forested woodland and a roadside park.
	13D	0.9	Shares road corridor with WI-93/WI-54/US-53. Segment located on north side of highway to reduce impacts to homes.
			Follows WI-93/WI-54. Crosses WI-93/WI-54/US-54 and WI-54. Passes through active agricultural areas, forested woodlands and rural residential areas.
Existing No Transmission Proposed 345 kV Single-Circuit Steel Monopole	13E	0.7	New corridor, no sharing. Segment transitions from paralleling WI-93/US-53 eastward to intersect with existing Xcel Energy 161 kV line.
			Does not occupy existing transmission corridor. Poles can be spotted to minimize impacts to agriculture. Crosses County Road AA. Passes through active agricultural areas and forested woodlands.

Arcadia Route			
Existing/Proposed Configuration	Segment	Length (miles)	Description
Existing 161 kV Single-Circuit Wood H-Frame and Multipoles Proposed 345/161kV Double-Circuit (1 Location Requires Multipole)	17A	2.1	Rebuild of existing Xcel Energy 161 kV line that would be removed and included in a new 345/161 kV double-circuit.
			Crosses Pow Wow Lane, Council Bay Road and County Road T. Share existing Xcel Energy 161 kV transmission corridor that passes through forested woodland, reforested area and rural residential area.
	17B	0.4	Rebuild of existing Xcel Energy 161 kV line that would be removed and included in a new 345/161 kV double-circuit. Segment selected to reduce impacts to homes on west side of Aspeslset Road. Xcel Energy 161 kV line on west side of the road would be removed and relocated with the 345 kV line.
			Crosses Aspeslset Road, Price Court, Castle Heights Drive, Sylvester Road and generally parallels Aspeslset Road. Shares existing Xcel Energy 161 kV transmission corridor that passes through a rural residential area.
	18A	2.6	Rebuild of existing Xcel Energy 161 kV line that would be removed and included in a new 345/161 kV double-circuit.
			Crosses Castle Mound Golf Course. Crosses Castle Mound Drive and Cliff Shade Road. Shares existing Xcel Energy 161 kV transmission corridor along a treeline that is adjacent to active agricultural areas and rural residential.
Existing No Transmission Proposed 345/161kV Double-Circuit Steel Monopole (5 Locations Require Multipoles)	18B	0.3	New alignment. Existing Xcel Energy 161 kV line located further east would be removed and included in new 345/161 kV double-circuit. Segment selected as transition point leaving the existing Xcel Energy 161 kV corridor and heading towards WI-/93US-53, rather than continuing south along the existing corridor to avoid impacting residences and businesses near Holmen. Existing 161 kV line would be removed from this point south until crossing over WI-93/US-53.
			Crosses County Road HD and active agricultural areas.
	18C	0.6	New alignment shares corridor with County Road Hd. Existing Xcel Energy 161 kV line located to the east would be removed and included in new 345/161 kV double-circuit.
			Crosses County Road HD and Newport Drive and then is parallel to County Road HD on the west side.

Arcadia Route			
Existing/Proposed Configuration	Segment	Length (miles)	Description
			Adjacent to active agricultural areas and an area in transition from agriculture to residential.
	18D	0.3	New alignment. Existing Xcel Energy 161 kV line located to the east would be removed and included in new 345/161 kV double-circuit. Segment selected to reduce impacts to residences near Holmen. Existing Xcel Energy 161 kV line east of here would be removed and relocated with the 345 kV line.
			East of GRR/US-53and west of County Road Hd. Crosses Old Na Road. Crosses active agricultural areas. Poles spotting can reduce agricultural impacts.
	18E	0.3	New alignment along property lines. Existing Xcel Energy 161 kV line located to the east would be removed and included in new 345/161 kV double-circuit. Segment selected to reduce impact to residences near Holmen. Existing Xcel Energy 161 kV line east of here would be removed and relocated with the 345 kV line.
			East of GRR/US-53and west of County Road Hd.
	18F	0.6	New alignment shares roadway corridors. Existing Xcel Energy 161 kV line located further east would be removed and included in new 345/161 kV double-circuit. Segment selected to reduce impacts to residences near Holmen. Existing Xcel Energy 161 kV line east of here would be removed and relocated with the 345 kV line.
			Shares corridor with local roadways such as Briggs Road. Crosses Sween Drive and County Road MH and east of GRR/US-53. Adjacent to Holmen High School and low density residential areas and crosses active agricultural areas.
	18G	0.6	New alignment transitioning to US-53. Existing Xcel Energy 161 kV line located to the east would be removed and included in new 345/161 kV double-circuit. Segment selected to reduce impacts to residences near Holmen. Existing Xcel Energy 161 kV line east of here would be removed and relocated with the 345 kV line.
			East of GRR/US-53/County Road MH interchange. Crosses GRR/US-53 and passes through open space and a low density residential area.
	18H	0.7	345/161 kV double-circuit.
			Continues to the proposed Briggs Road Substation on the west side of GRR/US-53.. Passes through an area of active agriculture.

Table 2.1-3:
Arcadia-Alma Option Configuration and Segment Summary
(Refer to Figure 11 and 12 in the Introduction and Overview section of this Application)

Arcadia-Alma Option			
Existing/Proposed Configuration	Segment	Length (miles)	Description
Existing No Transmission Proposed 345 kV Single-Circuit Steel Monopole	10B2	1.3	Alternative alignment option replacing Segments 10A1 and 10B1. Segment selected as the most direct route to connect with existing 161 kV line. Does not share with existing transmission corridor; however, when the segment crosses Prairie Road, it connects to an existing 161 kV transmission line. Crosses a forested woodland, an active agricultural area and rural residential.

2.1.1.3. Q1-Galesville Route

The Q1-Galesville Route is 48.4 miles, beginning at the Mississippi River crossing at Alma and ending at the proposed Briggs Road Substation site. The first part of this route follows the Q1-Highway 35 alignment. The route then connects with the Arcadia alignment to the proposed Briggs Road Substation.

The Q1-Galesville Route utilizes portions of the Q1-Highway 35 and Arcadia routes and a connector segment on new ROW north of Trempealeau. The Q1-Galesville Route is comprised of the following route segments:

- Common with Q1-Highway 35 Route: 1, 2A1, 2A2, 2A3, 2B, 2C, 2D, 2E, 2F, 2G, 2H and 2I
- Connector on new ROW: 6 and12
- Common with Arcadia Route: 13B2, 13C, 13D, 13E, 17A, 17B, 18A, 18B, 18C, 18D, 18E, 18F, 18G and 18H

The Q1-Galesville Route configuration and ROW sharing are presented in Figures 13 and 14. Route segments are described in Table 2.4-1 based on ROW sharing. More information about this route can be found in Section 2.4.

Table 2.1-4:
Q1-Galesville Route Configuration and Segment Summary
(Refer to Figures 13 and 14 in the Introduction and Overview section of this Application)

Q1-Galesville Route			
Existing/Proposed Configuration	Segment	Length (miles)	Description
Existing 161/161 kV Double-Circuit Steel Lattice Poles (Energized at 161/69 kV) Proposed 345/345/161 kV Triple-Circuit Steel Multipole (Energized at 345/161/69 kV)	1	0.9	Rebuild of existing Dairyland 161/69 kV line that would be removed and included in new 345/161/69 triple-circuit.
			Starts at Wisconsin state boundary in the Mississippi River and follows the existing 161 kV corridor eastward. Crosses active railroad tracks that comprise part of a Dairyland power plant coal unloading facility before crossing the GRR/WI-35 and the existing 161 kV transmission corridor.
Existing 161 kV Single-Circuit Wood H-Frame Proposed 345/345 kV Double-Circuit Steel Monopole (Energized at 345/161 kV)	2A1	0.1	Rebuild of existing Dairyland 161 kV line that would be removed and included in a new 345/161 kV double-circuit.
			Located east of the GRR/WI-35. Parallels existing transmission line corridors. Shares a transmission 161/69 kV corridor that has been cleared and maintained adjacent to the edge of forested lands.
	2A2	0.6	Rebuild of existing Dairyland 161 kV line that would be removed and included in a new 345/161 kV double-circuit.
			Located east of the GRR/WI-35. Parallels existing transmission line corridors. Shares a transmission 161/69 kV corridor that has been cleared and maintained adjacent to the edge of forested lands.
	2A3	1.2	Rebuild of existing Dairyland 161 kV line that would be removed and included in a new 345/161 kV double-circuit.
			Located east of the GRR/WI-35. Parallels existing transmission line corridors. Shares a transmission 161/69 kV corridor that has been cleared and maintained adjacent to agricultural areas and the edge of forested lands.

<table>
<tr><th colspan="4">Q1-Galesville Route</th></tr>
<tr><th>Existing/Proposed Configuration</th><th>Segment</th><th>Length (miles)</th><th>Description</th></tr>
<tr><td rowspan="4">Existing
161 kV
Single-Circuit
Wood H-Frame

Proposed
345/161 kV
Double-Circuit
Steel Monopole</td><td rowspan="2">2B</td><td rowspan="2">3.1</td><td>Rebuild of existing Dairyland 161 kV line that would be removed and included in a new 345/161 kV double-circuit.</td></tr>
<tr><td>Located west of the GRR/WI-35 and east of BNSF rail line.
Crosses County Road OO, Foegen Road, Herman Street Road and North Main Street, while proceeding in a generally southeast direction.
Shares 161 kV transmission corridor that is adjacent to active agricultural lands and rural agricultural development.</td></tr>
<tr><td rowspan="2">2C</td><td rowspan="2">1.4</td><td>Rebuild of existing Dairyland 161 kV line that would be removed and included in a new 345/161 kV double-circuit.</td></tr>
<tr><td>Crosses GRR/WI-35, Bluff Street, County Road O and a golf course, while generally staying on the east side of the GRR/WI-35.
Shares 161 kV transmission corridor that is adjacent to a forest and rural residential area.</td></tr>
<tr><td rowspan="2">Existing
69 kV
Single-Circuit
Wood Monopole

Proposed
345/161 kV
Double-Circuit
Steel Monopole</td><td rowspan="2">2D</td><td rowspan="2">1.8</td><td>Re-alignment to the Dairyland 69 kV corridor to reduce impacts to homes south of Cochrane and to mitigate aesthetic impacts to the GRR/WI-35. The existing Dairyland 161 kV and 69 kV lines near the GRR/WI-35 would be removed and relocated with the 345 kV line. Portions of a second 69 kV line near the GRR/WI-35 would also be removed.</td></tr>
<tr><td>Crosses the GRR/WI-35, Wisconsin Street and BNSF rail line.
Shares existing Dairyland 69 kV transmission corridor that passes through active agricultural areas.</td></tr>
<tr><td rowspan="4">Existing
No Transmission

345 /161 kV
Double-Circuit
Steel Monopole</td><td rowspan="2">2E</td><td rowspan="2">3.1</td><td>Re-alignment on new corridor to reduce impacts to homes south of Cochrane and to mitigate aesthetic impacts to the GRR/WI-35. The existing Dairyland 161 kV and 69 kV lines near the GRR/WI-35 would be removed and relocated with the 345 kV line. Portions of a second 69 kV line near the GRR/WI-35 would also be removed.</td></tr>
<tr><td>Parallels BNSF rail line and an existing 69 kV transmission line corridor.
Crosses Prairie Moon Road and Bechly Road, while crossing active agricultural areas, rural residential and small wetlands.</td></tr>
<tr><td rowspan="2">2F</td><td rowspan="2">1.1</td><td>Connects back to existing Dairyland 161 kV corridor.</td></tr>
<tr><td>New alignment that crosses the GRR/WI-35 and Haney Drive.
Crosses active agricultural land and a wetland.</td></tr>
</table>

Q1-Galesville Route			
Existing/Proposed Configuration	Segment	Length (miles)	Description
Existing 161 kV Single-Circuit Wood H-Frame and Multipole Proposed 345/161 kV Double-Circuit Steel Monopole (2 Locations Require Multipoles)	2G	6.6	Rebuild of existing Dairyland 161 kV line that would be removed and included in a new 345/161 kV double-circuit. Crosses Waumandee Creek Road, County Road G, Guenther Road, WI-95, County Road P and Rocky Ridge Road. Shares existing 161 kV transmission corridor that crosses a variety of terrain and land uses, including active agriculture, forest, open space and rural residential.
Existing No Transmission Proposed 345/161 kV Double-Circuit Steel Multipole	2H	0.7	Minor reroute to aid constructability through wooded, hilly topography. Located southwest of existing Dairyland 161 kV transmission corridor. Does not cross any existing roads, nor is it adjacent to development. Crosses forested terrain. Existing 161 kV alignment would be removed.
Existing 161 kV Single-Circuit Wooden H-Frame (Some Wood Multipole Structures) Proposed 345/161 kV Double-Circuit Steel Monopole (9 Locations Require Multipoles)	2I	7.5	Rebuild of existing Dairyland 161 kV line that would be removed and included in a new 345/161 kV double-circuit. Crosses Brandhorst Road, Oak Lane, County Road P, the GRR/WI-35, Klein Lane, West Prairie Road and Delaney Road. Shares existing Dairyland 161 kV transmission corridor that crosses an active agricultural area, forest, open space and rural residential areas.

Q1-Galesville Route			
Existing/Proposed Configuration	**Segment**	**Length (miles)**	**Description**
Existing No Transmission Proposed 345 kV Single-Circuit Steel monopole (2 Locations Require Multipoles)	6	5.4	Does not share with existing transmission corridor; however, it follows parcel and section lines. Segment selected to minimize impacts to residences.
			Crosses Sonsalla Road, Harris Road, the GRR/WI-35, Schubert Road and Wright Drive. Passes through areas in active agricultural production.
	12	0.9	Does not share with existing transmission corridor; however, it follows parcel and section lines. Segment selected to minimize impacts to residences.
			Crosses Towngale Road and passes through an active agricultural area.
Existing No Transmission Proposed 345 kV Single-Circuit Steel Monopole Vertical Configuration	13B2	3.5	Shares road corridor with WI-93. Segment follows south side of WI-93/WI-54/US-53 to reduce impacts to residences.
			Follows WI-93/WI-54/US-53. Crosses Engen Road, Dale Valley Lane, WI-93/WI-54/US-53, South 15th Street, West Mill Road, Hueston Street, North Main Street and Hilltop Lane. Passes through an active agricultural area, rural residential and small-scale commercial retail.
	13C	0.5	Shares road corridor with WI-93/WI-54/US-53. Segment follows south side of WI-93/WI-54/US-53 to reduce impacts to residences.
			Follows WI-93/WI-54/US-53. Crosses Hogden Road and McKeeth Drive. Passes through an edge of a forested woodland and roadside park.
	13D	0.9	Shares road corridor with WI-93/WI-54/US-53. Segment follows north side of WI-93/WI-54/US-53 to reduce impacts to residences.
			Follows WI-93/WI-54/US-53. Crosses WI-93/WI-54/US-53. Passes through active agricultural areas, forested woodlands and rural residential.
Existing No Transmission Proposed 345 kV Single-Circuit Steel Monopole	13E	0.7	New corridor, no sharing. Segment transitions from following WI-93/WI-54/US-53 eastward to intercept existing Xcel Energy 161 kV corridor.
			Does not occupy existing transmission line corridor. Poles can be spotted to minimize impact to agriculture. Crosses County Road AA. Passes through active agricultural areas and forested woodlands.

Q1-Galesville Route			
Existing/Proposed Configuration	Segment	Length (miles)	Description
Existing 161 kV Single-Circuit Wood H-Frame and Multipoles Proposed 345/161kV Double-Circuit (1 Location Requires a Multipoles)	17A	2.1	Rebuild of existing Dairyland 161 kV line that would be removed and included in a new 345/161 kV double-circuit.
			Crosses Pow Wow Lane, Council Bay Road and County Road T. Shares existing Dairyland 161 kV transmission corridor that passes through forested woodland, reforested area and rural residential area.
	17B	0.4	Rebuild of existing Xcel Energy 161 kV line that would be removed and included in a new 345/161 kV double-circuit. Segment selected to reduce impacts to homes on west side of Aspeslset Road. Xcel Energy 161 kV line on west side of the road would be removed and relocated with the 345 kV line.
			Crosses Aspeslset Road, Castle Heights Drive and Sylvester Road and generally parallels Aspeslset Road. Shares existing Dairyland 161 kV transmission corridor that passes through a rural residential area.
	18A	2.6	Rebuild of existing Xcel Energy 161 kV line that would be removed and included in a new 345/161 kV double-circuit.
			Crosses Castle Mound Golf Course. Crosses Castle Mound Drive and Cliff Shade Road. Shares existing Xcel Energy 161 kV transmission corridor along a treeline that is adjacent to active agricultural areas and rural residential.
Existing No Transmission Proposed 345/161 kV Double-Circuit Steel Monopole (5 Locations Require Multipoles)	18B	0.3	New alignment. Existing Xcel Energy 161 kV line located further east would be removed and included in new 345/161 kV double-circuit. Segment selected as transition point leaving the existing Xcel Energy 161 kV corridor and heading towards WI-93/US-53, rather than continuing south along the existing corridor to avoid impacting residences and businesses near Holmen. Existing 161 kV line would be removed from this point south until crossing over WI-93/US-53.
			Crosses County Road HD and active agricultural areas.
	18C	0.6	New alignment shares corridor with County Road Hd. Existing Xcel Energy 161 kV line located to the east would be removed and included in new 345/161 kV double-circuit.
			Crosses County Road HD and Newport Road and then parallels County Road HD on the west side. Adjacent to active agricultural areas and an area in transition from agriculture to residential.
	18D	0.3	New alignment. Existing Xcel Energy 161 kV line located further east would be removed and included in new 345/161 kV double-circuit. Segment selected to reduce

Q1-Galesville Route			
Existing/Proposed Configuration	Segment	Length (miles)	Description
			impacts to residences near Holmen. Existing Xcel Energy 161 kV line east of here would be removed and relocated with the 345 kV line. East of US-53/GRR and west of County Road Hd. Crosses Old Na Road. Along property lines Crosses active agricultural areas. Poles can be spotted to minimize impacts to agriculture.
	18E	0.3	New alignment. Existing Xcel Energy 161 kV line located further east would be removed and included in new 345/161 kV double-circuit. Segment selected to reduce impacts to residences near Holmen. Existing Xcel Energy 161 kV line east of here would be removed and relocated with the 345 kV line. East of GRR/US-53 and west of County Road Hd.
	18F	0.6	New alignment, shares roadway corridors. Existing Xcel Energy 161 kV line located further east would be removed and included in new 345/161 kV double-circuit. Segment selected to reduce impacts to residences near Holmen. Existing Xcel Energy 161 kV line east of here would be removed and relocated with the 345 kV line. Shares corridor with local roadways, such as Briggs Road and GRR/US-53. Crosses Sween Drive and County Road MH. Adjacent to Holmen High School and low density residential areas and crosses active agricultural areas.
	18G	0.6	New alignment transitioning to US-53. Existing Xcel Energy 161 kV line located further east would be removed and included in new 345/161 kV double-circuit. Segment selected to reduce impacts to residences near Holmen. Existing Xcel Energy 161 kV line east of here would be removed and relocated with the 345 kV line. East of the GRR/US-53 County Road MH interchange. Crosses GRR/US-53 and passes through open space and a low density residential area.
	18H	0.7	345/161 kV double-circuit. Continues to the proposed Briggs Road Substation on the west side of GRR/US-53. Passes through an area of active agriculture.

2.1.1.4. Tremval-Mayfair and Dairyland Q1 161 kV Transmission Line Reroutes

As part of the La Crosse Project, the existing Xcel Energy Tremval-Mayfair 161 kV transmission line and the existing Dairyland Q1 161 kV transmission line would be rerouted to the proposed Briggs Road Substation. The reroutes are shown in Figures 4 and 5 (and are shown in more detail in Figures 3 and 4 of Appendix K).

The Applicants evaluated two potential substation sites. The Briggs Road Substation West Site was used for describing the routes in this section. Locating the substation on the Briggs Road Substation East Site is a shift of only 1,600 feet; therefore, the impacts would be essentially the same. For the East Site, the lines approaching the substation from the northwest would become approximately 1,600 feet longer, but lines entering the substation from the east would become approximately 1,600 feet shorter. Substation information is included in Appendix K.

Regardless of the route selected, Xcel Energy's Tremval-Mayfair 161 kV line and Dairyland's Q1 161 kV line must be routed into the Briggs Road Substation to connect the 345 kV line to the existing system. The longer of the reroutes is approximately 0.75 miles. These reroutes are shown in Figures 4 and 5 and are described in more detail in Section 2.6.

2.1.2. General Description of the Proposed Line

2.1.2.1. Size of Lines

2.1.2.1.1. Voltage

The Applicants propose to construct a new 345 kV circuit in Wisconsin. Existing 161 kV and 69 kV lines in the study area present themselves as routing opportunities for the 345 kV line. If overtaken by the 345 kV transmission route, the lower voltage transmission would be removed and reconstructed at their existing voltages in a double or triple-circuit with the 345 kV line.

The MPUC ordered the Minnesota sections of the Project to be constructed on poles capable of carrying a second 345 kV line if authorized at a future date (CON Order at 28-30). In its decision, the MPUC elected to maximize the potential for new 345 kV ROWs created in Minnesota by ordering the poles be constructed with the capability of adding a second circuit in the future if authorized. Adding a second circuit does not increase ROW width.

The Applicants propose this double-circuit-ready configuration be continued in Wisconsin for 1.0 to 2.8 miles depending on the route selected:

- Q1-Highway 35 Route: Segments 1, 2A1, 2A2, 2A3 (2.8 miles).
- Q1-Galesville Route: Segments 1, 2A1, 2A2, 2A3 (2.8 miles).
- Arcadia Route: Segments 1, 2A1, 2A2 (1.6 miles).
- Arcadia-Alma Option: Segments 1, 2A1 (1.0 miles).

Segment 1 (Mississippi River crossing) would be constructed as 345/345/161 kV and energized as 345/161/69 kV. Segments 2A1, 2A2 and 2A3 would be constructed as 345/345 kV and energized at 345/161 kV. These configurations have little impact on the appearance of the poles as pole geometry and spacing is governed by the 345 kV design. No additional ROW would be required.

The double circuit 345/345 kV design is proposed to end at the Dairyland ash disposal facility near Dairyland Plant Road. Continuing this double circuit capable design to this location maximizes the carrying capacity of the existing ROW in an area with very limited routing options. Once at Dairyland

Plant Road, several co-location opportunities are available for a future 345 kV single circuit line: 161 kV line route to Holmen and La Crosse (Q1); 161 kV line route to Arcadia, Blair, Jackson County and I-94; and 161 kV line route to Eau Claire. A 345/161 kV substation at the Dairyland ash facility may also provide future benefits by allowing the 345 kV line to interconnect with 161 kV lines in the area.

A second 345 kV line would require a CON in Minnesota and a CPCN in Wisconsin. See CON Order on 28-30.

2.1.2.1.2. Size of Shield Wire

All routes would use two shield wires to protect phase conductors from lightning strikes. Depending on the route, the shield wires could consist of standard 7/16-inch, seven-strand extra high strength steel (EHS) cable and/or a steel and aluminum stranded wire containing a fiber optic bundle core (generally known as optical ground wire or OPGW). OPGW allows both lightning protection and a communication path between substations. The fiber optic would be utilized only for utility communication or to replace fiber currently installed on Dairyland's system. Table 2.1-5 summarizes shield wire information.

Table 2.1-5:
Size of Shield Wire

Shield Wire #	Segments	Type	Purpose
Q1-Highway 35 Route			
1	All	OPGW 48 fiber	Lightning protection and continuous ground. Control communication between Project substations. Intra-utility communications for CapX2020 Utilities.
2	All	OPGW 36 fiber	Lightning protection and continuous ground. Replacement for existing fiber on Dairyland's Q1 (12 fibers leased to Norlight and an additional 24 fibers for Dairyland's intra-utility communication).
Arcadia Route			
1	All	7/16-inch EHS	Lightning protection and continuous ground.
2	All	OPGW 48 fiber	Lightning protection and continuous ground. Control communication between Project substations. Intra-utility communications for CapX2020 Utilities.
Q1-Galesville Route			
1	All	OPGW 48 fiber	Lightning protection and continuous ground. Control communication between Project substations. Intra-utility communications for CapX2020 Utilities.
2	1, 2	OPGW 36 fiber	Lightning protection and continuous ground. Replacement for existing fiber on Dairyland's Q1 (12 fibers leased to Norlight and an additional 24 fibers for Dairyland's intra-utility communication).

2.1.2.1.3. Size of Conductor

345 kV Circuit: The 345 kV transmission line would use two 954 kcmil 45/7 Cardinal ACSS or 954 ACSS/TW Cardinal 20/7 Type 13 conductors per phase.[5]

161 kV Circuits: All 161 kV circuits rebuilt as part of this Project would use a single 795 kcmil 26/7 Drake ACSS conductor per phase.

69 kV Circuits: All 69 kV circuits rebuilt as part of this Project would use a single 795 kcmil 26/7 Drake ACSS conductor per phase.

2.1.2.1.4. Pole Type, Height and Typical Span Length

Except where galvanized poles would be utilized to minimize visual impacts along the GRR/WI-35, the proposed transmission line would use weathering steel poles that oxidize to a dark brown color. For most of the Project, the Applicants propose to install single shaft steel poles on concrete foundations. Large angles (typically those greater than 30 degrees) would be designed as two-pole poles to reduce foundation diameters and to aid constructability. In addition, several locations in the hilly coulee region would require multipole structures for additional strength required for long spans between hilltops, to aid constructability, or to aid construction access.

Tables 2.1-6 through 2.1-9 present pole type, height and typical span lengths.

Table 2.1-6:
Q1-Highway 35 Route Pole Type, Height and Typical Span Lengths

PoleType	Figure in Appendix L	Typical Height Above Ground (feet)	Typical Span Length (feet)
345/161 kV Double-Circuit I-String Tangent	S6-1	145-165	700-950
345/161 kV Double-Circuit 1°-5° I-String	S6-2	125-155	600-800
345/161 kV Double-Circuit 5°-15° I-String	S6-3	155-175	600-1,000
345/161 kV Double-Circuit 15°-30° I-String	S6-4	145-170	600-1,000
345/161 kV Double-Circuit V-String Tangent	S6-5	140-185	700-1,300
345/161 kV Double-Circuit 1°-5° V-String	S6-6	155-170	700-1,100
345/161 kV Double-Circuit 30°-60° Deadend	S6-7A or S6-7B	135-155	700-1,000
345/161 kV Double-Circuit 60°-95° Deadend	S6-10A or S6-10B	130	800
345 kV Single-Circuit 30°-60° Deadend	S6-9	120	300
161 kV Single-Circuit 30°-60° Deadend	S6-8	70-110	300-500

[5] The conductors have equivalent capacity (1725 amps for ACSS/TW and 1716 amps for ACSS). ACSS/TW is slightly more expensive (approximately $1,500 per circuit mile) but is expected to result in overall savings from reduced structure loading and reduced risk of damage during installation. If both conductors are approved, the Applicants would make a choice after a constructability review with the construction contractor and project team.

PoleType	Figure in Appendix L	Typical Height Above Ground (feet)	Typical Span Length (feet)
345/161/69 kV Triple-Circuit Deadend	S6-13	80-199	970-1,670
345/161/69 kV Triple-Circuit Tangent	S6-12	140	900-1,200
345/161 kV 6-Pole Deadend	S6-16	160	1700-2,500
345/161 kV Double-Circuit H-Frame Deadend	S6-15	170	1200-2,000
345/161 kV Double-Circuit I-String Tangent w/ 69 kV U.B.	S6-17	160	780-790
345/161 kV Double-Circuit Wetland H-Frame	S6-11	75-95	650-1,000
69 kV Mid-Span Single-Circuit Tangent	S6-14	55	300-400
345/161 kV Double-Circuit Wetland H-Frame w/ 69 kV UB	S6-28	90-130	600-950

Table 2.1-7:
Arcadia Route Pole Type, Height and Typical Span Lengths

Pole Type	Figure in Appendix L	Typical Height Above Ground (feet)	Typical Span Length (feet)
345/161 kV Double-Circuit I-String Tangent	S6-1	130-170	700-950
345/161 kV Double-Circuit 1°-5° I-String	S6-2	140-145	800-950
345/161 kV Double-Circuit 5°-15° I-String	S6-3	135-170	700-1,200
345/161 kV Double-Circuit 15°-30° I-String	S6-4	140-160	700-1,000
345/161 kV Double-Circuit V-String Tangent	S6-5	135-195	600-1,500
345/161 kV Double-Circuit 1°-5° V-String	S6-6	160-185	800-1,200
345/161 kV Double-Circuit 30°-60° Deadend	S6-7A or S6-7B	130-165	600-1,200
345/161 kV Double-Circuit 60°-95° Deadend	S6-10A or S6-10B	130-170	800-1,000
345 kV Single-Circuit I-String Vertical Tangent	S6-18	130-160	700-900
345 kV Single-Circuit I-String 1°-5° Vertical RA	S6-20	140-165	700-950
345 kV Single-Circuit I-String 5°-15° Vertical RA	S6-22	155-165	700-950
345 kV Single-Circuit I-String 15°-30° Vertical RA	S6-24	150-165	600-950
345 kV Single-Circuit I-String Delta Tangent	S6-19	125-135	900-950
345 kV Single-Circuit I-String 1°-5° Delta RA	S6-21	130-145	700-950
345 kV Single-Circuit I-String 5°-15° Delta RA	S6-23	135-145	900-1,000
345 kV Single-Circuit I-String 15°-30° Delta RA	S6-25	130	1,000-1,400
345 kV Single-Circuit V-String Delta Tangent	S6-26	135-155	1,000-1,400
345 kV Single-Circuit V-String 1°-5° Delta RA	S6-27	140	900
345 kV Single-Circuit 30°-60° Deadend	S6-9	140-160	700-1,000
161 kV Single-Circuit 30°-60° Deadend	S6-8	70-110	300-500

Pole Type	Figure in Appendix L	Typical Height Above Ground (feet)	Typical Span Length (feet)
345/161/69 kV Triple-Circuit Deadend	S6-13	80-199	970-1,670
345/161/69 kV Triple-Circuit Tangent	S6-12	140	900-1,200
345/161 kV Double-Circuit H-Frame Deadend	S6-15	140-175	1,000-2,000

Table 2.1-8:
Arcadia-Alma Option Pole Type, Height and Typical Span Lengths

Pole Type	Figure in Appendix L	Typical Height Above Ground (feet)	Typical Span Length (feet)
345/161 kV Double-Circuit I-String Tangent	S6-1	130-170	600-950
345/161 kV Double-Circuit 1°-5° I-String	S6-2	140-145	800-950
345/161 kV Double-Circuit 5°-15° I-String	S6-3	130-170	700-1,000
345/161 kV Double-Circuit 15°-30° I-String	S6-4	140-170	700-1,000
345/161 kV Double-Circuit V-String Tangent	S6-5	140-180	900-1,500
345/161 kV Double-Circuit 1°-5° V-String	S6-6	165-175	1,000-1,500
345/161 kV Double-Circuit 30°-60° Deadend	S6-7A or S6-7B	130-165	600-1,100
345/161 kV Double-Circuit 60°-95° Deadend	S6-10A or S6-10B	130-150	900-1,200
345 kV Single-Circuit I-String Vertical Tangent	S6-18	130-160	700-900
345 kV Single-Circuit I-String 1°-5° Vertical RA	S6-20	150-165	700-900
345 kV Single-Circuit I-String 5°-15° Vertical RA	S6-22	155-165	700-1,000
345 kV Single-Circuit I-String 15°-30° Vertical RA	S6-24	150-165	700-900
345 kV Single-Circuit I-String Delta Tangent	S6-19	125-150	900-950
345 kV Single-Circuit I-String 1°-5° Delta RA	S6-21	130-145	700-950
345 kV Single-Circuit I-String 5°-15° Delta RA	S6-23	145	1,100
345 kV Single-Circuit V-String Delta Tangent	S6-26	135-155	700-1,100
345 kV Single-Circuit V-String 1°-5° Delta RA	S6-27	140	900
345 kV Single-Circuit 30°-60° Deadend	S6-9	140-160	700-1,000
161 kV Single-Circuit 30°-60° Deadend	S6-8	70-110	300-500
345/161/69 kV Triple-Circuit Deadend	S6-13	80-199	970-1,670
345/161/69 kV Triple-Circuit Tangent	S6-12	140	900-1,200
345/161 kV Double-Circuit H-Frame Deadend	S6-15	175	1,900

Table 2.1-9:
Q1–Galesville Route Pole Type, Height and Typical Span Lengths

Pole Type	Figure in Appendix L	Typical Height Above Ground (feet)	Typical Span Length (feet)
345/161 kV Double-Circuit I-String Tangent	S6-1	130-160	700-950
345/161 kV Double-Circuit 1°-5° I-String	S6-2	125-155	600-800
345/161 kV Double-Circuit 5°-15° I-String	S6-3	135-175	700-1,100
345/161 kV Double-Circuit 15°-30° I-String	S6-4	145-165	700-1,300
345/161 kV Double-Circuit V-String Tangent	S6-5	135-190	700-1,400
345/161 kV Double-Circuit 1°-5° V-String	S6-6	155-170	700-1,000
345/161 kV Double-Circuit 30°-60° Deadend	S6-7A or S6-7B	130-155	700-1,000
345/161 kV Double-Circuit 60°-95° Deadend	S6-10A or S6-10B	130-150	900-1,000
345 kV Single-Circuit I-String Vertical Tangent	S6-18	130-160	600-900
345 kV Single-Circuit I-String 1°-5° Vertical RA	S6-20	150-160	700-900
345 kV Single-Circuit I-String 5°-15° Vertical RA	S6-22	155-175	700-900
345 kV Single-Circuit I-String 15°-30° Vertical RA	S6-24	150-165	700-900
345 kV Single-Circuit I-String Delta Tangent	S6-19	115-135	700-950
345 kV Single-Circuit I-String 1°-5° Delta RA	S6-21	115	800-900
345 kV Single-Circuit V-String Delta Tangent	S6-26	135-140	800-1,100
345 kV Single-Circuit V-String 1°-5° Delta RA	S6-27	120-160	900-950
345 kV Single-Circuit 30°-60° Deadend	S6-9	125-140	1,000
161 kV Single-Circuit 30°-60° Deadend	S6-8	70-110	300-500
345/161/69 kV Triple-Circuit Deadend	S6-13	80-199	970-1,670
345/161/69 kV Triple-Circuit Tangent	S6-12	140	900-1,200
345/161 kV 6-Pole Deadend	S6-16	160	1,700-2,500
345/161 kV Double-Circuit H-Frame Deadend	S6-15	170	1,100-2,000
345/161 kV Double-Circuit I-String Tangent w/ 69kV U.B.	S6-17	160	780-790
345/161 kV Double-Circuit Wetland H-Frame	S6-11	90-110	700-1,000
69 kV Mid-Span Single-Circuit Tangent	S6-14	55	300-400

2.1.2.1.5. Conductor Support System

The conductor support systems would consist of:

- Porcelain or glass V-string or I-string insulators for single-circuit tangent poles
- Porcelain or glass I-string insulators for angle poles
- Double strings of porcelain or glass insulators for dead-end poles

2.1.2.1.6. Foundations

The majority of poles are expected to be installed on steel reinforced concrete foundations. In general, poles would have drilled pier concrete foundations (Figure 2.5-2) that may vary from 6 to 10 feet in diameter and 25 to 50 feet in depth, depending on soil conditions. Vibratory caisson foundations are proposed for the portion of the Q1-Highway 35 Route in the Black River floodplain. An alternate foundation design, such as cap-on-pile, would likely be required for some of the poles in Segment 1, the Mississippi River crossing.

2.1.2.2. Transmission Line Configuration

Figures 9 through 14 and Tables 2.1-1 through 2.1-4 present the configuration for the alternative routes. Tables 2.1-6 through 2.1-9 identify the pole type, including pole height and average span length for each alternative. Appendix L contains the pole figures.

The typical ROW for the transmission line would be 150 feet wide. There are limited circumstances where specialty poles would be used that are taller and require additional ROW, such as the Mississippi River crossing and in the hilly coulee region, which would require multipoles for additional strength required for long spans between hilltops. In other cases there would be reduced ROW, such as Segment 2A where the ROW was minimized to preserve trees along WI-35/GRR. The transmission line ROW requirements are addressed in more detail in Section 2.4.1.

2.1.3. Problems and Possible Solutions

The Hampton-Rochester-La Crosse 345 kV Transmission Project is proposed to address three needs:

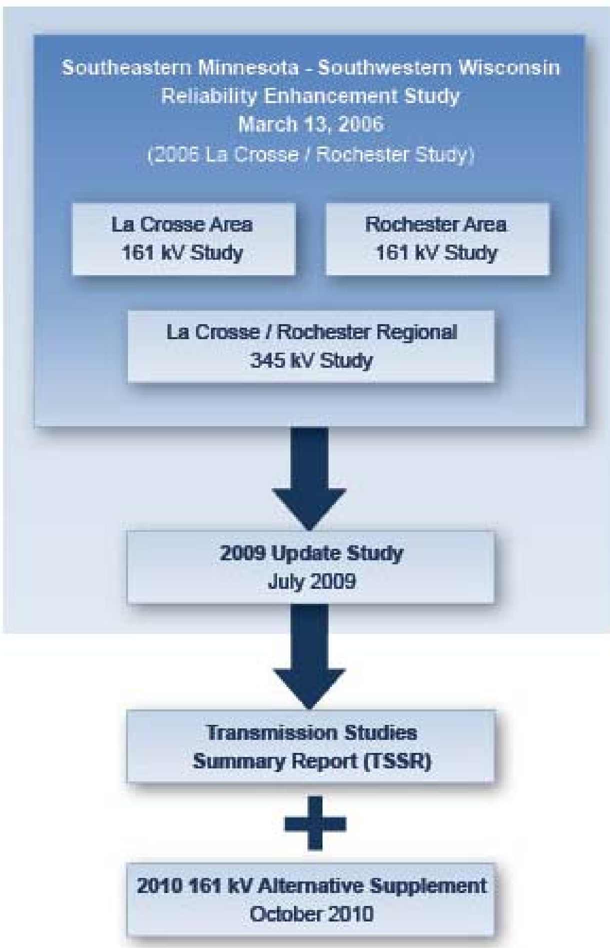
- Address the necessity for additional transmission facilities to provide reliable service to the growing communities in the Winona/La Crosse and Rochester areas.
- Strengthen the transmission network to meet ~~several thousand MWs of~~ additional demand for electrical power anticipated in Wisconsin, Minnesota and parts of surrounding states ~~by 2020~~.
- Support generation development by providing foundation facilities to enable future power transfers between Minnesota and Wisconsin.

To meet these needs, various options were considered in both local and regional studies: (1) alternative lower voltage transmission lines; (2) a “do-nothing” alternative; (3) generation alternatives; and (4) the proposed Hampton-Rochester-La Crosse 345 kV Transmission Project.

The 345 kV project, described in this section and the TSSR ~~associated technical studies~~, was determined to be the best way to meet the identified needs.

~~Figure 2.1-1 illustrates the study history and how each study feeds into the next document. Attached to this Application as Appendix E is the TSSR, which has all associated technical studies (discussed below) attached as appendices and paginated sequentially. Any reference to one of these studies will reference the TSSR with the corresponding page number.~~

~~Figure 2.1-1:~~
~~Southeastern Minnesota-Southwestern Wisconsin Study History~~



~~A brief summary of the transmission studies is provided below.~~

~~2006 La Crosse/Rochester Study~~

~~In the early 2000s, both RPU and Dairyland were independently working to determine the best system improvements to solve their then emerging load serving needs. For each load serving pocket – Rochester and La Crosse/Winona – the planning engineers found a 161 kV solution that served load for a period of time. The utilities then each began to investigate whether a 345 kV alternative would better meet the~~

~~need while also improving the greater region's system reliability. Following the individual study work, RPU and Dairyland (leading a study team that also included planning engineers from Xcel Energy, SMMPA, ATC, Alliant Energy and Great River Energy) began a joint study. This joint study evaluated local and regional system alternatives to address the load serving issues in both Rochester and La Crosse and recommended the proposed Hampton-Rochester-La Crosse 345 kV Transmission Project (Appendix E, page 34).~~

~~2009 Update Study~~

~~In 2009, planning engineers reevaluated the prior study analyses and conducted updated analysis to determine whether the La Crosse Project remained the most cost-effective and efficient solution to meet the three needs, given changes in system topology and load forecasts. The 2009 Update Study confirmed (based on the updated system model and updated forecasts) that the Hampton-Rochester-La Crosse 345 kV Transmission Project remained the best performing option. The 2009 Update Study also determined that the 2006 La Crosse / Rochester study's 161 kV alternative for the La Crosse/Winona area would last only until 2013. Study criteria, assumptions and methodology are also discussed in detail in the study (Appendix E, page 219). The TSSR also includes an evaluation of a new 161 kV transmission alternative to meet the load serving needs in the La Crosse/Winona areas more effectively than the 2006 Alternative.~~

Transmission Studies Summary Report

~~In early 2010, planning engineers developed a summary document to compile the 2006 and 2009 study work. A compilation of relevant prior studies and a summary of the study work supporting the proposed transmission facilities are included the in the TSSR and its appendices.~~ The March 2011 TSSR captures the results of system normal conditions, single contingencies, alternative transmission network solutions and electrical losses. The results of these analyses are summarized in Sections 2.1.3.1 through 2.1.3.4 below and in detail in Appendix E. In addition, the ~~associated~~ TSSR summarizes the coordination efforts between the Project team and various regional transmission planning analyses that are ongoing in the five-state area (Minnesota, Wisconsin, North and South Dakota and Iowa). Throughout this Application, references to study work would be to the TSSR (Appendix E).

Regulatory Proceedings

Based on study work ~~the local and regional studies detailed above,~~ Xcel Energy applied to the MPUC for approvals to construct the Minnesota portion of the proposed facilities:

- A 345 kV transmission line from a new Hampton Substation near Hampton, Minnesota (southeast of the Twin Cities), to a new North Rochester Substation near Rochester, Minnesota, and then east to a new Briggs Road Substation near Holmen (formerly referred to in planning documents as a North La Crosse Substation).
- Two 161 kV transmission lines: one between the new North Rochester Substation and the Northern Hills Substation and one between the new North Rochester Substation and the Chester Substation.

The MPUC granted a CON for these facilities in May 2009. As part of the CON, the MPUC ordered the Minnesota portion of the 345 kV transmission line double-circuit 345 kV capable so that the poles could accommodate a second 345 kV circuit in the future if conditions warrant. Xcel Energy filed an RPA with the MPUC for the Minnesota portion of the 345 kV line and the North Rochester Substation to Northern Hills Substation 161 kV line in January 2010.

The same studies support this Application, with the exception of the 2009 Update Study, which was completed following the MPUC CON proceedings.

2.1.3.1. System Normal

La Crosse/Winona Area

The La Crosse/Winona area, which has its highest electrical demand during the summer, is facing reliability issues as a result of population growth and the resulting increase in demand for electricity. The area includes the cities of La Crosse, Onalaska and Holmen, Wisconsin and extends to include Sparta, Arcadia, Trempealeau, Buffalo City, Cochrane and the surrounding rural areas. In Minnesota, the area includes Winona/Goodview, La Crescent, Houston and Caledonia.

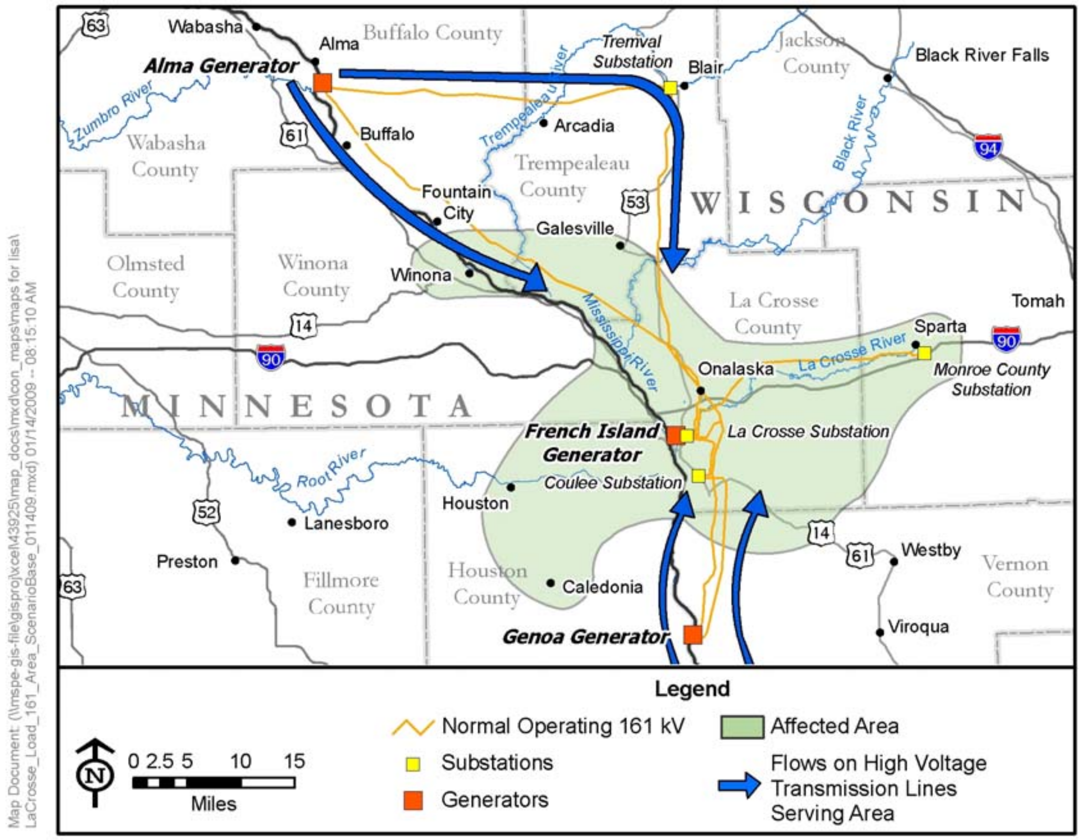
Xcel Energy and Dairyland member distribution cooperatives – Vernon Electric Cooperative, Tri-County Electric Cooperative, Oakdale Electric Cooperative and Riverland Energy Cooperative – serve the La Crosse/Winona area. In addition, five of WPPI Energy's municipal members are located within the pricing zone of Xcel Energy in western Wisconsin and would benefit from the improved regional reliability this Project would provide. Power to the area is provided by four 161 kV transmission lines:[6]

- Alma-Marshland-La Crosse Tap 161 kV transmission line (Dairyland)
- Alma-Tremval-La Crosse 161 kV transmission line (Dairyland and Xcel Energy)
- Genoa-Coulee 161 kV transmission line (Dairyland)
- Genoa-La Crosse Tap 161 kV transmission line (Dairyland)

Figure 2.1-2 shows the affected area and a graphical depiction of the general power flows on these HVTLs in the La Crosse/Winona area.

~~6~~ The La Crosse-Monroe County 161 kV line does not provide a meaningful source to the greater La Crosse area because it is the strongest source for Sparta and Tomah given the relatively weak transmission source from the east.

Figure 2.1-2:
General Power Flows in the La Crosse/Winona Area



The transmission system's ability to reliably serve the area depends on the status of major power plants in the area. The plants and summer ratings of the units located at each site are listed below:

- Alma Generation site, located about 40 miles northwest of La Crosse:
    - John P. Madgett generator (coal, 395.2 MW (net) (2008 Uniform Rating of Generating Equipment ("URGE") test)
    - Alma Units 1-5 (coal, 208.2 MW (net) (2008 URGE test)
- Genoa, located about 20 miles south of La Crosse:
    - Genoa Unit 3 (coal, 377.1 MW (net) (2008 URGE test)
- French Island, located within the city of La Crosse:
    - French Island Units 1 and 2 (refuse burning baseload units 13 MW each, nameplate, 26 MW total, which only run on weekdays when trash pickup service occurs)
    - French Island Units 3 and 4 (fuel oil, 70 MW each, nameplate, 140 MW total)

French Island Unit 3 is mothballed indefinitely, with no plans to be put back into service. Therefore, all further discussions of French Island in this Application would refer only to operational Units 1, 2 and 4; 70 MW from Unit 4 is all that is available for system support.

If plants at Genoa and Alma are in operation and a single transmission source fails, 470 MW of power demand can be met. Transmission support to the area can drop to as low as 330 MW if the John P. Madgett Station at Alma or Genoa generation is not operating. Local generation at French Island in La Crosse (totaling 70 MW) must be run any time demand exceeds these critical load levels. These critical system conditions are summarized below and discussed in detail in the TSSR (Appendix E, pages 13-23 ~~page 8~~). New HVTLs in this area would provide transmission support and alleviate these contingencies. Peak demand reached 447 MW in 2006 and 450.2 MW on August 12, 2010.

Rochester Area

RPU is the municipal electric utility serving the city of Rochester, Minnesota. Dairyland and its member, Peoples Cooperative Services, serve rural customers around the city. This area sees its greatest use of electricity during the summer months. The Rochester area is served by three transmission lines:

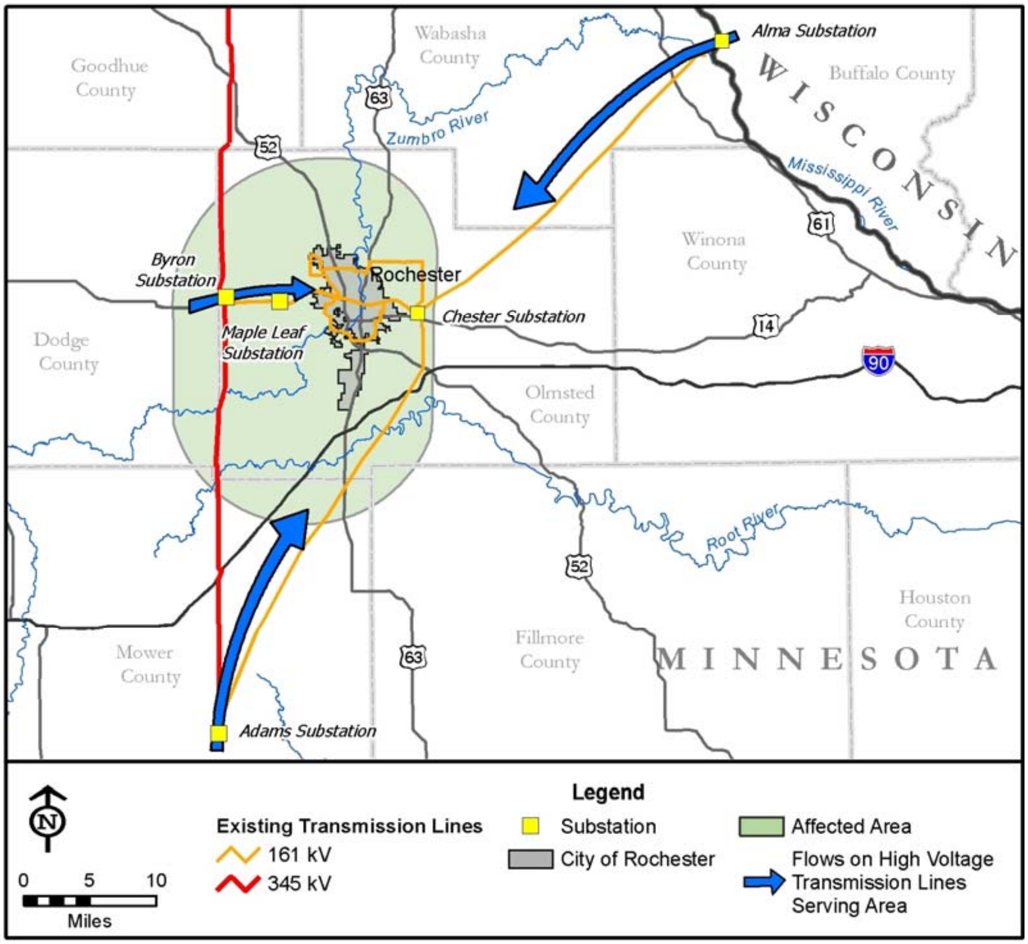
- Byron-Maple Leaf 161 kV transmission line (connects the system to the Byron 345 kV substation source)
- Alma Substation-Northeast Rochester 161 kV transmission line
- Adams-Rochester 161 kV transmission line

The transmission system delivers power to several substations in and around Rochester. The area is also supported by 181 MW of generation located within the city of Rochester:

- Silver Lake: four gas/coal units totaling 102 MW
- Zumbro River: two hydro units totaling 2.4 MW
- Cascade Creek: two natural gas/oil units totaling 77 MW

Figure 2.1-3 shows the affected area and a graphical depiction of the general power flows on these HVTLs in the Rochester area.

Figure 2.1-3:
General Power Flows in the Rochester, Minnesota Area



If one of the sources of power into Rochester fails, the remaining two transmission sources can only deliver 145 MW of power to area substations. The demand for power in the area has exceeded 145 MW by more than 4,000 hours annually since 2005, when the demand exceeded 145 MW for 5,400 hours. To protect against system failure, local generation must be run whenever RPU's demand is expected to exceed 145 MW. With all local generation operating, the system can support up to 362 MW of demand should a transmission source fail. Peak power demand reached an all-time high of 330 MW in 2006, and in August 2010, registered a peak of 314 MW. New transmission sources are needed to meet this increasing demand.

2.1.3.2. Single Contingencies

La Crosse Area

Through the detailed study work in the 2006 and 2009 Update Study, planning engineers found that without further improvements, the existing transmission system would not be able to reliably serve customers at the 494 MW level. The critical contingency was the loss of the Genoa-Coulee 161 kV transmission line. Under this scenario, the La Crosse area system can reliably serve only 460 MW when all generating units at Alma and Genoa are running. Two 60 megavolt amperes reactive (MVAR) capacitor blocks were added to the La Crosse area 161 kV system; the resulting system capability was increased by 10 MW from 460 MW to 470 MW. Figure 2.1-4 illustrates this contingency scenario. The scenario analyzed assumed Alma and Genoa generation were in operation and the French Island peaking unit was not operating. French Island Unit 4 was off-line because operating peak generation units as must-run is not reliable or cost-effective as an alternative to transmission.

The transmission system can be further supported by operating the one operational 70 MW peaking unit at French Island. If this generator were run as system support, the capacity of the system in the event of a Genoa-Coulee 161 kV transmission line outage would increase to approximately 540 MW. While local generation operated in advance of the next line or power plant outage may support additional demand, running generation for system support to prepare for the next line or power plant to go out of service is not a desirable long-term solution because it is less reliable than transmission. In addition, the energy generated from older oil-fueled facilities is normally more expensive than power purchased from MISO competitive markets. Finally, the number of hours the French Island unit can run may be restricted by environmental permitting limitations.

The electrical system's capacity to meet power demands is more limited when generation at Alma or Genoa is off-line. If the Genoa generator is off-line and the Alma-Marshland 161 kV transmission line is disconnected, the La Crosse area experiences low voltage conditions at approximately 430 MW of load. Figure 2.1-5 shows the system under this contingency scenario.

Under this contingency, once load reaches 430 MW, the Genoa-Lansing 161 kV transmission line overloads. This level has already been exceeded. As mentioned previously, actual flows on the transmission lines reached an all-time coincident peak load of 450.2 MW on August 12, 2010. If the 70 MW of French Island peaking generation is available and can be used for system support, the maximum capacity of the system reaches 510 MW.

Figure 2.1-4:
La Crosse/Winona Area Genoa-Coulee 161 kV Contingency

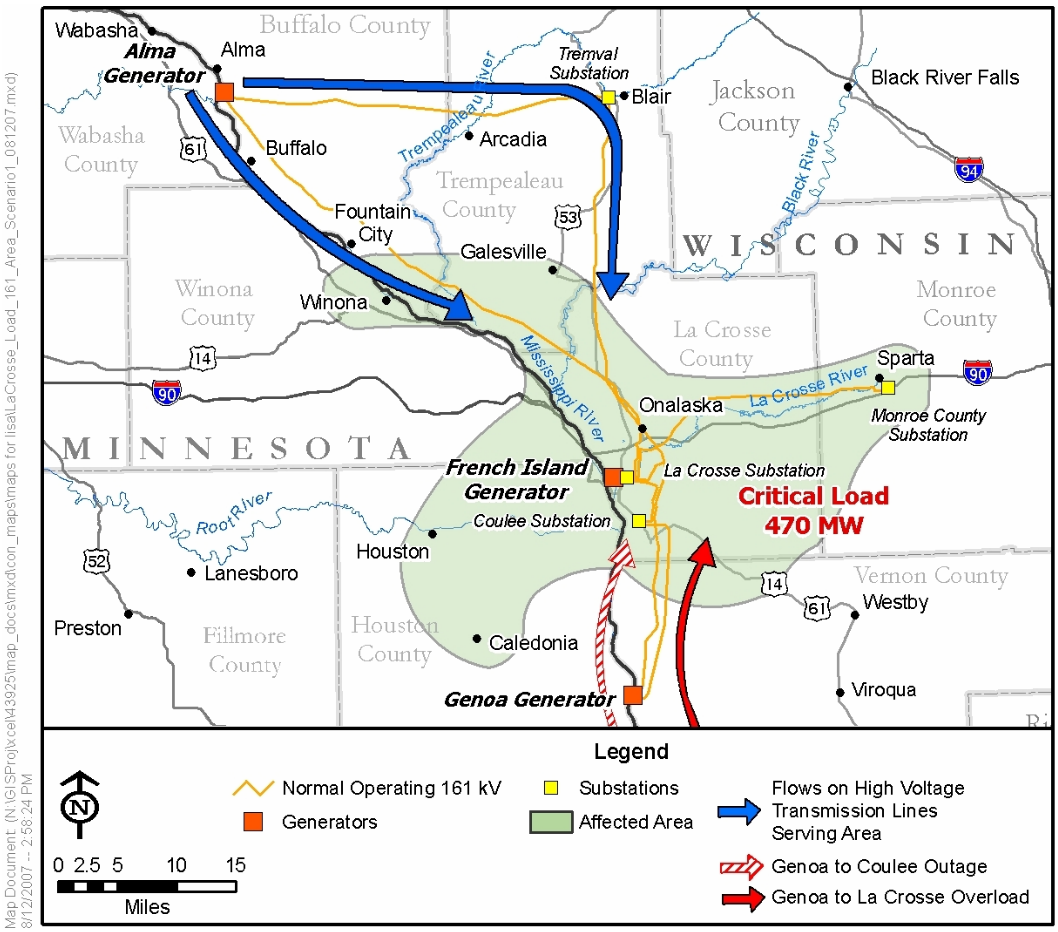
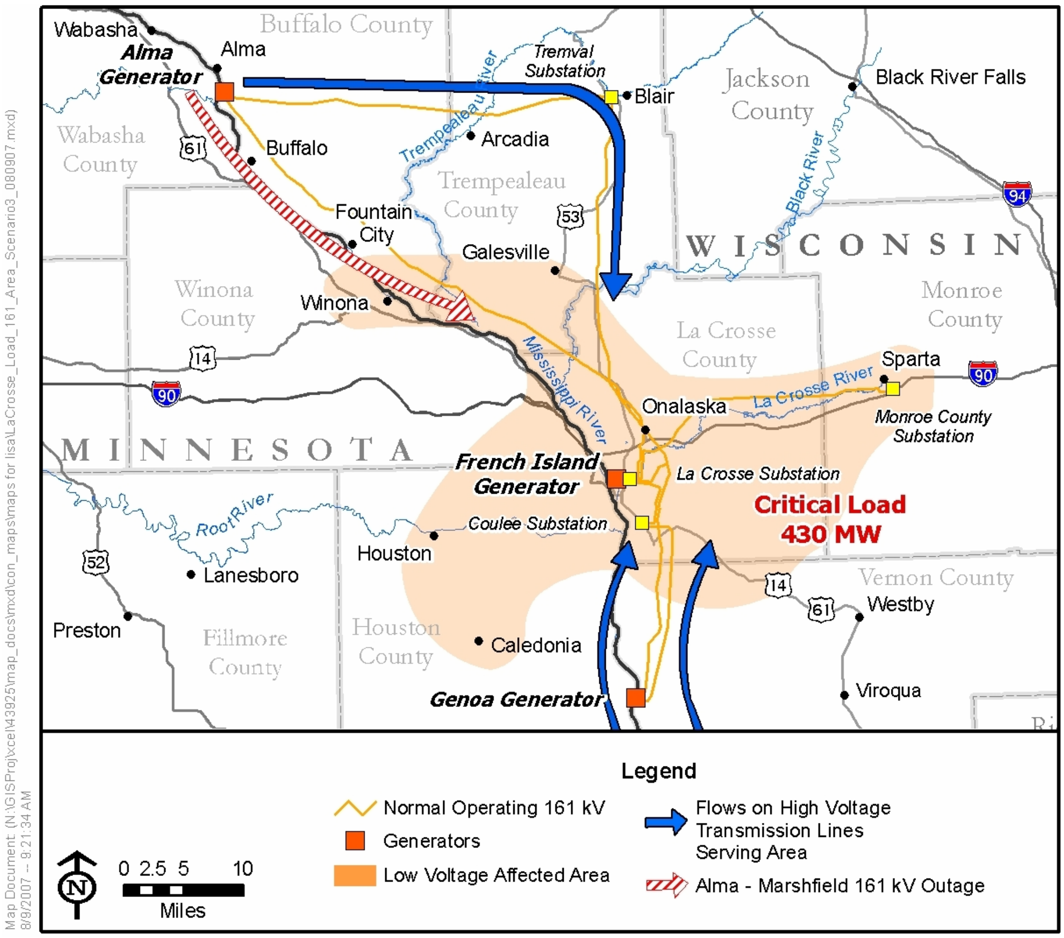
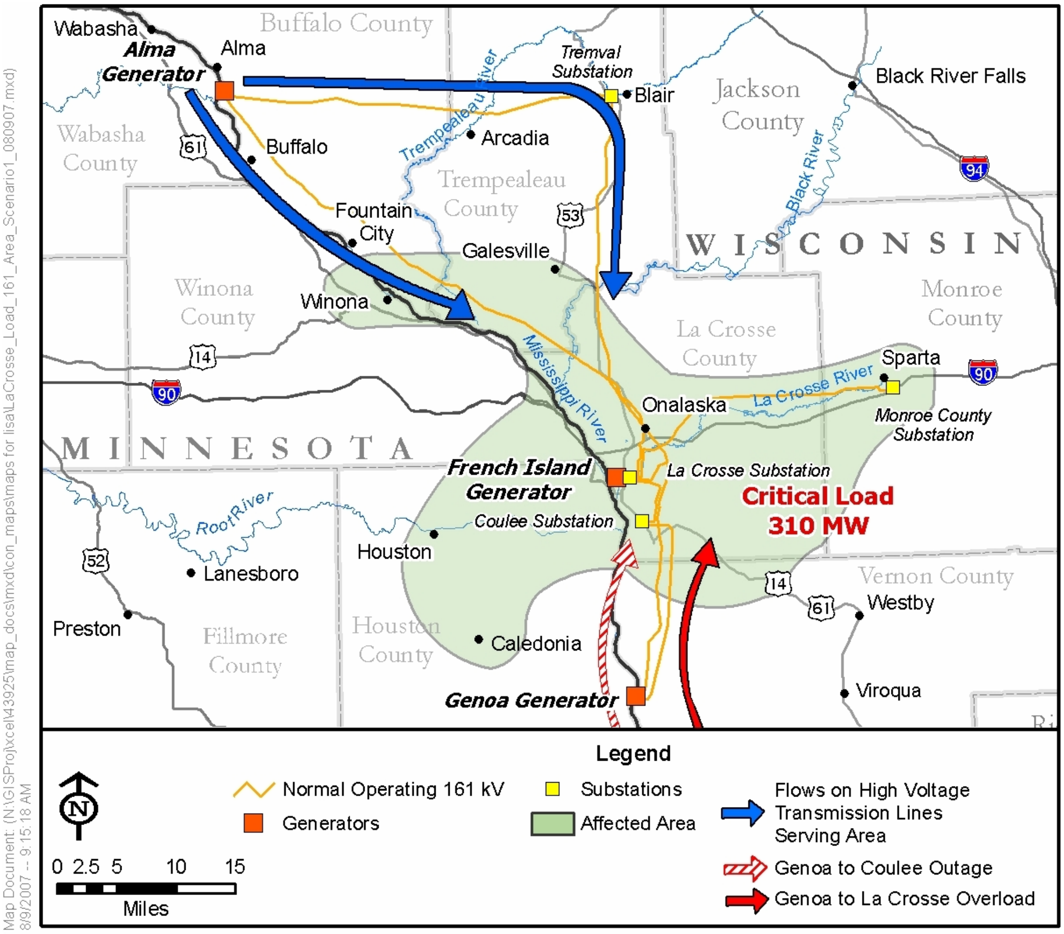


Figure 2.1-5:
La Crosse/Winona Area Genoa Off-Line, Alma-Marshland 161 kV Outage Contingency



The system capacity is similarly limited if the John P. Madgett generator is off-line, French Island peaking generation is off-line, and the Genoa-Coulee 161 kV transmission line is lost. In this scenario, the Genoa-La Crosse 161 kV transmission line overloads and the electrical system can reliably serve only 310 MW. Figure 2.1-6 illustrates this contingency scenario.

Figure 2.1-6:
La Crosse/Winona Area, John P. Madgett Off-Line, Genoa-Coulee 161 kV Line Contingency



As in the other two scenarios, French Island generation can supplement the load serving capability of the system by 70 MW, up to a total of 380 MW.

Timing of the Need

La Crosse Area: To better understand the timing of the La Crosse/Winona area need, planning engineers developed a peak load forecast for substations operating in the affected La Crosse/Winona area. ~~Detailed~~ A discussion of how the loads were gathered is included in the TSSR (Appendix E, pages 18-19 ~~page 226~~). Table 2.1-10 shows the actual annual peak demand for power at each substation in 2002, 2006, ~~and~~ 2008 and 2010, and provides a forecast of annual peak demand at each greater La Crosse area substation for ~~2010,~~ 2015 and 2020.

Table 2.1-10: Revised

Actual and Projected Future Substation Loads for the La Crosse/Winona Area (Summer Peak)

LA CROSSE AREA LOAD SERVING SUBSTATIONS	Actual				Projected	
	Load MW 2002	Load MW 2006	Load MW 2008	Load MW 2010	Load MW 2015	Load MW 2020
Bangor	4.08	4.17	3.46	~~4.22~~ 3.30	4.43	4.66
Brice	5.12	6.93	6.36	~~6.29~~ 3.50	~~6.85~~ 3.81	~~7.45~~ 4.15
Caledonia City	3.42	3.90	3.51	~~3.72~~ 3.65	4.06	4.44
Cedar Creek	3.54	5.17	4.93	~~4.54~~ 5.00	4.94	5.38
Centerville	2.79	3.34	4.20	~~3.46~~ 3.05	3.76	4.09
Coon Valley	4.29	5.22	3.96	~~5.31~~ 3.99	5.58	5.86
Coulee	53.50	60.30	52.91	~~63.96~~ ~~61.44~~ 54.6	67.40	71.03
East Winona	8.92	9.47	11.09	~~11.54~~ 7.00	12.74	14.07
French Island	19.50	29.04	24.06	~~35.44~~ ~~38.73~~ 29	37.34	39.35
Galesville	6.91	6.89	5.50	~~7.00~~ 5.79	7.36	7.73
Goodview	31.78	35.33	33.61	~~34.13~~ 31.67	36.14	38.27
Grand Dad Bluff	1.67	1.91	1.63	~~1.70~~ 1.68	1.85	2.01
Greenfield	2.85	3.43	3.06	~~3.12~~ 2.93	3.39	3.69
Holland	-	-	-	4.74	5.16	5.61
Holmen	14.97	13.16	14.91	~~15.21~~ ~~18.36~~ 13.3	15.99	16.80
Houston	3.61	3.78	3.38	~~3.55~~ 3.75	3.88	4.25
Krause	4.12	4.48	4.54	~~4.29~~ 5.02	4.67	5.08
La Crosse	58.43	50.33	46.98	~~51.70~~ 47.63	54.34	57.11
Mayfair	43.90	46.58	45.39	~~48.29~~ 56.45	51.26	54.44
Mound Prairie	2.18	2.02	2.39	~~2.27~~ 2.24	2.49	2.72
Mount La Crosse	1.64	2.00	2.09	~~1.95~~ 2.15	2.12	2.31
New Amsterdam	3.88	4.66	4.46	~~4.71~~ 3.47	~~5.12~~ 3.78	~~5.57~~ 4.11
Onalaska	11.73	12.93	10.48	~~13.50~~ 13.77	14.54	15.67
Pine Creek	2.03	2.36	1.84	~~2.01~~ 1.93	2.20	2.41
Rockland	4.18	4.14	3.10	~~3.95~~ 3.66	4.15	4.37
Sand Lake Coulee	2.99	2.84	2.59	~~2.73~~ 3.01	2.97	3.24
Sparta	29.65	32.47	31.74	~~33.27~~ 30.90	35.84	38.61

LA CROSSE AREA LOAD SERVING SUBSTATIONS	Actual				Projected	
	Load MW 2002	Load MW 2006	Load MW 2008	Load MW 2010	Load MW 2015	Load MW 2020
Sparta (Dairyland)	1.15	1.36	1.16	~~1.24~~ 1.14	1.42	1.63
Swift Creek	17.10	24.80	21.83	~~28.22~~ 23.75	29.65	31.17
Trempealeau	4.43	3.94	3.68	~~4.00~~ 2.68	4.20	4.41
West Salem	23.30	24.52	23.97	~~25.97~~ 22.80	27.63	29.41
Wild Turkey	1.17	1.20	1.35	~~1.31~~ 2.69	1.44	1.57
Winona	46.30	51.91	51.19	~~51.92~~ 51.17	55.23	58.77
Total Load MW:	425.12	464.59	435.34	~~484.52~~ ~~473.04~~ 451.41	514.98	547.57

Critical Load Level = 470 MW (Transmission Only with Genoa-Coulee 161 kV Outage)						
MW at risk				~~14.53~~ ~~3.04~~	45.01	77.57

Critical Load Level = 450 MW (With JPM outage and Genoa-Coulee 161 kV outage)						
MW at risk				~~34.52~~ ~~23.04~~ 1.41	64.98	97.57

The electrical system is currently at risk of low voltages and facility overloads (discussed above) in the event of a critical transmission line failure at a system peak load level. In 2015, it is estimated that demand would exceed the system's capability by 45 MW (470 MW of capacity versus 515 MW of demand). This means that in 2015, approximately 45 MW of load would be at risk of service interruption under peak load conditions with a critical transmission facility failure.

Rochester Area: When the demand for electrical power exceeds 181 MW in the Rochester area, the failure of a single transmission line could cause service interruptions. The actual load at the substations in the Rochester area reached 330 MW in 2006; thus, some area generation was being used to serve local load.

Byron-Maple Leaf 161 kV is a critical contingency in the Rochester system, leaving only two 161 kV ties to serve RPU and People's Cooperative Services customers. The two remaining Dairyland 161 kV lines provide the 181 MW import capability. Due to this limitation, RPU must run local generation when RPU's demand exceeds 145 MW to ensure reliable service to customers should an outage of the Byron-Maple Leaf 161 kV line occur. Since 2005, the demand for power on the RPU system has exceeded 145 MW for more than 4,000 hours annually. To alleviate the reliability deficiency, additional power sources into the Rochester area are needed.

A more detailed discussion of the Rochester area timing and a load forecast by substation is included in the detailed engineering reports in the Appendix E.

2.1.3.3. Alternative Transmission Network Solutions

Planning engineers evaluated several transmission network alternatives in the three local and regional studies. The alternative network solutions reviewed in those studies are described below and discussed ~~in greater detail~~ in the TSSR (Appendix E).

2.1.3.3.1. Prior Relevant Regional Studies of Transmission Network Solutions

~~The relevant studies are included in Appendix E.~~

There were several prior studies that evaluated transmission needs in the Rochester and La Crosse areas undertaken in 2005 and 2006. These studies include the Rochester Area Study, the La Crosse Area Study and the La Crosse/Rochester Regional Study studies. Each of these study efforts evaluated multiple options for addressing the identified community reliability needs, including 161 kV and 345 kV alternatives. Planning engineers reviewed and considered these prior study efforts as part of the analyses set forth in the TSSR.

2.1.3.3.2. Details of Reliability and Performance Benefits of Each Network Solution Studied

The TSSR summarizes and describes the engineering analyses undertaken to assess electrical system needs in the La Crosse/Winona and Rochester, Minnesota areas and to analyze options to address the identified needs. Various options were considered: (1) alternative lower voltage and higher voltage transmission lines, including reconductoring; (2) a "do-nothing" alternative; (3) generation alternatives; and (4) the proposed 345 kV Project. Per the recommendations of the ad hoc study group, this analysis was undertaken without making any assumptions as to the specific route the facility would follow, including whether a route might afford opportunities to co-locate the new transmission lines with existing facilities.

The alternative network solutions reviewed in those studies are described below and discussed in greater detail in the TSSR (Appendix E). A summary of the reconductor higher and lower voltage alternatives is provided below.

Reconductor: The reconductor alternative would require multiple transmission line upgrades, new transformers and substation expansions. To improve the load serving capability of the La Crosse/ Winona area without a new transmission source, a number of existing 161 kV lines in the area would need to be rebuilt to help the existing system handle the load growth. Table 2-1.11 below shows the facilities that would need to be upgraded. Upgrading these facilities would allow the transmission system to reliably serve load until 600 MW or approximately 2028. To improve the load serving capability past the 600 MW load level, the La Crosse/Winona system needs a new transmission source. At this point a 345 kV line or a 161 kV line could be added as a source.

2010 161 kV La Crosse Alternative; A second 161 kV La Crosse Alternative, "2010 161 kV La Crosse Alternative", was also evaluated. This alternative includes a new approximately 100-mile 161 kV line from Red Wing, Minnesota to La Crosse, Wisconsin with ties in at the following substations: Spring Creek, Lake City, Alma, Marshland, Onalaska and La Crosse.

The case used in the 2010 La Crosse 161 kV Alternative was created using the topology of a 2012 summer peak case and included a baseline load level of 491 MW in the La Crosse area.

In each of the identified contingencies, multiple existing lines needed to be rebuilt to solve the short-term needs and for the long-term needs an additional source needed to be added to the area. The identified new 161 kV source came from the Prairie Island generating plant and tied in to the existing sources in the area in an effort to decrease the impact of future outages while increasing system stability at the same time.

This 161 kV source, in addition to the list of system upgrades in the reconductor option, Table 2.1-11, could serve load growth in the La Crosse / Winona area to the 750 MW load level, or approximately 2045. This is the same load level that the Project could serve. This complete alternative is shown in Table 2.1-11 below.

**Table 2.1-11: Revised
161 kV Alternative Facilities**

161 kV Line Rebuilds	Miles
Genoa - La Crosse Tap	21
Coulee - La Crosse	8.5
Genoa – Coulee	19
Genoa – Lansing	20
Alma – Marshland	27
La Crosse – Mayfair	4
Marshland - La Crosse Tap	24
Total Miles of Rebuilt 161 kV	125.5

69 kV Line Rebuilds	Miles
Coulee - Swift Creek	2
Coulee - Mt. La Crosse	5
Total Miles of Rebuilt 69 kV	7

New 161 kV Lines	Miles
Alma - Marshland #2	28
Marshland – Onalaska	26
Onalaska - La Crosse	5
Spring Creek - Lake City	20
Lake City – Alma	22
Total Miles of New 161 kV	101

New 161/69 kV Transformers	Size
Tremval Upgrade existing	112 MVA
Coulee #3	112 MVA
Marshland #3	112 MVA
La Crosse #1	112 MVA
La Crosse #2	112 MVA
Coulee #1	112 MVA
Monroe County #2	70 MVA
Jackson Co Upgrade Existing	112 MVA
Lake City #2	70 MVA
Onalaska #1 and #2	112 MVA

Substations (New and Expansions)	
Coulee	Expansion
Marshland	Expansion
Alma	New
Spring Creek	Expansion
Onalaska	New
Lake City	Expansion

Single 161 kV Line Between North Rochester and La Crosse: Adding a single 161 kV line between North Rochester and Briggs Road 161 kV buses in the powerflow model instead of the proposed 345 kV line was capable of reliably serving load until the 550 MW load level. Using the most recent load forecast, this corresponds to approximately the year 2021.

At that point multiple bulk system transformers and 161 kV transmission lines in the immediate La Crosse area will overload requiring significant system improvements. The first facilities to overload at the 550 MW level are:

- Coulee 161/69 TR #1
- Coulee 161/69 TR #2
- Marshland 161/69 TR #1
- Marshland 161/69 TR #2
- Coulee - Swift Creek 69 kV line
- Caledonia SS – Brownsville Tap 69 kV line
- Genoa – Brownsville Tap 69 kV line
- Genoa – La Crosse Tap 161 kV line (361 MVA minimum required)

Double Circuit 161 kV Line North Rochester-La Crosse: Similar to the 161 kV Rochester to La Crosse option, adding a double circuit 161 kV line between North Rochester and Briggs Road 161 kV buses in the powerflow model instead of the proposed 345 kV line was capable of reliably serving load until the 600 MW load level. Using the most recent load forecast, this corresponds to approximately the year 2028. Due to the double circuit line being treated as a single transmission element contingency, this provided no more benefit than the single 161 kV alternative in question 5 above.

At the 600 MW level, the following list of facilities will overload under contingency:

- Coulee 161/69 TR #1
- Coulee 161/69 TR #2
- Marshland 161/69 TR #1
- Marshland 161/69 TR #2
- Coulee - Swift Creek 69 kV line
- Caledonia SS – Brownsville Tap 69 kV line
- Genoa – Brownsville Tap 69 kV line
- Genoa – La Crosse Tap 161 kV line (361 MVA minimum required)

As is the case with a single circuit 161 kV alternative, regional reliability and regional transfer capability is not increased with a single circuit 161 kV alternative.

In addition, the proposed 345 kV project assumes co-location with existing 161 kV and 69 kV transmission lines for a majority of the route. If the line were to be built as double circuit 161 kV, a new route would need to be identified. In particular, a new location for the crossing of the Mississippi River would likely be required. The proposed Alma crossing utilizes an existing crossing and requires the addition of only one new circuit at this time. If two circuits had to be added, additional right-of-way would be required at the river crossing area, presenting significant United States Fish and Wildlife Service permitting issues.

Single Circuit 230 kV Line North Rochester-La Crosse: Planning engineers determined that although a 230 kV alternative is feasible, past planning efforts for other areas indicated it would provide system benefits comparable to the 161 kV alternatives for each community (approximately 550 MW or 2021), but at a higher cost due to the need for major installations to accommodate the new voltage. There are also other reasons that the study team does not endorse a 230 kV alternative.

The primary reason is that a 230 kV alternative would introduce a new voltage in each of the three areas where the Project connects: SE Twin Cities (Prairie Island/Hampton area), Rochester, and La Crosse. In these areas 345 kV, 161 kV and 69 kV voltages are the primary transmission voltages. When a new voltage is introduced there are significant cost implications to incorporate the non-standard transformers and substation equipment necessary to transform from 345 kV to 230 kV, and then to the local area lower voltages of 161 kV and 69 kV. Since there were no existing 230 kV lines in the area and no plans in the future, 230 kV was not included.

230/161 kV transformers are not industry standard, and are extremely rare. 25 out of 18,174 transformers, or approximately 0.14%, of the total transformers in the MRO models are 230/161 kV units.

~~**2006 Rochester Area 161 kV Study:** In the local Rochester area load serving study, planning engineers considered four 161 kV options and three 345 kV options to meet the growing demand for power.~~

~~The best performing 161 kV option in the Rochester area, based on system impact, cost and reliability, was a new 161 kV transmission line from Pleasant Valley to Quarry Hill and a 161 kV line from the Byron Substation to the Northern Hills Substation, coupled with a new Byron 345/161 kV transformer to eliminate overloads. This option would meet local needs until approximately 2033 (roughly 810 MW) (Appendix E, pages 96 and 97) based on current load growth trends, after which additional infrastructure would be required to meet power demands.~~

~~The 345 kV options examined in this study provide longer lasting solutions. Planning engineers determined that a 345 kV solution would reliably serve the load well beyond mid-century based on current load growth trends in the Rochester area; in addition, it would greatly improve system reliability in Rochester and the greater regional area.~~

~~**2006 La Crosse Area 161 kV Study:** In the local La Crosse/Winona area study, planning engineers analyzed 23 possible 161 kV alternatives to meet identified load serving needs. Those alternatives were then screened to identify five options worthy of additional study.~~

~~The best performing 161 kV option required operation of the baseload refuse burners at French Island (Units 1 and 2) to maintain system reliability. It also included a 300 megavolt-amperes (MVA) phase shifting transformer at the North La Crosse Substation.~~

~~Planning engineers concluded that even the best performing 161 kV option was inadequate to meet identified needs for several reasons. First, the phase shifting transformer application in the La Crosse area prevented transmission overloads post-contingency in the short-term, but did not eliminate the need for additional transmission lines as the La Crosse/Winona area load increased. Second, the 161 kV Alternative would require more 161 kV transmission facilities in the long run, and inevitably a 345 kV transmission line would be required to serve the load. Thus, a 345 kV solution would meet load serving needs for several decades longer with fewer transmission lines.~~

~~The Hampton-Rochester-La Crosse 345 kV line serves as an important first step in a greater regional transmission system build out. It would provide foundational facilities for the necessary 345 kV connection between Wisconsin and Minnesota to provide transfer capability. Additional 345 kV facilities from La Crosse to the Madison area have been proposed by ATC (Badger-Coulee Project).~~

~~The Hampton-Rochester-La Crosse 345 kV Transmission Project is also designed to provide generation support, including support for renewable generation, in southeast Minnesota. These benefits would not be realized with a 161 kV line.~~

~~**La Crosse/Rochester Regional Study:** Given the Rochester study's finding that a 345 kV solution was optimal for the Rochester area when regional reliability was included in the discussion, and the La Crosse study's determination that 161 kV alternatives could not meet load serving needs in the La Crosse/Winona area, RPU and Dairyland undertook further studies to identify a 345 kV regional solution – the 2006 La Crosse/Rochester Study (Appendix E, page 149). Possible cost savings and better solutions could be determined by identifying regional 345 kV transmission improvements that would meet reliability needs in the Rochester and La Crosse/Winona areas as well as adding system reliability to the wider southern Minnesota/western Wisconsin area.~~

~~To determine potential 345 kV solutions, planning engineers first selected a point of origin for providing this source to the area. Typically, to develop a 345 kV system aimed at supporting a particular area, connections to other parts of the existing 345 kV system are usually most effective. A number of geographically diverse sources, which were connected to the existing 345 kV system, were considered for this purpose: Mankato, the Twin Cities and Eau Claire, Wisconsin.~~

~~Two key criteria were evaluated to determine the point of origin: distance of the source from the community to be served and strength of source. Regarding the distance criterion, the farther the source is from the community, the more the line would cost to build. Also, if the new line goes to a strong source but is very long, by the time the line reaches the community it would effectively be a weak source. Regarding the strength of the source, in general the more lines and generators in a source area, the stronger the source would be. A strong source helps to ensure the community being served by a new line would enjoy the benefit of the new line. If the new line goes to a weak source, very little electrical support would be provided to the community by that line, so the new line would be of little value.~~

~~Based on this criterion, planning engineers determined that the new 345 kV line should connect with the 345 kV loop surrounding the Twin Cities in the southeast area of the metropolitan area.~~[7] ~~This location is close to the Rochester and La Crosse/Winona areas and is tied into significant generation on the west side of the Twin Cities, including the Blue Lake plant. The location also serves as an effective new 345 kV source location to the Rochester metro area. This source would support the two proposed 161 kV lines that leave the North Rochester Substation and tie into two locations on the Rochester 161 kV transmission system.~~

~~Planning engineers also considered the need for load serving support to the 161 kV system in the La Crosse/Winona area. In the primary study, planning engineers focused on a Prairie Island Substation source and a substation connection in the La Crosse area to provide area load serving support. Based on this criterion, five potential 345 kV options were initially evaluated:~~

- ~~Option 1 – Prairie Island-Rochester-North La Crosse-Columbia~~
- ~~Option 2 – Prairie Island-Rochester-North La Crosse to West Middleton~~
- ~~Option 3 – Prairie Island-Rochester-Salem~~
- ~~Option 4 – Prairie Island-North La Crosse-Columbia~~
- ~~Option 5 – Prairie Island-North La Crosse-West Middleton~~

~~Options 1, 2 and 3 included two 161 kV lines to tie into the RPU system at the Rochester area substations: one at Northern Hills and one at the Chester Substation.~~

~~Planning engineers eliminated Option 3 because it did not address load serving needs in La Crosse. Options 4 and 5 were eliminated because they did not resolve reliability issues in Rochester. The two remaining options, Options 1 and 2, performed equally well on system impact in mitigating contingency overloads during summer off-peak contingency scenarios. However, Option 1, Prairie Island-Rochester-North La Crosse-Columbia, provided better system performance under a summer peak contingency analysis – it eliminated existing overloads and created fewer overloads than Option 2.~~

~~The Prairie Island-Rochester-North La Crosse-Columbia 345 kV option was further refined based on additional analysis from a siting perspective. The Prairie Island site is located near the Mississippi River adjacent to the Prairie Island Tribal lands. The site is surrounded on the west by bluffs and all major lines entering and exiting the substation are on the same ROW. There would be limited if any opportunities to create new corridors to the site. Continued reliance on the Prairie Island Substation site as a primary terminus to connect additional lines to the transmission system would only exacerbate the siting issues.~~

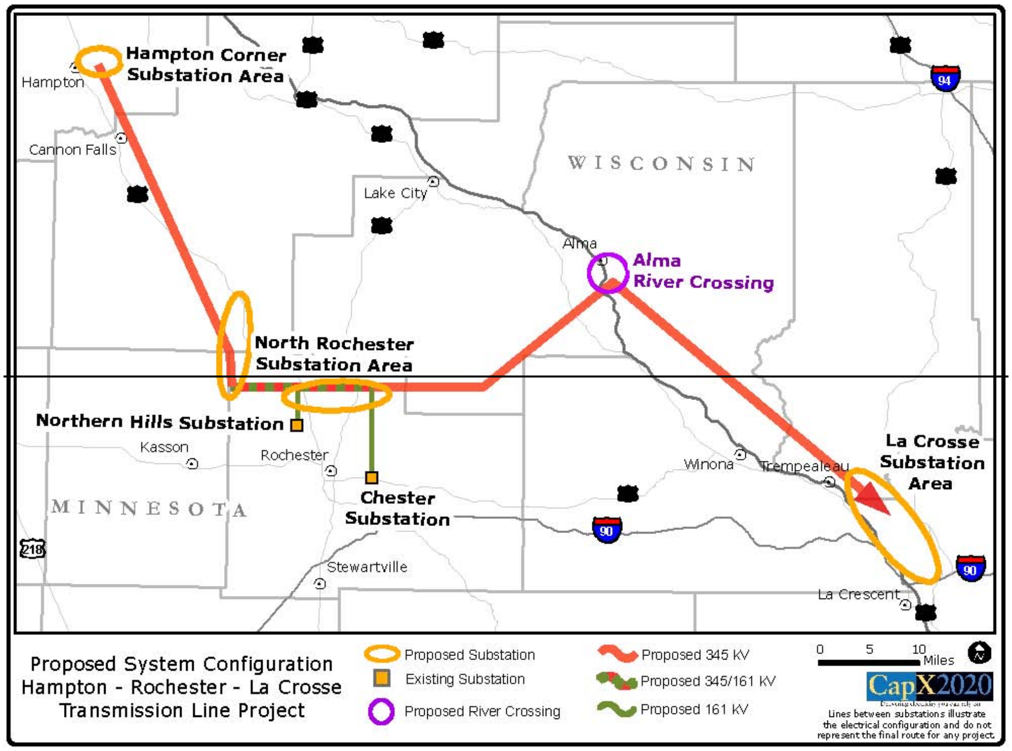
~~7~~ ~~The Twin Cities was chosen as the source to Rochester based primarily on the distance, strength of source and other available lines and generators. In the case of distance, the Twin Cities source would require the shortest line to Rochester, approximately 50 miles compared to Mankato (85 miles) and Eau Claire (90 miles). The longer distances would make these options considerably more expensive. Similarly, Mankato and Eau Claire would not be a source selection as strong as that from the Twin Cities; the longer lines would also diminish the source strength. The redundancy was also greater by sourcing at the Twin Cities, which has multiple 345 kV lines and generation running at all times, and the particular substation envisioned as the Twin Cities source would have at least three 345 kV lines into it, in addition to the new line planned to go to Rochester. The 345 kV substations in Mankato and Eau Claire each have two existing 345 kV lines into them and limited generation in the area.~~

~~A site further west of Prairie Island on the Blue Lake-Prairie Island 345 kV line was recommended by the siting group to analyze as the alternative endpoint.~~

~~A Hampton source was then identified. Analysis showed that the Hampton source provided the same system performance as a Prairie Island source. In addition, the Hampton termination is a better alternative because it provided a more robust transmission system in the Rochester area. The Prairie Island-Byron 345 kV line is currently the primary 345 kV source and a critical line in the area. A new Hampton source provides redundancy so that if the Prairie Island-Byron 345 kV line is out of service, the Hampton-North Rochester 345 kV line could be relied upon to provide service. Additionally, by physically separating the two lines, the likelihood of losing both lines in a natural disaster is reduced. The lines would also be electrically separated by a minimum of two breakers, which reduces the impact of a breaker failure at either location.~~

~~Planning engineers determined the line would terminate at La Crosse and further study work should be undertaken to evaluate additional facilities to the east that could connect at La Crosse. This 345 kV line connecting Hampton to La Crosse would serve load serving needs in Rochester past mid-century, and La Crosse until approximately 2050 given current load forecasts. The MN PUC approved the Hampton Substation endpoint as part of the Brookings County-Hampton 345 kV Project.~~ ~~*In the Matter of the Route Permit Application for a 345 kV Transmission Line from Brookings County, South Dakota to Hampton, Minnesota*~~~~, Order Granting Route Permit at Route Permit at p. 4 MPUC Docket No. ET-2/TL-08-1474 (Sept. 14, 2010). Figure 2.1-7 shows the proposed configuration for the Hampton-Rochester-La Crosse 345 kV Transmission Project.~~

~~Figure 2.1-7:~~
~~Proposed Configuration~~



~~Section 2.1.7 presents the Project cost estimates.~~

~~**2009 Update Study:** The Update Study confirmed the need for the 345 kV project using updated forecasts and system topology. The study also further evaluated the 161 kV transmission option for the La Crosse/Winona area. Based on power flow results, planning engineers determined that the 161 kV Alternative allows for 6 MW of load serving capability, assuming a required voltage at French Island generation bus of 0.95 pu. Based on the loading forecasts for the La Crosse/Winona area, this additional capacity would reliably serve the La Crosse/Winona area until approximately 2013 based on current forecasts. The next major transmission fix for the area would then be a new 345 kV source, similar to the 345 kV Project.~~

~~The 2006 study showed the 161 kV Alternative lasting until approximately 2026 to 2028, upon which time a 345 kV source would be necessary. This differs from the results found in the 2009 Update Study due to the following major drivers.~~[8]

~~[8] The 2006 161 kV alternative for the La Crosse area is discussed in more detail in Section 4.2.3 of the 2009 Update Study (Appendix C, page 249).~~

- ~~The voltage criterion for the French Island generator was corrected in the 2009 Update Study. The voltage at the plant must be at 95 percent to operate. The previous study work allowed the voltage to be below 95 percent.~~
- ~~The 2006 La Crosse Area Study included numerous reconductors and rebuilds on the 161 kV system to help the alternative serve loads until approximately 2026. The alternative project (the Genoa-North La Crosse 161 kV line), in combination with the French Island voltage correction, serve loads until approximately 2013.~~

~~TSSR Supplement-2010 161 kV Alternative Analysis:~~ ~~The TSSR Supplement identified and analyzed a new La Crosse area lower voltage alternative (hereafter referred to as the 2009 161 kV Alternative) demonstrated that it would not be sufficient to load past 2013. Therefore, a new La Crosse area lower voltage alternative was studied in 2010 (hereafter referred to as the 2010 161 kV Alternative). This alternative (as described below) would serve the load in the La Crosse area until the 600 MW load level, or approximately 2028, using the load forecasts included in the TSSR report (Appendix E, page 408). However, there is less improvement to regional reliability and reduced load serving capability with the 2010 161 kV Alternative than with the proposed 345 kV line. These issues will be discussed in more detail below; a supplemental technical report is included in the Appendix as well (Appendix E, page 459).~~

~~To increase the load serving capability of the La Crosse/Winona area without a new transmission source, a number of existing 161 kV lines in the area would need to be rebuilt to help the existing system to handle the load growth. Table 2.1-11 shows the facilities that need upgrading. Upgrading these facilities would allow the transmission system to reliably serve load until 600 MW, or approximately 2028.~~

~~To improve the load serving capability past the 600 MW load level, the La Crosse/Winona system needs a new transmission source. At this point, a 345 kV line or a 161 kV line could be added as a source. For the 2010 161 kV Alternative, an approximately 100-mile 161 kV line was considered from Red Wing, Minnesota to La Crosse, Wisconsin, with ties at the following substations: Spring Creek, Lake City, Alma, Marshland, Onalaska and La Crosse. This 161 kV source, in addition to the list of system upgrades in Table 2.1-11, could serve load growth in the La Crosse/Winona area to the 750 MW load level, or approximately 2045. This is the same load level that the proposed Hampton-Rochester-La Crosse 345 kV Transmission Project could serve as shown in the TSSR (Appendix E, page 26). This complete alternative is shown in Table 2.1-12.~~

~~Table 2.1-11:~~
~~161 kV Transmission Upgrades~~~~[9]~~

161 kV Line Rebuilds	Miles
~~Genoa-La Crosse Tap~~	~~21~~[10]
~~Coulee-La Crosse~~	~~8.5~~
~~Genoa-Coulee~~	~~19~~
~~Genoa-Lansing~~	~~20~~
~~Alma-Marshland~~	~~27~~
~~La Crosse-Mayfair~~	~~4~~
~~Marshland-La Crosse Tap~~	~~24~~
~~Total Miles of Rebuilt 161 kV~~	~~123.5~~

69 kV Line Rebuilds	Miles
~~Coulee-Swift Creek~~	~~2~~
~~Coulee-Mt. La Crosse~~	~~5~~
~~Total Miles of Rebuilt 69 kV~~	~~7~~

New 161/69 kV Transformers	Size
~~Tremval Upgrade existing~~	~~112 MVA~~
~~Coulee #3~~	~~112 MVA~~
~~Marshland #3~~	~~112 MVA~~
~~La Crosse #1~~	~~112 MVA~~
~~La Crosse #2~~	~~112 MVA~~
~~Coulee #1~~	~~112 MVA~~
~~Monroe County #2~~	~~70 MVA~~

Substations (New and Expansions)	
~~Coulee~~	~~Expansion~~
~~Marshland~~	~~Expansion~~

~~[9] In addition to the upgrades listed on Table 2.1.11, there are 14 existing 161 kV and 69 kV lines that need clearance and terminal limits addressed.~~

~~[10] Genoa – La Crosse Tap is planned to be reconductored in 2012/2013. The 2010 161 kV Alternative requires an additional reconductor is to a higher value than the currently planned upgrade.~~

~~Table 2.1-12:~~
~~2010 161 kV Alternative Facilities~~

161 kV Line Rebuilds	Miles
~~Genoa-La Crosse Tap~~	~~21~~
~~Coulee-La Crosse~~	~~8.5~~
~~Genoa-Coulee~~	~~19~~
~~Genoa-Lansing~~	~~20~~
~~Alma-Marshland~~	~~27~~
~~La Crosse-Mayfair~~	~~4~~
~~Marshland-La Crosse Tap~~	~~24~~
~~Total Miles of Rebuilt 161 kV~~	~~123.5~~

69 kV Line Rebuilds	Miles
~~Coulee-Swift Creek~~	~~2~~
~~Coulee-Mt. La Crosse~~	~~5~~
~~Total Miles of Rebuilt 69 kV~~	~~7~~

New 161 kV Lines	Miles
~~Alma-Marshland #2~~	~~28~~
~~Marshland-Onalaska~~	~~26~~
~~Onalaska-La Crosse~~	~~5~~
~~Spring Creek-Lake City~~	~~20~~
~~Lake City-Alma~~	~~22~~
~~Total Miles of New 161 kV~~	~~101~~

New 161/69 kV Transformers	Size
~~Tremval Upgrade existing~~	~~112 MVA~~
~~Coulee #3~~	~~112 MVA~~
~~Marshland #3~~	~~112 MVA~~
~~La Crosse #1~~	~~112 MVA~~
~~La Crosse #2~~	~~112 MVA~~
~~Coulee #1~~	~~112 MVA~~
~~Monroe County #2~~	~~70 MVA~~
~~Jackson County Upgrade Existing~~	~~112 MVA~~
~~Lake City #2~~	~~70 MVA~~
~~Onalaska #1 and #2~~	~~112 MVA~~

Substations (New and Expansions)	
~~Coulee~~	~~Expansion~~
~~Marshland~~	~~Expansion~~
~~Alma~~	~~New~~
~~Spring Creek~~	~~Expansion~~
~~Onalaska~~	~~New~~
~~Lake City~~	~~Expansion~~

Total Cost	
~~La Crosse 161 kV Alternative~~	~~$330 Million~~
~~Rochester 161 kV Alternative~~	~~$ 47 Million~~
~~Total 161 kV Alternative Cost~~	~~$376 Million~~

2.1.3.3.2.1. Alternative Cost Analysis

To have a full comparison between the Hampton-Rochester-La Crosse 345 kV Transmission Project and the 2010 161 kV Alternative, cost analysis, generation transfer capability and system benefits were analyzed as well. In assessing the overall alternative cost, consideration was also given to the need in Rochester, which required inclusion of the Rochester 161 kV alternative. Details of the cost analysis are contained in the appendix (Appendix E, pages 30-32).

~~To have a full comparison between the Hampton-Rochester-La Crosse 345 kV Transmission Project and the 2010 161 kV Alternative, cost analysis, generation transfer capability and system benefits were analyzed as well. Details of the cost analysis are contained in the appendix (Appendix E, page 462, Table 3). In assessing the overall alternative cost, consideration was also given to the need in Rochester, which required inclusion of the Rochester 161 kV alternative.~~

2.1.3.3.2.2. Community Reliability

The following Table 2.1-11a summarizes the load-serving capability of the La Crosse area, without additions, with the Project and with the Project and capacitor additions options. All options were analyzed assuming the Monroe County-Council Creek 161 kV line out of service. The key column in that figure is the column labeled "Most limiting load-serving increment/ MW". That column shows the increment (or decrement, if negative) of load-serving capability over the La Crosse load level forecast for year 2012 (491 MW). All load-serving increments shown are real (MW) increments only; the reactive (MVAr) load was not increased. Note also that for the purpose of this transmission planning study, the evaluation was done assuming that the new transmission line would not be co-located (or double circuited) with existing transmission facilities.

In the La Crosse/Winona area, the proposed 345 kV transmission line would community reliability by providing a strong 345 kV source to the 161 kV network to the greater La Crosse area. This reduces the burden on the four existing 161 kV source lines into La Crosse and mitigates the risk caused by a contingency loss of any of these lines. Also, a new 345 kV line greatly reduces the risk of interrupted load caused by the loss of a generator and a 161 kV line in the area.

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Table 2.1-11a
Load Serving Capability with Capacitor Bank Additions

Year	Option	Route	Capacitor additions	First equipment upgrade assumed	Second equipment upgrade assumed	Base case area load/ MW	Most limiting load-serving increment/ MW	Most limiting load-serving level/ MW	Voltage incremental load served/ MW	Voltage Limiter	Contingency	Voltage load served/ MW	Thermal incremental load served/ MW	Thermal Limiter	Contingency	Thermal load served/ MW
2012	Base case		-	Genoa-Lansing 161 (264 MVA emergency rating)	La Crosse-La Crosse Tap (490 MVA emergency rating)	491	-222	269	-18	French Island 95%	Genoa & Alma-Marshland	473	-222	Genoa-La Crosse Tap	JP Madgett & Genoa-Coulee	269
2012	Hampton-Rochester-La Crosse 345	New ROW		Genoa-Lansing 161 (264 MVA emergency rating)	La Crosse-La Crosse Tap (490 MVA emergency rating)	491	125	616	125	French Island 95%	North La Crosse-North Rochester & Genoa	616	319	Genoa-La Crosse Tap	JP Madgett & Genoa-Coulee	810
2012	Hampton-Rochester-La Crosse 345	New ROW	North La Crosse 4x80	Genoa-Lansing 161 (264 MVA emergency rating)	La Crosse-La Crosse Tap (490 MVA emergency rating)	491	300	791	353	French Island 95%	North La Crosse-North Rochester & Genoa	844	300	Genoa-La Crosse Tap	JP Madgett & Genoa-Coulee	791

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2.1.3.3.2.3. Regional Reliability ~~with the 161 kV Alternative~~

To improve regional reliability, additional 345 kV facilities are needed between Minnesota and Wisconsin. Accordingly, none of lower voltage options would provide regional reliability benefits.

This analysis to study 161 kV and 230 kV alternatives to the 345 kV project has helped support the 345 kV project as the best alternative both for the load serving areas of Rochester and La Crosse / Winona, and the greater region.

The 2006 and 2010 161 kV Alternatives would provide increased load serving capacity to the Winona/La Crosse areas, but would not further enhance the reliability of the regional bulk transmission grid or contribute to future transfer capability between Wisconsin and Minnesota.

The 2010 161 kV Alternative would not address the need for additional 345 kV facilities between Wisconsin and Minnesota. This 161 kV alternative would require building a 100 mile 161 kV line across the Mississippi River, but would have none of the regional benefits realized by the 345 kV project:

The 345 kV line from Hampton to Rochester and on to La Crosse serves as an important first step in a greater regional transmission system buildout. The Hampton-Rochester-La Crosse 345 kV Project will provide foundational facilities for the necessary 345 kV connection between Wisconsin and Minnesota to provide transfer capability. Additional 345 kV facilities from La Crosse to the Madison area have been proposed by ATC (Badger-Coulee Project).

~~The analysis done in 2010 to study additional 161 kV alternatives has helped support the proposed 161 kV and 345 kV transmission lines as the best alternative, both for the load serving areas of Rochester and La Crosse/Winona and the greater region.~~

~~The 2010 161 kV Alternative would provide increased load serving capability to the La Crosse/Winona area, but would not further enhance the reliability of the regional bulk transmission grid or contribute to future transfer capability between Wisconsin and Minnesota.~~

~~In Wisconsin, the transmission grid in the western portion of the state, along with interface loading levels across the Minnesota-Wisconsin border, limit the ability to interconnect new generation in Minnesota as well as generation from points further west. Planning engineers have identified the lack of 345 kV facilities between Minnesota, La Crosse and points east as the impediment to further transfers. The 161 kV Alternative would require building a 100-mile 161 kV line across the Mississippi River, which ould have none of the regional benefits realized by the Hampton-Rochester-La Crosse 345 kV Transmission Project .~~

~~2.1.3.3.2.1 Reliability and Performance Benefits of Solutions~~

~~In the La Crosse/Winona area, the proposed 345 kV transmission line would enhance reliability by providing a strong 345 kV source to the 161 kV network to the greater La Crosse area. This reduces the burden on the four existing 161 kV source lines into La Crosse and mitigates the risk caused by a~~

~~contingency loss of any of these lines. Also, a new 345 kV line greatly reduces the risk of interrupted load caused by the loss of a generator and a 161 kV line in the area.~~

~~Table 2.1-13 summarizes the contingencies, existing system capabilities and capabilities when the Hampton-Rochester-La Crosse 345 kV Transmission Project is operational:~~

~~Table 2.1-13:~~
~~La Crosse/Winona Area Contingencies and Transmission System Capabilities~~

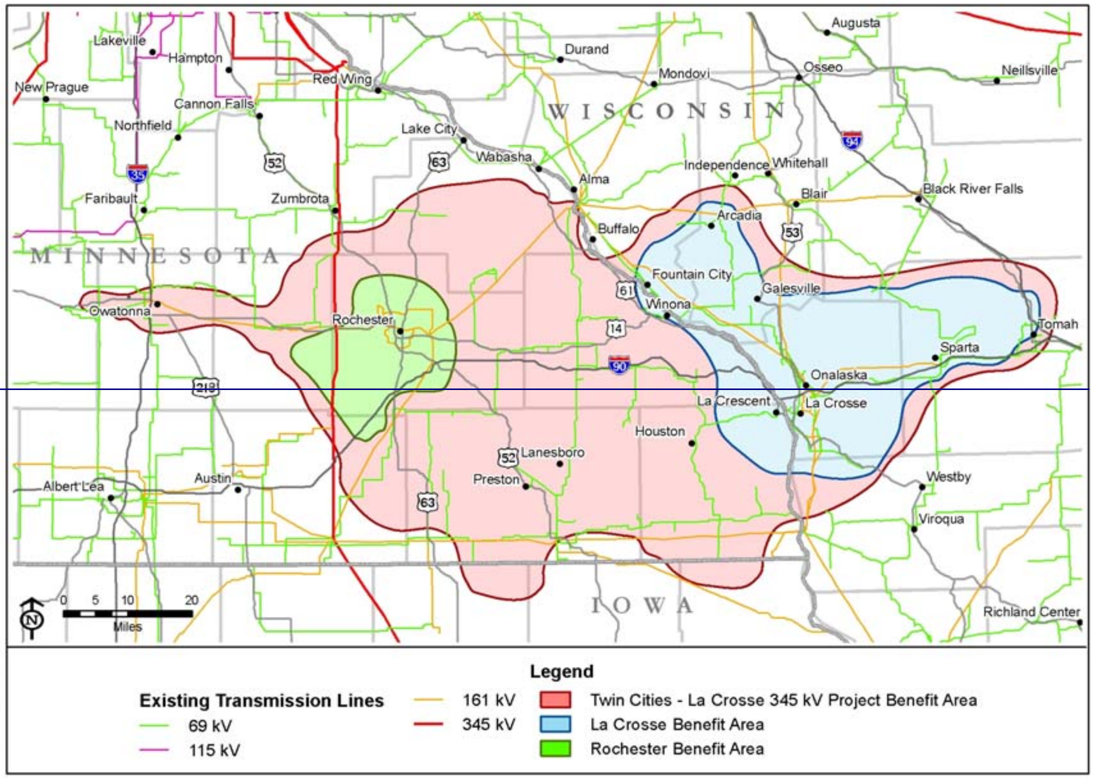
~~GENERATOR OUTAGE~~	~~Contingency~~	~~Overloaded Facility~~	~~Existing System~~	~~Existing System & French Island On-Line 70 MW~~[11]	~~SE 345 kV Line In-Service~~
	~~La Crosse Critical Load Level (MW)~~				
~~None~~	~~Genoa-Coulee 161 kV~~	~~Genoa-La Crosse 161 kV~~	~~470 MW~~	~~540 MW~~	
~~John P. Madgett~~	~~Genoa-Coulee 161 kV~~		~~310 MW~~	~~380 MW~~	
~~John P. Madgett~~	~~Genoa-La Crosse 161 kV~~	~~Genoa-Coulee 161 kV~~			~~690 MW~~
~~Genoa 3~~	~~Alma-Marshland 161 kV~~	~~Low Voltage in La Crosse~~	~~430 MW~~	~~500 MW~~	~~Eliminated~~

~~The overall Hampton-Rochester-La Crosse 345 kV Transmission Project would also provide transmission system benefits for a larger geographic area served by Xcel Energy, Dairyland, RPU and SMMPA. Figure 2.1-8 shows this area.~~

~~In Wisconsin, the transmission grid in the western portion of the state, along with interface loading levels across the Minnesota – Wisconsin border, limit the ability to interconnect new generation in Minnesota as well as generation from points further west. Additional 345 kV facilities are needed to address this deficit. The 345 kV Project is also designed to provide generation support, including support for renewable generation, in southeast Minnesota. These benefits will not be realized with a 161 kV line.~~

~~[11] French Island Unit 3 is mothballed indefinitely, with no plans to be put back into service. Therefore, discussions of French Island in this Application would refer only to the operational Units 1, 2 and 4; 70 MW from Unit 4 is all that is available for system support~~

~~Figure 2.1-8:~~
~~Benefit Area~~



~~The green area shows the benefit area of the 161 kV transmission option for the Rochester area. The blue area shows the benefit area associated with the 161 kV transmission options studied for the La Crosse/Winona area. The pink area shows the entire benefit area of the Hampton-Rochester-La Crosse 345 kV Transmission Project. The areas in Wisconsin benefiting from the project are Buffalo, Trempealeau and La Crosse Counties, including the communities of Alma, Buffalo City, Fountain City, Arcadia, Galesville, Trempealeau, Holmen, Onalaska, La Crosse and the surrounding rural areas.~~

~~After construction, this area would have improved load serving capability as well as overall system stability and reliability.~~

~~The Hampton-Rochester-La Crosse 345 kV Transmission Project would also improve the ability of the 345 kV system around Rochester to deliver power. Power flows through the Byron-Adams 345 kV line are currently constrained because the underlying Byron-Maple Leaf 161 kV line cannot withstand the outage of the Byron-Adams 345 kV line when flow levels exceed 766 MW north to south. By adding a new 345 kV line in the area and additional parallel path for the power to travel the Byron-Maple Leaf 161 kV line limitation is removed.~~

2.1.3.3.2.4. Generation Support

In Wisconsin, the transmission grid in the western portion of the state, along with interface loading levels across the Minnesota – Wisconsin border, limit the ability to interconnect new generation in Minnesota as well as generation from points further west. Additional 345 kV facilities are needed to address this deficit. The 345 kV Project is also designed to provide generation support, including support for renewable generation, in southeast Minnesota. These benefits will not be realized with a 161 kV or 230 kV alternative.

2.1.3.4. Electric Losses for Each Alternative

New transmission lines added to the electric system affect the resistive losses of the system. In turn, the costs for capacity and energy for the system are affected. If adding a new transmission line reduces losses, capacity and energy costs are reduced.

Loss effects have been analyzed for the 345 kV Project, the 2009 161 kV Alternative and the 2010 161 kV Alternative. Based on Table 2.1-14, ~~$4,498,110~~ $4,255,454 is the present value of cost of capacity and energy for a 1 MW loss reduction.

Table 2.1-14: Revised:
Computation of Equivalent Capitalized Value for Losses

Table 2.1-15 shows the losses performance comparison of the 345 kV Project and 161 kV Alternative for serving La Crosse area load growth. The loss improvements shown are relative to the Proposed 345 kV project, and compare them to a base case which is the case used for the analysis of the 345 kV Project and 161 kV Alternative ~~base model used for the analysis of the 345 kV Project and 161 kV Alternative~~. The proposed Hampton-Rochester-La Crosse 345 kV Transmission Project saves ~~8~~ 10 MW of capacity and ~~21~~ 25 gigawatt hour (GWh)/year of energy. This calculates to a present value of capacity and energy cost savings of approximately $42 million. The 2010 161 kV Alternative has a present value of cost savings of $5 million relative to the Proposed 345 kV Project. The negative loss savings for the three lower voltage alternatives from North Rochester – Briggs Road as they compare to the Proposed 345 kV project are shown in Table 2.1-15 as well. ~~The 161 kV Alternative saves 4 MW of capacity and 11 GWh/year of energy. The 345 kV Project and the 2010 161kV Alternative have a present value of cost savings of $36 million, and the 2009 161 kV Alternative has a present value of cost savings of $18 million.~~

Table 2.1-15: Revised
Losses Performance Comparison

Year	Case	System Capacity Loss Savings from Base Case/MW	Annual Energy Loss Savings/GWh*	Present Value of Capacity and Energy Cost Savings/M$
2012	Base Model	~~0~~ -10	~~0~~ -25	~~0~~ -42
2012	Proposed 345 kV Project Added	~~8~~ 0	~~21~~ 0	~~36~~ 0
2012	2006 161 kV La Crosse Area Alternative	~~4~~ -6	~~11~~ -16	~~18~~ -25
2012	2010 161 kV La Crosse Area Alternative	~~8~~ 1	~~21~~ 3	~~36~~ 5
2012	230 kV North Rochester – Briggs Road Alternative	-1	-4	-6
2012	161 kV North Rochester – Briggs Road Alternative	-3	-8	-12
2012	Double-circuit 161 kV North Rochester – Briggs Road Alternative	-1	-3	-5

*All values using 2010 dollars

2.1.3.5. Short Circuit, Stability and Thermal Analyses

The proposed Project does not involve new generation facilities or installation of significant reactive sources. The existing transmission system is known to be stable and without fault duty problems, so short circuit and stability analyses were not undertaken in the study of alternatives.[12]

A thermal analysis was conducted with the proposed facilities, both in and out of service in the original 2006 La Crosse Area Study and the 2009 Update Study as well as summarized in the TSSR. Appendix E contains the results of this analysis.

[12] The stability analyses completed as part of the "Minnesota RES Update Study, March 31, 2006" were done on models of the transmission system, including the CapX 2020 Group 1 lines, particularly the new 345 kV and 161 kV facilities proposed with the Hampton- Rochester-La Crosse 345 kV Transmission Project. There were no significant violations shown in the output of those simulations and the proposed facilities would not degrade the stability of the system, and in fact, adding significant transmission for load serving purposes without adding generation or changing bulk power transfers usually improves electric system stability.

2.1.3.6. Distribution Needs and Alternatives

There are no distribution substations proposed for this Project in Wisconsin. The entire Project is designed to support the transmission system.

2.1.3.7. Planning Simulation Data (PSSE)

Please see confidential data disks provided under separate cover in August 2009 and February 2011.

Included with the data disk are:

- PSSE base and study models for the most recent and updated study work (the 2009 Update Study) in .raw format.
- Idev files necessary to duplicate study assumptions and results in the base case models.
- Base case correction idevs.
- A text file that details each file included and how to replicate study results as presented in the study documentation.

2.1.4. Description of Substation Facilities

To integrate the proposed new transmission line into the existing electrical system, a new Briggs Road substation would be constructed near the intersection of US-53 and Briggs Road in the town of Onalaska, near Holmen. The Applicants identified two potential substation sites at the southern terminus of the Project referred to as the West Site and the East Site (Figures 4 and 5, and is shown in more detail in Figures 3 and 4 of Appendix K). Initial construction of the substation area would occupy approximately 10 acres; the ultimate layout would require an additional 2 acres. The Applicants propose to acquire a parcel of approximately 40 acres to accommodate the substation, a buffer and line connections.

The West Site is a relatively flat, irrigated farm field while the East Site is a rolling, partially-wooded site occupied by a horse rider/rodeo club. Based on the factors presented in Table 2.1-16, the West Site is the preferred site. Additional detail is provided in Section 2.6 of this Application and in Sheet Maps 14 and 15 in Appendix K.

Table 2.1-16
Comparison of the Briggs Road Substation West and East Sites

	West Site	East Site
Land Use	40 acres of agricultural land	Equestrian facility would need to be relocated
Cost (grading)	Minimal grading-lower cost	Major grading required-higher cost
Natural Resources	Currently farmed	Rolling, partially wooded
Cultural Resources	No documented occurrences of archaeological resources, area has been heavily cultivated	Archeological sites have been documented on the eastern area of the site, potential to find additional sites in this particular area remains high.

<u>Briggs Road Substation</u>

The major equipment being proposed for the initial phase of the Briggs Road Substation includes:

- One 345/161 kV 448 MVA auto transformer with oil containment system.
- One 345 kV circuit breaker with associated control cables and foundations.
- One 34.5 kV 50 MVAR tertiary reactor with associated breaker, switch, foundations and protective relaying.
- A dead-end with foundations for the 345 kV line being terminated during the initial phase.
- Associated 345 kV aluminum bus, disconnect switches, switch stands and bus supports needed for the initial phase. Extra switches and stands will be installed to limit outages during future 345kV additions. Drilled piers are planned for foundations for all support structures.
- Sixteen 161 kV circuit breakers with associated control cables and foundations.
- Four 161 kV, 80 MVAR capacitor banks would be installed with switches, foundations and protective relaying.
- Dead-ends with foundations for the four 161 kV lines being terminated in the initial phase.
- 161 kV aluminum bus, disconnect switches, switch stands, and bus supports needed for the initial phase. Drilled pier foundations are anticipated for all support structures. The 161 kV bus is configured as a breaker-and-one-half design with seven bays installed initially. The substation would be laid out to accommodate five future 161 kV positions.
- Protection and control panels for the 345 kV line, 161 kV lines and 448 MVA transformer.
- An electrical equipment enclosure to house 345 kV and 161 kV protection and control equipment.
- AC and DC auxiliary systems will be installed.
- Approximately 10 acres would be graded during initial construction, with the dimensions of the fenced area being approximately 665 feet by 675 feet (10.3 acres).
- The ultimate layout would require an additional 2 acres to be graded with the dimensions of the fenced area being approximately 665 feet by 830 feet (12.6 acres). The ultimate design includes provision for a 69 kV yard with a separate electrical equipment enclosure.
- Perform grading and drainage to accommodate the work described above in accordance with stormwater management requirements as set by the applicable permits. The graded acreages listed do not include any retention pond requirements.

Figures 1A and 1 (Appendix K) show the layout of the proposed Briggs Road Substation.

2.1.5. Contractual Agreements between Developer and Utilities

A copy of the PDA between and among the Applicants and other potential owners of the Hampton-Rochester-La Crosse 345 kV Transmission Project is included at Appendix G. Only Applicants will own facilities in Wisconsin.

2.1.6. Transmission Service Agreements

The Project is not currently subject to any transmission service agreement. Once constructed, transmission service would be subject to open access transmission tariffs on file with the Federal Energy Regulatory Commission. In addition, a Transmission Capacity Exchange Agreement (TCEA) is currently in the process of being developed for the Project and is anticipated to be executed in 2011. This TCEA will align the transmission capacity rights of the co-owners of the Project (Xcel Energy, Dairyland, RPU, SMMPA and WPPI Energy) with their respective ownership percentage interests in the facilities.

2.1.7. Cost

2.1.7.1. Segment Cost Estimate

Table 2.1-17 contains the costs by segment and categories as required by the AFR for Section 2.1.7.1 through 2.1.7.4. The costs shown are 2010 dollar direct costs (materials and installation labor, ROW clearing and preparation and distribution relocations) to allow segment-to-segment comparisons. Nodal costs are included in the capital costs. Other costs, including escalation to the year spent (2014 and 2015), overheads, allowance for funds used during construction (AFUDC) and all other costs that are common to all routes (such as engineering, project management and oversight, etc.) are presented in the total cost table 2.1-19.

Table 2.1-17:
Costs by Segment

Segment	Q1 – Highway 35 Route	Arcadia Route	Arcadia-Alma Option	Q1 – Galesville Route	Capital Costs	Operation and Maintenance Costs	Removal Costs
1	X	X	X	X	$ 6,057,000	$ 0	$ 389,000
2A1	X	X	X	X	288,000	0	4,000
2A2	X	X		X	975,000	0	30,000
2A3	X			X	1,869,000	0	57,000
2B	X			X	3,531,000	0	114,000
2C	X			X	1,844,000	0	51,000
2D	X			X	2,935,000	0	152,000
2E	X			X	4,204,000	0	145,000
2F	X			X	2,066,000	0	45,000
2G	X			X	8,944,000	0	245,000
2H	X			X	1,357,000	0	25,000
2I	X			X	12,042,000	0	278,000
3	X				7,657,000	0	267,000
4	X				163,000	0	6,000
5A					754,000	0	24,000

Segment	Q1 – Highway 35 Route	Arcadia Route	Arcadia-Alma Option	Q1 – Galesville Route	Capital Costs	Operation and Maintenance Costs	Removal Costs
5B					7,817,000	0	106,000
5C					3,362,000	0	90,000
6				X	4,959,000	0	0
8A	X				2,408,000	0	29,000
8B	X				5,798,000	0	69,000
8C	X				1,574,000	0	35,000
9	X				3,716,000	0	63,000
10B1		X			1,496,000	0	0
10B2			X		2,072,000	0	8,000
10C		X	X		25,758,000	0	767,000
11A		X	X		1,066,000	0	25,000
11B		X	X		3,370,000	0	76,000
11C		X	X		1,380,000	0	27,000
11D		X	X		1,963,000	0	41,000
11E		X	X		1,345,000	0	19,000
11F		X	X		1,168,000	0	14,000
11G		X	X		15,845,000	0	325,000
12				X	816,000	0	0
13A		X	X		1,775,000	0	0
13B1		X	X		896,000	0	0
13B2		X	X	X	6,007,000	0	0
13C		X	X	X	791,000	0	0
13D		X	X	X	1,282,000	0	0
13E		X	X	X	1,142,000	0	0
17A		X	X	X	2,645,000	0	78,000
17B		X	X	X	574,000	0	13,000
18A		X	X	X	3,230,000	0	96,000
18B		X	X	X	533,000	0	11,000
18C		X	X	X	872,000	0	21,000
18D		X	X	X	389,000	0	10,000
18E		X	X	X	379,000	0	13,000
18F		X	X	X	1,306,000	0	21,000

Segment	Q1 – Highway 35 Route	Arcadia Route	Arcadia-Alma Option	Q1 – Galesville Route	Capital Costs	Operation and Maintenance Costs	Removal Costs
18G		X	X	X	1,020,000	0	20,000
18H	X	X	X	X	1,502,000	0	72,000

2.1.7.2. Route Cost Estimate

2.1.7.2.1. Transmission Line (Facilities – New and Upgrades and Land/Land Rights)

See Section 2.1.7.3 for information required by Sections 2.1.7.2.1.1 and 2.1.7.2.1.2.

2.1.7.2.1.1. Facilities

2.1.7.2.1.1.1. New

See Section 2.1.7.3 below. All Project components are new. No upgrades to existing lines are proposed. Nodal costs are included in the segment costs and are not itemized.

2.1.7.2.1.1.2. Upgrades

Not applicable.

2.1.7.2.1.2. Land/Land Rights

See Section 2.1.7.3.

2.1.7.2.2. Distribution System Modifications

There are distribution lines along the routes. In consultation with local distribution companies Xcel Energy and Riverland Energy Cooperative, conflicting distribution lines would be removed, relocated or buried in circumstances where there was a physical conflict or if the proximity might result in neutral-to-earth voltage (NEV) concerns. For NEV, both Xcel Energy and Riverland opted to relocate distribution if it met the following criterion: less than 150-foot separation between transmission and distribution for greater than a 1,000-foot continuous distance.

Distribution farther away from the 345 kV line the distribution would remain. Table 2.1-18 identifies these distribution lines to be relocated. The Q1-Highway 35 route does not require any distribution relocations.

Table 2.1-18: Revised
Distribution Lines and Proposed Actions

Segment	Q1 – Hwy 35 Route	Arcadia Route	Arcadia - Alma Option	Q1 – Galesville Route	Location	Cost	Owner	Action
6				X	0.5 miles north of Schuh Road. Poles 601 - 611	$ 210,000	Riverland Energy Cooperative	Remove approximately 9,000 feet existing overhead 3 phase. Install approximately 9,000 feet 3 phase underground across actively farmed fields.
11B		X	X		North of Village of Arcadia, 0.25 miles east of WI-93. Poles 345 - 346	$ 30,000	Riverland Energy Cooperative	Remove approximately 1,200 feet 3 phase overhead. Install approximately 1,200 feet 3 phase underground.
11E		X	X		Thompson Valley Road. Poles 364 – 368	$ 30,000	Riverland Energy Cooperative	Reconfigure services overhead and underground. Remove approximately 6,900 feet overhead 1 phase. Install approximately 2,100 feet 1 phase underground along road and on the edge of farm fields.
11G		X	X		Thompson Valley Road. Poles 369 – 374	$ 60,000	Riverland Energy Cooperative	Reconfigure services overhead and underground. Remove approximately 4,100 feet overhead 1 phase. Install approximately 2,100 feet underground 1 phase along road and farm field.
11G		X	X		Rural neighborhood at Grove Lane. Poles 411 – 414	$ 70,000	Riverland Energy Cooperative	Remove approximately 2,200 feet overhead 1 phase. Install approximately 2,200 feet underground 1 phase along road.

Segment	Q1 – Hwy 35 Route	Arcadia Route	Arcadia - Alma Option	Q1 – Galesville Route	Location	Cost	Owner	Action
13A		X	X		West of Galesville sub along WI-93. Poles 830 – 837	$650,000	Xcel Energy	Remove approximately 6,500 feet existing 3 phase overhead from along road. Install approximately 6,500 feet 3 phase underground along road, including looped circuit.
13B1		X	X		West of Galesville sub along WI-93. Poles 838 - 840	$ 350,000	Xcel Energy	Remove approximately 2,700 feet existing 3 phase overhead from along road. Install approximately 2,700 feet 3 phase underground along road, including looped circuit.
13B2		X	X	X	West of Galesville sub along WI-93. Poles 841 – 845	$ 380,000	Xcel Energy	Remove approximately 3,600 feet existing 3 phase overhead from along road. Install approximately 3,600 feet 3 phase underground along road, including looped circuit.
13B2		X	X	X	East of Galesville sub along WI-93. Poles 846 – 853	$ 1,230,000	Xcel Energy	Remove approximately 6,200 feet existing 3 phase overhead from along road. Install approximately 6,200 feet 3 phase underground along road, including looped circuit.
17A		X	X	X	Residential area	$ 16,000	Riverland Energy Cooperative	Remove approximately 1,000 feet existing 1 phase overhead. Install approximately 1,400 feet underground 1 phase along road.

The process used to remove distribution lines typically begins with removal of the conductors and insulators. These activities are accomplished with a two-axel bucket truck where sufficient access is available. Where such access is not available, these tasks are accomplished by a lineperson climbing the pole and detaching the conductors and insulators. Insulators are then carried out and the conductors are pulled and coiled from an accessible location.

Removal of distribution poles is typically accomplished by pulling poles using vehicle mounted equipment. where access is available. Where access is unavailable, the poles are typically cut off at ground level using a chain saw. The poles can be pulled to an accessible location where they are loaded onto a flatbed truck.

Installation of underground distribution lines is typically performed using vibratory plow methods. Locations of distribution lines are typically adjacent to a roadway. If installation of distribution lines through vibratory plow or directional boring is not feasible in areas of regulated resources, the Applicants would apply for the appropriate permits. As part of this process, a more detailed discussion of construction practices within sensitive areas would be provided. Such sensitive areas may include wetlands, waterways and areas where T&E species are of concern are present as wells as areas requiring wetland matting or forestry clearing. Areas requiring driveway cuts that could affect access or outages during relocation would also be addressed.

~~Table 2.1-18:~~
~~Distribution Lines and Proposed Actions~~

Segment	Arcadia Route	Arcadia - Alma Option	Q1 – Galesville Route	Location	Cost	Owner	Action
~~6~~			~~X~~	~~0.5 miles north of Schuh Road. Poles 601 - 611~~	~~$ 210,000~~	~~Riverland Electric Cooperative~~	~~Bury 3 phase~~
~~11B~~	~~X~~	~~X~~		~~North of Village of Arcadia, 0.25 miles east of WI-93. Poles 342 - 347~~	~~$ 30,000~~	~~Riverland Electric Cooperative~~	~~Bury 3 phase~~
~~11E~~	~~X~~	~~X~~		~~Thompson Valley Road. Poles 364 – 368~~	~~$ 30,000~~	~~Riverland Electric Cooperative~~	~~Reconfigure services utilizing overhead and underground. Abandon distribution over the hill.~~
~~11G~~	~~X~~	~~X~~		~~Rural neighborhood at Grover Lane. Poles 411 – 414~~	~~$ 70,000~~	~~Riverland Electric Cooperative~~	~~Bury on west side of road~~

Segment	Arcadia Route	Arcadia - Alma Option	Q1 – Galesville Route	Location	Cost	Owner	Action
~~11G~~	~~X~~	~~X~~		~~Thompson Valley Road. Poles 369 – 374~~	~~$ 60,000~~	~~Riverland Electric Cooperative~~	~~Reconfigure services utilizing overhead and underground. Abandon distribution over the hill.~~
~~13A~~	~~X~~	~~X~~		~~West of Galesville sub along WI-93. Poles 830 – 837~~	~~$650,000~~	~~Xcel Energy~~	~~Bury 3 phase including looped circuit~~
~~13B1~~	~~X~~	~~X~~		~~West of Galesville sub along WI-93. Poles 838 - 840~~	~~$ 350,000~~	~~Xcel Energy~~	~~Bury 3 phase including looped circuit~~
~~13B2~~	~~X~~	~~X~~	~~X~~	~~West of Galesville sub along WI-93. Poles 846 – 853~~	~~$ 380,000~~	~~Xcel Energy~~	~~Bury 3 phase including looped circuit~~
~~13B2~~	~~X~~	~~X~~	~~X~~	~~East of Galesville sub along WI-93. Poles 846 – 853~~	~~$ 1,230,000~~	~~Xcel Energy~~	~~Bury 3 phase including looped circuit~~

2.1.7.2.3. Substation Construction

See Section 2.1.7.3.

2.1.7.2.4. Total Capital Costs

See Section 2.1.7.3.

2.1.7.2.5. Removal

See Section 2.1.7.3.

2.1.7.2.6. Salvage

See Section 2.1.7.3.

2.1.7.2.7. Operation and Maintenance

No Operation and Maintenance costs are anticipated.

2.1.7.2.8. Expense Including Pre-Certification

See Section 2.1.7.3.

2.1.7.2.9. Gross Project Cost

See Section 2.1.7.3.

2.1.7.3. Projects for 345 kV or Greater

2.1.7.3.1. Transmission (Material, Labor and Other)

Table 2.1-19 provides the total cost information for each route and satisfies the requirements of Sections 2.1.7.2 and 2.1.7.3. Individual line items are shown in 2010 costs. The escalation line item is based on a Handy-Whitman index and accounts for inflationary forces expected in the transmission industry between 2010 and the construction years (2014-2015). Therefore the total cost, which includes escalation, represents costs for the years they will be incurred (2014 and 2015). Table 2.1-20 provides additional detail on the substation costs.

Table 2.1-19:
Total Project Cost Estimates

Project Cost Categories	Q1 –Highway 35 Route	Arcadia Route	Alma-Arcadia Option	Q1-Galesville Route
Material				
Poles	$ 22,680,000	$ 28,410,000	$ 28,190,000	$ 24,270,000
Wire	5,440,000	5,910,000	5,830,000	5,640,000
Other Material	15,040,000	16,220,000	16,070,000	13,780,000
Labor				
ROW Prep	2,620,000	2,570,000	2,490,000	2,380,000
Foundations	16,970,000	22,470,000	21,980,000	19,180,000
Line	19,980,000	23,620,000	23,460,000	21,180,000
Other				
Real Estate	3,860,000	4,940,000	4,890,000	4,360,000
Technical Support Services	13,010,000	13,370,000	13,350,000	13,190,000
Environmental	1,410,000	1,470,000	1,470,000	1,440,000
Removal	2,020,000	2,070,000	2,050,000	1,890,000
Distribution Relocations	0	2,820,000	2,820,000	1,820,000
Escalation	18,410,000	22,190,000	21,960,000	19,470,000
Overheads	6,970,000	8,370,000	8,290,000	7,340,000
AFUDC	19,330,000	22,960,000	22,740,000	20,400,000
Subtotal	$ 147,740,000	$ 177,390,000	$ 175,590,000	$ 156,340,000
Substations				
Briggs Road Substation	$ 27,285,000	$ 27,285,000	$ 27,285,000	$ 27,285,000

Project Cost Categories	Q1 –Highway 35 Route	Arcadia Route	Alma-Arcadia Option	Q1-Galesville Route
161 kV reroutes to substation				
Material	$ 946,000	$ 562,000	$ 562,000	$ 562,000
Labor	1,496,000	868,000	868,000	868,000
Other	1,871,000	1,102,000	1,102,000	1,102,000
Subtotal	$31,598,000	$ 29,817,000	$ 29,817,000	$ 29,817,000
Other Costs				
Pre-certification Costs	$ 7,281,000	$ 7,686,000	$ 7,668,000	$ 7,476,000
Environmental Fee (one time)	7,117,000	8,448,000	8,558,000	7,528,000
Environmental Fee (annual, during construction years)	854,000	1,014,000	1,026,000	904,000
Subtotal	$15,192,000	$ 17,148,000	$ 17,252,000	$ 15,908,000
Total Cost	$194,590,000	$ 224,355,000	$ 222,659,000	$ 202,065,000

2.1.7.3.1.1. Material

See Table 2.1-19.

2.1.7.3.1.2. Labor

See Table 2.1-19.

2.1.7.3.1.3. Other

The following tables provide the total cost for the Project. Project costs for transmission line and substation construction have been combined and then categorized by transmission line voltage. The gross Project cost is the sum of these costs.

2.1.7.3.2. Substation Costs

The cost of substation construction is included in Table 2.1-19. The substation costs are further itemized in Table 2.1-20. Substation costs are the same for all routes. Substation costs are itemized below by voltage. The 345 kV cost figures were used in the environmental impact fee calculations. Costs are escalated to in-service year (2014).

Table 2.1-20:
Briggs Road Substation Construction Cost Estimates

Project Cost Categories	345 kV	161 kV	Total
Engineering and Design	$ 234,00	$ 936,000	$ 1,170,000
Material	1,914,00	7,656,000	9,570,000
Transformer	0	3,870,000	3,870,000
Construction Labor and Rents	1,267,000	5,068,000	6,335,000
Commissioning and Testing	100,000	400,000	500,000
Other	1,318,000	4,522,000	5,840,000
Total Cost	$ 4,833,000	$ 22,452,000	$ 27,285,000

2.1.7.3.2.1. Material

See Table 2.1-20.

2.1.7.3.2.2. Labor

See Table 2.1-20.

2.1.7.3.2.3. Other

See Table 2.1-20.

2.1.7.3.3. Environmental Protection and Licensing

2.1.7.3.3.1. Environmental Monitoring Services

2.1.7.3.3.1.1. Cost for Internal Environmental Monitors

Internal environmental monitors are responsible for the inspection and monitoring of construction activities to ensure compliance with environmental permit requirements and regulations. Environmental monitors would work directly with the Applicants' staff and contractors, providing advice, consultation and reports on environmental matters as they relate to construction activities. They would also communicate directly with agency staff, as required. The estimated cost for internal environmental monitors is $500,000. This estimate assumes that one monitor would work full time for approximately 100 weeks of construction. This cost is included in the Project total cost calculation in Table 2.1-19

2.1.7.3.3.1.2. Cost of Independent Environmental Monitors

The PSCW has previously ordered the use of independent environmental monitors. Similar to internal monitors, the Applicants assume that independent monitors would work full time for approximately 100 weeks at a cost of $500,000. This cost is included in the Project total cost calculation in Table 2.1-19

2.1.7.3.3.1.3. Agricultural Protection

The Applicants anticipate that agricultural protection measures (also called Farm Disease Prevention) may be used in agricultural areas; however, the need and exact locations for these protection measures would be determined based on landowner discussions. For this estimate, the Applicants assume that agricultural protection measures would only be necessary in areas that have livestock or practice organic farming. Based on a rough estimate of livestock areas and an assumption of minimal organic farmland, $5,000 per mile of agricultural protection costs were included in cost estimates. This cost is included in the Project total cost calculation in Table 2.1-19

2.1.7.3.3.1.4. Environmental Protection Wetlands

The use of mats and other ground-based construction methods including the use of vibratory caisson foundation construction in Black River floodplain wetlands are included in the overall cost estimates presented in Table 2.1-19. The Applicants believe that ground access is feasible to all structure locations along the routes.

2.1.7.3.3.2. Technical Support Services

In Table 2.1-19, the following costs are listed under Technical Support Services: project management, construction oversight, engineering and design, survey, geotechnical investigations, and project controls.

Cost items listed under Environmental in Table 2.1-19 include costs to develop an environmental monitoring and training plan ($100,000), storm water and erosion control plans ($100,000) and the costs of environmental monitors and agricultural protection.

2.1.7.3.3.3. Costs Listed as Licensing and Regulation

The cost of the WDNR Utility Permit for each route is provided below. This cost assumes that the Utility Permit would include Water Quality Certification, Wis. Stat. Chapter 30, and Wis. Admin Code ch. NR 216 coverage.

- Q1 – Highway 35 Route: Approximately $6,550, includes three counties where wetland impacts occur, therefore Water Quality Certification is capped at $3,000.
- Arcadia Route with or without the Arcadia-Alma Option: Approximately $2,800, includes two counties where wetland impact s occur, therefore the Water Quality Certification is capped at $2,000.
- Q1 – Galesville Route: Approximately $3,100, includes two counties where wetland impact s occur, therefore the Water Quality Certification is capped at $2,000.

A cost breakdown for WDNR Permits including the feature identification of the wetland or waterway that will be affected, type of permit being applied for, legal description for the location of the permit activity, and subsequent permit application fee are summarized in Table 1 (Appendix T) by route and route segment. The cost of these permits does not include field studies and/or reports.

2.1.7.3.4. Estimate of Fee Payments to the Department of Administration under Wis. Stat. § 196.491(3g)

The estimated one-time 5 percent environmental impact fee is:

- Q1 – Highway 35 Route: $ 7,183,000
- Arcadia Route: $ 8,376,000

- Arcadia-Alma Option Route: $ 8,290,000
- Q1 – Galesville: $ 7,481,000

The annual 0.3 percent environmental impact fee is:

- Q1 – Highway 35 Route: $ 431,000
- Arcadia Route: $ 503,000
- Arcadia-Alma Option Route: $ 497,000
- Q1 – Galesville: $ 449,000

These fees were also included in the route cost totals presented in Table 2.1-19. More detail regarding the environmental impact fees can be found in the environmental impact fee tables located in Appendix H.

2.1.7.4. Regional Projects – Cost Benefit Analysis and Likely Cost Allocation

This section is not applicable to this Application.

2.1.7.5. Cost of Electrical Losses and Assumptions

Table 2.1-14 contains the calculations of electrical losses and the assumptions underlying those calculations.

2.1.8. Anticipated Construction Schedule

Construction for the Project is expected to begin in January 2013. The Applicants anticipate a December 2015 in-service date for the proposed 345 kV transmission line. Table 2.1-21 provides a permitting and construction schedule summary.

Table 2.1-21:
Permitting and Construction Schedule Summary

Item	Date
File CPCN Application	January 2011
Receive CPCN Order	March 2012
Start Substation and Line Design	April 2012
ROW Acquisition	July 2012 – December 2012
Transmission Line Construction	January 2013 – October 2015
Substation Construction	May 2013 – August 2014
Final ROW Contacts and Cleanup	November – December 2015
Project In-Service Date	December 2015

This schedule is based on information known as of the date of this filing and upon planning assumptions that balance the timing of implementation with the availability of crews, materials and other practical considerations. This schedule may be subject to adjustment and revision as further information is developed.

2.1.9. Description of Applicable Transmission Tariffs

Since the approval of MTEP08,[13] the North Rochester to North La Crosse portion of the Hampton-Rochester-La Crosse 345 kV Project owned by MISO members has been included in Appendix A of the MTEP as a Baseline Reliability Project.[14] This means the Project will receive regional cost allocation according to the Regional Expansion Criteria and Benefits (RECB) criteria applicable to Baseline Reliability Projects. According to this cost allocation methodology[15], 20 percent of the Rochester-La Crosse 345 kV portion of the Project cost will be allocated to all loads in MISO on a postage stamp basis. The remaining 80 percent of the cost will be allocated via the Line Outage Distribution Factor (LODF) methodology, which is a MISO model intended to allocate costs to those utilities whose flows are most impacted by the completion of the Project. The Hampton to North Rochester portion of the project has been classified as "other" by MISO and is not eligible for cost allocation.[16]

[13] Midwest Independent Transmission System Operator, Inc., MIDWEST TRANSMISSION EXPANSION PLAN 2008, *available at*: http://www.midwestiso.org/publish/Folder/279a04_11db4d152b9_-7dc50a48324a?rev=1 (2008).

[14] Associated 161 kV lines from North Rochester to Northern Hills and Chester substations are also included in Appendix A of the MTEP as Baseline Reliability Projects, with only the line to Northern Hills eligible for cost allocation.

[15] The MISO cost allocation methodology only applies to the transmission systems of MISO transmission owner members as of the date of the MTEP08 report. Therefore, the MISO cost allocation methodology used for MTEP08 excludes the investment of DPC, RPU, and WPPI from cost sharing.

[16] *See generally*, Midwest Independent Transmission System Operator, Inc. Open Access Transmission, Energy and Operating Reserve Markets Tariff, FERC Electric Tariff, Fifth Revised Volume No. 1, Attachment FF.

2.2. Project Development and Alternatives Considered

2.2.1. Local Transmission Level Alternatives

The Applicants evaluated several engineering alternatives to the proposed transmission lines. The description, analysis and evaluation of the alternatives considered are provided in the TSSR (Appendix E). The Hampton-Rochester-La Crosse 345 kV Transmission Project is necessary to provide adequate and reliable transmission service to the La Crosse/Winona and Rochester areas and would support additional needs for future years. The specific system and local alternatives investigated in the development of this Project are discussed in Section 2.1.3.3.

2.2.2. Factors Considered When Evaluating Route Alternatives

The overall Project route development utilized Minnesota and Wisconsin routing criteria and spanned more than three years. The Applicants' routing and engineering personnel identified the Q1-Highway 35 Route, Arcadia Route, Q1-Galesville Route and the Arcadia-Alma Option for the La Crosse Project based on their investigation of the overall study area, regulatory guidance about corridor sharing and routing criteria, extensive agency and landowner input, suitability for construction, cost and electrical system need. These alternative routes are shown in Figure 2 and are described in detail in Section 2.4. An overview of route configuration and ROW sharing information for the Q1-Highway 35 Route is presented in Figures 9 and 10, the Arcadia Route and Arcadia-Alma Option in Figures 11 and 12, and the Q1-Galesville Route in Figures 13 and 14.

The evaluation factors and route development process undertaken by the Applicants, with an emphasis on the Wisconsin portion of the 345 kV transmission line, are described below.

2.2.2.1. Routing Criteria

2.2.2.1.1. Wisconsin Statutes

Route selection in Wisconsin was guided by Wis. Stat. § 1.12(6) Siting of Electric Transmission Facilities, which specifies that the following corridors should be utilized in order of priority:

- Existing utility corridors
- Highway and railroad corridors
- Recreational trails
- New corridors

The fourth category, new corridors, could include secondary roads and administrative or property boundaries or other linear features (such as field lines or fence lines) or other features that minimize the number of poles in cultivated land to the extent practical.

2.2.2.1.2. Additional Routing Factors

In addition to the routing criteria provided under Wis. Stat. § 1.12(6), the Applicants applied other routing criteria to identify potential corridors, including considering elements of the human and natural environment that could be affected by the development of a transmission line (siting constraints). These criteria, which are not listed in order of priority and were not assigned weighted values, include to the extent practical and applicable:

- Minimizing impacts to residences by avoiding high density residential areas.
- Minimizing land use impacts by conforming to existing and proposed land use patterns, including routing along existing transmission lines and roads, and to reduce the amount of new ROW required (*e.g.* corridor sharing) and by placing new facilities along natural corridors, field lines and property lines where an existing corridor (*e.g.* fence line, drainage ditch or access road) is present.
- Avoiding, where prudent, public and private hunting grounds, woodlands, streams, lakes, floodplains, wetlands, public lands and public airports.
- Maintaining compatibility with local agricultural practices.
- Maintaining appropriate separation from residences, schools, daycares and hospitals.
- Minimizing environmental impacts consistent with engineering and economic considerations.
- Assessing the ability to meet identified or reasonably foreseeable future needs.

In addition, as part of the development of potential routes for the La Crosse Project, the Applicants consulted and are in ongoing communication with local, state and federal agencies associated with the study area. State and federal agencies identified several issues of concern regarding the potential route alignments. These issues include:

- Avian collisions with wires.
- Impacts to the habitat of listed species: Bell's vireo, Massasauga rattlesnake, Blanding's turtle, red-shouldered hawks and freshwater snail species.
- Impacts to migratory bird habitat, particularly wetland habitat.
- Fragmentation of wildlife habitat, especially riparian forests of the Upper Mississippi River NWFR and the Trempealeau NWR.
- Introduction of invasive plant species due to construction disturbance.
- Overlap of the proposed transmission ROW and railroad ROW.
- Aesthetic impacts to GRR, a National Scenic Byway and sensitive visual resource.
- Recreational and historic aspects of the Old McGilvray Road "Seven Bridges Road/Trail."
- Impacts to agricultural lands, including irrigation pivots around the Trempealeau area.

2.2.2.1.3. Opportunity and Constraint Mapping

When identifying corridors and route options, the Applicants further analyzed environmental resources by developing maps that identified siting opportunities and constraints using data and information collected from various sources. Aerial photography, zoning, land use and parcel data were obtained from Buffalo, Trempealeau and La Crosse counties. The USDA was contacted for soil data and floodplain information was obtained from the Federal Emergency Management Agency (FEMA). The WDNR provided information on native plant communities, sites with biodiversity significance, streams and lakes, wildlife management areas (WMAs) and rare natural features, and identified the wetlands on the Wisconsin Wetlands Inventory (WWI). WisDOT provided input on roadways, including the GRR. The USFWS provided information on threatened and endangered species and USFWS lands in the study area. In addition, the Wisconsin State Historic Preservation Office (SHPO) was consulted for the existence of sites within the study area that have historic or archaeological significance. The U.S. Geological Survey (USGS) and Wisconsin Geological Survey provided mapping and boring logs. The following information was included in the analysis:

- Fish, wildlife and botanical resources: Data on fish, wildlife, wetlands and botanical resources from resource agencies and preliminary habitat surveys.
- Cultural and archaeological resources: Historical structures and archaeological resource data.
- Geology and soils: Geological and soils data from the USGS, state geological survey data, Natural Resource Conservation Service (NRCS) and local and federal land management agencies.
- Recreational resources: Recreational plans and facilities information from local and state agencies.
- Land use: Land use mapping, county and municipal land use plans, and special land management areas (such as environmental corridors, state and local parks).
- Utility corridors, highways, roadways and other linear corridors.

2.2.3. Route Corridors and Alternatives

2.2.3.1. Route Development Process

Route development for the Hampton-Rochester-La Crosse 345 kV Transmission Project began in 2007 in connection with the Minnesota CON process. At this stage, a broad overall study area and initial corridors were defined, within which it was expected routes would be developed (Routing Corridors). In late 2007/early 2008, the routing team developed revised corridors (macro-corridors) from Hampton to La Crosse for the RUS EIS process. In December 2008, route options within the macro-corridors were modified. Beginning in June 2009, the routes were further refined through late 2010, when this Application was submitted. Each of these steps in route development is described in more detail below.

2.2.3.1.1. Study Area

The first step in the process was to define the study area (Figure 2.2-1). Early in the development process, endpoints were identified near Hampton, Minnesota and La Crosse, Wisconsin. The northwest end would connect at a new Hampton Substation. The southeastern endpoint would connect with two existing 161 kV lines that provide power to the La Crosse area.

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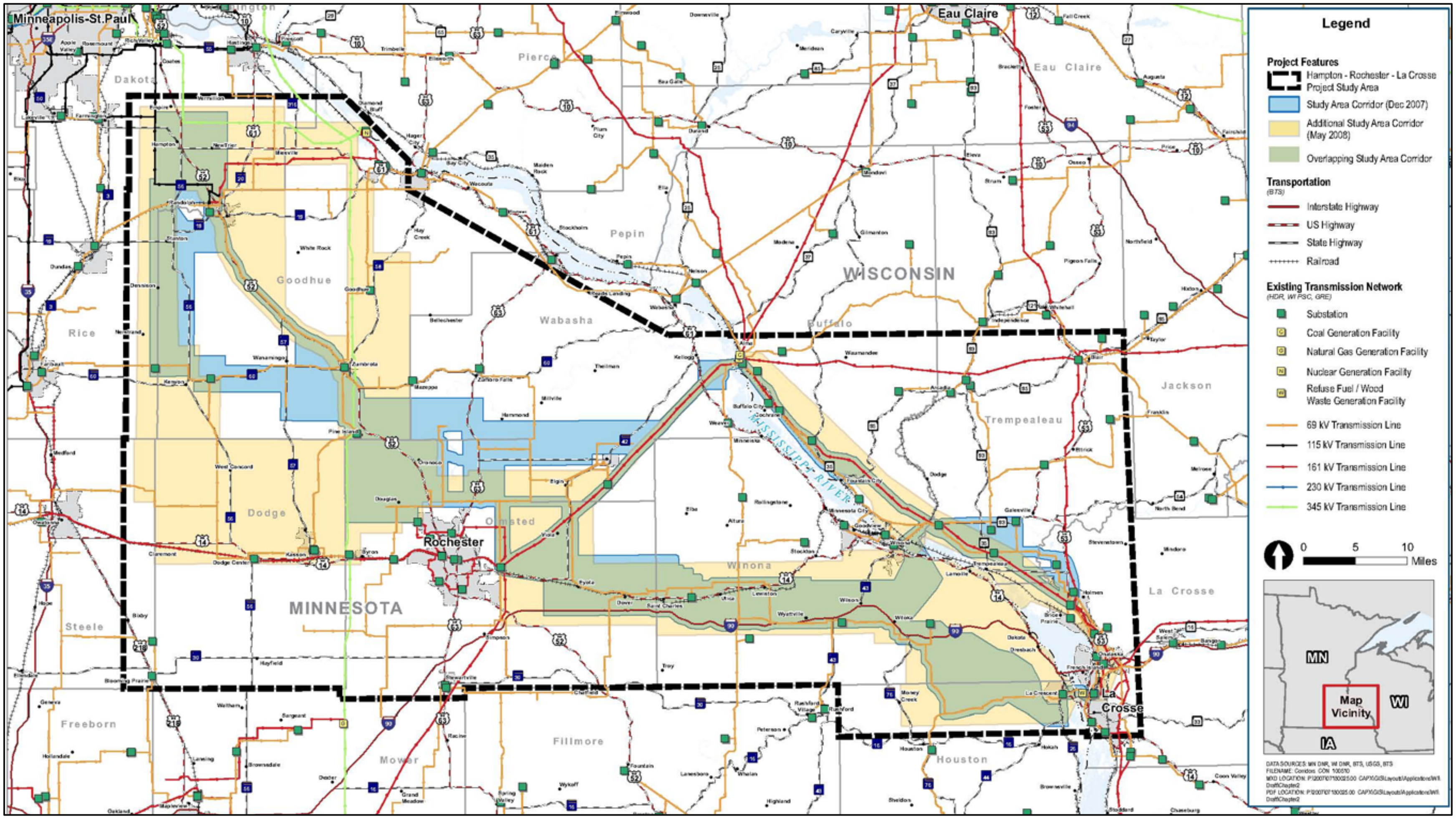
Figure 2.2-1:
Project Study Area and CON Corridors



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2.2.3.1.2. Routing Corridors

After defining the study area, the Applicants established broad routing corridors in Minnesota and Wisconsin (Figure 2.2-1) based on the identified purpose and need and required interconnections between Minnesota and La Crosse[17]. The major constraint in the study area is the Mississippi River, which must be crossed to connect the Rochester area to the La Crosse area. The routing corridors included four potential crossing sites at the Mississippi River. These crossings were evaluated assuming that the new 345 kV line would be collocated with existing facilities. Four potential crossing sites were identified:

- Alma, Wisconsin, where an existing 161 kV/69 kV double-circuit transmission line crosses the river.
- Winona, Wisconsin, where an existing 69 kV transmission line built to 161 kV specifications crosses the river.
- Between La Crescent, Minnesota and La Crosse, Wisconsin, where an existing 69 kV transmission line built to 161 kV specifications crosses the river.
- Trempealeau, Wisconsin, which does not have an existing transmission line; however, Lock and Dam No. 6 is located in this area, and the crossing could occur at a narrow section of the river containing several islands that could support transmission line poles.

In Wisconsin, routing corridors for the La Crosse Project were drawn around routing opportunities such as existing transmission lines and highways. The existing Q1 transmission line owned by Dairyland – a 161 kV transmission line between the Alma Generating Plant and the North La Crosse Substation near Holmen, Wisconsin – was identified as the most direct route between both the Alma or Winona River crossings and the La Crosse area. In addition to the Q1 corridor, highway, railroad and other transmission lines were identified in close proximity to the Q1 line. Development of Q1 routes assumed that the existing 161 kV line could be double-circuited on the same poles as the 345 kV transmission line proposed as part of the Project. The new double-circuit line could also share significant lengths of ROW with highways and railroads. This corridor sharing and line consolidation would avoid creation of new corridor in the blufflands adjacent to the Mississippi River in Wisconsin and be consistent with Wisconsin Statute §1.12(6), which prioritizes use of existing high voltage transmission corridors when routing a new transmission line. During this phase of route development, the Applicants focused on the Q1 corridor because the multiple Mississippi River crossing locations provided route alternatives to the Q1 corridor.

In September 2007, the Applicants hosted a series of open houses for the public in the study area to introduce and describe the Hampton-Rochester-La Crosse 345 kV Transmission Project, communicate the purpose and need, identify potential opportunities and constraints in the study area, obtain input and develop a mailing list. Wisconsin residents in the study area were invited to participate in those meetings.

[17] This phase coincided with the Defining the Certificate of Need (CON) Routing Phases (December 2008) that were conducted as part of the RUS federal and the Minnesota processes.

2.2.3.1.3. Macro-Corridors

Routing corridors were then refined[18] based on agency and public comments, additional data collection and field investigations (Figure 2.2-1). In some areas, corridors were expanded where additional opportunities were identified or where additional area was needed to assess a wider array of alternatives. The public commented on these corridors during March and May 2008 route working groups and May 2008 public open houses.

The Applicants determined that the Trempealeau crossing of the Mississippi River did not merit further evaluation because the other three Mississippi River crossing options followed existing transmission line corridors across the river (Appendix F).

In Wisconsin, routing corridors were narrowed along the existing Dairyland Q1 transmission line, reflecting the routing opportunity presented by the existing transmission line. Corridors were expanded between the Winona crossing and the North La Crosse Substation to accommodate multiple alignment options to cross the Black River. The Black River and associated wetlands and floodplain are valuable natural resources, parts of which are managed by WDNR as the Van Loon Wildlife Area; others are managed by the USFWS as the Upper Mississippi River National Wildlife and Fish Refuge (NWFR). The Q1 line currently crosses the Black River floodplain in an area managed by USFWS and WDNR as part of the refuge. Additional corridors across the Black River floodplain, including the WI-35 transportation corridor and an existing 69 kV transmission line adjacent to the Seven Bridges Trail, were identified as potential alternatives to the existing Q1 crossing to be assessed through the routing process. The routing considerations in this area are discussed in more detail in Section 2.2.3.1.6.1 below and are shown in Figure 2.2-6.

As part of the corridor expansion near the Black River, the Applicants identified a siting area for a second potential terminal substation northwest of the intersection of US-53 and WI-35 (New Amsterdam Substation siting area). This potential substation site was identified as an open farm field in an area that was zoned as commercial land use. If this location were to be used as an endpoint, a 161 kV transmission line would then be needed between the New Amsterdam Substation and the North La Crosse Substation. The expanded corridor in this area would accommodate the substation siting area and associated routes.

The two northern Mississippi River crossings at Alma and Winona share an endpoint in the Holmen area near where there is an existing substation in proximity to two existing 161 kV lines. The southern Mississippi River crossing at La Crosse has a different endpoint near central La Crosse where an existing substation is present.

[18] This corresponds to the Preliminary Macro-Corridors Routing Phase (May 2008) that was conducted as part of the RUS federal and Minnesota processes.

This process resulted in the macro-corridors submitted to RUS in May 2008 as part of the RUS federal EIS process.

2.2.3.1.4. Macro-Corridors with Route Options

Later in 2008, the Applicants identified route options, mostly following existing linear features, within the macro-corridors[19.] Table 1 and Figure 1 (Appendix M) present the 106 route segments considered in Wisconsin in detail. Preliminary corridors with all of these route segment options were presented to the public during the December 2008 public open houses (Figure 2.2-2).

Major corridors within the study area include:

- An existing Dairyland single-circuit 161 kV (Dairyland Q1) transmission line that runs from Alma south to the North La Crosse Substation
- An existing 161 kV transmission lines between Alma and Arcadia
- An existing 69 kV transmission line between Arcadia and the Galesville
- An existing 69 kV transmission line between Winona and Centerville
- An existing 69 kV transmission line near the Seven Bridges Road
- An existing 161 kV transmission line from near Galesville to North La Crosse.
- Great River Road/WI-35
- WI-54/US-93
- Numerous county highways, town and city roads
- The BNSF railroad corridor

The Applicants' routing analysis considered the existing corridors listed above and identified those that best met the referenced siting criteria. There were few areas where the corridors develop new ROW. In addition to investigating these corridors, the Applicants also investigated new cross-country corridors, generally following existing features such as field and section lines, to minimize landowner impacts. In general, cross-country route corridors were chosen for evaluation where they would reasonably intersect with lower impact corridors or to avoid conflicts.

[19] This corresponds to the identification of Route Options with Preliminary Macro-Corridors (December 2008) as part of the RUS federal and Minnesota processes.

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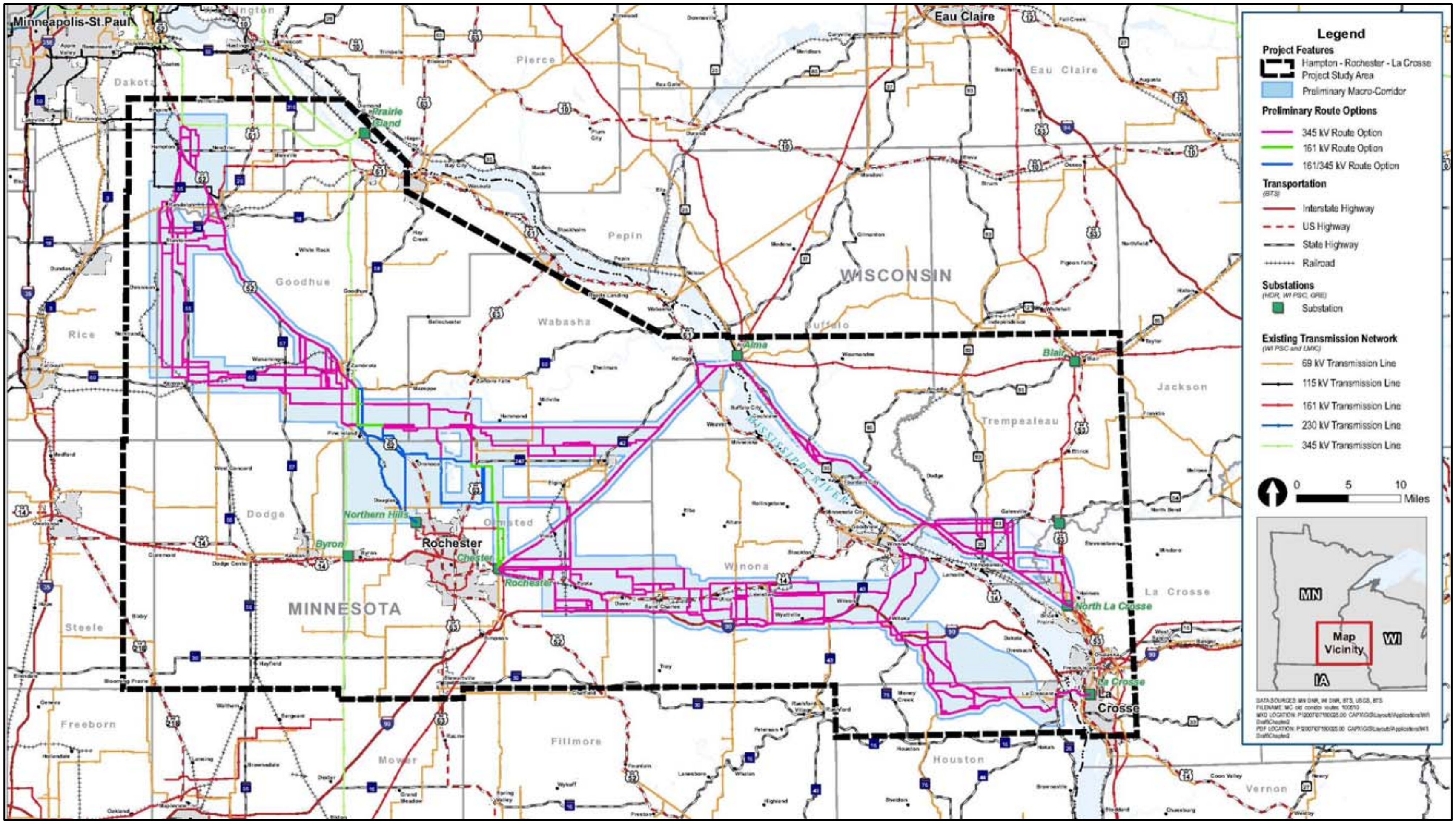
Figure 2.2-2:
Routing Corridors with Route Options



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After collecting available data, the Applicants then conducted the necessary field investigations to further identify siting opportunities or constraints within the routing corridors. The Applicants analyzed routing criteria and incorporated public comments and then used this information to begin the process of potential route identification.

In response to comments collected in December 2008 and after further analysis and fieldwork, the Applicants refined route options and adjusted corridors [20] (Figure 2.2-3). Final corridors with refined route options were presented to the public during RUS Public Scoping meetings in December 2009. The following describes changes to the corridors and routes, including areas where the corridor was expanded and route options added and where the corridor was narrowed or routes eliminated.

2.2.3.1.5. Route Refinements (June 2009 - November 2010)

2.2.3.1.5.1. Identification of Mississippi River Crossing at Alma

The Applicants developed routes to all three river crossings early in the route development process. The Mississippi River Crossing analysis, discussed in Appendix F, was performed using all the routing analyses completed through summer 2009. In approximately November 2009 the Applicants concluded that Alma was the superior Mississippi River crossing. Based on any objective measure -- including a systematic analysis of routing data for the entire project area as well as localized Mississippi River considerations -- overall impacts in both states would be reduced by crossing the Mississippi at Alma. This analysis is summarized in Table 2.2-1.

[20-] This corresponds to the Final Macro-Corridors with Refined Route Options (June 2009) Phase of the RUS federal and Minnesota processes.

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Figure 2.2-3:
Refined Corridors Route Options

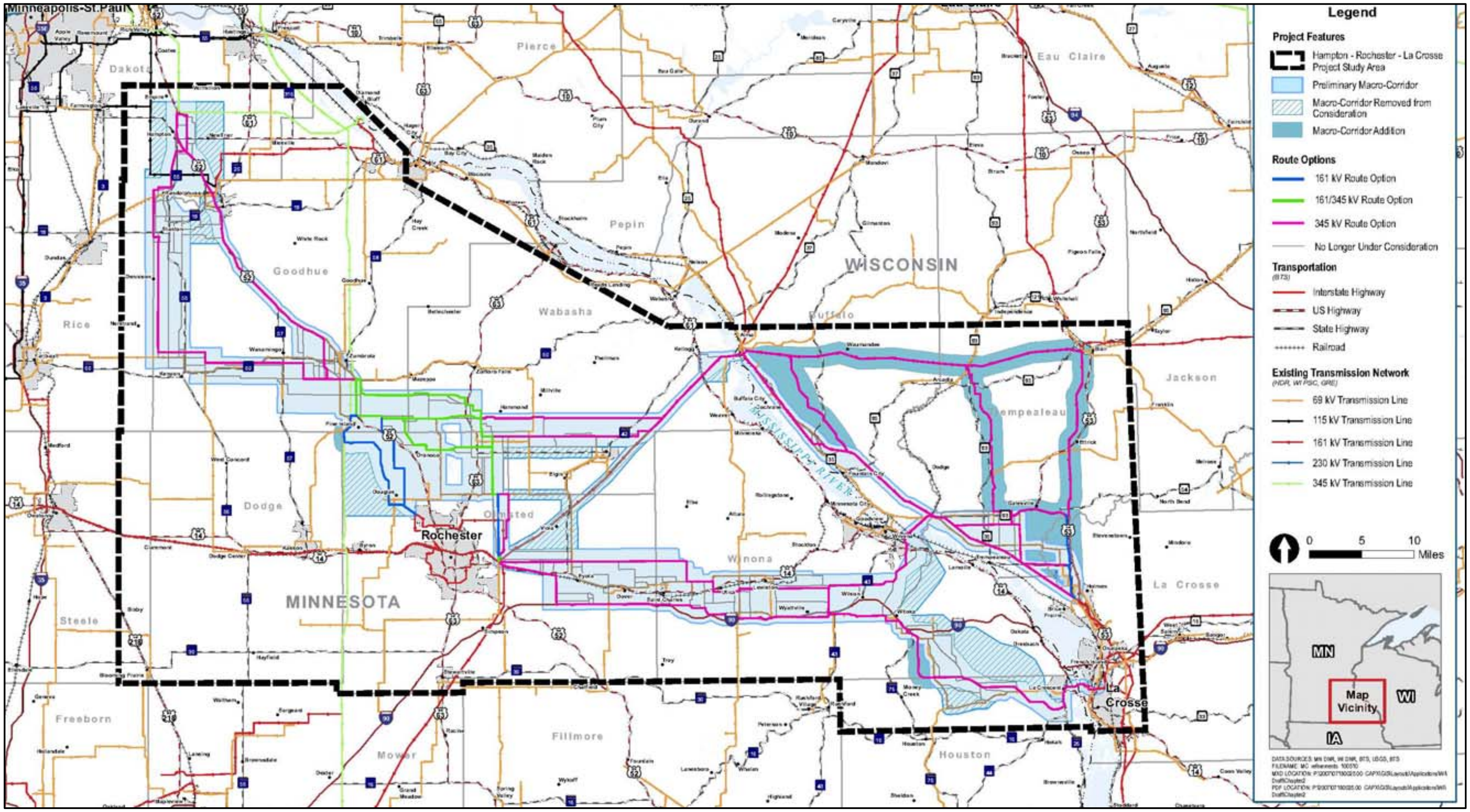

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Table 2.2-1:
Summary of Rationale Supporting Alma Crossing

Factor	Alma	Winona	La Crescent
Use of Existing Corridors, Wisconsin	Two feasible route options that follow existing transmission lines	Two feasible route options. One follows an existing transmission line and one follows property boundaries and roads.	Route options may not be feasible due to potentially unpermittable wetland impacts and/or displacement of businesses
Use of Existing Corridors approaching the Mississippi River in Minnesota	No new corridor required, the route follows an existing 161 kV line	10 miles of new corridor required	15 miles new corridor required
Length in Floodplain	1.4 miles	3.25 miles	2 miles
Permitted ROW in Refuge	180 feet	100 feet	100 feet
USFWS Opinion	Preferred	Opposed	Alternative with additional permitting constraints
Engineering Considerations	Narrowest river crossing Route follows existing transmission corridor through bluff lands Wider ROW through refuge property allows flexibility to design lower poles to mitigate potential impacts to birds and aesthetics	Widest river crossing, requiring multiple poles to be located in Mississippi River backwaters New corridor required in bluff lands, limited access Narrow ROW through refuge property results in tall poles causing potential impacts to birds and aesthetics	New corridor required in bluff lands, limited access Narrow ROW through refuge property results in tall poles causing potential impacts to birds and aesthetics
Feasible Substation Locations	Three potential substation sites	Three potential substation sites	La Crosse Substation not feasible; other alternatives require business displacement or an upgraded line in the La Crosse Marsh

The key factors that support the Alma crossing are:

- Between Alma and La Crosse, there are multiple routing opportunities that follow existing transmission line corridors.
- Routes to the Alma crossing on the Minnesota side of the river follow an existing transmission line corridor through the hills along the river; other crossings would require creation of a new 10 to 15-mile transmission corridor through the bluffland driftless area.

- The Alma crossing would result in the shortest crossing of the Mississippi River floodplain, the shortest crossing of the wildlife refuge and the least wetlands impacts.
- The USFWS prefers the Alma crossing over the other two crossings.
- The La Crescent crossing would require substantial impacts to developed land including relocation of existing businesses to establish an endpoint substation or would require routing the 345 kV line through the La Crosse Marsh wetland.

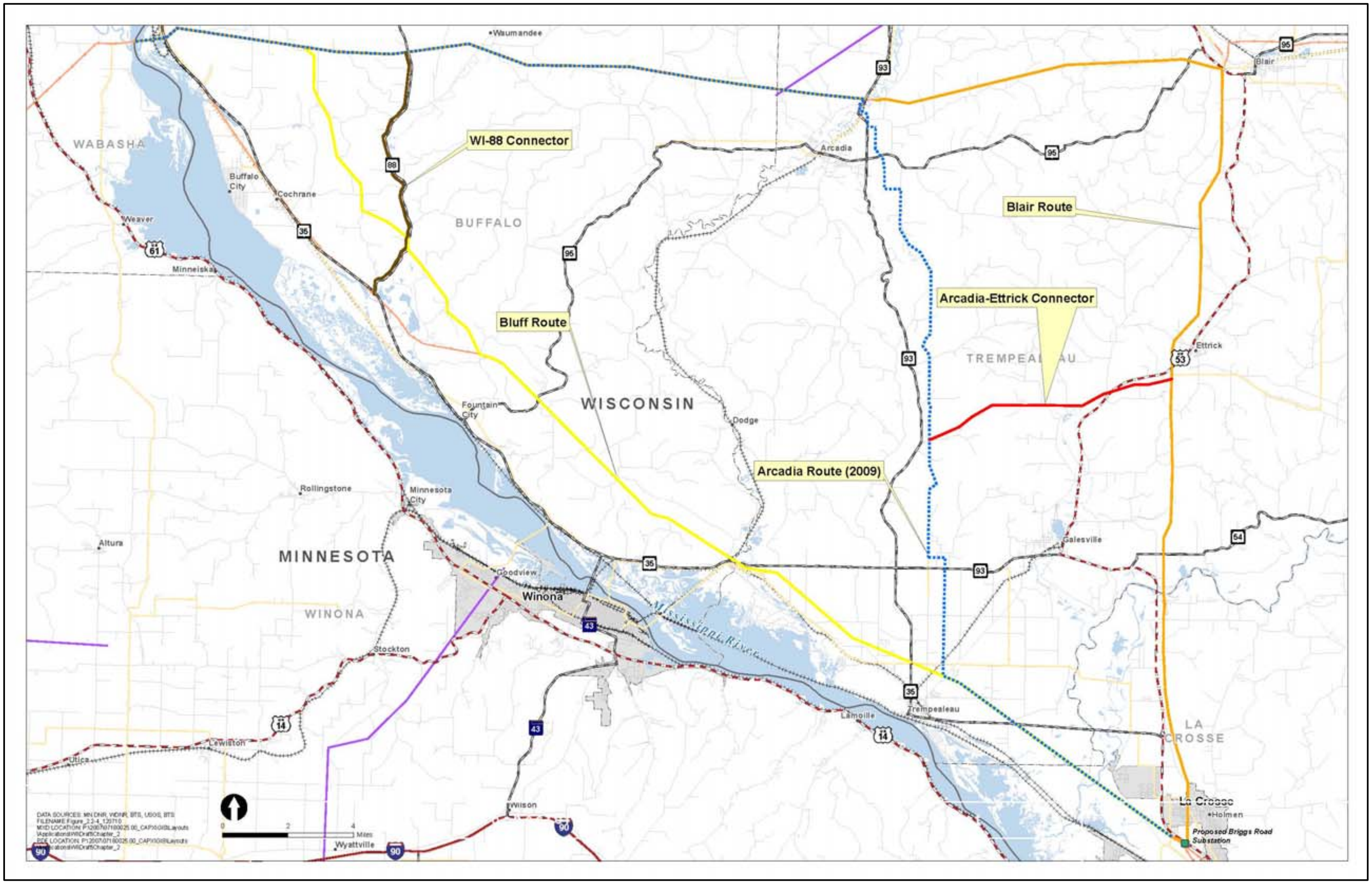
Appendix F presents detailed design options for the immediate area of the Mississippi River crossing at Alma. These design options demonstrate the tradeoffs between pole height and width of the footprint. Included are designs for which the Applicants believe there would be minimal or no incremental environmental impact to the river area.

2.2.3.1.5.2. Original Q1 and Arcadia Routes

Also during this time routing development was focused on the Q1 Route. The Q1 Route is the most direct route between Alma and Holmen as well as the route with the most corridor sharing because it follows the existing Dairyland Q1 161 kV transmission line corridor, highway and railroad corridors. Early agency and public comments raised concerns regarding potential impacts to aesthetics along the GRR/WI-35 and biological impacts along the Mississippi River Valley. Based on this input, the Applicants worked to identify an alternative to the Q1 Route that would avoid both aesthetic impacts to GRR and impacts related to crossing at the Black River. As part of this process, the Applicants expanded the macro-corridor and added route options, including the Arcadia, Blair and Bluff routes (Figure 2.2-4) and explored an additional substation option near Galesville with a 161 kV line between the Galesville Substation and North La Crosse Area Substation. Of these route options, only the Arcadia Route was carried forward. Routing decisions were also made regarding a residential area in the town of Milton and in the network of options between the Winona crossing to the Black River (Table 1 and Figure 1, Appendix M). Black River crossing options were also evaluated.

The Arcadia Route was carried forward as an alternative to the Q1 Route, but the Blair and Bluff routes were not. In summary, the Blair Route was eliminated because it would require additional length and cost compared to the Arcadia and Q1 routes. The Blair Route would also add 5 miles and cost an estimated $6 million more than the Arcadia Route and would add 15 miles and cost an estimated $30 million more than the Q1 Route. The Bluff Route was not carried forward beyond November 2009 because it does not follow an existing linear corridor and would therefore require many poles to be placed in agricultural fields and the creation of a new corridor through wooded bluffs. In addition, the Arcadia Route avoids the GRR/WI-35.

Figure 2.2-4:
Considered but Eliminated Routes



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During the summer of 2009, route development had progressed to a point where routes had been subjected to several iterations of systematic analysis and reconfigurations of route segments. Routing categories for each route were compared and the best route segments were carefully assembled into optimized routes. The routes had also been reviewed at public meetings and by various agencies. The routes were therefore at a point where they could be considered optimized and could be compared to each other on a route-wide basis. Any analysis and meaningful comparison of the three Mississippi River crossing analyses needed to consider not only the river valley, but also the routes in both states leading to each of the river crossings.

2.2.3.1.5.3. Selecting Final Route Alternatives

Following public outreach, the potential route alternatives were further reviewed. This review included continued evaluation of environmental and natural resource features, including feedback from agencies and officials, public comments received from earlier phases and continued engineering analysis. After careful evaluation, the Applicants refined and reduced the number of considered segments. Where there were multiple options in a segment or grouping of segments between two common points, the Applicants studied and reviewed the various engineering, operational, maintenance, social and environmental considerations to identify the segment that offered the least overall impact.

In some corridors, larger buffered areas were identified where more flexibility might be needed for routing due to a high number of constraints. In some cases, changes were made to the initial corridor to accommodate constraints or reflect public input. This overall reduction of segments in the study area was used to develop preliminary transmission line routes for the Project.

The resulting corridors and route options (Figure 2.2-5) were presented to the public during RUS public scoping meetings in December 2008. The following describes development and changes to the corridors and routes, including areas where the corridor was expanded and route options added and where the corridor was narrowed or routes eliminated.

2.2.3.1.6. Considered but not Proposed Routes

With the endpoint fixed at Alma, routing focused on identifying routes between Alma and a North La Crosse area substation. Table 2 (Appendix M) summarizes the routes evaluated and identifies those that were proposed in this Application and those that were considered but not proposed.

2.2.3.1.6.1. Original Q1 Route

The Q1 Route was the first route identified for the Project. Until August 2010, the Applicants planned to include the Q1 Route in this Application, as it represents the most direct corridor between these two endpoints and minimizes impacts due to its sharing of the existing Dairyland Q1 161 kV transmission line corridor. The analysis conducted for the original Q1 Route for CPCN submittal is included in Appendix N. The following provides a summary of issues related to the original Q1 Route. These issues focused on aesthetic and environmental impacts along the GRR/WI-35. The following section presents the reasons that the Black River segment of the original Q-1 Route was not proposed in the Application.

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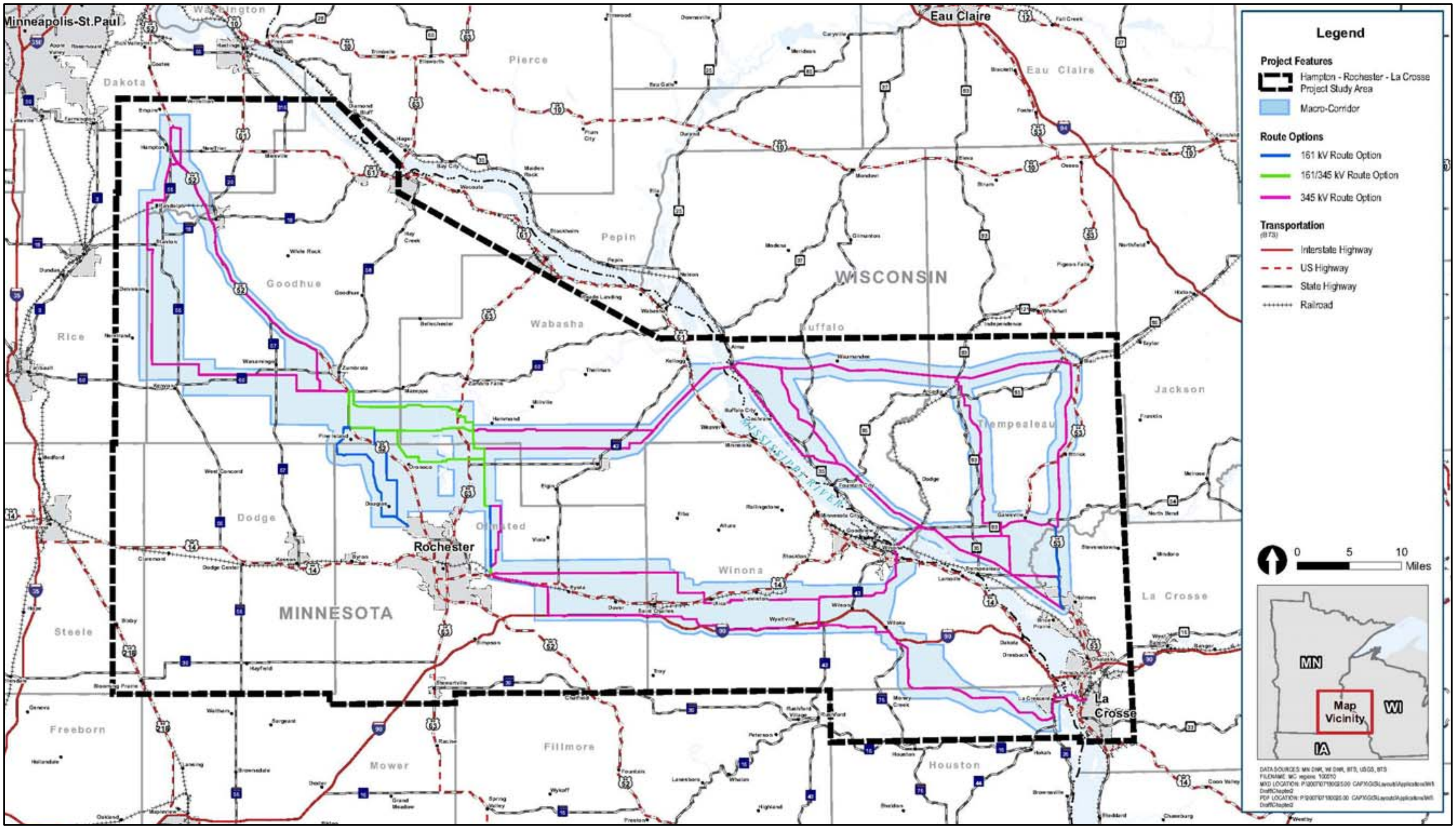
Figure 2.2-5:
Final Macro-Corridors with Route Refinement Options



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2.2.3.1.6.1.1. Wisconsin State Highway 35/Great River Road

The northern portion of the Q1 corridor is located near GRR/WI-35 along the Mississippi River for approximately 8 miles. The GRR is a designated National Scenic Byway. The Wisconsin Mississippi River Parkway Commission (WI-MRPC), made up of representatives from communities located along the Wisconsin GRR, oversees the Wisconsin GRR. Potential aesthetic impacts to the GRR National Scenic Byway were raised by WI-MRPC and WisDOT. These aesthetic concerns were primarily directed to the northernmost 8 miles of the Q1 Route. WI-MRPC and WisDOT representatives participated in the Applicants' outreach process. These agencies raised concerns of aesthetic impacts and potential incompatibility of the Project with existing scenic easements. The Applicants have worked with these agencies to analyze and minimize aesthetic impacts related to the Q1 Route in the following ways:

- Relocating the existing Q1 alignment where it occurs within the GRR/WI-35 scenic easements for approximately 6.1 miles and proposing to remove the existing Q1 161 kV line in this location to consolidate (double-circuit) it with the proposed 345 kV line. This would result in:
  - Removing 3.4 miles of existing 161 kV transmission line from within the GRR/WI-35 scenic easements to the proposed Q1 Route alignment along the railroad to reduce the GRR/WI-35 impact.
  - Removing 2 miles of 69 kV transmission line from within the GRR/WI-35 scenic easements as additional mitigation.
- Accommodating requests from WisDOT on pole placement and proposed suggestions for pole finish color. This would result in:
  - Placing poles as shown in the current alternative route alignments.
  - Installing weathering steel poles that weather to a rust brown color and galvanized poles that are gray, as determined in cooperation with WisDOT to better blend with the surroundings.
- Preparing a Visual Impact Assessment (Appendix O).
- Modify design to preserve tree buffers between the highway and route where possible.
- Revising proposed alignments to avoid high quality visual areas and consolidating the proposed line with existing lines.
- Development and inclusion of a route (Arcadia Route) that avoids impacts to the Great River Road.
- Changes proposed by the Applicants and WisDOT resulted in the following reduction of impacts to scenic easements along the GRR/WI-35 as presented in Table 2.2-2.

Table 2.2-2:
Existing and Proposed Conditions Relative to Scenic Easements if Project is Constructed along Q1-Highway 35 or Q1-Galesville Routes

	Miles	Poles
Existing 161 kV Transmission Poles within Scenic Easements	6.1	51
Poles within Scenic Easements Post Project	2.7	15
Reduction	3.4	36

2.2.3.1.6.1.2. Black River Crossing

A significant constraint along the original Q1 Route is the Black River and its forested floodplain near Holmen. The Black River floodplain is up to 3 miles wide and approximately 7 miles long just northwest of the route's endpoint in Holmen. Regardless of route, the proposed 345 kV line must cross the Black River to connect into the 161 kV system serving the La Crosse area. Only one Black River crossing location, adjacent to the US-53 crossing of the Black River (Hunters Bridge) east of Galesville, would not require crossing of wetlands. Two of the three routes presented in this application (Arcadia and Q1-Galesville) share this crossing location.

Because the Arcadia and Q1-Galesville Routes share 14 miles of common corridor, including an area of higher residential impacts, the Applicants saw the need to develop at least one route across the Black River wetlands and identified three existing corridors that could be used: the existing Q1 line, the GRR/WI-35 and an existing 69 kV line near the Seven Bridges Trail. Figure 2.2-6 presents these alternatives; Table 2.2-3 compares the alternatives.

The Black River floodplain is comprised of state, federal and private lands. Federal lands in the Black River area are part of the Upper Mississippi National Wildlife Refuge and which is limited to the southern Project area. Of the three considered corridors, only the Q1 Route crosses these federal lands.

The Van Loon Wildlife Area is a 3,918-acre state-owned property located in the northwest corner of La Crosse County, about 3.5 miles northwest of the village of Holmen. Routes crossing the Black River would likely cross short segments of Van Loon lands. The Seven Bridges Road corridor crosses Van Loon lands for most of its length through the Black River floodplain.

The Black River is an area of special natural resource interest (ASNRI). The Van Loon Wildlife Area is designated by the WDNR as a WBCI Important Bird Area (IBA).

Figure 2.2-6:
Black River Crossings Analyzed

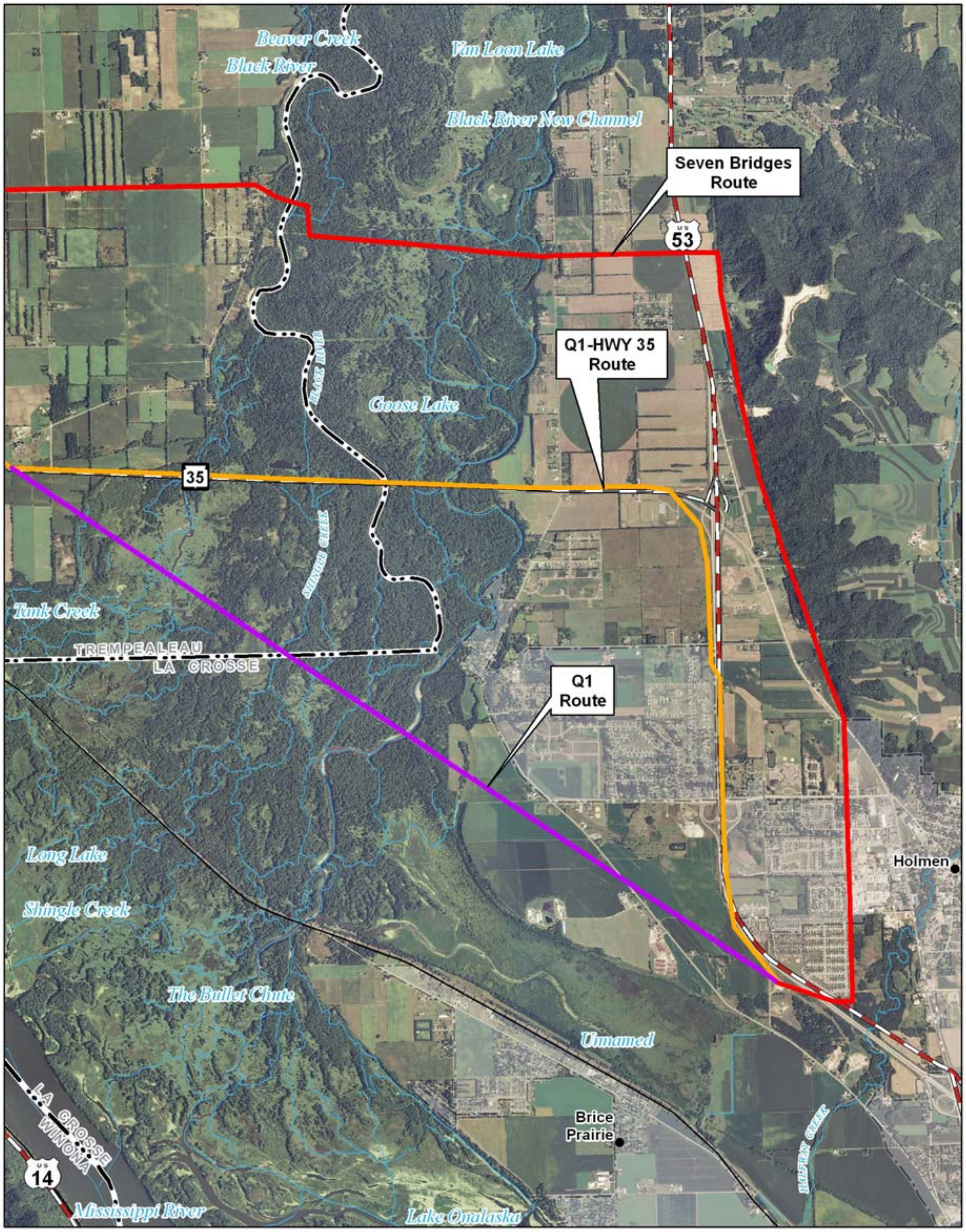

Table 2.2-3: Revised
Summary Table for Black River Crossing Alternative Analysis

Q1 Corridor	Highway 35 Corridor	Seven Bridges Corridor	Q1-Galesville Corridor
Shortest Route Follows existing transmission corridor through forested floodplain Least residential impact	Adds 1.7 miles to the Q1 Route Follows less transmission corridor Crosses 0.5 mile less wetland than other alternatives Near GRR for 6.9 miles	Adds 3.3 miles to the Q1 Route Crosses 1.5 miles of the Van Loon Wildlife Area through Seven Bridges Two houses within ROW for 345 kV line (both would be newly impacted) Near six historic bridge sites (listed on National Register of Historic Places [NRHP])	Adds 7.1 miles to the Q1 Route Highest residential impact Follows existing transmission corridor across a narrow segment of the Black River No floodplain wetland crossing required

As described in Section 2.9, the Applicants approached the WDNR to receive input on the Black River crossing options. Department staff indicated that any crossing of the Black River floodplain might not be permittable by WNDR and encouraged the Applicants to develop alternative routes that do not impact the Black River floodplain.

In comparing the three alignments across the Black River, the Applicants' interpretation of the data (see Table 2.2-3) found that that the Q1 corridor, by following an existing transmission corridor with the shortest route distance, best minimized impacts. The Applicants therefore developed detailed construction plans (Appendix N) identifying the methods that would be used to construct the proposed Q1 transmission line along this existing corridor to minimize temporary impacts. Temporary impact minimization measures included winter construction and helicopter access to areas that were difficult to reach to minimize traffic and ground disturbance. Vibratory caisson foundations, which do not require excavation or the use of concrete or other fill, would be used. Tree clearing impacts were minimized through the use of specialized poles that required the least amount of new ROW, while keeping pole heights and wires in a single plane and at elevations below treetop height to minimize potential impacts to birds.

2.2.3.1.6.1.3. US Fish and Wildlife Service Refuge Lands

The Applicants also recognized that the Q1 Route would require a special use permit to occupy refuge lands. The Applicants met with USFWS several times to discuss the Black River area. After preparing the construction plan and an assessment of temporary and permanent impacts, the Applicants inquired as to the permittability of the Q1 Route through the Black River. As described, the Applicants presented detailed construction plans, access routes, itemizations of tree clearing needs, and a range of four different pole types. The Applicants also offered mitigation in the form of exchanging an existing easement across the Mississippi River near the Trempealeau NWR for a permit to cross the refuge lands at the Black River. After assessing all of the above information, USFWS indicated the Q1 Route was not permittable under its rules governing what compatible uses are allowed in refuge lands (see USFWS August 16, 2010 letter in Appendix P).

2.2.3.1.6.2. Wisconsin State Highway 88 and Arcadia-Ettrick Connectors

The WI-88 and Arcadia Ettrick connectors suggested by WisDOT and the WDNR, respectively, were recently considered but eliminated.

The WI-88 Route segment follows WI-88 and was suggested by WisDOT as a 15-mile alternative to the northernmost 10 miles of the Q1 Route. The WI-88 corridor would connect the Arcadia Route to the Q1 Route and would avoid the northernmost 10 miles of the Q1 Route. The Applicants are not proposing the WI-88 Route because it is significantly longer than the Q1 routes and only 4 miles shorter than the Arcadia Route; other available routes, such as the Arcadia Route, avoid the area of WisDOT's concern and share transmission ROW that is a higher priority siting corridor per Act 89. There are constructability, cost and aesthetic complications for this corridor due to its curvy nature. The southern portion of the route would result in impacts to the GRR/WI-35, following the Q1 through a residential neighborhood in the town of Milton, which is avoided by other routes. Given these facts, particularly that the Arcadia Route provides an alternative that avoids the GRR/WI-35 and utilizes an existing transmission corridor, routes such as Highway 88 were not carried forward in the Applicants' route development process.

The Arcadia-Ettrick Route was suggested by the WDNR as a potential substitute for the Q1-Highway 35 Route. The Arcadia-Ettrick Route relies on an 8-mile connector segment following a 69 kV line between the Arcadia Route and the Blair Route. Using this connector segment yields a route that is approximately 55 miles. Based on this length (approximately 12 miles longer than the Q1-Highway 35 Route), the Arcadia-Ettrick Route was not considered a reasonable substitute for the Q1-Highway 35 Route.

2.2.3.2. Routes Proposed in Application

2.2.3.2.1. Q1-Highway 35 Route

Based on the USFWS letter indicating that it could not permit the Q1 Route, the Applicants revisited the alternative Q1 alignment that crosses the Black River floodplain north of the GRR/WI-35, termed the Q1-Highway 35 Route, which follows the GRR/WI-35 across the Black River and requires more tree clearing than the Q1 Route segment.

The Q1-Highway 35 Route is 43 miles and approximately 70 percent of the route shares the Dairyland Q1 161 kV transmission line. To minimize aesthetic impacts to the GRR/WI-35, the route is located approximately 350 feet north of GRR across the Black River floodplain.

Instead of utilizing the existing Q1 transmission line corridor through the Black River floodplain, the Applicants propose a route that places poles just outside of the highway ROW and scenic easements, approximately 350 feet north of the GRR/WI-35. This alignment would allow a tree buffer that would act as visual screening between the proposed transmission line and the GRR/WI-35. To minimize aesthetic impacts, the measures described in Section 2.2.3.1.6.1 that were developed in cooperation with WisDOT would be applied to the northern portion of the Q1-Highway 35 Route.

To further mitigate for wetland and visual impacts, the Applicants propose to remove the existing Dairyland Q1 transmission line from its current alignment in the Black River floodplain and carry it with the proposed line adjacent to WI-35. The Applicants are also working to determine the feasibility of removing the existing 69 kV line from its location crossing the Black River near the Seven Bridges Trail and consolidate it with the new 345 kV line, the relocated Q1 161kV line at the proposed location north of the GRR/WI-35. Thus, the Applicants proposed Q1-Highway 35 Route could potentially remove two existing transmission line corridors crossing the Black River and consolidate them along with the proposed line adjacent to the existing WI-35 corridor.

2.2.3.2.2. Arcadia Route

As discussed in Section 2.2.3.1, the Arcadia Route is the route carried forward in this Application to avoid both aesthetic impacts to the GRR/WI-35 and impact related to crossing the Black River floodplain. The Arcadia Route is 54.8 miles, beginning at the Mississippi River crossing at Alma and ending at the new Briggs Road substation near the intersection of US-53 and Briggs Road near Holmen.

The Arcadia Route utilizes the same Mississippi River crossing at Alma, then proceeds east toward Waumandee and Arcadia, and turns south towards Galesville and Holmen. The Arcadia Route is a combination of existing Dairyland 161 kV transmission corridor, existing Dairyland 69 kV corridor, existing Xcel Energy 161 kV corridor, and roadways. The Arcadia Route avoids both the aesthetic impacts to the GRR/WI-35 and the Black River, but is the longest of the three proposed routes.

The Arcadia-Alma Option is a 1.3-mile segment alternative near the Mississippi River and offers an alternative connection from the river crossing to the Arcadia Route. It crosses the Mississippi River at the same location as the Arcadia Route and follows a short portion of the existing 161 kV corridor prior to diverting up the bluff through a forested area, some agricultural land and a rural residential development, prior to reconnecting with the existing 161 kV corridor and the Arcadia Route.

2.2.3.2.3. Q1-Galesville Route

Also in response to specific WDNR concerns about crossing the Black River along the Q1 Route, the Applicants developed the Q1-Galesville Route. Based upon input received from the WDNR, which questioned whether any of the three routes crossing the Black River could be permitted, the Applicants developed a connector route segment from the original Q1 Route to the Galesville area to form another route that avoided impacts to the Black River floodplain.

The Q1-Galesville Route is 48.4 miles, beginning at the Mississippi River crossing at Alma and ending at the proposed new Briggs Road substation near the intersection of US-53 and Briggs Road near Holmen. The first part of this route follows the Q1 alignment. Then the route connects with the Arcadia Route alignment to the proposed new Briggs Road Substation. The Applicants studied four possible configurations by combining the Q1 Route with the Galesville section of the Arcadia Route (Appendix M). In comparing these route options, the Applicants concluded that Option 1d was the option that would be submitted as the Q1-Galesville Route. These analyses were conducted in response to WDNR concerns of potential impacts to the Black River floodplain. The Applicants determined that Option 1d was the only prudent Q1-Galesville Route configuration because:

- Other routes required the use of the WI-93/US-53 corridor instead of the existing 161 kV transmission line corridor between Holmen and the WI-93/US-53 bridge at the Black River. The WI-93/US-53 corridor has greater residential impacts than the 161 kV corridor.
- Options other than Option 1d have significant engineering challenges in fitting a double-circuit line between homes and the highway along the 7-mile section of the route that follows WI-93/WI-54 south of Galesville. Preliminary engineering designs for carrying the double-circuit configuration, as opposed to the single-circuit of the 1d Option, resulted in as many as 12 highway crossings in a 7-mile stretch or the removal of several homes.

The route options were not carried forward and are described in more detail in Appendix M.

2.2.3.3. Galesville and Amsterdam Substation Site Evaluation

During route development, two locations were considered as alternatives to the Briggs Road/North La Crosse Substation area:

- Amsterdam area, including parcels located in the town of Holland and the Village of Holmen, La Crosse County. This area generally lies northeast of the US-53/WI-35 interchange and is bounded by the following roads: WI-35, US-53, Amsterdam Prairie Road and Old Wisconsin 93 Road.
- Galesville area, located in the town of Gale, Trempealeau County. This area includes agricultural parcels located northeast of the intersection of US-53 and County Road AA.

These sites were studied as possible endpoint substations. Each of these substation sites would require routing a 161 kV line along the north/south segment US-53 between Trempealeau County AA (near the US-53 crossing of the Black River) and Briggs Road. This segment of highway has many homes built in close proximity to the road. Under this scenario, substation sites at Amsterdam or Galesville would serve as an endpoint for the proposed 345 kV line and a 161 kV line would continue south along US-53 to the vicinity of the North La Crosse Substation. Some scenarios would also require a 161 kV substation to be constructed at North La Crosse Substation.

Galesville and Amsterdam substation sites were dropped from further consideration because a 345 kV route was developed along the existing Xcel Energy Tremval – Mayfair 161 kV line that is located approximately one-quarter mile east of this US-53 segment. This route segment avoids the US-53 corridor and therefore minimizes impacts to residential land use. The route segment became the southeastern end of the Arcadia Route and the Q1-Galesville Route.

2.2.4. Public Outreach

2.2.4.1. Meeting and Open Houses

The Applicants conducted a more than two-year public participation process to provide stakeholders the opportunity to discuss Project goals, routing criteria and environmental concerns. As presented in Table 2.2-4, the Project public participation process consisted of:

- One round of CON public information meetings held in six locations in southeast Minnesota in September 2007 as part of the Minnesota CON process.
- A second round of public open houses in May 2008 in five locations to provide new information to the public and gather input on the siting process and newly developed macro-corridors.
- A third round of public open houses in December 2008. New route options within the previously identified macro-corridors were presented to attendees in seven locations within the study area.
- A fourth round of public meetings in June 2009 at five locations to conduct RUS public scoping meetings. New route centerline options within the previously identified macro-corridors were presented to attendees in six locations within the Project area.
- One round of RPA scoping meetings in May 2010 at three locations to conduct public scoping for the Minnesota Office of Energy (OES) EIS.

Table 2.2-4:
Hampton-Rochester-La Crosse Open House Meetings

Round	Date	City	Meeting Location
Round One: Minnesota CON Public Information Meetings	September 11, 2007	Winona, MN	Riverport Inn
	September 12, 2007	Rochester, MN	International Event Center
	September 13, 2007	Wabasha, MN	Coffee Mill Golf Course and Country Club
	September 25, 2007	Redwing, MN	Red Wing Community Library, Foot Room
	September 26, 2007	Northfield, MN	Archer House
	September 27, 2007	Lakeville, MN	Holiday Inn
Round Two: May 2008 Public Open Houses	May 20, 2008	Winona, MN	Riverport Inn
	May 20, 2008	Trempealeau, WI	Town of Trempealeau Community Center
	May 21, 2008	Rochester, MN	International Event Center
	May 21, 2008	St. Charles, MN	City of St. Charles Community Meeting Room
	May 22, 2008	Cannon Falls, MN	Grandpa's Event Center
Round Three: December 2008 Public Open Houses	December 8, 2008	Winona, MN	Riverport Inn
	December 9, 2008	St. Charles, MN	City of St. Charles Community Meeting Room
	December 9, 2008	Alma, WI	Alma High School
	December 10, 2008	Trempealeau, WI	Town of Trempealeau Community Center
	December 10, 2008	La Crescent, MN	La Crescent American Legion
	December 11, 2008	Oronoco, MN	Oronoco Community Center
	December 11, 2008	Cannon Falls, MN	Grandpa's Event Center

Table 2.2-4:
Hampton-Rochester-La Crosse Open House Meetings

Round	Date	City	Meeting Location
Round Four: June 2009 RUS Public Scoping Meetings	June 16, 2009	Plainview, MN	Plainview-Elgin-Millville High School
	June 17, 2009	Wanamingo, MN	Wanamingo Community Center
	June 18, 2009	St. Charles, MN	City of St. Charles Community Meeting Room
	June 23, 2009	La Crescent, MN	La Crescent American Legion
	June 24, 2009	Trempealeau, WI	Town of Trempealeau Community Center
	June 25, 2009	Fountain City, WI	Cochrane-Fountain City High School
Round Five May 2010 Minnesota OES EIS Public Scoping Meetings	May 4, 2010	Plainview, MN	American Legion
	May 5, 2010	Pine Island, MN	American Legion
	May 6, 2010	Cannon Falls, MN	Grandpa's Event Center

Public open houses provided an opportunity to present information to landowners and other stakeholders, answer questions about the need for the new transmission lines, discuss the routing process used for the transmission lines and environmental concerns. The routing work group meetings described in the following section focused on the routing process and criteria. Both types of meetings provided opportunities to discuss the public process and to collect information and comments on community preferences about the state routing criteria the Applicants followed to develop route options. The public scoping meetings focused on providing the public with information regarding the Project, answering questions, identifying concerns regarding the potential environmental impacts that may result from construction and operation of the Project, and gathering information to determine the scope of issues to be addressed in the RUS environmental review and documentation of the Project.

The public open house format included large informational displays that provided Project purpose and need, permitting process information, detailed aerial maps with Project corridors or routes, handouts and comment forms. Project representatives staffed the meetings, answered questions and engaged the public in discussion. Aerial maps were used to show greater routing area detail and to collect site-specific public input. The third and fifth rounds of public open houses in December 2008 included a GIS station that allowed landowners to obtain a detailed map of their property in relation to the route options. Public scoping meetings were also conducted in the open house format and included two GIS stations.

Public open houses solicited information about the types of land use in the Project Area, environmental considerations, routing suggestions and the criteria that should be used in developing proposed routes. Comments were recorded on the detailed aerial maps and comment forms, while notes were taken of conversations (with stakeholders' approval). The team also provided explanations on various aspects of the Project and the public participation process.

A similar format was used for the RUS public scoping meetings with presentation of the full suite of Project materials. An RUS representative also attended and provided additional information on the National Environmental Policy Act (NEPA) and Section 106 processes.

Approximately 1,126 people signed in at the first three rounds of public open houses; more people attended, but did not sign in. Approximately 339 comment forms were received throughout the three rounds of public open houses. Approximately 540 people signed in at the RUS public scoping meetings, and 337 comment forms, letters or emails were received during the formal scoping comment period. Comments received consisted of a range of issues that included Project need, Project alternatives, cumulative impacts, connected actions, land use, land rights, agriculture, proximity to residences, biological and vegetation resources, health and safety, electric and magnetic field (EMF), visual resources, water resources, historical and cultural resources, noise, and TV and radio interference. Approximately 350 people attended the Minnesota OES public scoping meetings. Open houses and meetings provided stakeholders the opportunity to be involved in the routing process at each successive routing milestone, including the CON corridors, macro-corridors and macro-corridors with route options. At the conclusion of the scoping process, the Minnesota OES issued its Scoping Decision, identifying all routes and route segments under consideration in the Minnesota routing process. The Scoping Decision identifies Kellogg, Minnesota/Alma, Wisconsin as the only Mississippi River crossing location.

Landowners, interested parties, local government representatives and other public officials representing communities in the Project corridors were invited to participate in the public open houses and the routing work group meetings discussed below. Many of the same stakeholders remained involved throughout the two-year public participation process, and communication with stakeholders occurred throughout that time. Project newsletters and meeting invitations were distributed across the Project Area.

2.2.4.1.1. Tribal Coordination

The Applicants coordinated with RUS to conduct tribal consultation regarding the proposed transmission facilities. Prior to the conference call, consulting parties were contacted and provided with details to participate in a teleconference. Letters were sent to 87 participating parties on April 30, 2010 and provided details to participate in a teleconference (Appendix P). On April 22, 2010, RUS hosted the teleconference with tribes and others interested in participating as a consulting party to discuss the date, time and agenda for meetings planned for May 2010. The informational meetings took place on May 11 and 12, 2010, at the AmericInn Hotel in Wabasha, Minnesota and the Radisson Inn in La Crosse, Wisconsin. The meetings were followed by site visits.

2.2.4.1.2. CapX2020 Website

The public participation process has been continuously promoted and periodically updated through the virtual open house on the CapX2020 website at http://www.capx2020.com/Gallery/openhouse/index.html.

The CapX website located at http://www.capx2020.com/index.html has copies of mailings and fact sheets.

The website contains tools to inform stakeholders and provides contact information for Project leads so stakeholders can submit questions, suggestions and concerns. A member of the Project team typically responds to emails and comments within a week. Updated Project fact sheets about the routing process, permitting and public processes, and environmental issues are provided on the Project website for wide ranging accessibility.

2.2.4.1.3. Routing Work Group Meetings

Routing work group meetings took place in March and May 2008 at five locations in the Project Area (Table 2.2-5). The workshop format featured small group discussions on the importance and implications of the Project routing criteria. Federal, state, regional, county and city officials and representatives as well as members of the general public who requested to be included, were invited to participate. Participants were asked to provide comments, data and input representing their organizations or communities. Some participants were appointed or selected by their respective agency. Members of the general public were invited to participate using the December 2007 CapX2020 update newsletter; interested individuals signed up to participate at the December 2007 CON scoping meetings.

Table 2.2-5:
Routing Work Group Meetings

Date	City	Meeting Location
March 3, 2008	Rochester, MN	Rochester International Event Center – Ballroom C
March 4, 2008	Winona, MN	Riverport Inn
March 5, 2008	La Crosse, WI	La Crosse Center – Boardroom B
March 6, 2008	Lakeville, MN	Holiday Inn
May 22, 2008	Cannon Falls, MN	Grandpa's Event Center

The routing work group meetings included several different activities. The CapX2020 routing leads gave a presentation describing the proposed transmission facilities, siting approach, criteria, resources, opportunities and constraints, and comparative analysis. Small group discussions focused on the siting criteria. Map workshops focused on the specific work group's section of the Project area. The meetings collected input and routing suggestions and identified challenges for routing in the area.

Comments received during each round of public open houses and routing work group meetings were categorized and summarized into several common themes, including:

- Avoid and minimize impacts to sensitive and common animal and plant species, including threatened, endangered, and federally and state listed plant and animal species and habitats.
- Avoid and minimize impacts to culturally significant resources and historic places and landmarks in the Project area, including sites on the NRHP.
- Avoid and minimize human and animal health impacts caused by electric and magnetic fields (EMF) and transmission lines and provide the public with supplemental information regarding EMF. Consider safety implications when routing the transmission line.

- Avoid and minimize impacts to agricultural land, production, resources, equipment and operations.
- Prefer to route the Project on existing linear corridors, including highways and roadways, existing utility easements and ROWs, and field lines.
- Route the line along US-52 rather than on agricultural land.
- Avoid and remedy radio, television, cell phone and GPS equipment interference caused by the Project.
- Avoid and minimize impacts to property value, land value, personal income, tourism, resale value, insurance rates, personal and business investments, future market appreciation, infrastructure projects, local business and local economies in the Project area.
- Avoid and minimize visual and aesthetic impacts, especially in the scenic corridors surrounding the Mississippi River and rural southwest Wisconsin.
- Avoid and minimize impacts to ecologically valuable wetlands, floodplains and river valleys.
- Address and justify the Project need more thoroughly, and explore other options like alternative energy sources and local supply.
- Avoid existing and future residences, residential developments and densely populated areas when routing the transmission lines. Minimize impacts to residential property by working with landowners to route the transmission line in the least burdensome areas.
- Provide information to landowners on land rights and easement acquisition. Consider providing monthly payments for transmission line easements. Avoid using eminent domain to secure property rights.
- Avoid highly erodible soils, historic flood areas, steep terrain and bluffs.
- Follow local, state and federal land use codes, regulations and guidance.
- Avoid impacts to recreation areas, activities and businesses in the Project Area.

The Applicants considered common themes and topics when developing the routes proposed in this Application. Routes suggested through public and agency involvement are discussed below.

2.2.4.1.4. Minnesota Advisory Task Force (ATF) Meetings

On January 19, 2010, the Applicants submitted a Route Permit Application to the MPUC for the Minnesota portion of the Hampton-Rochester-La Crosse 345 kV Transmission Project.

On March 16, 2010, the MPUC established and charged two geographically based Advisory Task Forces (ATFs) to assist OES staff in determining the scope of the EIS to be prepared for the proposed Project.

The North Rochester-Mississippi River ATF was charged to (1) assist in determining specific impacts and issues of local concern that should be assessed in the EIS; and (2) assist in determining potential route alternatives that should be assessed in the EIS. On April 23, 2010, the OES appointed seven persons to the Hampton-Northern Hills ATF, which met three times – April 28, May 12 and June 3, 2010. Through a facilitated process, the task force discussed the proposed project and the charge given to the task force. Task force meetings were open to the public, and additional people attended to listen to the discussion.

The Hampton-Northern Hills ATF was charged to (1) assist in determining specific impacts and issues of local concern that should be assessed in the EIS; and (2) assist in determining potential route alternatives that should be assessed in the EIS. On April 23, 2010, the OES appointed 11 individuals to the Hampton-Northern Hills ATF, which met three times – April 27, May 11 and June 2, 2010. Through a facilitated process, the task force discussed the proposed project and the charge given to the task force. Task force meetings were open to the public, and additional people attended to listen to the discussion.

These ATFs commented on proposed routes and identified potential alternatives for the MN PUC to consider during the Minnesota EIS process.

2.2.4.2. Routes Suggested through Public and Agency Involvement

During agency consultation and the public participation process, numerous route segments were suggested and considered. Some of these recommended options were minor variations of the Applicants' proposed route segments, and others were major revisions of proposed route segments. Some of these recommended route segments were incorporated into the routes evaluated in this document, and some were eliminated. Three of the more significant options incorporated into the route analysis for the 345 kV transmission line include the Arcadia, Bluff and Blair routes, which are discussed in Section 2.2 3.

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2.3. General Transmission Line Siting Information

The proposed facilities would be located entirely within La Crosse, Trempealeau and Buffalo counties. General Route Maps (Appendix C) include detailed maps showing the location of routes and the location of new substation facilities and parcel data. Zoning Maps are included in Appendix Q. All digital copies of the maps and other digital data for the Project filing can be found in the GIS data discs provided concurrently with this filing.

2.3.1. General Route Maps

General Route Maps (Appendix C) consist of detailed maps showing the location of routes and new substation facilities. The expansion of existing substations is not proposed as part of the Project. General Route Maps present local infrastructure, including roads, existing utility facilities (electric transmission and distribution, pipelines, etc.) and location of sensitive sites (daycare centers, hospitals or other health care facilities, etc.).

2.3.1.1. Topographic Maps

Topographic Maps (Appendix B) provide topographic maps at 1:24,000 scale showing all routes.

2.3.1.2. Maps Showing Land Ownership by Parcel Boundaries

General Route Maps (Appendix C) show land ownership by parcel boundaries. These maps are based on the most recent data available. The Applicants' review of the electronic parcel mapping for Buffalo County determined that it was not accurate. As a result, the Applicants worked with a title company to accurately develop the property owner list for Buffalo County that is included in Section 2.10.

2.3.1.3. Street Maps

Aerial photography on General Route Maps (Appendix C) provides current land use and identifies street names.

2.3.2. Aerial Photography

General Route Maps (Appendix C) provide aerial photographs from 2008 at a scale of 1:4,800 for all routes and route segments.

2.3.3. Geographic Information Systems (GIS) Data

All information required under Section 2.3.3 is included in the GIS digital submission in shapefile format, projected to Wisconsin Transverse Mercator (WTM). This data includes all maps listed in Section 2.3.1 (Appendices B through D); digital versions of aerial photographs (General Route Maps, (Appendix C); route segments organized by proposed routes (General Route Maps, Appendix C); and wetlands, including WDNR WWI (Environmental Features Maps, Appendix D); wetlands identified for the Project using recent aerial photography and in-field verification and characterization (Environmental Features Maps, Appendix D); land ownership (General Route Maps, Appendix C); and WisDOT GRR/WI-35 scenic easements (Figure 5, Appendix O).

2.3.4. Zoning

2.3.4.1. Current Zoning Maps

Zoning Maps (Appendix Q) identify zoning plans along all route segments. Zoning data is provided for the following counties: Buffalo, Trempealeau and La Crosse; cities: Alma, Cochrane, Trempealeau, Holmen, La Crosse and Arcadia; and towns: Belvidere, Milton, Cross, Buffalo, Waumandee, Trempealeau, Gale, Arcadia, Holland, Onalaska and Caledonia.

2.3.4.2. Zoning GIS Data

Zoning GIS data for all routes and segments projected to WTM are included in the GIS digital submission.

2.3.5. Current Land-Use Plans for Project Area

Appendix R presents available land use plans for areas crossed by the Project. Land use data is provided for the following counties: Buffalo, Trempealeau and La Crosse; cities: Alma, Buffalo City, Cochrane, Galesville, Trempealeau, Holmen, La Crosse and Arcadia; and towns: Arcadia, Belvidere, Milton, Cross, Glencoe, Lincoln, Buffalo, Waumandee, Trempealeau, Gale, Arcadia, Holland, Onalaska and Caledonia. The Project passes through the unincorporated communities of Marshland (Buffalo County) and Centerville (Trempealeau County).

Project Area

The Project is located in a three-county area that hosts major industrial clusters such as food products and processing, wood and furniture products and machinery, equipment and electronic products. There is a concentration of trucking services in city of Galesville. The comprehensive plans for local government units in the Project area emphasize the growth of existing businesses and attracting new commercial and light industrial businesses, while balancing growth and the protection of the environment. There are also development and growth opportunities on the Minnesota side of the Mississippi River that could draw employees from Wisconsin.

The village of Holmen developed a mixed-use plan to attract development north of the village center as well as creating a gateway into La Crosse County. The city of Buffalo City and the village of Cochrane are planning a shared industrial facility in an area between the two incorporated units. The “Smart Park” located in immediate proximity to railroad and highway access and has the potential to draw workers from the La Crosse, Eau Claire and Winona areas.

The Project area is within the Mississippi River Regional Planning Council planning area. The three-county area has development potential due to the rural nature of the region and proximity to two larger area employers and major employment centers. Residential development is characterized by rural residential and denser clusters near villages and cities. The Mississippi River Regional Planning Council noted that people live in rural areas and commute to jobs in La Crosse, Eau Claire and Winona. This is reflected in Buffalo County’s high per-capita income that contrasts with a predominantly agricultural area.

The three counties in the Project area support the state’s Farmland Preservation Program. Agricultural land is preserved through local planning and zoning. Farmers qualify if their land is zoned agriculture or if they sign an agreement to use their land exclusively for agricultural purposes. The program also promotes soil and water conservation and provides tax relief to participating farmers.

The Project area supports several forms of active recreation. The Trempealeau National Wildlife Refuge and the Upper Mississippi River NFWR allow public access to the Mississippi River. Perrot State Park has a variety of active and passive recreation resources. Smaller county parks and recreation areas provide sport fields, passive recreation and trailheads for bicycle and pedestrian trails. Designated bicycle routes exist in Trempealeau County. Snowmobile routes and cross country trails are present.

Buffalo County

Buffalo County is primarily rural with rural residential and agricultural land uses. Agricultural land uses consist of row crops, animal husbandry and associated support uses. Agricultural uses have been a part of the county's land use development since the 1850's and continue today. Buffalo County supports recreational activities associated with the Mississippi River, Great River Road and second-home vacation cabins. Development that has occurred in the county is mainly associated with agricultural uses or the incremental development of incorporated cities and villages in the county. The small incorporated hamlet of Marshland is a collection of residential homes along County Road (CR) P and the Great River Road.

The county has experienced a low level of development over the past two years, with 16 (2009) and 123 (2010) zoning permits granted. Approximately 30 percent of the zoning permits were from accessory structures. Agricultural buildings are exempt from zoning permits. The county does not have any new mining development activities.

Buffalo County is in the process of revising their comprehensive plan. The adopted zoning ordinance is silent regarding transmission lines in all zoning categories. The county has a Land and Water Resource Management Plan which provides guidance and direction for soil conservation work associated with agricultural activities. The county also has adopted a comprehensive nutrient management program and grassland reserve program.

The town of Belvidere is developing a new comprehensive plan with an anticipated adoption date of 2011. The town's adopted ordinances and resolutions do not address transmission lines.

The city of Buffalo City has an adopted zoning ordinance that allows the construction, reconstruction and maintenance of aboveground and underground public utility service lines. The city's Board of Appeals may designate reasonable conditions and safeguards to public utility buildings, structures and lines.

The village of Cochrane has an adopted zoning ordinance that allows transmission lines in all zoning districts as long as they are located a minimum of 50-feet from any residential district lot line. Transmission lines are exempt from the village's height limitations and yard setbacks. The primary land uses in the village include residential, commercial and agricultural processing. The La Crosse Milling company is located near the center of the village and is adjacent to the BNSF railroad. The 24-hour facility processes grain for food stock and feed. The privately-owned Walnut Grove Golf Course is located in the village and provides recreation. Residential home development in the past decade has been flat with the most recent permit issued in 2001.

The towns of Cross, Glencoe, Lincoln, and Milton are in the process of developing a comprehensive plan with an anticipated adoption date of late winter 2011. The towns have adopted the Buffalo County Zoning Ordinance, which is silent on transmission lines in all zoning categories.

The town of Waumandee consists of rural residential, agricultural lands, limited commercial and institution. The town is in the process of developing a comprehensive plan with an anticipated adoption date of late winter 2011. The town of Waumandee has adopted the Buffalo County Zoning Ordinance, which is silent on transmission lines in all zoning categories.

Trempealeau County

Trempealeau County is characterized by agriculture and rural residential with small cities and villages scattered in the agriculture landscape. Development in the county is mainly agricultural-based and typically consists of expansion of existing farms. Small residential subdivisions are typical near the cities and villages. The county has several limestone, shale and gravel mines. The first permit for a non-metallic mine was granted by the county in 2010. Additional mining permits are anticipated in 2011.

The Trempealeau County Comprehensive Plan addresses utilities and community facilities. The plan's goal includes support of community facilities and services which contribute to the overall improvement of the community. The plan encourages and supports the burial of utility lines when and where feasible. The plan promotes the use and production of green energy with respect to public health and safety. The adopted zoning ordinance stipulates that a land use permit is not required for any installation of distribution poles, towers or wires.

The city of Arcadia is located on the west side of Trempealeau County. It is an important agricultural service and manufacturing center within two economic zones of influence: La Crosse, Wisconsin (35 miles to the south) and Winona, Minnesota (20 miles to the west). The city's population and growth has been relatively stable in the past few years with some incremental growth. There has been significant employment growth due to existing industrial and commercial businesses such as Ashley Furniture and Gold'n Plump. The two major area employers also provide opportunities for several supply-chain support companies for the area's industrial uses. The city's economic development element of the comprehensive plan identifies a goal to expand existing businesses as well as new environmentally suitable businesses that can be accommodated in the city's existing infrastructure.

The city has adopted two tax incremental finance districts. One tax incremental finance districts consists of the area around the Ashley Furniture factory. The second district is located east of WI-93 between Clydesdale Avenue and Waneck Avenue, and west of Segment 11B of the Arcadia Route. The tax incremental finance district is characterized by light industrial and commercial businesses.

The city of Arcadia's utilities element is silent regarding existing or proposed transmission lines. The policies section of the utilities element defers to the PSCW to administer policies regarding reliability expectations. The city's zoning ordinance allows transmission lines in the 'open development – conservancy' zoning district and is silent in all other zoning districts. Public utility poles, lines, and related equipment without permanent foundations are allowed within the required setbacks of highways, provided that they do not violate any other provision of the county's zoning ordinance.

The towns of Caledonia and Gale have adopted the Trempealeau County Zoning Ordinance. The county's adopted zoning ordinance stipulates that a land use permit is not required for any installation of distribution poles, towers, or wires.

The city of Galesville is located in the southeast part of Trempealeau County. The city is an important agricultural and manufacturing service center within the economic zone of influence for Winona, Minnesota and La Crosse, Wisconsin (15 miles). The city's population has increased at a rate consistent with other local government units in Trempealeau County. The city has three historic districts and is adjacent to Lake Marinuka. The city has limited growth in its tax base and growth within incorporated limits, however there is potential growth for businesses along WI-93/WI-54/US-53. Ridgeview Estates is an existing mixed use development located west of the city on WI-93/WI-54. The development is partially built with approximately forty residential units. At present, the commercial parcels have not been developed. The city's comprehensive plan has identified the potential for planned growth outside the city's limits. The town of Gale would regulate the future development designated as the "transitional agriculture" designated area on the town's land use map. The city's economic development element of the comprehensive plan recommends expanding existing industrial development as well as encouraging the development of environmentally suitable industries which can financially and physically be accommodated by the city's infrastructure.

Regional transportation improvements are planned for WI-93/WI-54/US-53 near the city. The WI-53 bridge replacement is a planned improvement. The proposed bridge would have bicycle and pedestrian features to be consistent with the city's and county's bicycle/pedestrian plan.

The city of Galesville's comprehensive plan is silent regarding transmission line corridors and associated structures. The city's zoning ordinance exempts transmission lines from the city's maximum height and yard requirements. Utilities and structures for utilities are conditional uses in the city's zoning districts.

The town of Trempealeau has adopted the Trempealeau County Zoning Ordinance. The county's adopted zoning ordinance stipulates that a land use permit is not required for any installation of distribution poles, towers or wires. La Crosse County

La Crosse County consists of a variety of land uses, incorporated cities and villages, as well as agricultural and recreation areas. The suburban nature of the landscape is composed of low and medium density residential, a private golf course and gun and rod club, rodeo grounds, tree farms, row crops and a public high school.

The county is a regional trade center and is industrially diverse. Industrial businesses in the county include food processing, wood processing and furniture manufacturing, metal products and machinery and equipment manufacturing. The La Crosse County Board is developing plans to make application for designation as one of the state's eight tech zones. Certified high tech businesses in these zones are eligible for tax credits in each zone for a ten year period.

The county's adopted comprehensive plan recognizes the Wisconsin's Citizen Utility Board assessment that the electrical system in western Wisconsin is congested and not as robust as in other parts of the state and the importance of considering energy needs over this planning horizon and the coordination of transmission planning with Minnesota. The county's code of ordinances exempts transmission poles and lines from height requirements. Transmission lines are permitted in Agricultural District "B" as well as the location of the poles between the setback lines and the highway.

The county's zoning regulations are in the process of being revised. A public version will be available for review and comment during the spring 2011.

The village of Holmen is located approximately five miles north of La Crosse, Wisconsin. It was initially an agricultural community but has developed as an outlying suburban community of La Crosse. The primary land uses in the village are single family residential, two-family residential, multifamily residential, commercial and retail along South Main Street/County Road HD; government/institutional and agriculture. Agricultural lands surround the village's developed core. The village adopted a comprehensive plan in December 2004; several of its goals include preserving and maintaining the village's small town character, preserving the landscape, phased and efficient community services, avoidance of land use conflicts and protecting the environment. The village has experienced rapid growth, increasing in population by 92 percent between 1990 and 2000. The comprehensive plan identifies goals and objectives to provide a framework in which growth and development can occur in a timely and orderly fashion.

The utilities element of the comprehensive plan does not directly address electrical transmission lines and substations. However, it does provide direction for the coordination of growth with the provision of utilities, the development of utilities between 700 and 900 feet above sea level and preserving the maximum amount of native vegetation where utilities would be sited. The intergovernmental coordination element of the comprehensive plan addresses compatible land uses and zoning regulations between the village and adjacent cities and towns and specifically addresses the village's northwest expansion toward the town of Holland.

The village of Holmen received a preliminary master plan for the North Holmen Neighborhood in December 2009 and adopted the Seven Bridges Master Tax Increment District (TID) in October 2010. The proposed project is located north of the village and incorporates a mixed use plan for the conversion of agricultural lands to residential, multi-family, mixed use, office, light industrial, conservancy and a park. The plan also includes the provision for new bike routes, a storm water collection network and several improved intersections. The inclusion of development of large-parcel development north of the village provides for a gateway to the village and opportunity for orderly growth and development.

The parcel designated as "conservancy" in the Seven Bridges TID allows for parks, parkways, recreation areas and cemeteries, management of forestry, wildlife and fish, harvesting of wild crops and uses customarily incidental to the aforementioned uses. Conditional uses within the zoning category include gravel or sand pits; institutional uses for the villages include landfill areas, sewage disposal and treatment plants, village garages, water pumping or storage facilities, and other recreation uses such as golf courses and driving ranges, public recreation buildings and campgrounds. Utility uses such as dams, transmission lines and telecommunication towers are also conditional uses.

Plans for the Gunderson Lutheran Clinic, a new medical center at the intersection of the GRR/WI-35 and WI-93/US-53, have been submitted to the village. The clinic is scheduled for discussion and review in

December 2010. The proposed site is located in the southeast corner of the Seven Bridges TID master plan.

A new proposed middle school is planned for a site south of the Gunderson Medical Clinic. The site is west of the GRR/WI-35 and north of Newport Road. The proposed Ryan Estates project is located west of the Holmen High School at the intersection of Briggs Road and Sween Drive. The middle school project would occupy eight quarter-acre lots on a cul de sac west of the Holmen High School.

The utility element of the village of Holmen discusses the coordinating growth with the provision of utilities. However, the element is silent on regulations and guidelines for utility lines and substations. The village's zoning ordinance is silent regarding transmission lines and substations.

The town of Onalaska's comprehensive plan addresses utilities and public infrastructure in context with protecting the environment and visual resources. The plan directs that utilities should avoid environmentally sensitive areas when extending and constructing new utilities and community facilities. The Utilities and Community Facilities Element directs that the Environmental Features Map should be consulted prior to making decisions regarding location of new utilities. The element requires that the extension or development of new utilities and facilities in floodplains wetlands, steep slopes or other environmentally sensitive areas should be prohibited.

The town's comprehensive plan has a section that identifies and provides recommendations and direction for the Great River Road District. The recommendations include direction to enhance the visual character, such as burying overhead utility lines, removing, relocating or screening overhead transmission lines wherever possible in conjunction with street reconstruction or redevelopment.

The town of Onalaska has adopted the La Crosse County Code of Ordinances, which exempts transmission poles and lines from height requirements. Transmission lines are permitted in Agricultural District "B" as well as the location of the poles between the setback lines and the highway.

The town of Holland is predominantly forest and agriculture with residential and commercial/manufacturing a small part of the total town area. Approximately 8 percent of the town's land has been converted from agriculture. There is an increasing demand for residential units with over 200 housing units constructed over the 1999 to 2005 period. The town's comprehensive plan estimates that over 1,100 acres will be needed to accommodate new development over the next twenty years and over 600 acres needed for new residential demand. The estimates are based upon the projected population and housing growth.

The town of Holland has an adopted comprehensive plan. The town's goals, objectives and actions provide a framework for the planning and construction of utilities. The plan directs utility development to avoid environmentally sensitive areas when extending and constructing new utilities and community facilities. The plan recommends that the Environmental Features Map be consulted prior to making decisions regarding location of new utilities. The town has adopted the La Crosse County Code of Ordinances, which exempts transmission poles and lines from height requirements. Transmission lines are permitted in Agricultural District "B" as well as the location of the poles between the setback lines and the highway.

2.3.6. Floodplain Maps

Environmental Features Maps (Appendix D) provide FEMA floodplain information.

2.4. Detailed Route Information

The potential impacts resulting from the construction of a new transmission line along the routes identified in this Application are discussed and quantified below.

2.4.1. General Route Impacts

CPCN Impact Tables (Appendix A) provide supporting information quantifying the impacts of the routes. The results of the impact analysis are presented below.

The identified routes are long and therefore have been broken into segments based on ROW sharing; they have also been given a designated alphanumeric identifier. Each route begins with the Mississippi River crossing at Alma and terminates at a new Briggs Road substation near the intersection of US-53 and Briggs Road in the Town of Onalaska near Holmen.

2.4.1.1. Table 1A ROW Required, New ROW and Corridor Sharing

Table 1A (Appendix A) presents the ROW required, new ROW and corridor sharing for each route, by segment. The typical ROW requirement for the Project is 150 feet. Table 1A identifies the exceptions. The percentage of route acres shared with existing corridors varies from zero to 48.8 percent as listed below:

- Q1-Highway 35 Route shares 48.7 percent with existing corridors
- Arcadia Route shares 48.4 percent with existing corridors
- Arcadia-Alma Option shares zero percent with existing corridors; this option would replace Arcadia Route Segments 2A2 (shares 100 percent) and 10B1 (shares zero percent)
- Q1-Galesville Route shares 44.0 percent with existing corridors

2.4.1.1.1. Total Segment Length (in feet and miles)

Table 1A (Appendix A) presents the total length for each segment. The total lengths for each alternative route are identified below:

- Q1-Highway 35 Route: 227,189 feet (43.0 miles)
- Arcadia Route: 289,089 feet (54.8 miles)
- Arcadia-Alma Option: 6,645 feet (1.3 miles): the portion of the Arcadia Route that it would replace is 9,083 feet (1.7 miles)
- Q1-Galesville Route: 255,628 feet (48.4 miles)

2.4.1.1.2. Length (feet)

See Table 1A, Appendix A for the length of each alternative route by segment category.

2.4.1.1.3. Total Width of the ROW Required

The average ROW requirement for the Project is 150 feet. Required ROW width varies from an estimated 115 feet to 280 feet for all of the alternative routes. The total width by segment is provided in Table 1A (Appendix A).

2.4.1.1.4. ROW Requirements (acres)

- Q1-Highway 35 Route: 789.0 acres
- Arcadia Route: 1,007.3 acres
- Arcadia-Alma Option: 22.9 acres; portion of the Arcadia Route that it would replace: 28.80 acres
- Q1-Galesville Route: 886.9 acres

2.4.1.1.5. Type of Existing ROW, if any, that would be Used (Shared) by the Proposed New ROW

The following is a general summary of existing ROW that would be shared with the proposed new transmission line ROW. Refer to Table 1A (Appendix A) for a more detailed summary of ROW sharing for each route, by segment. The Mississippi River crossing would be a rebuild of the Dairyland 161/69 kV line.

2.4.1.1.5.1. Q1-Highway 35 Route

The Q1-Highway 35 Route is 43 miles long and shares the Dairyland Q1 161 kV transmission line corridor to a point where the route runs parallel to WI-35 across the Black River floodplain. The proposed line would then proceed south adjacent to US-53 for approximately 3.1 miles to a new substation by Briggs Road near Holmen (Table 2.1-1). The route has a minor reroute to aid constructability through wooded and hilly terrain. To minimize aesthetic impacts to the Great River Road/WI-35 the route is located north of road through the Black River floodplain. The route shares ROW with the GRR/WI-35 and WI-93/US-53, as described in Section 2.4.1.3.

2.4.1.1.5.2. Arcadia Route

The Arcadia Route is 54.8 miles long and shares the Dairyland Q1 161 kV and 69 kV transmission corridors and Xcel 161 kV corridor that parallels US-53/WI-93. It also shares ROW with WI-93/WI-54 and GRR/US-53 (Table 2.1-2). The route also shares railroad ROW as described in Section 2.4.1.2 and road ROW as described in Section 2.4.1.3.

2.4.1.1.5.3. Arcadia-Alma Option

The Arcadia-Alma Option is 1.3 miles long and does not share the Dairyland Q1 161 kV and 69 kV corridors. The proposed corridor crosses a rural development to reconnect with an existing 161 kV corridor (Table 2.1-3). The Arcadia-Alma Option would replace Arcadia Route Segments 2A2 (shares 100 percent) and 10B1 (shares 0 percent) (Table 2.1-3).

2.4.1.1.5.4. Q1-Galesville Route

The Q1-Galesville Route is 48.4 miles long, beginning at the Mississippi River crossing at Alma and ending at the proposed new Briggs Road Substation. The first part of this route follows the Q1 alignment. It then connects with the Arcadia Route alignment to the proposed new Briggs Road Substation. The first part of this route follows the Q1-Highway 35 alignment and shares the Dairyland Q1 161 kV corridor with rerouting to WI-35 to cross the Black River. (This was based on USFWS input requiring avoidance of the existing Q1 crossing of the Black River floodplain to aid constructability through wooded hilly terrain; to minimize impacts to homes south of Cochrane; and, at the request of WisDOT, for aesthetic reasons along the GRR/WI-35.) The route then connects with the Arcadia alignment to the proposed new Briggs Road substation site. The route also shares the Xcel Energy 161 kV corridor that parallels US-53/WI-93 as well as with WI-93/WI-54 and GRR/US-53 (Table 2.1-4). The route leaves existing transmission line corridors to move from one transmission line corridor to another. The route also shares railroad ROW as described in Section 2.4.1.2 and road ROW as described in Section 2.4.1.3.

2.4.1.1.6. Shared Existing ROW Metrics

This section provides a characterization of the existing ROW to be shared by the alternative routes. The following sections summarize existing ROW metrics. Detailed information is presented in Table 1A (Appendix A).

2.4.1.1.6.1. Length (feet) of the Existing ROW to be Shared

- Q1-Highway 35 Route: 212,348 feet (40.2 miles)
- Arcadia Route: 260,120 (49.3 miles)
- Arcadia-Alma Option: zero feet (zero miles); portion of the Arcadia Route that the option would replace 3,088 feet (0.6 miles)
- Q1-Galesville Route: 201,437 feet (38.1 miles)

2.4.1.1.6.2. Width of the Entire Existing ROW (feet)

- Q1-Highway 35 Route

  The width of the existing ROW where shared ranges from:

  - 50 feet to 180 feet for transmission line ROW
  - 50 feet to 100 feet for railroad ROW
  - 216 feet to 700 feet for road ROW

- Arcadia Route

  The width of the existing ROW where shared ranges from:

  - 66 feet to 180 feet for transmission line ROW
  - 44 feet to 400 feet for road ROW

- Arcadia-Alma Option

  The Arcadia-Alma Option does not share existing transmission line ROW; portion of the Arcadia Route that the option would replace shares zero to 120 feet

- Q1–Galesville Route

  The width of the existing ROW where shared ranges from:

- 50 feet to 180 feet for transmission line ROW
- 50 feet to 100 feet for railroad ROW
- 44 feet to 400 feet for road ROW

2.4.1.1.6.3. Width (feet) of the Existing ROW that would be Shared

The width of the existing ROW that would be shared along the routes varies depending on the type of ROW sharing, and is presented in more detail in Table 1 (Appendix A). In some areas shared railroad or road ROW overlapped with shared transmission ROW. In such cases, the transmission ROW was given priority and only the portion of railroad or road ROW that did not overlap with transmission ROW is presented below.

- Q1-Highway 35 Route

  The width of the existing ROW where shared ranges from:

  - 50 feet to 180 feet for transmission line ROW
  - 25 feet to 50 feet for railroad ROW
  - 32 feet to 70 feet for road ROW

- Arcadia Route

  The width of the existing ROW where shared ranges from:

  - 43 feet to 180 feet for transmission line ROW
  - 26 feet to 150 feet for road ROW

- Arcadia-Alma Option

  The Arcadia-Alma Option does not share existing transmission line ROW; portion of the Arcadia Route that the option would replace shares ranges from zero to 87.5 feet

- Q1-Galesville Route

  The width of the existing ROW where shared ranges from:

  - 50 feet to 180 feet for transmission line ROW
  - 25 feet to 50 feet for railroad ROW
  - 26 feet to 150 feet for road ROW

2.4.1.1.6.4. Area (acres) of the Existing ROW that would be Shared

- Q1-Highway 35 Route: 384.6 acres
- Arcadia Route: 487.8 acres
- Arcadia-Alma Option: zero acres; portion of the Arcadia Route that the option would replace shares 6.2 acres
- Q1-Galesville Route: 390 acres

2.4.1.1.7. New (Additional) ROW Required

2.4.1.1.7.1. Width (feet)

- Q1-Highway 35 Route: 27.5 feet to 118 feet
- Arcadia Route: zero feet to 150 feet
- Arcadia-Alma Option: 150 feet
- Q1-Galesville Route: zero feet to 150 feet

2.4.1.1.7.2. Area (acres)

- Q1-Highway 35 Route: 404.4 acres
- Arcadia Route: 519.5 acres
- Arcadia-Alma Option: 22.9 acres; portion of the Arcadia Route that the option would replace is 22.6 acres
- Q1-Galesville Route: 497.0 acres

2.4.1.1.8. Corridor Sharing

2.4.1.1.8.1. Percent New ROW Length Shared

- Q1-Highway 35 Route: zero percent to 100 percent
- Arcadia Route: zero percent to 100 percent
- Arcadia-Alma Option: zero percent; portion of the Arcadia Route that the option would replace: zero to 100 percent
- Q1-Galesville Route: zero percent to 100 percent

2.4.1.1.8.2. New ROW Width Shared

- Q1-Highway 35 Route: zero feet to 180 feet
- Arcadia Route: zero feet to 180 feet
- Arcadia-Alma Option: zero feet; portion of the Arcadia Route that the option would replace is zero to 87.5
- Q1-Galesville Route: zero feet to 180 feet

2.4.1.1.8.3. Percent Existing ROW Width Shared

- Q1-Highway 35 Route: zero percent to 100 percent
- Arcadia Route: zero percent to 100 percent
- Arcadia-Alma Option: zero percent; the portion of the Arcadia Route that the option would replace: zero to 72.9 percent
- Q1-Galesville Route: zero percent to 100 percent

2.4.1.1.8.4. Percent New Project ROW Width Shared

- Q1-Highway 35 Route: zero percent to 76.7 percent
- Arcadia Route: zero percent to 100 percent
- Arcadia-Alma Option: zero percent; the portion of the Arcadia Route that the option would replace: zero to 76.1 percent
- Q1-Galesville Route: zero percent to 100 percent

2.4.1.2. Railroad and Pipeline Corridors

None of the routes parallels a pipeline. As described below, the Q1-Highway 35 and Q1-Galesville Route alternatives parallel railroad ROW owned by the BNSF. The Applicants have contacted BNSF and were advised that because the poles and conductors would not physically encroach on railroad property if one of these routes were selected, no permit or license would be required for longitudinal installations. A permit would be required for three crossings of BNSF property. At the railroad's request, an alternating current (AC) interference study has been commissioned to determine potential interference issues with the railroad's signaling communications. Preliminary results show no major interference that cannot be addressed with industry accepted and relatively inexpensive mitigation equipment.

2.4.1.2.1. Q1-Highway 35 Route

Segment 2A3 of the Q1-Highway 35 Route continues southeast from the Alma crossing of the Mississippi River and parallels approximately 0.18 miles of the BNSF railroad. Segments 2B, 2D and 2E continue south and parallel approximately 3.1, 1.5 and 3.2 miles, respectively, of the BNSF rail line. Segment 2D crosses the BNSF rail line south of Wisconsin Street. Segment 2I crosses the Canadian National (CN) Railroad near Marshland, and Segment 3 crosses a former spur line of the Chicago and North Western (C&NW) Railroad that heads north out of Trempealeau to Galesville.

2.4.1.2.2. Arcadia Route

Segment 1 of the Arcadia Route crosses the BNSF railroad at the GRR/WI-35. Segment 10C crosses the CN railroad northeast of Arcadia. Segment 13B2 crosses an abandoned C&NW railroad spur ROW south of Galesville.

2.4.1.2.3. Arcadia-Alma Option

Neither the segments of the Arcadia-Alma Option or the portion of the Arcadia Route it would replace parallel or cross the existing railroad ROW.

2.4.1.2.4. Q1-Galesville Route

Segment 1 of the Q1-Galesville Route crosses the BNSF railroad at the GRR/WI-35. Segment 2A3 crosses the BNSF rail line south of Dairyland Power Road. Segments 2B, 2D and 2E head south, paralleling the BNSF railway ROW approximately 3.1, 1.5 and 3.2 miles, respectively. Segment 2I crosses the CN railroad near Marshland. Segment 13B2 crosses an abandoned C&NW railroad spur ROW south of Galesville.

2.4.1.3. Interstate or State Highways

Throughout the routing process, the Applicants have worked with WisDOT to identify and address issues related to sharing state highway ROW, including the GRR/WI-35. Shared ROW by segment follows, excluding portions where the Segment only crosses an interstate or state highways. Sharing with local roads is presented in Table 1A and is not repeated here.

2.4.1.3.1. Q1-Highway 35 Route

Segments 8A, 8B and 8C share ROW with GRR/WI-35 where the route crosses the Black River floodplain. Segments 9 and 18H share ROW with GRR/US-53.

2.4.1.3.2. Arcadia Route

Segments 13A, 13B1 and 13B share ROW with WI-93/WI-54. Segments 13C and 13D share ROW with WI-93/WI-54/WI-53. Segment 18C shares ROW with WI-35/County Road Hd. Segment 18H shares ROW with GRR/US-53.

2.4.1.3.3. Arcadia-Alma Option

No interstate of state highway sharing.

2.4.1.3.4. Q1-Galesville Route

Segment 13B2, 13C and 13D share ROW with WI-93/WI-54/US-5. Segment 18C shares ROW with WI-35/County Road Hd. Segment 18H shares ROW with GRR/US-53.

2.4.1.4. Table 1B, Buildings within 300 feet of Centerline

Table 1B (Appendix A) summarizes the number and type of each building within the following distance categories from the route centerline: zero-25 feet, 26-50 feet, 51-100 feet, 101-150 feet and 150-300 feet. Tables 2.4-1 through 2.4-4 provide a summary of the results.

2.4.1.4.1. Number and Type of Buildings (Table 1B)

2.4.1.4.1.1. Homes

2.4.1.4.1.1.1. Q1-Highway 35 Route

Table 1B (Appendix A) presents data for homes within the specified distances along the Q1-Highway 35 Route. There are 74 houses within 300 feet of the Q1-Highway 35 centerline. There are no houses between zero and 50 feet of the centerline. There are 14 houses between 51 and 100 feet of the centerline, eight houses between 101 and 150 feet of the centerline, and 52 houses between 151 and 300 feet of the centerline. Table 2.4-1 below shows the number of houses within 300 feet of the Q1-Highway 35 centerline by segment.

Table 2.4-1:
Residences within 300 Feet of the Q1-Highway 35 Centerline

SEGMENT	0' – 25'	26' -50'	51' – 100'	101' – 150'	151' – 300'
	From Route Centerline				
2A2					1
2A3				1	1
2B					10
2C			2	1	1
2E					4
2F					1
2G			1		3
2I			5	1	5
3			5	2	14
8B				1	1
8C					1
9			1	2	9
Total	0	0	14	8	52

2.4.1.4.1.1.2. Arcadia Route

Table 1B (Appendix A) presents data for houses within the specified distances along the Arcadia Route. A total of 102 houses are located within 300 feet of the centerline of the Arcadia Route. There are no houses between zero and 50 feet of the centerline, nine houses between 51 and 100 feet of the centerline, 15 houses between 101 and 150 feet of the centerline, and 78 houses between 151 and 300 feet of the centerline. Table 2.4-2 shows the number of houses within 300 feet of the Arcadia centerline by segment.

Table 2.4-2:
Residences within 300 Feet of the Arcadia Route

SEGMENT	0' – 25'	26' -50'	51' – 100'	101' – 150'	151' – 300'
	From Route Centerline				
2A2					1
10C					9
11A				1	1
11B					1
11D			1	1	2
11G			2	2	5

SEGMENT	0' – 25'	26' -50'	51' – 100'	101' – 150'	151' – 300'
	From Route Centerline				
13A				3	2
13B1			1		1
13B2				5	32
13C					1
13D			2	1	3
13E					2
17A			3	1	3
17B				1	6
18A					4
18C					1
18F					4
Total	0	0	9	15	78

2.4.1.4.1.1.3. Arcadia-Alma Option

Table 1B (Appendix A) presents data for houses within the specified distances along the Arcadia-Alma Option. One house is located within 300 feet of the centerline under the Arcadia-Alma Option, and one house is located between 151 and 300 feet of the centerline. Table 2.4-3 shows the number of houses within 300 feet of the Arcadia-Alma Option centerline by segment. The portion of the Arcadia Route that the option would replace also has one house located between 151 and 300 feet of the centerline.

Table 2.4-3:
Residences within 300 Feet of the Arcadia-Alma Option

SEGMENT	0' – 25'	26' – 50'	51' – 100'	101' – 150'	151' – 300'
	From Route Centerline				
10B2					1
Total	0	0	0	0	1

2.4.1.4.1.1.4. Q1-Galesville Route

Table 1B (Appendix A) presents data for houses within the specified distances along the Q1-Galesville Route. A total of 109 houses are located within 300 feet of the centerline of the Q1-Galesville Route. There are no houses between zero and 50 feet of the centerline, 14 houses between 51 and 100 feet of the centerline, 11 houses between 101 and 150 feet of the centerline, and 84 houses between 151 and 300 feet of the centerline. Table 2.4-4 shows the number of houses within 300 feet of the Q1-Galesville Route centerline by segment.

Table 2.4-4:
Residences within 300 Feet of the Q1-Galesville Route

SEGMENT	0' – 25'	26' – 50'	51' – 100'	101' – 150'	151' – 300'
	From Route Centerline				
2A2					1
2A3				1	1
2B					10
2C			2	1	1
2E					4
2F					1
2G			1		3
2I			5	1	5
6			1		1
13B1			1		1
13B2				5	32
13C					1
13D			2	1	3
13E					2
17A			3	1	3
17B				1	6
18A					4
18C					1
18F					4
Total	0	0	14	11	84

There are two locations along the WI-93/WI-54 corridor where the proposed alignment crosses over WI-93/WI-54 and back again, in each case to avoid a single residence. Alternate alignments were developed that avoid these two crossings as shown on General Route Maps 86, 87, 89, and 90 (Appendix C). In these two cases, residences are located so close to the highway that they would be in the proposed transmission line ROW. It is uncertain whether these residences would have to be relocated if the line did not cross to the other side of the highway. Wisconsin rule, PSC 114.234A4 governs how close a house can be to a transmission line. Because these two houses are very close to the proposed conductors, the Applicants propose an alignment that avoids conflict with theses existing residences.

Along this stretch of WI-93/WI-54, the proposed alignment currently crosses the highway seven times. Four of these crossing could be removed if the alternate alignments were used. The alternate alignments could be used if the houses were moved or removed, or if an acceptable and allowable final design had sufficient clearance to the two homes. The Applicants have contacted the owners of these two residences to assess whether the homeowners would be amenable to a voluntary purchase of their homes. An initial response from one homeowner was agreeable while the other was noncommittal. The Applicants will continue to work with these two homeowners in an effort to advance the alternate alignments.

2.4.1.4.1.2. Apartments

No apartments are located within 300 feet of any of the alternative routes or the Arcadia-Alma Option.

2.4.1.4.1.3. Schools

No schools are recorded within 300 feet of the centerline of the Q1-Highway 35 Route, Arcadia-Alma Option or Q1-Galesville Route.

No schools are located within 300 feet of the centerline of the Arcadia Route. The western edge of the Holmen High School property occurs within 300 feet of the route centerline along Segment 18F of the Arcadia and Q1-Galesville Routes; however, the main school building is greater than 300 feet from the route centerline.

2.4.1.4.1.4. Daycare Centers

Spatial information from a database containing regulated daycare centers in Buffalo, Trempealeau and La Crosse counties was used to determine the location and capacity of these centers along the routes. This information, dated June 2010, was provided by Family Resources of La Crosse and the Childcare Partnership Resource and Referral Center. No daycare centers are located within 300 feet of the centerline any of the routes.

2.4.1.4.1.5. Hospitals

No hospitals are located within 300 feet of the centerline of any of the routes. The Franciscan Skemp Medical Center in Alma is located 1.75 miles west of Segment 11B of the Arcadia Route. A rezoning application for a proposed assisted living facility (ALF) has been submitted to the village of Holmen for a location near the intersection of the GRR/WI-35 and WI-93/US-53.

2.4.1.4.1.6. Commercial/Industrial

There is one commercial/industrial building within 100 feet of the centerline of Segment 2G for the Q1-Highway 35 Route and Q1-Galesville Route. There is one commercial building on Segment 13B2 near the intersection of Dale Valley Lane and WI-54 that is located within 100 feet of the centerline for the Arcadia Route. There is one commercial building within 100 feet of the centerline of Segment 17A for the Q1-Galesville and Arcadia Routes. There are no commercial/industrial buildings within 100 feet of the centerline for the Arcadia-Alma Option.

2.4.1.5. Changes to Existing Easements

There would be transmission corridor sharing as identified by segment in Table 1A (Appendix A); Figures 10, 12, and 14; and Tables 2.1-2 through 2.1-4. In cases where the proposed line would be double- or triple-circuit with existing transmission lines, the existing easements (currently owned by Xcel Energy or Dairyland) would remain in place without modification. New easements would be acquired, overlaying the existing easements and including the additional width and other terms necessary to construct the new double or triple-circuit transmission line.

2.4.1.5.1. Dates Easements were Reviewed

The existing easements for this Project were reviewed from 2007 through 2010, as corridors and routes were identified and refined.

2.4.1.5.2. Modification of Existing Easements

2.4.1.5.2.1. Modernization of Language Only

No changes would be made to existing easements.

2.4.1.5.2.2. Changes in Size of Easement Required

No changes would be made to existing easements.

2.4.1.5.2.3. Other Reasons

No changes would be made to existing easements.

2.4.2. Detailed Route Impacts by Existing Land Cover

The land cover within each route was identified using aerial photography and field observations (along accessible segments). Two sources of photography were used, the National Agricultural Imagery Program (NAIP) 2008 orthophotography and high resolution photography acquired for the Project. Photography from flights within the routes was taken in April 2008. Data from these sources were verified through field observations along existing ROW when fieldwork was conducted in August 2008, April through July 2009, and April through September 2010. Fieldwork on existing ROW included wetland and waterway identification and direct land cover observations. The proposed ROW typically extends beyond existing transmission line ROW or other public ROW. These areas were field checked to the extent possible from the existing ROWs during the fieldwork.

Land cover within each route was digitized into a GIS layer to quantify land cover impacts. Land cover categories corresponded to the categories specified in Section 2.4.2.1. For each route, a corridor corresponding to the segment that required ROW was established along the route centerline. Existing ROW corridors were then overlaid on the route corridor to distinguish land cover in existing ROW versus new ROW. The extent of existing ROW was determined from the following sources:

- Road/railroad: Approximate boundary based on georeferenced plat maps and aerial photography review.
- Transmission line: Dairyland and Xcel Energy existing easements.
- Distribution line: When a distribution line occurred along a road, it was assumed that additional ROW beyond road ROW was not required. When distribution line was not collocated with another ROW, the easement width was assumed to be 20 feet.

The polygons of each land cover type were then clipped with the route and existing ROW corridors. The acreages of each resulting polygon were quantified with GIS software. The resulting acreages were summed by land type within existing and new ROW for each segment.

Quantifying land cover impacts in this fashion varies from the method outlined in the AFR, and therefore, it resulted in several changes to the format of Table 2, Appendix A (see the footnotes in Table 2). This approach was used because of the complexity in ROW width, ROW sharing and land cover in the Project area and was approved by PSCW staff for this Project.

Numerous segments are crossed by or run parallel to road ROW, road pavement or railroad ROW. Areas associated with road pavement and maintained road and railroad ROW (corresponding to the area of ballast) are described as having no resource impact. Per PSCW Guidance, land cover impacts that fall within road or railroad ROW were not included in the calculations; however, these impacts are described in Table 2 (Appendix A) in the comments column.

Table 2 (Appendix A) provides an estimate of the land cover area that would be impacted by each route. The land cover present on the routes and identified in Table 2 (Appendix A) includes agricultural lands (AFR Section 2.4.2.2.7.1), non-agricultural lands (AFR Section 2.4.2.2.7.2) and developed lands (AFR Section 2.4.2.2.7.3), as described in more detail below.

2.4.2.1. Detailed Route Summary (Table 2)

Detailed land cover information is compiled by segment in separate tables for the three routes and the one option (Table 2, Appendix A for each route). The following information is required in Table 2 if land cover impacts are calculated according to methods outlined in the AFR. However, as land cover impacts were determined by digitizing with GIS software for this Project, some of the following information is not provided in this table, but is provided elsewhere as noted below. The following summarizes the information provided in Table 2 (Appendix A).

2.4.2.1.1. Existing/New ROW Required (feet)

This information is provided in Table 2.

2.4.2.1.2. Existing ROW (feet) Used (excluding road ROW)

This information is not provided in Table 2, but is included in Table 1A.

2.4.2.1.3. New ROW (feet) (excluding road ROW)

This information is not provided in Table 2, but is included in Table 1A.

2.4.2.1.4. Total Segment Length (feet)

This information is provided in Table 2.

2.4.2.1.5. Length (feet)

This information is not provided in Table 2, but is included in Table 1A.

2.4.2.1.6. Segment Length Shared with an Existing Corridor.

This information is provided in Table 2.

2.4.2.1.7. Report the Length of a Segment that Affects the Following Land Cover Types:

Length is not provided in Table 2 because land cover area was digitized into polygons, as described above.

2.4.2.1.7.1. Agricultural

Agricultural land cover includes active fields, pastures and recently fallow fields (old field). Fields or other areas with no evidence of recent tillage or agricultural production were not included as agricultural land. A detailed discussion of these lands is included in Section 2.4.5.

2.4.2.1.7.1.1. Cropland (row crops, hay)

The routes cross mostly lands under corn, soybean or forage (alfalfa) production. The following summarizes the acreage of cropland within each route:

- Q1-Highway 35 Route: 317.2 acres (132.3 acres existing ROW and 184.9 acres new ROW)
- Arcadia Route: 401.0 acres (171.0 acres existing ROW and 230.0 acres new ROW)
- Arcadia-Alma Option: 16.0 acres (16.0 acres new ROW); portion of the Arcadia Route that would be replaced by the option: 6.7 acres (in new ROW)
- Q1-Galesville Route: 360.7 acres (96.4 acres existing ROW and 264.3 acres new ROW)

2.4.2.1.7.1.2. Pasture

Pasture lands refer to areas grazed by livestock. The following summarizes the acreage of pasture within each route:

- Q1-Highway 35 Route: 8.1 acres (1.6 acres existing ROW and 6.5 acres new ROW)
- Arcadia Route: 36.7 acres (20.1 acres existing ROW and 16.6 acres new ROW)
- Arcadia-Alma Option: pasture was not observed within the option; portion of the Arcadia Route that would be replaced by the option: pasture was not observed within the option
- Q1-Galesville Route: 5.1 acres (3.1 acres existing ROW and 2.0 acres new ROW)

2.4.2.1.7.1.3. Old Field

The areas designated as old field are comprised of recently fallow lands that are currently not under agricultural production. Old field was not observed within any of the proposed routes.

2.4.2.1.7.1.4. Specialty

The following summarizes the acreage of specialty crops (*e.g.* ginseng, tree farm, orchards and cranberry bogs) within each route:

2.4.2.1.7.1.4.1. Ginseng

Ginseng was not observed within any of the alternative routes.

2.4.2.1.7.1.4.2. Tree Farm (does not include pine plantations that result in mature trees)

Tree farms were the only specialty crop observed within the alternative routes. The following summarizes the acreage of this specialty crop:

- Q1-Highway 35 Route: Tree farms were not observed within the route
- Arcadia Route: 8.2 acres (3.3 acres existing ROW and 4.9 acres new ROW)
- Arcadia-Alma Option: Tree farms were not observed within the option or the portion of the Arcadia Route that would be replaced by the option
- Q1-Galesville Route: 1.7 acres (0.3 acres existing ROW and 1.4 acres new ROW)

2.4.2.1.7.1.4.3. Orchard

Orchards were not observed within any of the alternative routes.

2.4.2.1.7.1.4.4. Cranberry Bog

Cranberry bogs were not observed within any of the alternative routes.

2.4.2.1.7.2. Non-Agricultural

The non-agricultural lands include upland prairie/grasslands, upland forest, upland shrub land and wetlands.

2.4.2.1.7.2.1. Upland

The uplands identified within the routes include prairie/grassland and upland forest, as described below.

2.4.2.1.7.2.1.1. Prairie/Grassland (does not include converted forest on existing ROW in this category)

Grasslands identified for each alternative route consist primarily of grassed swales or open fields (dominated by herbaceous vegetation) not in agricultural production. These areas do not include converted forest on existing transmission line ROW or cleared road ROW. The following summarizes the acreage of upland prairie/grassland within each route:

- Q1-Highway 35 Route: 28.2 acres (12.9 acres existing ROW and 15.3 acres new ROW)
- Arcadia Route: 50.6 acres (20.6 acres existing ROW and 30.0 acres new ROW)
- Arcadia-Alma Option: 0.1 acres (0.1 acres new ROW); portion of the Arcadia Route that would be replaced by the option:1.3 acres (0.6 acre in existing ROW and 0.7 acre in new ROW)
- Q1-Galesville Route: 28.4 acres (14.3 acres existing ROW and 14.1 acres new ROW)

2.4.2.1.7.2.1.2. Upland Forest (existing ROW through previously forested land must be included in this category. Staff will differentiate between converted forest and new forest impact in its analysis)

Forest lands were assessed using a combination of on-site verification and aerial photography analysis due to the inaccessibility of some areas. The aerial photographs used for the assessment were published by the NAIP in 2008 and flown for the Project in April 2008. On-site verification was conducted in the 2008, 2009 and 2010 field seasons.

Forest lands were defined as areas dominated by trees (>20 percent canopy cover) within the proposed transmission line ROW. Forest lands on the existing transmission ROW (converted forest) were included in this category. Narrow tree lines (<75 feet wide) were excluded. A detailed discussion of forested lands, including the criteria used to identify forested areas, is included in Section 2.4.6. The following summarizes the acreage of upland forest areas within each route:

- Q1-Highway 35 Route: 186.1 acres (91.6 acres existing ROW and 94.5 acres new ROW)
- Arcadia Route: 266.6 acres (127.0 acres existing ROW and 139.6 acres new ROW)
- Arcadia-Alma Option: 5.9 acres (0.2 acres of existing ROW and 5.7 acres of new ROW); portion of the Arcadia Route that would be replaced by the option: 20.5 acres (5.5 acres in existing ROW and 15 acres in new ROW)
- Q1-Galesville Route: 218.3 acres (106.4 acres existing ROW and 111.9 acres new ROW)

2.4.2.1.7.2.1.3. Other

Other lands were identified as areas of open water, prairie/grassland within road and railroad ROW, and road and railroad crossings. Other lands are discussed in the comments column of Table 2.

2.4.2.1.7.2.2. Wetland (Identify source(s) from which wetland impacts were determined)

The wetlands identified for each alternative route include forested and non-forested wetland types. The wetlands are described further in Section 2.4.13, including the methods used to identify the presence of these features.

2.4.2.1.7.2.2.1. Forested Wetland (existing ROW through previously forested wetland must be included in this category. Staff will differentiate between converted forest and new forest impact in its impact analysis)

A detailed discussion of forested wetlands, including the criteria used to identify forested areas, is included in Section 2.4.6. This land cover category includes wetlands located in existing transmission line ROW through previously forested wetland. The following summarizes the acreage of forested wetland areas within each route:

- Q1-Highway 35 Route: 55.1 acres (21.8 acres existing ROW and 33.3 acres new ROW)
- Arcadia Route: 38.8 acres (17.7 acres existing ROW and 21.1 acres new ROW)
- Arcadia-Alma Option: Forested wetland was not observed within the option or the portion of the Arcadia Route that it would replace

- Q1-Galesville Route: 34.9 acres (14.9 acres existing ROW and 20.0 acres new ROW)

2.4.2.1.7.2.2.2. Non-Forested Wetland (all types combined)

All other non-forested wetlands (wet meadow, shrub carr, shallow marsh, etc.) are included in this category. The following summarizes the acreage of non-forested wetland areas within each alternative route:

- Q1-Highway 35 Route: 28.5 acres (14.9 acres existing ROW and 13.6 acres new ROW)
- Arcadia Route: 56.8 acres (22.5 acres existing ROW and 34.3 acres new ROW)
- Arcadia-Alma Option: Non-forested wetland was not observed within the option or the portion of the Arcadia Route that it would replace
- Q1-Galesville Route: 28.8 acres (14.3 acres existing ROW and 14.5 acres new ROW)

2.4.2.1.7.3. Developed Land

The developed lands identified for each route include residential and commercial/industrial lands.

2.4.2.1.7.3.1. Residential

The residential land is primarily comprised of scattered rural residences associated with agricultural operations. For residences, residential length was characterized by lawns associated with those residences. The following summarizes the acreage of residential areas within each alternative route:

- Q1-Highway 35 Route: 27.0 acres (13.8 acres existing ROW and 13.2 acres new ROW)
- Arcadia Route: 19.7 acres (6.6 acres existing ROW and 13.1 acres new ROW)
- Arcadia-Alma Option: The option consists of land that is currently undergoing the conversion from cropland to residential development; portion of the Arcadia Route that the option would replace has no residential land
- Q1-Galesville Route: 30.7 acres (12.4 acres existing ROW and 18.3 acres new ROW)

2.4.2.1.7.3.2. Commercial/Industrial

The commercial/industrial lands identified within each alternative route are generally concentrated in urban areas. Commercial/industrial lands are comprised of individual businesses and adjacent grounds. The following summarizes the acreage of commercial/industrial areas within each route and option:

- Q1-Highway 35 Route: 15.2 acres (10.0 acres existing ROW and 5.2 acres new ROW)
- Arcadia Route: 18.3 acres (10.6 acres existing ROW and 7.7 acres new ROW)
- Arcadia-Alma Option: Commercial/industrial land was not observed within the option or the portion of the Arcadia Route that it would replace
- Q1-Galesville Route: 23.5 acres (13.7 acres existing ROW and 9.8 acres new ROW)

2.4.3. Impacts by Land Ownership – Public and Tribal Lands

The estimated potential impacts to public lands are compiled by segment for the routes (Tables 3A and 3B, Appendix A). The segment lengths and ROW information contained within these tables were taken from the General Route Impacts (Table 1A, Appendix A).

2.4.3.1. Impacts to Public and Tribal Lands (Table 3)

An estimate of the potential impacts to public lands is compiled for the alternative routes in Table 3 (Appendix A). The following information is identified in each table.

2.4.3.1.1. Existing ROW (feet) Shared

This is the same value reported in Section 2.4.1.1.6.3.

2.4.3.1.2. New ROW Required (feet)

This is the same value reported in Section 2.4.1.1.7.1.

2.4.3.1.3. Total Segment Length (feet)

This is the same value reported in Section 2.4.2.1.4.

2.4.3.1.4. Length (feet)

This is the same value as reported in Section 2.4.2.1.5.

2.4.3.1.5. Length of Proposed Line Passing through the Following Ownership Types (feet)

2.4.3.1.5.1. Federal Land

Approximately 1,220 feet of the Q1-Highway 35 Route and the Q1-Galesville Route (Segment 2B) cross USFWS-owned wildlife refuge land (Upper Mississippi River National Wildlife and Fish Refuge) and approximately 952 feet cross other USACE-owned land (referred to as Lizzy Paul Pond). The Arcadia Route and Arcadia-Alma Option do not cross federally-owned land. None of the routes cross federally designated or managed parks or trails. The Mississippi River has not been designated as a Wild and Scenic River by the National Park Service; therefore, none of the routes would have an impact to a scenic riverway. The corridors do not cross other federally-designated or managed land.

2.4.3.1.5.2. State Properties

Approximately 629 feet of the Q1- Highway 35 Route (Segment 8B) crosses WDNR wildlife area land. None of the routes cross state-designated or managed fisheries areas, forests, natural areas, state parks, state trails or bike paths or other managed land. None of the routes cross properties purchased with Land and Water Conservation grant program (LAWCON) funds.

2.4.3.1.5.3. County-Owned Lands

No portions of the Arcadia Route cross county-owned land. An area identified as part of the Pietrek County Park on GIS databases (1,400 feet along Segments 10C/11A) is actually privately-owned land and not parkland as verified with the county in December 2010.

The Q1-Highway 35 Route (Segments 3 and 4A) crosses Loop 1 and 2 of the Trempealeau County Bike Trail. The Arcadia Route crosses a county bike trail east of Arcadia in the vicinity of SR93 and SH95. The Q1-Galesville Route (Segments 6 and 13B2) crosses Loop 1 and 2 of the Trempealeau County Bike Trail. The Arcadia-Alma Option does not cross a county trail or bike path. None of the routes cross through county-owned property with an office or garage. None of the routes cross through other county-owned or managed property.

2.4.3.1.5.4. Village, City, or Town

The Q1-Highway 35 Route does not cross through municipally-owned properties. Segment 13C of the Arcadia and Q1-Galesville Routes crosses approximately 285 feet of village/city-owned parkland (Wayside Park east of Galesville). The Arcadia-Alma Option does not cross municipally-owned land.

Segment 18F of the Arcadia and Q1-Galesville Routes is adjacent to village of Holmen land that is used as a storage shed and maintenance property for Holmen High School.

None of the routes cross or impact school forests or municipally-owned offices or garages. The Arcadia Route and the Q1-Galesville Route cross the Holland Bike Trail at GRR/US-53 and County Road Hd.

2.4.3.1.5.5. Tribal lands and Native American Reservations

No tribal-owned lands or lands within a tribal land trust are crossed by any segments in any of the routes.

2.4.4. Route Summary Table (Table 4)

Information for Sections 2.4.4.1 through 2.4.4.7 is provided in Table 4 (Appendix A), which summarizes characteristics of the alternative routes. This is also described in Sections 2.4.1 and 2.4.2. Tables 1A and 2 (Appendix A) provide further detail on the parameters for each alternative route.

2.4.5. Agriculture

Agricultural land uses were identified using a combination of 2008 NAIP orthophotography, and pedestrian and/or windshield surveys conducted in 2008, 2009 and 2010. Pedestrian surveys were conducted within existing ROW, while windshield surveys were conducted along off-ROW areas when access was limited. Route-specific field evaluation of agricultural land was completed in 2009 and 2010 by walking the centerline of each route where access was available.

Property classified as agricultural use includes active cropland, pastures, recently fallow fields (old field) and specialty crops (*e.g.* tree farms). Tree farms, timber lots and fields with no evidence of recent tillage were not included as agricultural land. Similar to other land cover types, the amount of agricultural acreage along the routes was determined by digitizing cover type within GIS software. Table 2 (Appendix A) summarizes the amount and type of agricultural land along the routes.

2.4.5.1. Type of Farming

The primary type of farming along the alternative routes is row crop agriculture. The majority of the crops are corn and soybeans; however, wheat and alfalfa were observed along several segments. Fallow fields and pastures occur along the routes, but are relatively limited in number. Specialty crops, including tree plantations and fruit orchards, were observed in three locations along the routes. No ginseng or cranberry production was observed along the routes.

There is no indication of how many farms along the routes utilize organic management practices. If organic farms are present and tree lines separate the parcels from a farm not under organic management, it is possible that removing the tree lines may increase herbicide drift onto the parcels and threaten the crop's organic status. If this situation exists, the Applicants would work with landowners and producers to minimize potential impacts to the organic farming status due to the transmission line routing or construction. Methods to minimize impacts could include offsetting the transmission line poles from the property line so tree lines or other buffers are maintained. Construction vehicles may also be cleaned prior to entering the organic farm parcels based on input from the landowner.

Aerial spraying of agricultural crops or forested parcels could occur near the routes. The DATCP administer the "Slow the Spread Program," which targets isolated, pioneering colonies of gypsy moth (*Lymantria dispar*) in the southwest portion of the state. La Crosse, Buffalo and Trempealeau counties contain isolated populations of gypsy moth, which may be treated via aerial applications. Limited aerial applications of herbicides, fungicides and pesticides to specialty crops may occur along the routes. The Applicants would work with landowners whose aerial spraying or seeding would be affected by transmission line placement to minimize potential impacts.

2.4.5.1.1. Q1-Highway 35 Route

The primary farming practice along the Q1-Highway 35 Route is cropland, generally row crops and hay (General Route Maps, Appendix C). Old fields, formerly cultivated but later abandoned, exist intermittently in the corridor. The route crosses a small vineyard and one tree plantation.

2.4.5.1.2. Arcadia Route

The primary farming practice along the Arcadia Route is cropland, primarily row crops (General Route Maps, Appendix C). The corridor also crosses old fields. Fergusons Morningside Orchard is crossed in two locations along the Arcadia Route.

2.4.5.1.3. Arcadia-Alma Option

The primary farming practice along the Arcadia-Alma Option is cropland, generally row crops (General Route Maps, Appendix C).

2.4.5.1.4. Q1-Galesville Route

The primary farming practice along the Q1-Galesville Route is cropland, generally row crops and hay. The corridor also crosses old fields (General Route Maps, Appendix C).

2.4.5.2. Farming Practices Potentially Affected

Potential agricultural impacts of the Project would generally be short-term and include temporary construction-related impacts, such as loss of crops. Long-term impacts due to transmission pole placement would also occur.

Many of the route segments in agricultural areas run along fence lines or between fields. Some of the route segments run along public road ROW, and the proposed poles would be located along the edge of the ROW and the farm field, where practicable. These route-siting practices should minimize the loss of tillable land and any problems associated with use of agricultural equipment. If issues arise, conversations could continue during the real estate acquisition process to address property owner concerns.

The portion of ROW that is located on mapped NRCS Prime and Other Farmland Soils is summarized by route and soil classification here:

- Q1-Highway 35 Route:
  - 112.8 acres of prime farmland soils
  - 65.3 acres of farmland of statewide importance
  - 11.9 acres of prime farmland if drained and/or protected from flooding
- Arcadia Route:
  - 188.8 acres of prime farmland soils
  - 137.7 acres of farmland of statewide importance
  - 59.5 acres of prime farmland if drained and/or protected from flooding
- Arcadia-Alma Option:
  - 5.1 acres of prime farmland soils
  - 6.1 acres of farmland of statewide importance
  - No acres of prime farmland if drained and/or protected from flooding
- Q1-Galesville Route:
  - 196.2 acres of prime farmland soils
  - 99.1 acres of farmland of statewide importance
  - 17.6 acres of prime farmland if drained and/or protected from flooding

2.4.5.2.1. Q1-Highway 35 Route

Five pivot irrigation systems are crossed by the Q1-Highway 35. The same pivot systems are currently impacted by the existing Dairyland Q1 line. The pivot irrigation systems could potentially be impacted by greater transmission line pole diameters and temporary impacts due to construction. The potential impact could be minimized by restoring agricultural lands to the extent practicable and by providing compensation to farmers, where necessary.

The Q1-Highway 35 Route would eliminate one pivot irrigation system at Segment 18H and the Briggs Road Substation West Site.

The Q1-Highway 35 Route has minimal impacts to existing windbreaks as the route follows an existing transmission line. There is the potential for impacts to windbreaks along Segments 2B, 2E, 2F, 8A and 8C.

2.4.5.2.2. Arcadia Route and Arcadia-Alma Option

The Arcadia-Alma Option does not impact any existing pivot irrigation systems. The Arcadia Route would eliminate one pivot irrigation system at Segment 18H and the Briggs Road Substation West Site.

The Arcadia Route affects a windbreak along Segment 18E. The alignment of the Arcadia-Alma Option segments does not affect windbreaks.

2.4.5.2.3. Q1-Galesville Route

One pivot irrigation system is crossed by the Q1-Galesville Route. This pivot irrigation system has not been previously impacted by a transmission line. The potential impact could be minimized by restoring agricultural lands to the extent practicable and by providing compensation to farmers, where necessary.

The Q1-Galesville Route would eliminate one pivot irrigation system at Segment 18H and the Briggs Road Substation West Site.

The Q1-Galesville could potentially affect windbreaks along Segments 2B, 2E, 2F, 6, 18B, 18D and 18E.

2.4.5.3. Farmland Preservation Parcels

Parcels enrolled in the Farmland Preservation Credit Program (FPCP) along routes were identified in tables provided by DATCP (data current as of March 2009); they were joined with county parcel data to complete this analysis. La Crosse County has no lands under FPCP. Table 2.4-5 summarizes the number of parcels participating in FPCP and the percentage of the route length traversing FPCP land.

Table 2.4-5:
Routes that Intersect Farmland Preservation Parcels

	A	B	C
Route	Number of Parcels Intersecting each Route ROW	Number of Parcels in Farmland Preservation Intersecting each Route ROW	Percent of Total Route Length Intersecting Farmland Preservation Land
Q1-Highway 35 Route	277	30	11.0 percent
Arcadia Route	410	68	18.4 percent
Arcadia-Alma Option	5	1	9.7 percent
Q1-Galesville Route	335	37	9.1 percent

Source: Wisconsin Department of Agriculture, Trade and Consumer Protection, 2010.

Table 2.4-5, Column A, sums the total number of parcels along each route ROW. Column B sums those landowners who have enrolled part or their entire parcel in FPCP. Column C calculates the percent of the total route length that intersects land that is directly under Farmland Preservation.

Electric transmission lines are permitted on lands enrolled in the FPCP and are considered to be compatible with agricultural use. The Applicants would work with landowners to reduce impacts where practicable.

2.4.5.4. Proximity to Farm Buildings

Farm buildings located within 100 feet of each side of the centerline are identified for each route by segment and are shown in General Route Maps (Appendix C). Residential structures associated with agricultural operations were not included in the analysis, but are identified in Section 2.4.1.4.

2.4.5.4.1. Buildings Used to House Animals

Buildings used to house animals were observed within 100 feet of the centerline of the routes. There are six buildings within 100 feet of the centerline of the Q1-Highway 35 Route, two buildings within 100 feet of the centerline of the Arcadia Route, and two buildings within 100 feet of the centerline of the Q1-Galesville Route. The Arcadia-Alma Option does not impact any buildings housing animals, so two buildings occur within 100 feet of the centerline for the Arcadia Route with or without the Arcadia-Alma Option.

2.4.5.4.2. Metal Sheds or Equipment Storage Buildings

Metal sheds or equipment storage buildings were observed within 100 feet of the centerline of each route. There is one metal shed within 100 feet of the Q1-Highway 35 centerline, three buildings within 100 feet of the centerline of the Arcadia Route, and two buildings within 100 feet of the centerline of the Q1-Galesville Route. The Arcadia-Alma Option does not impact any metal sheds or equipment storage buildings, leaving no buildings within 100 feet of the centerline for the Arcadia Route with or without the Arcadia-Alma Option.

2.4.5.4.3. Farm Building Locations

Information on farm buildings located within 100 feet of the centerlines is shown in General Route Maps, Appendix C. This shapefile includes an attribute table that identifies the type of building segment along which it was identified and distance measured from the route centerline.

2.4.6. Forest Lands

Forest lands were assessed using a combination of on-site verification and aerial photography analysis due to the inaccessibility of some areas. The aerial photographs used for the assessment were published by the NAIP in 2008. On-site verification was conducted in the 2009 and 2010 field seasons.

Forest lands were defined as areas dominated by trees (>20 percent canopy cover) within the proposed transmission line ROW. Forest lands on the existing transmission ROW (converted forest) were included in this category. Narrow tree lines (<75 feet wide) were excluded. This section provides a general summary of the forest lands along the Q1-Highway 35 Route, Arcadia Route, Arcadia-Alma Option and the Q1-Galesville Route. Table 6 (Appendix A) provides a summary of forest lands impacted by the routes. Vegetation community species composition, tree size classes and canopy cover were only assessed for areas that were field verified. Section 2.4.2.1.7.2 provides a quantitative evaluation of woodland impacts.

2.4.6.1. Q1-Highway 35 Route

The Q1-Highway 35 Route intersects several forested wetlands along the northern part of the route. Forested wetlands are extensive (running at least 1,000 feet along a segment) throughout Segments 1 and 8B. Small and medium-sized forested wetlands are intersected by Segments 2A3, 2B, 2E and 2F. Forested wetland communities along the northern sections of the Q1-Highway 35 Route are dominated by trees such as eastern cottonwood (*Populus deltoides*), box elder (*Acer negundo*), black willow (*Salix nigra*), American elm (*Ulmus americana*) and black birch (*Betula nigra*). Other common tree species include black oak (*Quercus velutina*), silver maple (*Acer saccharinum*), green ash (*Fraxinus pennsylvanica*), red cedar (*Juniperus virginiana*) and red maple (*Acer rubrum*). Dominant tree species in the floodplain forests intersecting Segment 8B include American elm, silver maple, swamp white oak (*Quercus bicolor*) and black birch. Trees are primarily of pole (6-10 cm dbh) and sawtimber (12-20+ cm dbh) size. Canopy cover ranges from 50 percent to 100 percent.

Forested uplands are frequently intersected by the Q1-Highway 35 Route along its southern portion and occasionally across segments located in the more northerly portion of the route. Segments 2A1, 2A2, 2A3, 2C, 2G, 2H, 2I and 3 intersect extensive forested uplands; Segments 2G, 2H, 2I, 3, 8A, 8C and 9 also intersect several smaller woodlots. Numerous small and medium-sized disturbed woodlots are intersected by Segment 3. Forested upland communities along the Q1-Highway 35 Route are primarily southern dry-mesic forest communities, typically dominated by trees such as red oak (*Quercus rubra*), shagbark hickory (*Carya ovata*), *Populus* spp. and paper birch (*Betula papyrifera*). Red cedar is an important tree species in the southern dry-mesic forests intersecting northern sections of the Q1-Highway 35 Route. Southern dry-mesic forests intersecting the southern sections of the Q1-Highway 35 Route include higher densities of black cherry (*Prunus serotina*) and white oak (*Quercus alba*). Other common tree species include American elm, American basswood and box elder. Five plantations containing a combination of white spruce (*Picea glauca*), Norway spruce (*Picea abies*) and black cherry intersect the Q1-Highway 35 Route. Southern portions of the Q1-Highway 35 Route are intersected by dry forests comprised of red pine (*Pinus resinosa*) plantations and forests dominated by white pine (*Pinus strobus*) saplings. A forest dominated by green ash intersects the far southern end of the Q1-Highway 35 Route in Segment 3. Trees are primarily of pole size, with a few sawtimber-sized trees scattered throughout the woodlots. Canopy cover primarily ranges from 50 to 100 percent.

The majority of the woodlots along the Q1-Highway 35 Route are on privately owned lands. Exceptions include approximately 200 feet of federal lands along Segment 2B and approximately 630 feet of Segment 8B within the Van Loon Wildlife Area (state of Wisconsin land).

2.4.6.2. Arcadia Route and Arcadia-Alma Option

Forested wetlands are extensive (running at least 1,000 feet along a segment) throughout Segment 1 along the Arcadia Route. Aside from Segment 1, the Arcadia Route occasionally intersects forested wetlands where the route crosses streams and rivers. These forested wetlands are small and isolated; many are linear habitat features and only occur in Segments 10C, 11A, 11B, 11C, 11G, 13B1, 13B2, 13C and 13D. Forested wetlands along the Arcadia Route are dominated by a variety of tree species, including box elder, eastern cottonwood and silver maple. Other common tree species include black walnut (*Juglans nigra*), green ash, paper birch, *Salix* spp. and slippery elm (*Ulmus rubra*). Canopy cover ranges from 50 to 100 percent. No forested wetlands occur along the Arcadia-Alma Option.

Numerous forested uplands are intersected by the Arcadia Route. Extensive forested uplands intersect Segments 2A1, 2A2,10B1, 10B2, 10C, 11E, 11G, 13B2, 13D, 17A and 18A; however, smaller, isolated patches are more common and are intersected by portion of Segments 10C, 11A, 11B, 11C, 11D, 13B1, 17B and 18F. Forested upland communities along the Arcadia Route are primarily southern mesic and southern dry-mesic forest communities. Dominant trees include red oak, white oak, shagbark hickory, box elder, black cherry, black walnut, large-tooth aspen (*Populus grandidentata*), and quaking aspen. Forested upland communities along the northern part of the Arcadia Route are comprised more of *Populus* spp., pin oak (*Quercus ellipsoidalis*), black cherry, and paper birch. Upland forests along the southern part of the route have a greater presence of red oak, white oak, shagbark hickory, American basswood, and black walnut. Other common tree species include American elm, silver maple, *Fraxinus* spp., slippery elm, black oak, bur oak (*Quercus macrocarpa*), and white pine (*Pinus strobus*). Tree size varies, ranging from pole size to sawtimber size, with large sawtimber-sized trees being the most prevalent. Canopy cover ranges from 25 to 100 percent, but is most commonly 50 to 75 percent.

All woodlots along the Arcadia Route and Arcadia-Alma Option are on privately-owned lands.

2.4.6.3. Q1-Galesville Route

The Q1-Galesville Route intersects several forested wetlands along the northern part of the route. Forested wetlands are extensive (running at least 1,000 feet along a segment) throughout Segment 1. Small- and medium-sized forested wetlands intersect Segments 2A3, 2B, 2E and 2F; small- and medium-sized forested wetlands along the southern portion of the route are intersected by Segments 13B2, 13C and 13D. Forested wetland communities along the northern sections of the Q1-Galesville Route are dominated by trees such as eastern cottonwood (*Populus deltoides*), box elder (*Acer negundo*), black willow (*Salix nigra*), American elm (*Ulmus americana*), and black birch (*Betula nigra*). Other common tree species include black oak (*Quercus velutina*), silver maple (*Acer saccharinum*), green ash (*Fraxinus pennsylvanica*), red cedar (*Juniperus virginiana*) and red maple (*Acer rubrum*). Trees are primarily of pole (6-10 cm dbh) and sawtimber (12-20+ cm dbh) size. Canopy cover ranges from 50 to 100 percent.

Forested uplands are frequently intersected by the Q1-Galesville Route along its southern portion, and occasionally across segments located in the more northerly portion of the route. Segments 2A1, 2A2, 2A3, 2C, 2G, 2H, 2I, 6, 13B2, 13D, 17A and 18A intersect extensive forested uplands; Segments 2G, 2H, 2I, 12, 17B and 18F are intersected by several smaller woodlots. Forested upland communities along the Q1-Galesville Route are primarily southern dry-mesic forest communities, typically dominated by trees such as red oak (*Quercus rubra*), shagbark hickory (*Carya ovata*), *Populus* spp., and paper birch (*Betula papyrifera*). Red cedar is an important tree species in the southern dry-mesic forests intersecting northern sections of the Q1-Galesville Route. Southern dry-mesic forests intersecting the southern sections of the Q1-Galesville Route include higher densities of black cherry (*Prunus serotina*) and white oak (*Quercus alba*). Other common tree species include American elm, American basswood and box elder. Five plantations containing a combination of white spruce (*Picea glauca*), Norway spruce (*Picea abies*) and black cherry intersect the route. Southern portions of this route are intersected by dry forests comprised of red pine (*Pinus resinosa*) plantations and forests dominated by white pine (*Pinus strobus*) saplings. Trees are primarily of pole size, with a few sawtimber-sized trees scattered throughout the woodlots. Canopy cover primarily ranges from 50 to 100 percent.

The majority of woodlots along the Q1-Galesville Route are on privately owned lands. The exception is approximately 200 feet of federal lands along Segment 2B.

2.4.6.4. Impacts

Increasing the easement areas for the Arcadia Route, Arcadia-Alma Option and Q1-Galesville Route would have a negative impact on the forests intersected. In these circumstances, tree removal would be required in the portions of these woodlots that extend into the proposed easement area for the route. In such areas, shrubs and other low-growing vegetation would be allowed to re-establish once construction is completed.

Temporary impacts on forest land due to construction access are discussed in further detail in Section 2.4.11 and are summarized in Table 6 (Appendix A).

Based on a general evaluation, it is likely the routes pass through land enrolled in the Managed Forest Law (MFL) and Forest Crop Law (FCL) programs. Electronic GIS files showing areas along each route currently enrolled in these programs have been provided to the PSCW. Both the FCL and MFL programs allow for up to 20 percent of the area enrolled to be converted to “non-productive” forest land. This allows for potential easement clearing. If a current landowner has expended this 20 percent “non-productive” forest land allowance and additional clearing is proposed, it may result in the parcel being withdrawn from the program. The Applicants would evaluate the impact of the Project on lands enrolled in these programs post order.

2.4.7. Conservation Easements

The Q1-Galesville and Arcadia Routes cross an area zoned as conservancy by the village of Holmen for approximately 1,600 feet (0.31 miles) along Segment 18A. However, this is a zoning designation and the Applicants could not locate any information indicating that this area was in conservation easement.

2.4.8. Endangered, Threatened, Special Concern Species, and Natural Communities

This document summarizes general rare species information. Specifics of rare species occurrences and their locations are confidential information and will be presented in a separate confidential report. Information concerning the presence of rare species, including threatened, endangered or special concern, within 2 miles of the Q1-Highway 35 Route, Arcadia Route, Arcadia-Alma Option and Q1-Galesville Route was obtained through a review of the Wisconsin Natural Heritage Inventory (WNHI) database dated March 15, 2010 by a qualified environmental specialist with Natural Heritage Inventory (NHI) Screening and Methodology Training. Both historic (pre-1970) and non-historic (current since 1970) element occurrence records were evaluated. The Applicants also consulted extensively with local WDNR personnel to verify and refine the rare species studies presented in this Application. The WNHI database notes the presence of 33 threatened, endangered or special concern species (historic occurrences) within 2 miles or the routes. The WNHI database notes the presence of ~~79~~ 78 threatened, endangered or special concern species (non-historic occurrences) and 16 natural communities within 2 miles of the routes. Several of these species and natural communities occur more than once along the routes.

Several historic and non-historic WNHI records for threatened, endangered or special concern species are intersected by the routes, including:

2.4.8.1. Q1-Highway 35 Route

Fifteen records of historic occurrences of 11 species are intersected by the Q1-Highway 35 Route. Of these, four threatened species represent four occurrences, and seven special concern species represent 11 occurrences.

Forty-five records of non-historic occurrences of 31 species are intersected by the Q1-Highway 35 Route. Of these, six endangered species represent six occurrences, seven threatened species represent 12 occurrences and 18 special concern species represent 27 occurrences. Nine recorded natural communities are intersected by the Q1-Highway 35 Route.

2.4.8.2. Arcadia Route and Arcadia-Alma Option

Thirteen records of historic occurrences of nine species are intersected by the Arcadia Route and the Arcadia-Alma Option. Of these, one endangered species represent one occurrence, one threatened species represent one occurrence and seven special concern species represent 11 occurrences.

Thirty-two records of non-historic occurrences of 26 species are intersected by the Arcadia Route. Of these, five endangered species represent five occurrences, five threatened species represent five occurrences and 16 special concern species represent 22 occurrences. Two recorded natural communities are intersected by the Arcadia Route. The Arcadia-Alma Option does not intersect any non-historic WNHI records.

2.4.8.3. Q1-Galesville Route

Seventeen records of historic occurrences of 14 species are intersected by the Q-1 Galesville Route. Of these, one endangered species represent one occurrence, three threatened species represent three occurrences and ten special concern species represent 13 occurrences.

Forty records of non-historic occurrences of 32 species are intersected by the Q1-Galesville Route. Of these, five endangered species represent five occurrences, eight threatened species represent nine occurrences and 19 special concern species represent 26 occurrences. Eight recorded natural communities are intersected by the route.

2.4.8.4. Proximity to Natural Resource Areas

In addition to review of WNHI records, each route was evaluated for proximity to designated natural resource areas (Table 2.4-6). Several designated natural resource areas occur in proximity of the routes (*i.e*. within 0.25 miles).

Table 2.4-6:
Segments that are in Proximity to Designated Natural Resource Areas[1]

Route	Segment(s) that Cross/Adjacent to Designated Natural Resource Areas	Designated Natural Resource Area
Q1-Highway 35 Route	1	Upper Mississippi River NWFR is immediately south of the Mississippi River crossing at Alma
	2B	Crosses Upper Mississippi River NWFR
	2E	Adjacent to the Mississippi River Blufflands
	8B	Adjacent to and crosses through Van Loon Wildlife Area
	9	Adjacent to La Crosse Terrace Grasslands
	9	In proximity to the Holland Sand Prairie
	Briggs Road Substation	Holland Sand Prairie State Natural Area is approximately 0.25 miles from proposed substation site
Arcadia Route	1	Upper Mississippi River NWFR is immediately south of the Mississippi River crossing at Alma
	Briggs Road Substation	Holland Sand Prairie State Natural Area is approximately 0.25 miles from proposed substation site

Route	Segment(s) that Cross/Adjacent to Designated Natural Resource Areas	Designated Natural Resource Area
Q1-Galesville Route	1	Upper Mississippi River NWFR is immediately south of the Mississippi River crossing at Alma
	2B	Crosses the Upper Mississippi River NWFR
	2E	Adjacent to the Mississippi River Blufflands
	Briggs Road Substation	Holland Sand Prairie State Natural Area is approximately 0.25 miles from proposed substation site

[1] There are no designated natural resource areas along the Arcadia-Alma Option.

Subsequent to review of existing WNHI data and designated natural resource areas, an in-field habitat characterization was conducted within and adjacent to portions of the routes where field access was available. Along segments where field access was not available, the habitat characterization was based on aerial photographs and targeted in-field verification from accessible public ROWs.

The majority of the Arcadia Route follows existing transmission line and road corridors that pass through agricultural land and forested bluff lands. The Arcadia-Alma Option heads in a general easterly direction across forested bluff lands prior to joining an existing Dairyland 161 kV transmission ROW. The Q1-Galesville Route follows existing transmission line, railroad and corridors that pass through agricultural and forested bluff lands. Off-ROW construction access for all routes is generally proposed to follow existing field roads, forest roads and field edges. Temporary impacts related with off-ROW construction access are discussed in more detail in Section 2.4.11 and are summarized in Table 6 (Appendix A).

Route segments or portions of route segments that pass through agricultural land and/or follow existing transmission lines and road/railroad edges are subject to frequent disturbance. During field verification, it was observed that habitat quality in these areas was generally poor. With poor habitat quality and the context of being in a disturbed environment, the risk of direct or indirect impact to many of the species identified within 2 miles of these segments from construction of the proposed Project appears minimal. Portions of the route segments that pass through forested bluff lands, forested bottomlands and large wetland complexes tend to be less disturbed, and the potential for a rare species to be present could be higher. The habitat characterization information was compared with the WNHI database to evaluate the likelihood that the WNHI-listed species would be found within or in proximity to the less disturbed areas along the routes. When a match occurred between WNHI-listed species habitat preferences and the presence of suitable habitat, focus areas were identified along the routes.

Surveys and refined assessments were conducted for rare species groups in focus areas along the routes where appropriate habitat was identified. Focus areas were identified for surveys based on the WNHI database review and route habitat characterizations, as well as several pre-application consultation meetings with WDNR and PSCW to discuss habitat assessment results and rare species survey needs.

Listed species were detected along each route during the in-field habitat characterization and species surveys. A confidential report describing the methods and results of the threatened, endangered, and special concern species investigation; habitat assessment and species surveys was submitted to the WDNR OEC and PSCW under separate cover. A copy of the cover letter submitted with that report is located in Appendix P.

The Applicants' standard construction techniques and construction timing should result in minimal ground disturbance along existing ROWs, and the change to existing habitat conditions from the resulting transmission facilities would be minimal. More permanent habitat modification may occur in forested bluff lands adjacent to existing ROWs as well as along forest roads proposed for construction access. Once a route has been selected, the WDNR would be consulted to discuss the results of the species surveys, to identify areas where additional species surveys may be required and to develop any avoidance measures. If avoidance measures cannot be implemented, supplemental information may be needed to evaluate the potential for an incidental take.

2.4.9. Archaeological and Historic Resources

This document summarizes general cultural resources information. Specifics of cultural resource sites and locations are confidential information and will be presented in a separate confidential report. The Mississippi Valley Archaeological Center (MVAC) at the University of Wisconsin has conducted an archival and literature review of the Project corridors for the Applicants. The information is summarized here and the report will be submitted to the SHPO in early 2011. The initial archaeological surveys along the Project corridor were conducted by the Wisconsin Historical Society's Museum Archaeology Program (MAP) during the late 1970s and early 1980s. These surveys were completed along the GRR as part of a WisDOT transportation corridor study.

The MVAC report identified 18 archaeological sites as potentially within or immediately adjacent to the proposed segments. Findings included campsites, a workshop site, grave site, lithic scatter, campsite/village and several mound groupings. Eight of the archaeological sites are in Buffalo County, six are in Trempealeau County and four are in La Crosse County. Table 2.4-7 details the location of each archaeological site in context to the segments.

Avoidance of identified cultural resources is the preferred approach. If avoidance is not possible and construction is planned at an identified site, the SHPO may recommend Phase I testing of the identified site by a fully qualified archeologist to verify location and determine whether evidence of the site remains. Some level of additional mitigation, such as recordation, may be determined for an identified and eligible site prior to construction. Previously undiscovered sites uncovered during construction would likely follow a similar course of Phase I examination with appropriate mitigation determined in consultation with all parties.

Table 2.4-7:Revised
Segments that are in Proximity to Documented Archaeological Sites

Route	Segment(s) that are in Proximity to a Documented Archaeological Site	Quarter-Quarter – Section – Township – Range	Documented Archaeological Site	Type of Archaeological Site
Q1-Highway 35	2B	NW ¼, NE ¼ of S30 T21N R12W NE ¼, NW ¼ of S30 T21N R12W	47BF242	Woodland mound group
	2C	NW ¼, SE ¼ of S5 T20N R12W	47BF164 / BBF 85	Grave site
	2E	SE ¼, SW ¼ of S15 T20N R12W	47BF81	Campsite of unknown prehistoric affiliation
	2E	NE ¼, NW ¼ of S22 T20N R12W NW ¼, NE ¼ of S22 T20N R12W	47BF127	Workshop site
	2E	NW ¼, SE ¼ of S26 T20W R12W	47BF92	Late Woodland campsite
	2G	SE ¼, NE ¼ of S31 T20N R11W NW ¼ , SW ¼ of S31 T20N R11W SW ¼, NW ¼ of S32 T20N R 11W NW ¼, SW ¼ of S32 T20N R 11W	47BF124	Late Woodland campsite
	2I	SE ¼, SE ¼ of S34 T19N R10W	47BF123	Artifacts with Woodland culture affiliation
	8A	NE ¼, SW ¼ of S29 T18 R8W	47TR53	Late Woodland campsite
	8B	SE ¼, SE ¼ of S29 T18 R8W SE ¼, SE ¼ of S29 T18 R8W NE ¼, SE ¼ of S29 T18 R8W NW ¼, SE ¼ of S29 T18 R8W	47TR389	Late Woodland mound site
	8B	NE ¼, SE ¼ of S29 T18 R8W	47TR75	Late Woodland campsite
	9	NW ¼, NW ¼ of S1 T17N R8W	47LC531	Oneota Campsite / Village
	9	NW ¼, NW ¼ of S1 T17N R8W	47LC530	Oneota Campsite / Village
Arcadia Route	11G	NW ¼, SW ¼ of S35 T20N R9W	47TR154	Late Archaic/Middle Woodland campsite
	13B1	SE ¼, SW ¼ of S31 T19N R8W	47TR95	Mound group
	13B1	NW ¼, SE ¼ of S31 T19N R8W	47TR16	Woodland mound group
	13B1	Entire Section, S32 T19N R8W	47TR17, 47TR18	Woodland mound group
	18A	SE ¼, NW ¼ of S25 T18N R8W NE ¼, SW ¼ Of S25 T18N R8W	47LC97	Campsite affiliated with Late Woodland and Oneota Traditions
	18B	NW ¼ of NE ¼ of S36 T18N R8W NE ¼ of NW ¼ of S36 T18N R8W	47LC107	Campsite of unknown prehistoric affiliation
	18C	SW ¼, SE ¼ of S36 T18N R8W	47LC639	Lithic scatter of unknown prehistoric

Route	Segment(s) that are in Proximity to a Documented Archaeological Site	Quarter-Quarter – Section – Township – Range	Documented Archaeological Site	Type of Archaeological Site
				affiliation
Arcadia-Alma Option	No documented archaeological sites along the route option.			
Q1-Galesville	2B	NW ¼, NE 1/4 of S30 T21N R12W NE ¼, NW ¼ of S30 T21N R12W	47BF242	Woodland mound group
	2C	NW ¼, SE ¼ of S5 T20N R12W	47BF164 / BBF 85	Grave site
	2E	SE ¼, SW ¼ of S15 T20N R12W	47BF81	Campsite of unknown prehistoric affiliation
	2E	NE ¼, NW ¼ of S22 T20N R12W NW 1/4, NE ¼ of S22 T20N R12W	47BF127	Workshop site
	2E	NW ¼, SE ¼ of S26 T20W R12W	47BF92	Late Woodland campsite
	2G	SE ¼, NE ¼ of S31 T20N R11W NW ¼ , SW ¼ of S31 T20N R11W SW ¼, NW ¼ of S32 T20N R 11W NW ¼, SW ¼ of S32 T20N R 11W	47BF124	Late Woodland campsite
	2I	S34 T19N R10W // SE4 SE ¼, SE ¼ of S34 T19N R10W	47BF123	Artifacts with Woodland culture affiliation
	13B2	SE ¼, SW ¼ of S31 T19N R8W	47TR95	Mound group
	13B2	NW ¼, SE ¼ of S31 T19N R8W	47TR16	Woodland mound group
	13B2	Entire Section, S32 T19N R8W	47TR17, 47TR18	Woodland mound group
	18A	SE ¼, NW ¼ of S25 T18N R8W NE ¼, SW ¼ Of S25 T18N R8W	47LC97	Campsite affiliated with Late Woodland and Oneota Traditions
	18B	NW ¼ of NE ¼ of S36 T18N R8W NE ¼ of NW ¼ of S36 T18N R8W	47LC107	Campsite of unknown prehistoric affiliation
	18C	SW ¼, SE ¼ of S36 T18N R8W	47LC639	Lithic scatter of unknown prehistoric affiliation

Source: MVAC, 2008 and 2010

Based on the literature review and August 2010 site visit, MVAC has made a recommendation based on the information available as to whether or not field investigation is recommended for each of the 18 sites. During the final design phase, further archaeological review would be completed by the Applicants to ensure that the documented sites along the selected segments are properly protected.

In order to preserve the archaeological integrity of documented archaeological sites, the Applicants would locate poles to span the archaeological sites. If avoidance of the archaeological sites cannot be avoided, Phase I survey would be conducted to confirm the location and determine if evidence of the site remains.

2.4.10. Airports

2.4.10.1. Airstrips

A proximity analysis was completed to identify airports and airstrips within 3miles of the alternate routes. Sources researched include:

- Federal Aviation Administration (FAA) National Flight Data Center (NFDC) airport facilities and runways database. http://www.faa.gov/airports_airtraffic/airports/airport_safety/airportdata_5010/menu/index.cfm
- WisDOT Bureau of Aeronautics detailed county maps. http://www.dot.state.wi.us/travel/air/airportsbydist.htm
- AirNav.com (on-line location-based search engine for airport locations) http://www.airnav.com/cgi-bin/airport-search
- Landings.com (on-line location-based search engine for airport locations) http://www.landings.com/evird.acgi$pass*104603885!_h-www.landings.com/_landings/pages/search/search_apt-pos.html
- SkyVector (http://skyvector.com/airport/LSE/La-Crosse-Municipal-Airport
- FlightAware (http://flightaware.com/resources/airport/KLSE/summary http://flightaware.com/resources/airport/KLSE/remarks

The five airstrips in the vicinity of alternative routes are non-public airstrips under federal and state regulations. Because they are considered "non-public" airports, FAA obstruction standards do not govern the use of the airstrips, and Wisconsin regulations do not impose specific clearance zones.

In order to evaluate the potential for the alternative alignments to impact these non-public airstrips, the Applicants analyzed the requirements that would be imposed if the airstrips were public airports, a category above and more restrictive than non-public use. These public airport criteria were reviewed and applied in the following analysis to provide a method of determining the potential for the transmission line routes to impact the non-public airstrips.

As part of this assessment, if the runway was not visible, its location was estimated using latitude/ longitude and runway information obtained from FAA databases. Approach areas were drawn as trapezoids centered on the extended runway centerline. The inner width of the trapezoid was 250 feet at the runway threshold and extends outward 5,000 feet, with an outer width of 1,250 feet. Displaced thresholds have not been considered in drawing the approach areas.

2.4.10.1.1. Parkway Farm Airstrip – Holmen, WI (09WI)

The Parkway Farm Airstrip is a privately owned airstrip located approximately 3 miles northwest of Holmen, Wisconsin. The FAA latitude/longitude location of the airstrip is approximately 44.00357 N / 91.30764 W at 705 feet of elevation. The runway (N/S) is an unlit turf surface, 2,500 feet by 100 feet in length, running in a north/south alignment. The approach traffic pattern is from the left. No displaced thresholds are listed; however, tree obstructions at 1,300 feet and 1,500 feet are noted for the north and south approaches, respectively. The village of Holmen and La Crosse County do not have zoning ordinances that address pole heights in the vicinity of private airstrips.

This analysis is based on a runway location assumed from aerial images and FAA latitude/longitude location (Figure AA-2, Appendix S). Segment 8B of the Q1-Highway 35 Route crosses immediately south of the southern end of the runway (near pole #214) along the GRR/WI-35. If this segment becomes part of a permitted route, the Applicants would coordinate with appropriate local officials, the airport operator and WisDOT Bureau of Aeronautics regarding impacts.

2.4.10.1.2. Schubert Airstrip – Centerville, WI (40WI)

The Schubert Airstrip is a privately owned airstrip located approximately 1 mile southeast of Centerville and 3 miles north of the city of Trempealeau, Wisconsin. The FAA latitude/longitude location of the airstrip is approximately 44.05829 N / 91.43070 W, at 750 feet of elevation. The runway is an unlit turf surface approximately 2,500 feet by 50 feet in length, running in an east/west alignment. No displaced thresholds are listed; however, tree obstructions at 900 feet occur for both approaches. Note that trees are not visible on aerial images on the eastern approach (Figure AA-4, Appendix S). Trempealeau County has a general height requirement of 35 feet for all poles, but does not have a zoning ordinance that specifically restricts the height of poles to less than 35 feet in the vicinity of private airstrips.

This analysis is based on a runway location assumed from aerial images and FAA latitude/longitude location. Segment 6 of the Q1-Galesville Route may impact the airstrip approach near the southern edge (near pole #609 west side, #621 east side). An existing 69 kV distribution line currently crosses the western edge of the runway near Schubert Road (Figure AA-4, Appendix S). If this segment becomes part of a permitted route, the Applicants would coordinate with appropriate local officials, the airport operator and the WisDOT Bureau of Aeronautics regarding impacts.

2.4.10.1.3. Holland Air Park – Holmen, WI (36WI)

The Holland Air Park is a privately owned airstrip located approximately 6 miles northwest of Holmen, Wisconsin. The FAA latitude/longitude location of the airstrip is approximately 44.03218 N / 91.29959 W at 730 feet of elevation. The runway (18/36) is a lighted asphalt surface, 3,200 feet by 60 feet in length, running in a north/south alignment. The approach traffic pattern is from the left with a 300-foot displaced threshold.

This analysis is based on a runway location assumed from aerial images and FAA latitude/longitude location. None of the routes identified in this Application would affect the Holland Air Park. The air park's runway is parallel to and more than 3,500 feet west of Segments 17B and 18A of the Q1-Galesville and Arcadia Routes. The Q1-Highway 35 Route is located approximately 10,500 feet south of the southern end of the runway. The approximate approach areas drawn for this airstrip indicate that no impacts would result from the location of the proposed transmission lines (Figure AA-1, Appendix S).

2.4.10.1.4. Carhart Farms Airport – Galesville, WI (4WI8)

The Carhart Farms Airport is a privately owned airstrip located approximately 3 miles southwest of Galesville, Wisconsin. The FAA latitude/longitude location of the airstrip is approximately 44.05135 N /

91.37626 W at 737 feet of elevation. The runway (9/27) is an unlit turf surface, 2,500 feet by 50 feet in length, running in an east/west alignment. The approach traffic pattern is from the left. Displaced thresholds are listed as 1,300 feet and 500 feet for Runway 9 and 27, respectively. Obstructions currently include an existing power line 50 feet to the west and an existing power line and road 30 feet to the east of the runway.

This analysis is based on a runway location assumed from aerial images and FAA latitude/longitude location. None of the routes identified in this Application would affect the Carhart Farms Airport. The west end of the runway is close to part of a connector segment evaluated in routing that is not being carried forward at this point (Figure AA-3, Appendix S), as discussed in the routing process in Section 2.2.

2.4.10.1.5. Unknown Name – Waumandee Township, Buffalo County (No ID)

A possible airstrip in the township of Waumandee, Buffalo County was identified through WisDOT county maps. It does not appear to be registered with the FAA or WisDOT. The estimated location is near Maier Road and WI-88; approximate latitude/longitude is 44.2408 N / 91.7664 W. No runway is apparent on aerial images of the area. None of the routes identified in this Application would affect this site. A 5,000-foot buffer around the estimated location indicates that if the airstrip does exist, the identified routes would impose no impacts (Figure AA-5, Appendix S).

2.4.10.2. La Crosse Municipal Airport

The La Crosse Municipal Airport (LSE) is a publicly-owned controlled airport that is owned and managed by the city of La Crosse and provides scheduled commercial service, general aviation and freight services to southwestern Wisconsin and regional services to the Midwest. The distance from the north end of runway 18/36 to the nearest element of the Project is approximately 4.4 miles. The Applicants have reviewed the Height Limitation Zoning Map for LSE. The Project is located approximately 0.5 mile outside of all related height limitation zones.

2.4.11. Access Issues

Potential access for construction of the transmission line could cross existing or new easements using entrances from local roads, field roads, private roads (where access is granted) and along existing ROW. Environmental Features Maps (Appendix D) presents a preliminary plan showing access to the routes. A description of construction access methods within wetlands is in Section 2.5.4. Table 4, Appendix T identifies the additional off-ROW access routes summarized by land cover acreage based on the preliminary access plan. Once a route is selected, the preliminary access plan may be amended based on negotiations with local landowners or as a result of contractor requirements.

Based on the preliminary access plan and construction methods plan, the approximate temporary impacts to forested and non-forested wetlands from access matting or ice roads are:

- Q1-Highway 35 Route: 5.1 acres in ROW and 1.0 acres out of ROW
- Arcadia Route: 3.9 acres in ROW and 0.9 acres out of ROW

- Arcadia-Alma Option: there are no forested or non-forested wetlands along the Arcadia-Alma Option.
- Q1-Galesville Route: 5.0 acres in ROW and 1.3 acres out of ROW

Construction activities may require access from the roadway ROW to the transmission line ROW at existing or additional turnout or approach locations. Construction of temporary additional turnouts or approaches may require installation of culverts ~~and fill materials~~. Installation of additional or temporary access points would be subject to review and approval from local or state roadway officials.

2.4.12. Waterway Permitting Activities

Table 3 (Appendix T) presents a summary of waterways intersecting each alternative route. Table 3 also indicates whether any of the waterways are considered ASNRI. It is anticipated that the Project would require WDNR permits (Wis. Stat. 30.123) to temporarily cross streams identified along the alternative routes.

2.4.12.1. Q1-Highway 35 Route

The Applicants are seeking approval to cross each of the streams identified in Table 1 (Appendix T) with temporary clear span bridges (TCSB), except for waterways 1-WW3, 2B-WW1 and all waterways identified within Segment 8B along the Q1-Highway 35 Route. The proposed crossings of 1-WW3, 2B-WW1 and all waterways identified within Segment 8B appear to be below the ordinary high water mark (OHWM) of their associated waterways. Therefore, the use of mats or other access structures at these locations would likely be permitted as miscellaneous structures per Wis. Stats. 30.12. Table 1 (Appendix T) lists these regulated activities (Supplement to Form 3500-53). As discussed in Section 2.8, WDNR approval and Water Quality Certification to place several transmission line poles in wetlands that occur below the OHWM of navigable waters (Wis. Stat. 30.12 and Wis. Admin. Code chs. NR 103 and NR 299) would be required. Table 1 (Appendix T) also lists these regulated activities.

2.4.12.2. Arcadia Route and Arcadia-Alma Option

The Applicants are seeking approval to cross each of the streams identified in Table 1 (Appendix T) with a TCSB, except for waterway 1-WW3 along the Arcadia Route. The proposed crossing of waterway 1-WW3 appears to be located below the OHWM of the Mississippi River. Therefore, the use of mats or other access structures at this location would likely be permitted as a miscellaneous structure per Wis. Stat. 30.12. Table 1 (Appendix T) lists this regulated activity (Supplement to Form 3500-53). As discussed in Section 2.8, WDNR approval and Water Quality Certification to place several transmission line poles in wetlands that occur below the OHWM of navigable waters (Wis. Stat. 30.12 and Wis. Admin. Code chapters NR 103 and NR 299) would be required. Table 1 (Appendix T) also lists these regulated activities.

2.4.12.3. Q1-Galesville Route

The Applicants are seeking approval to cross each of the streams identified in Table 1 (Appendix T) with a TCSB, except for waterways 1-WW3 and 2B-WW1 along the Q1-Galesville Route. The proposed crossing of 1-WW3 and 2B-WW1 appear to be located below the OHWM of their associated waterways.

Therefore, the use of mats or other access structures at these locations would likely be permitted as a miscellaneous structure per Wis. Stat. 30.12. Table 1 (Appendix T) lists these regulated activities (Supplement to Form 3500-53). As discussed in Section 2.8, WDNR approval and Water Quality Certification to place several transmission line poles in wetlands that occur below the OHWM of navigable waters (Wis. Stat. 30.12 and Wis. Admin. Code chapters NR 103 and NR 299) would be required. Table 1 (Appendix T) also lists these regulated activities.

The number of potential temporary stream crossings has been minimized by proposing access from the ROW on either side of the stream or by using existing public crossings. The Applicants would work with private landowners to identify alternate access routes to further reduce the use of stream crossings, if possible. Some of these crossings may not be required if the Applicants are able to secure alternate access via privately owned land. However, the Applicants have applied for WDNR permits for all potential crossings that are reasonably anticipated in the event that avoidance is not possible. The Applicants would also attempt to minimize the placement of poles below the OHWM of navigable waters; however, engineering and construction requirements may limit the ability to avoid these locations.

2.4.13. Wetlands

2.4.13.1. Wetland Delineation Map

The Applicants utilized the more conservative approach to identify wetland boundaries throughout the Project as described in the next section, Alternative Identification Methods (2.4.13.2).

2.4.13.2. Alternative Wetland Identification Methods

Field access was limited to the existing ROW (transmission line and public ROW) along routes. For areas extending outside the existing ROW, the wetland boundaries were conservatively estimated by interpretation of aerial photography (2008 NAIP Orthophotography and aerial photography taken for this Project in April 2008), soil survey, Wisconsin Wetland Inventory (WWI) maps, topographic contours and field review. For shared ROW segments, these boundaries were sketched onto aerial photographs in the field and documented with photographs. Field identified wetland boundaries are displayed in green on Environmental Features Maps (Appendix D).

Along unshared segments (which occur occasionally along the Q1 Route, Q1-Highway 35 Route, Arcadia Route, Arcadia-Alma Option, and Q1-Galesville Route), wetland boundaries were estimated from aerial photographs (2008 NAIP orthophotography and aerial photography taken for this Project in April 2008), soil survey, topographic contours and WWI maps. Remotely identified wetland boundaries were digitized into a GIS system and are displayed in red on the Environmental Features Maps (Appendix D).

2.4.13.3. Wetland Crossings (Length, Type and Invasive Species Presence)

Numerous wetlands occur along routes that would need to be crossed during transmission line construction unless alternate routes can be identified upon final route approval. A preliminary access plan specific to remote areas containing wetlands or waterways is discussed in Section 2.4.11 and provided on Environmental Features Maps (Appendix D). These figures also show conceptual pole locations within and adjacent to wetlands.

Pole locations have been developed to evaluate potential impacts to wetlands and develop preliminary access routes. These pole locations are based on the proposed design spans for poles that would be used and have been spotted along the alignment to estimate transmission line impacts. The wetland impacts and access routes would be re-evaluated during the detailed design phase to minimize impacts to the extent practicable without adding undue costs and physical impacts to the integrity and reliability of the transmission line design, and to accommodate landowner concerns. There is potential for the estimated wetland impacts to be adjusted if unknown conditions are encountered prior to and during detailed design. These conditions could include impacts on span lengths due to the physical terrain of the land and refinement of wetland boundaries (primarily aerially delineated boundaries).

Based on these conceptual locations, the following number of poles along each route would need to be located in wetlands (further detail on the length, type and invasive species presence) for each wetland is provided in Table 1 (Appendix T).

- Q1-Highway 35 Route: 78 poles
- Arcadia Route: 64 poles
- Arcadia-Alma Option: there are no wetlands along Arcadia-Alma Option or the portion of the Arcadia Route that it would replace, therefore no poles would be needed.
- Q1-Galesville Route: 50 poles

The impacts estimated are likely higher than what would actually occur, as all poles within approximately 50 feet of a wetland were counted as being within the wetland to maintain the conservative approach and until such time that on-site delineations demonstrate otherwise.

Information on the type and dominance of invasive species within each wetland within all proposed ROW is summarized in Table 3 (Appendix T). The tables are organized by route and the information within them is organized by route segment and wetland ID (Feature ID).

2.4.13.4. Sensitive Wetlands

The majority of wetlands along routes support a fresh (wet) meadow plant community. Those communities observed in the field are typically degraded and contain low plant diversity, often being dominated by reed canarygrass (*Phalaris arundinacea*). Other plant species occasionally observed in this community type include jewelweed (*Impatiens capensis*), stinging nettle (*Urtica dioica*), cattail (*Typha spp.*), sedges (*Carex spp.*), purplestem angelica (*Angelica atropurpurea*) and various facultative agricultural weeds.

Numerous wetlands along the routes also support a mix of plant communities, with forested wetlands and shrub carr most common, in addition to the wet meadow community. Based on field observations, these wetlands are also typically degraded with a relatively low level of vegetative diversity. Dominants typically observed in forested wetland communities include boxelder (*Acer negundo*), quaking aspen (*Populus tremuloides*), eastern cottonwood (*Populus deltoides*), green ash (*Fraxinus pennsylvanica*) and willow species (*Salix spp.*). Shrub carr wetlands are typically dominated by boxelder (*Acer negundo*) and green ash saplings (*Fraxinus pennsylvanica*), spirea species (*Spirea spp.*), buttonbush (*Cephalanthus* *occidentalis*), willow species (*Salix spp.*), dogwood species (*Cornus spp.*) and elderberry (*Sambucus canadensis*), with elements of the wet meadow community described above.

Despite generally low vegetative diversity of wetlands observed along the alternative routes, several wetlands along these areas would be considered sensitive based on community type and/or floristic quality, as listed in AFR Section 2.4.13.4. These wetlands are identified in Table 2.4-8 (refer to Tables 1 and 3 [Appendix T] for a summary of poles and TCSBs proposed to be placed in these areas). None occur along the Arcadia-Alma Option.

Table 2.4-8:
Sensitive Wetland Type by Route

Route	Segment	Wetland ID Number	Description
Q1-Highway 35 Route	1	1-FW1	Floodplain forest adjacent to the Mississippi River
	1	1-FW2	Floodplain forest adjacent to the Mississippi River
	2A3	2A-FW2	Floodplain forest adjacent to an unnamed tributary (UNT) to the Mississippi River
	2B	2B-FW1	Floodplain forest adjacent to Mississippi River backwater slough
	2E	2E-FW2	Floodplain forest fringe adjacent to Mississippi River backwater slough
	2E	2E-FW4	Floodplain forest and emergent aquatic wetland adjacent to an UNT to the Mississippi River
	2F	2F-FW1	Floodplain forest adjacent to Waumandee Creek
	2F	2F-W1	Sedge meadow component adjacent to Eagle Creek
	2F	2F-FW2	Floodplain forest adjacent to Eagle Creek
	2G	2G-W1	Sedge meadow not dominated by reed canarygrass and floodplain forest adjacent to Eagle Creek
	2G	2G-W2	Sedge meadow not dominated by reed canarygrass adjacent to Eagle Creek
	2I	2I-W1	Emergent aquatic wetland complex adjacent to the Trempealeau River West Channel
	2I	2I-W2	Emergent aquatic wetland complex associated with the Trempealeau River
	2I	2I-W3	Emergent aquatic wetland complex adjacent to the Trempealeau River
	8B	8B-FW1	Floodplain forest adjacent to Tank Creek
	8B	8B-FW2	Floodplain forest adjacent to Tank Creek
	8B	8B-W2	Wet meadow, shrub carr, and emergent aquatic wetland complex not dominated by reed canarygrass
	8B	8B-FW3	Floodplain forest adjacent to the Black River
	8B	8B-FW4	Floodplain forest adjacent to the Black River and the Black River New Channel
	8B	8B-FW5	Floodplain forest adjacent to the Black River New Channel
Arcadia Route	1	1-FW1	Floodplain forest adjacent to the Mississippi River
	1	1-FW2	Floodplain forest adjacent to the Mississippi River
	10C	10C-FW1	Floodplain forest adjacent to Little Waumandee Creek
	10C	10C-FW2	Floodplain forest adjacent to an UNT to Waumandee Creek
	10C	10C-W2	Wet prairie not dominated by reed canarygrass
	10C	10C-W3	Southern sedge meadow not dominated by reed canarygrass

Route	Segment	Wetland ID Number	Description
	10C	10C-FW3	Floodplain forest adjacent to an UNT to Waumandee Creek
	10C	10C-FW5	Floodplain forest adjacent to an UNT to the Trempealeau River
	10C	10C-W8	Emergent aquatic wetland component associated with the Trempealeau River
	10C	10C-FW6	Floodplain forest adjacent to the Trempealeau River
	10C	10C-FW7	Floodplain forest adjacent to the Trempealeau River
	10C	10C-W9	Emergent aquatic wetland and floodplain forest complex associated with the Trempealeau River
	11B	11B-FW1	Floodplain forest associated with Turton Creek
	11B	11B-FW2	Floodplain forest adjacent to Turton Creek
	11D	11D-W1	Southern sedge meadow component not dominated by reed canarygrass
	11G	11G-FW1	Floodplain forest associated with an UNT to Tamarack Creek
	11G	11G-FW2	Floodplain forest associated with an UNT to Tamarack Creek
	11G	11G-W1	Southern sedge meadow not dominated by reed canarygrass
	11G	11G-W2	Southern sedge meadow component not dominated by reed canarygrass
	13B1	13B1-FW1	Ephemeral pond in wooded setting type habitat within mesic forest
	13B2	13B2-FW1	Floodplain forest adjacent to an UNT to Beaver Creek
	13B2	13B2-W1	Sedge meadow and deep marsh complex
	13B2	13B2-FW2	Floodplain forest adjacent to Beaver Creek
Q1-Galesville Route	1	1-FW1	Floodplain forest adjacent to the Mississippi River
	1	1-FW2	Floodplain forest adjacent to the Mississippi River
	2A3	2A-FW2	Floodplain forest adjacent to an UNT to the Mississippi River
	2B	2B-FW1	Floodplain forest adjacent to Mississippi River backwater slough
	2E	2E-FW2	Floodplain forest fringe adjacent to Mississippi River backwater slough
	2E	2E-FW4	Floodplain forest and emergent aquatic wetland adjacent to an UNT to the Mississippi River
	2F	2F-FW1	Floodplain forest adjacent to Waumandee Creek
	2F	2F-W1	Sedge meadow component adjacent to Eagle Creek
	2F	2F-FW2	Floodplain forest adjacent to Eagle Creek
	2G	2G-W1	Sedge meadow not dominated by reed canarygrass and floodplain forest adjacent to Eagle Creek
	2G	2G-W2	Edge meadow not dominated by reed canarygrass adjacent to Eagle Creek
	2I	2I-W1	Emergent aquatic wetland complex adjacent to the Trempealeau River West Channel
	2I	2I-W2	Emergent aquatic wetland complex associated with the Trempealeau River
	2I	2I-W3	Emergent aquatic wetland complex adjacent to the Trempealeau River
	13B2	13B1-FW1	Ephemeral pond in wooded setting type habitat within mesic forest
	13B2	13B2-FW1	Floodplain forest adjacent to an UNT to Beaver Creek
	13B2	13B2-W1	Sedge meadow and deep marsh complex
	13B2	13B2-FW2	Floodplain forest adjacent to Beaver Creek

Aerially delineated wetlands are not included in this evaluation due to the difficulty in remotely assessing wetland quality.

2.4.13.4.1. Areas of Special Natural Resource Interest

In addition to the sensitive wetlands described above, several wetlands along the routes are associated with designated areas and could potentially be considered ASNRI. The following is a summary of these wetland areas.

2.4.13.4.1.1. Q1-Highway 35 Route

Along the Q1-Highway 35 Route, the following wetlands would likely be considered ASNRI:

- Wetlands 1-FW1 and 1-FW2, which are associated with the Mississippi River (designated as NHI water) and fall within the Upper Mississippi River NWFR.
- Wetland 2F-FW1, which is associated with Waumandee Creek (designated as NHI water).
- Wetland 2I-W1, which is associated with the Trempealeau River West Channel (designated as NHI water).
- Wetlands 2I-W2 and 2I-W3, which are associated with the Trempealeau River (designated as NHI water).
- Wetlands 8B-FW1, 8B-W1 and 8B-FW2, which are associated with Tank Creek (designated as NHI water).
- Wetland 8B-FW3, which is associated with the Black River (designated as NHI water)
- Wetland 8B-FW4, which is associated with the Black River and Black River New Channel (designated as NHI water).
- Wetland 8B-FW5, which is associated with the Black River New Channel (designated as NHI water).

2.4.13.4.1.2. Arcadia Route

Along the Arcadia Route the following wetlands could potentially be considered ASNRI:

- Wetlands 1-FW1 and 1-FW2, which are associated with the Mississippi River (designated as NHI water) and fall within the Upper Mississippi River NWFR.
- Wetland 10C-W1, which is associated with Waumandee Creek (designated as NHI water).
- Wetlands 10C-W8, 10C-FW6 and 10C-FW7, which are associated with the Trempealeau River (designated as NHI water).
- Wetlands 11G-FW1, 11G-FW2, 11G-W3, 11G-W5 and 11G-W6, which are associated with unnamed tributaries to Tamarack Creek (a trout stream).
- Wetland 11G-FW3, which is associated with Tamarack Creek (a trout stream).

- Wetland 11G-W2, which is associated with Holcomb Coulee Creek, a tributary to Tamarack Creek (a trout stream).
- Wetland 11G-W4, which is associated with Tamarack Creek Branch, a tributary to Tamarack Creek (a trout stream).
- Wetland 13B2-FW2, which is associated with Beaver Creek (designated as NHI water).
- Black River (a NHI water and priority navigable water [PNW] Sturgeon Area) also occurs along the Arcadia Route Segment 17A; however, wetlands are not adjacent to this waterway.

2.4.13.4.1.3. Arcadia-Alma Option

No wetlands occur along the Arcadia-Alma Option.

2.4.13.4.1.4. Q1-Galesville Route

Along the Q1-Galesville Route, the following wetlands would likely be considered ASNRI:

- Wetlands 1-FW1 and 1-FW2, which are associated with the Mississippi River (designated as NHI water) and fall within the Upper Mississippi River NWFR.
- Wetland 2F-FW1, which is associated with Waumandee Creek (designated as NHI water).
- Wetland 2I-W1, which is associated with the Trempealeau River West Channel (designated as NHI water).
- Wetlands 2I-W2 and 2I-W3, which are associated with the Trempealeau River (designated as NHI water).
- Wetland 13B2-FW2, which is associated with Beaver Creek (designated as NHI water).
- The Black River (an NHI water and PNW Sturgeon Area) also occurs along the Q1-Galesville Route, Segment 17A; however, wetlands are not adjacent to this waterway.

The construction of routes would result in the conversion of some forested wetlands. In areas where additional ROW is needed, the adjacent lands would be cleared of trees and other woody vegetation. Forested wetlands in these locations would be cleared, resulting in a conversion to wet meadow or shrub carr wetland types.

The approximate acreage of forested wetlands that may be converted in and out of the ROW is:

- Q1-Highway 35 Route: 47.7 acres in ROW and 0.8 acres out of ROW
- Arcadia Route: 37.6 acres in ROW and 0.3 acres out of ROW
- Arcadia-Alma Option: None; the portion of the Arcadia Route that the option would replace: None
- Q1-Galesville Route: 33.4 acres in ROW and 0.5 acres out of ROW

The implementation of best management practices (BMPs) along with the Applicants' standard environmental protection practices would avoid and minimize wetland impacts to the maximum extent practicable, as further described in Section 2.5.4.

2.4.14. Mapping Wetland and Waterway Crossings

Route centerlines and land cover types within the proposed ROW are presented in General Route Maps (Appendix C). The routes are also shown 7.5 Minute USGS topographic quadrangle maps (Topographic Maps, Appendix B).

Environmental Features Maps (Appendix D) present recent aerial photographs overlaid with the following features: existing transmission lines, identified routes, waterways, WWI wetlands, field sketched wetlands, aerially delineated wetlands, hydric soils, proposed temporary bridge locations, locations of proposed access routes through remote areas containing wetlands or waterways and preliminary locations of transmission line poles along proposed access areas.

The identification of waterways was based on review of WDNR 24K Hydrography Layer, aerial photography and field observations along accessible routes. Several waterways appear on the WDNR 24K Hydrography Layer that are not evident based on field and/or aerial photograph review. Table 2 (Appendix T) identifies these "non-apparent waterways" if there is no association with wetlands, and/or if adjacent wetlands occur. Only waterways evident in field/aerial photograph review were included on Environmental Features Maps (Appendix D). The WDNR has the final jurisdictional authority over navigability determinations.

2.4.14.1. Recent Aerial Photography (Line and ROW only)

See General Route Maps (Appendix C).

2.4.14.2. Topographic Map (Line and ROW only)

See Topographic Maps (Appendix B).

2.4.14.3. Recent Aerial Photography

The aerial photography (AFR Sections 2.4.14.3.1 through 2.4.14.3.10) required for this section are contained in General Route Maps (Appendix C) and Environmental Features Maps (Appendix D).

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2.5. Construction Methods

2.5.1. General Construction Information

Construction of a transmission line follows the sequence of surveying the centerline, performing a geotechnical investigation, determining construction access, installing foundations, assembling and erecting poles, installing shield wires and conductors, installing ground rods and cleanup and site reclamation. Various phases of construction occur at different locations throughout the construction process and, in some cases, at the same time at different locations. Typical transmission line construction activities are depicted in Figure 2.5-1.

Figure 2.5-1:
Typical Transmission Line Construction Activities

The following discussion is related to the Applicants' specifications used in overhead transmission line construction. See Section 2.6.7 for additional discussion related to substation construction.

2.5.1.1. Type and Location of Structures

Structure diagrams are included in Appendix L.

The proposed transmission line would use a combination of galvanized and weathering steel poles. The weathering steel oxidizes to form a protective coating that is dark brown. The galvanized poles are light gray.

For most of the Project, the Applicants propose to install single shaft steel poles on concrete foundations. Large angles (typically those greater than 30 degrees) would be designed as two-poles to reduce foundation diameters and to aid constructability. In addition, several poles in the hilly coulee region would require multipole poles for additional strength required for long spans between hilltops, to aid constructability or to minimize construction access.

More detail about the quantities and location of each pole type is provided in Section 2.1, Tables 2.1-6 through 2.1-9, and Appendix L.

2.5.1.2. Use of Existing Structures

No existing transmission poles would be reused. In locations where the proposed 345 kV circuit would be double-circuited with an existing lower voltage circuit, the existing poles would be removed and salvaged or disposed of in the appropriate manner.

2.5.1.3. Method of Structure Placement in Ground

After the foundation is installed, the pole sections are moved to the ROW and assembled. Insulators and other hardware would be attached while the pole is on the ground. The pole would then be lifted, placed and secured using a crane. The foundation construction methods are discussed in more detail below.

2.5.1.4. Concrete Foundation Type

The majority of poles are expected to be installed on steel reinforced cast-in-place concrete pier foundations. Concrete foundations are constructed by first excavating a hole with a large auger. After the hole is excavated, reinforcing steel and an anchor bolt cage are placed into the excavation, and the excavation is filled with concrete from a local concrete batch plant. The completed foundation is allowed to cure to develop necessary strength. After the foundation is cured, the pole is mounted on the foundation using exposed anchor bolts. In general, poles would have drilled pier concrete foundations (Figure 2.5-2) that may vary from 6 to 10 feet in diameter and 25 to 50 feet deep, depending on soil conditions.

Excess soil from foundation holes would be offered to the landowner for placement at an appropriate place on the property within reasonable proximity to the construction site. If on-site disposal is not permitted, the excess soil would be completely removed from the site and disposed of appropriately, such as at neighboring properties requiring fill. Gravel pits or construction sites are examples of nearby properties that may accept fill. No soils would be disposed in wetlands or other sensitive areas. Soil disposal locations would not be subject to concentrated stormwater flows and would not be located adjacent to surface waters, storm sewer or sanitary sewer inlets or manholes, recreational areas, wetlands, areas critical to endangered or threatened species, or other sensitive areas. Where appropriate, on-site soil disposal areas would be seeded and mulched within seven days of the last construction activity at the disposal location. Appropriate stormwater management practices would be employed until disturbed areas are stabilized.

Figure 2.5-2:
Concrete Pier Foundation with Anchor Bolts

The presence of groundwater at or near the ground surface can affect the construction procedures used when auguring holes. If groundwater flow into an excavation results in the excavation becoming unstable, it is often necessary to install a casing to support the walls of the excavation. Depending on site conditions, groundwater may need to be removed. The extracted groundwater would be discharged to an upland location where it is allowed to infiltrate or be loaded onto a tanker truck and disposed of offsite. In some situations it may be possible to auger the hole, using casings to maintain the stability of the hole without dewatering the site during excavation. In this situation, groundwater is removed from the casing as it is displaced by concrete pushed into the excavation via a special concrete-pouring sleeve known as a tremie. This water would contain solids from the auguring process and/or from contact with the fresh concrete; it is pumped out of the hole and transported by appropriate tanker truck to an upland site where it can be allowed to settle and re-infiltrate. Any solids left after the water infiltrates the soil or evaporates is collected and disposed of in the same manner as other excavated soil.

In the event that shallow bedrock is encountered, modifications to the standard foundation designs by either shortening the foundation length and socketing into bedrock or anchoring directly into the bedrock may be required. Another option would be removing the rock via blasting or special drilling methods to develop the full foundation length.

The Applicants propose tubular steel vibratory caisson foundations for all poles within the Black River floodplain area. At each pole location, a temporary work surface would be constructed with construction matting. The steel caisson, crane, vibratory hammer and associated equipment are transported to the site. The steel caisson is stood up at the staked location and the vibratory hammer is placed on top of the steel caisson. The high frequency vibration and weight of the vibratory hammer vibrate the hollow steel caisson into the earth to a pre-determined elevation, normally 2 to 3 feet above ground level. Vibratory caissons along the Q1-Highway 35 Route within the Black River floodplain would be installed to depths of approximately 30 to 70 feet below grade. The vibratory caisson foundation is then complete and ready for erection of the tubular steel pole. Vibratory caisson foundation installations do not require concrete or dewatering and do not generate spoils from the excavations.

For locations with construction equipment access (matted roads or ice roads), all material (steel caisson), equipment (trucks, crane, vibratory hammer, etc.) and labor would access the site via the temporary access roads.

For locations with restricted construction equipment access (areas where matted roads or ice roads prove to be impractical), the steel caisson, alignment jig, vibratory hammer and associated equipment are transported to the site with a heavy lift helicopter. The same helicopter is then used to stand up the steel caisson and place it in the staked location inside the alignment jig. It then lifts the vibratory hammer and places it on top of the caisson. Finally, it then removes all equipment when installation is complete.

2.5.1.5. Type of Machinery

Typical construction equipment that would be used on the Project consists of tree removal equipment, mowers, cranes, backhoes, digger-derrick line trucks, track-mounted drill rigs, dump trucks, front-end loaders, bucket trucks, bulldozers, flatbed tractor-trailers, flatbed trucks, pickup trucks, concrete trucks and various trailers. Many types of excavation equipment are set on wheel- or track-driven vehicles. Poles would be transported on tractor-trailers in areas with conventional construction access (including matted access roads or ice roads), and via heavy lift helicopter in areas without ground-based construction access (potentially the Black River floodplain if matted roads or ice roads prove to be impractical).

2.5.1.6. Width of Construction Disturbance Zone – Access Roads and Temporary Stringing Setups

Construction would mostly be confined to the ROW and along access routes. However, it is likely that construction at each pole site would temporarily occupy an area outside the established ROW. Access to the transmission line ROW corridor would be made directly from existing roads or trails that run parallel or perpendicular to the transmission line ROW. In some situations, private field roads or trails would be used. Permission from the property owner is obtained prior to accessing the transmission line route.

Where necessary to accommodate the heavy equipment used in construction, existing access routes may be upgraded or new routes may be constructed. New access routes may also be used when no current access is available, or the existing access is inadequate to cross roadway ditches or other obstructions. Disturbance at these areas may include clearing of vegetative cover, soil compaction, vehicular tracking and some topsoil disturbance. An access path of approximately 16 feet would be needed. However, there may be areas where a greater width is required to allow for two lanes of construction traffic. The entire ROW width would be assessed for preconstruction vegetation management. Site maps showing existing and proposed access routes are provided on Environmental Features Maps (Appendix D).

Once foundations and poles are in place, conductors are installed by establishing stringing setup areas within the ROW or on temporary construction areas outside of the ROW. These stringing setup areas are usually located every 8,000 to 10,000 feet (sometimes closer together based upon terrain and/or alignment) along a project route. The exact distance would depend on the type of conductor, access, terrain and alignment. Conductor stringing operations also require brief access to each pole to secure the conductor wire to the insulator hardware and the shield wire to clamps once final sag is established. Where the transmission line crosses streets, roads, highways, or other energized conductors or obstructions, temporary guard or clearance poles may be installed. This ensures that conductors do not obstruct traffic or contact existing energized conductors or other cables during stringing operations, while also protecting the conductors from damage. Figure 2.5-3 shows a single-circuit steel 115 kV pole midway through the stringing process. Once the installation of new conductors has been completed, the temporary guard poles would be removed.

A typical stringing setup area would be approximately 100 feet by 200 feet, and no permanent wetland fill would be needed. The Applicants would attempt to locate stringing setup areas outside of wetlands; however, based on these assumptions, it may be necessary to locate wire pulling/handling areas in some of the more extensive wetlands along Segment 8B.

2.5.1.7. Location of Staging Areas

Staging areas are usually established for projects of this type. Staging involves delivering the equipment and materials necessary to construct the new transmission line or substation facilities. Construction of the Project would likely include a number of staging areas. Materials would be stored at the staging areas until they are needed. These areas are selected for their location, access, security and ability to efficiently and safely warehouse supplies. The areas are also chosen to minimize vegetation clearing, excavation and grading. The staging areas outside the transmission line ROW would be obtained from private landowners through lease options. Site maps showing planned staging areas are provided in Sheet Maps 5 through 15 (Appendix K).

Additional description of the environmental impacts associated with staging areas is located in Section 2.5.7.

Figure 2.5-3:
Midway Point in Stringing Process

Table 2.5-1 identifies the staging areas that the Applicants have selected and the current status of the lease options.

Table 2.5-1:
Stockpile and Equipment Staging Areas

Area #	Legal Description	Municipality	County	Size (Acres)	Lease Option Status
1	Part of SW1/4-NE1/4, Sec 32, T21N-R12W	Town of Belvidere	Buffalo	20	Signed
2	Part of W1/2-NW1/4, Sec 11, T19N-R11W	Town of Gross	Buffalo	16	Signed
3	Part of NW1/4-NE1/4, Sec 16, T18N-R10W	Town of Trempealeau	Trempealeau	20	Signed
4	Part of NE1/4, Sec 23, T18N-R9W	Town of Trempealeau	Trempealeau	20	Signed
5	NE1/4-NW1/4, Sec 13, T17N-R8W	Town of Onalaska	La Crosse	17	Ongoing
6	Part of NW1/4-NW1/4, Sec 1, T18N-R8W	Town of Galesville	Trempealeau	13	Signed
7	Part of W1/2-NW1/4, Sec 34, T21N-R9W	Town of Glencoe	Buffalo	20	Signed
8	Part of N1/2-SW1/4 & Part NW1/4-SE1/4, Sec 6 T20N-R9W	Town of Arcadia	Trempealeau	16	Signed
9	Part SW1/4-NW1/4, Sec 16, T21N- R12W	Town of Belvidere	Buffalo	20	Signed

2.5.1.8. Construction Methods in and around Agricultural Lands, Forest Lands, Surface Water and Wetlands

Transmission line poles are generally designed for installation at existing grades. Typically, pole sites with 10 percent or less slope would not be graded or leveled. At sites with more than 10 percent slope, working areas would be graded level or fill would be brought in for working pads. In some cases, construction mats may be utilized to create a level workspace where grading is impractical. If the landowner permits, it is preferred to leave the leveled areas and working pads in place for use in future maintenance activities. If the landowner does not wish to leave the leveled area, the site is graded back to its original condition as much as possible and all imported fill is removed from the site.

Construction mats may be placed in wet or soft soil locations and in narrow ditches to minimize disturbance. These mats can also provide access to sensitive areas during times when the ground is not frozen to minimize impacts at the site. Figure 2.5-4 shows an example of construction mats.

Figure 2.5-4:
Construction Mats

Environmentally sensitive areas and wetland areas may also require special construction techniques in some circumstances. During construction, the most effective way to minimize impacts is to avoid wet areas, streams and rivers. Construction equipment would not be allowed to cross waterways unless it is unavoidable, and then only after appropriate authorization is obtained from resource agencies. Where waterways must be crossed to pull in the new conductors and shield wires, workers may walk across, use boats or drive equipment across ice in the winter. These construction practices help prevent soil erosion. Equipment fueling and lubricating would occur at a distance from waterways. Additional mitigation measures relating to wetlands are described in Section 2.4.12 and 2.4.13.

2.5.1.8.1. Agricultural Areas

Agricultural areas are found along Segments 2A3, 2B-G, 2I, 3, 4, 8A-C, 9 and 18H for the Q1-Highway 35 Route; Segments 10B1, 10C, 11A-G, 13A, 13B1, 13B2, 13D, 13E, 17A and 18A–H for the Arcadia Route; 10B2 for the Arcadia-Alma Option; and Segments 2A3, 2B-G, 2I, 6, 12, 13B2, 13D, 13D, 17A and 18A-H for Q1-Galesville Route.

During the routing and siting process, The Applicants considered potential impacts to agricultural landowners and farming operations to the extent possible. To limit disruption to farming practices and/or potential impacts to agricultural lands, transmission structures were sited outside of cultivated cropland, along field edges, and/or along property lines, where possible.

The Applicants would use general upland construction procedures utilizing standard construction equipment. These construction practices would conform to Best Management Practices (BMPs) to minimize environmental impact (e.g., soil erosion).

In agricultural areas, foundation construction would proceed as described in Section 2.5.1. Work in agricultural areas (lands under cultivation, lands used for hay production and lands used for pasture) would be conducted to minimize damage to existing crops or vegetation. Construction practices would conform to best management practices (BMPs) to minimize environmental impacts (i.e. soil erosion). Excess soil previously excavated and piled adjacent to the foundation would be disposed of as described in Section 2.5.1.4. Excess concrete materials would be removed from site and transported to an appropriate disposal location. If dewatering were required, discharged water would normally be allowed to flow onto and infiltrate the surrounding soils. In areas of close proximity to surface waters or other sensitive areas where treatment of the discharge by ponding or filtration is not practical, the water would be pumped from the excavation and transported to an appropriate upland infiltration location or transported for off-site disposal.

The Applicants would work with potentially affected agricultural landowners to ensure that farm protection practices would be implemented during construction of the transmission line. Specific practices may vary depending on the type of agricultural operation, cropping practices, site conditions (soil type, slopes, etc.), and extent of construction. The development of site-specific protection measures would occur in cooperation with landowners, with consideration given to Project schedule and cost. The Applicants' contractors and field personnel would work proactively to develop and incorporate additional measures to prevent or minimize impacts that are cost-effective whenever possible.

Where possible and when practicable, during construction the Applicants may implement any of the following farm protection and agricultural impact mitigation methods:

- Accessing structure locations using the route or method that would minimize impacts to agricultural land by using field edges, existing roads and/or lanes utilized by the landowner
- Minimizing compaction, soil mixing, significant rutting, or damage to existing drainageways and/or drainage tiles by scheduling construction during dry or frozen conditions, utilizing low ground pressure or tracked equipment and/or utilizing construction matting
- Using soil de-compaction methods, such as chisel plowing, as appropriate
- Removing material excavated from foundations and other construction-related debris from agricultural lands
- Repairing or paying the landowner to repair drainage systems and tiles, and any soil conservation practices, such as grassed waterways or terraces, damaged during construction
- Compensating landowners for crop and other damages from construction activity consistent with the terms in the property easements
- Other farm protection and/or avoidance measures may be used to address concerns regarding animal and crop disease or impacts to organic farms. These measures may include the following:
- Avoiding such areas where possible by excluding areas or obtaining alternate access
- Implementing measures that are currently being used by the farm owner or operator to prevent farm diseases related to animal health or soil contamination

- Working with landowners to temporarily change farming practices, such as moving animals to another pasture or changing manure application schedule
- Utilizing barriers between construction equipment and agricultural land such as utilizing construction matting or ice roads
- Physical removing potential contaminants from the access path or construction equipment

The Applicants would strive to use access routes that minimize impacts to agricultural land to the extent practicable (i.e. utilizing field edges). Landowners would be compensated for crop and other damages arising from construction activity consistent with the terms in the property easements. See General Route Maps (Appendix C) and Environmental Features Maps (Appendix D) for existing and proposed access routes.

The portion of ROW on mapped NRCS Prime and Other Farmland Soils is summarized by route and soil classification below:

- Q1-Highway 35 Route:
    - 112.79 acres of prime farmland soils
    - 65.34 acres of farmland of statewide importance
    - 11.86 acres of prime farmland if drained and/or protected from flooding
- Arcadia Route:
    - 188.77 acres of prime farmland soils
    - 137.73 acres of farmland of statewide importance
    - 59.5 acres of prime farmland if drained and/or protected from flooding
- Arcadia-Alma Option:
    - 5.1 acres of prime farmland soils
    - 6.1 acres of farmland of statewide importance
    - No acres of prime farmland if drained and/or protected from flooding
- Q1-Galesville Route:
    - 196.18 acres of prime farmland soils
    - 99.13 acres of farmland of statewide importance
    - 17.59 acres of prime farmland if drained and/or protected from flooding

Permanent impacts to agricultural land can include loss of agricultural land due to pole placement or substation construction. These permanent impacts of the Project represent less than 200 square feet per pole. Temporary impacts during construction may include soil compaction, disruption of agricultural practices (i.e. center pivot irrigation) and crop damages within the ROW. Temporary impacts are estimated at approximately 325 acres for the Q1-Highway 35 Route; 439 acres for the Arcadia Route; 16 acres for the Arcadia-Alma Option; and 372 acres for the Q1-Galesville Route.

2.5.1.8.2. Forest Lands

Forested land is found along Segments 1, 2A1-3, 2B, 2C, 2E-I, 3, 8A-C and 9 for the Q1-Highway 35 Route; Segments 1, 2A1-2, 10B1, 10C, 11A-G, 13B1-2, 13C-E, 17A-B, 18A-B, 18F and 18G for the Arcadia Route; Segment 10B2 for the Arcadia-Alma Option; and Segments 1, 2A1-3, 2B, 2C, 2E-I, 6, 12, 13B2, 13C-E, 17A-B, 18A-B, 18F and 18G for the Q1-Galesville Route.

To accommodate transmission line construction, all woody vegetation would be cleared for the full ROW width, which would facilitate safe and efficient construction, operation and maintenance of the transmission line.

After construction is complete, vegetation in the ROW would be maintained using the Applicants' Vegetation Management Procedures. Vegetation would be cut at or slightly above the ground surface. Root stocks would be left in place to regenerate after construction, except in areas where stump removal is necessary to facilitate the movement of construction vehicles along the ROW. Regrowth of tall-growing species under the transmission line would not be allowed. Where permission of the landowner has been obtained, stumps of tall-growing species would be treated with an herbicide to discourage regrowth. The disposition of trees of commercial or other value would be negotiated with the landowner prior to land clearing and included in the easement agreement.

Vegetation clearing would be completed in accordance with PSCW restrictions on oak tree cutting and pruning, as specified in Wis. Admin. Code § PSC 113.0511.

2.5.1.8.3. Surface Water and Wetlands

Project construction would require crossing several perennial and intermittent creeks, streams, and the Mississippi and Black Rivers. Depending on which route is selected, some transmission line poles would require placement in the floodplains of the Mississippi and Black Rivers. Construction plans for the crossing the Black River and associated wetlands is included as Appendix J.

Crossing the Mississippi River and Upper Mississippi River Wildlife and Fish Refuge may involve impacts such as temporary habitat disturbance associated with construction activities; permanent modification of habitat from forested to non-forested wetland associated with clearing for construction access; and temporary shoreline and river bottom disturbance associated with access from barges. Final construction plans for work in the refuge will be coordinated with the USFWS as part of the special use permit process. General habitat impacts in these wetlands are not expected to impact local populations or survivorship because they will occur within existing transmission ROW and other unaffected habitats are available nearby to support displaced individuals. Habitat conversion from forested to non-forested wetland due to clearing may need associated state and federal permits. Temporary shoreline and river bottom disturbance associated with access from barges in the Mississippi River may impact state listed mussels. If at the time of construction, state listed mussels are located within proposed access areas, divers and qualified aquatic scientists will be involved in the process of safely moving species to unaffected areas. If necessary, field surveys to obtain more route specific wildlife data will be completed once the route has been selected.

Additional indirect impacts to surface water and wetlands along the alternative routes could include sedimentation reaching surface waters during construction due to ground disturbance by excavation, grading, construction traffic and dewatering of holes drilled for transmission poles. This could temporarily degrade water quality due to turbidity. These impacts would be avoided and minimized using appropriate sediment control practices and BMPs. These practices would be detailed in the Construction Site Erosion, Storm Water Control Plan and in the Storm Water Pollution Prevention Plan (SWPPP) that would be completed prior to the start of construction.

Once the Project is completed, there would be no significant impacts on surface water quality because wetland impacts would be minimized and mitigated, disturbed soil would be restored to previous conditions or better, and the amount of land area converted to an impervious surface would be small.

The Applicants would maintain sound water and soil conservation practices during construction and operation of the Project to protect topsoil and adjacent water resources and minimize soil erosion. Construction would be completed according to WDNR and USACE permit requirements. Practices may include:

- Providing containment of stockpiled material away from stream banks and lake shorelines
- Stockpiling and respreading topsoil
- Reseeding and revegetating disturbed areas as required by the Wisconsin Pollution Discharge Elimination System (WPDES) permit
- Implementing erosion and sediment controls as required by the WPDES permit
- Minimizing disturbed areas in proximity to rivers and lakes, where practicable
- Preventing waste water from concrete batching or other construction operations from entering streams or other surface waters without using turbidity control methods; waste waters discharged would be free of settleable material

Temporary impacts to wetlands may occur if they need to be crossed during construction of the transmission line. No staging or stringing setup areas would be placed within or adjacent to water resources, as practicable. The Applicants would avoid major disturbance of individual wetlands and drainage systems during construction by spanning wetlands and drainage systems, where possible. When it is not possible to span the wetland, the Applicants would draw on several options during construction to minimize impacts:

- When possible, construction would be scheduled during frozen ground conditions and construction access would utilize ice road construction techniques.
- Crews would attempt to access the wetland with the least amount of physical impact to the wetland (i.e. shortest route).

- Structures would be assembled on upland areas before they are brought to the site for installation, when practicable.
- When construction during winter is not possible, construction mats would be used where wetlands would be impacted. Additionally, the Applicants have access to low impact or tracked construction vehicles designed to minimize soil impacts in wet areas. Wetlands impacted would be restored as required by the USACE and WDNR.
- When winter construction or access via construction matting is not practical, access and delivery of labor, equipment and material would be performed by heavy lift helicopter.

Permanent impacts in the form of fill in wetlands would take place where poles must be located within wetland boundaries. Wetland crossings of less than 1,000 feet can typically be spanned. If a wetland crossing is greater than 1,000 feet, but less than 1,500 feet, one pole would be placed in the wetland. Two poles would be needed for wetlands between 1,500 and 2,500 feet and so on. Wetland impacts due to permanent pole placement would result in approximately 78.5 square feet of permanent impacts per standard single-pole. Permanent wetland impact due to pole placement is detailed in Table 1 (Appendix T). Between 4,989 square feet (0.11 acres) and 9,247 square feet (0.21 acres) of temporary wetland impact per pole would occur during construction, depending on which construction access option is chosen. A detailed Construction Plan for the Black River Floodplain (Appendix J) shows the temporary wetland impact associated with each pole option under consideration. Wetland vegetation would be restored following construction. The Applicants would obtain necessary Section 404 permits from USACE and state level permits from the WDNR.

Vegetation maintenance procedures under transmission lines prohibit the establishment of trees. Existing trees must be removed from the entire ROW, including forested wetlands. Removal of trees within forested wetlands would change the type of wetland from forested to scrub/shrub or emergent.

2.5.2. Underground Construction

No underground transmission line construction is proposed as part of this Project. All proposed transmission lines would be above ground. While it is not being proposed, an underground configuration for the Mississippi River crossing was studied and a detailed engineering report is included in Appendix F.

A number of transmission line route segments are located along road ROW with existing overhead distribution lines. In certain areas, local distribution circuits would be displaced by the transmission line. These distribution lines would be relocated as overhead in alternate locations or buried. Underground distribution lines would be installed using a vibratory plow and directional drilling as necessary. The vibratory plow method is typically used in open areas while directional drill is utilized to cross roads. Construction standards and procedures for the utility owners of the particular underground lines would apply in these situations.

2.5.3. Stream/River Crossings

2.5.3.1. Method of Crossing

Temporary bridge crossings are proposed to cross streams, as identified in Section 2.4.12 and Table (Appendix T). Whenever possible, clear span bridges would be constructed. Drawings of a typical crossing method, photographs of the crossing locations and cross-sections are also provided in the Exhibits in Appendix T

2.5.3.2. Upland Excavation

Except for minor blading that may be required to properly stabilize the bridge, excavation would not be required for the waterway crossings.

The volume of excavated materials is dependent upon the specific route chosen and site characteristics, such as topography, pole height and angle, and soils.

2.5.3.3. Access Routes Associated with Temporary Bridges

Temporary bridge crossings would be located within the ROW or other areas with proper permission. Construction access to bridge locations would be gained in the same manner as access within the ROW, as described in Section 2.4.11. Access routes and temporary bridge locations are shown on Environmental Features Maps (Appendix D).

2.5.3.4. Underground Crossing Construction

No underground waterway crossings are being proposed for the transmission lines.

2.5.4. Wetland Crossings

2.5.4.1. Crossing Methods

Access through wetlands would be required during transmission line construction. Methods that may be used to minimize the impact associated with access include, but are not limited to: frozen conditions (i.e. ice roads), low ground pressure equipment, construction mats, temporary access routes and restricting the length and width of the access path. The locations and access within these wetlands is discussed in Section 2.4.12.

The following summarizes construction techniques that would be utilized for crossing wetlands. The construction technique identifiers (i.e., CT-2, CT-3) are used to indicate the crossing method in the Environmental Inventory Table provided in Table 3 (Appendix T).

CT-2: Unstable Soil Conditions: If saturated or unstable soil conditions exist at a construction location, several construction techniques may be implemented to reduce the effects on wetland soil and dependent functions, including hydrology and the wetland's capacity for revegetation of native species. These techniques include the use of the following: construction during frozen conditions (ice roads), construction mats, low ground pressure, tracked vehicles in areas where soils are saturated or not frozen and TCSBs installed in wetlands that contain cross-cut channels.

CT-3: Stable Soil Conditions: If the wetland to be crossed has drier, stable and cohesive soils or is frozen, construction would proceed in a manner similar to upland construction. If the wetland soils are not saturated at the time of construction and can support both tracked and/or rubber-tired equipment, the Applicants would construct in that area using construction mats only when needed to minimize impacts.

CT-4W: Wire Handling/Stringing – Wetlands: Wire handling and stringing may still be necessary in wetlands where heavy equipment crossing is restricted. Helicopter stringing would likely be used to avoid crossing wetlands and waterways and to generally increase efficiency. Smaller vehicles, such as a small tracked vehicle or an all-terrain vehicle, may also be used to pull the line between poles. In this case, construction traffic would be limited, and if necessary, construction mats would be used.

Wetlands in the Black River Floodplain: The Applicants considered various options for accessing proposed pole locations in the wetlands associated with the Black River floodplain. A detailed Construction Plan for the Black River floodplain is included as Appendix J. Based on geotechnical information from WGS and considering the issue of logistics and safety in accessing pole locations from the highway, the Applicants propose to use the following methods:

- Construction in this area during the time of year when conditions are most likely to be favorable (low water and/or frozen ground).
- If constructing during the winter, vegetation would be cleared to increase potential for frost penetration in the soil. This enhanced freezing of soil along an access route is referred to as an "ice road."
- Construction matting would be used to create a temporary construction access path to each pole location. At each pole location, a temporary work pad of construction mats would also be needed.
- A heavy lift helicopter may be used for some limited portions of construction.

In the event that water level and weather conditions do not allow for a stable working surface, the Applicants may need to implement an alternate construction method, which may include the use of fill to create a temporary access route. This route would need to allow for construction traffic along the ROW and a work platform at each pole location. If alternate construction methods utilizing wetland fill is needed, a specific construction and restoration plan would be developed.

2.5.4.1.1. Crossing Structures

The Applicants have not identified a typical pole for crossing wetlands. Appendix J contains drawings of typical pole types proposed for the Project.

2.5.4.1.2. Access Routes in Wetlands

Access to each pole has been determined based on a combination of the shortest distance and avoidance of obstacles or sensitive areas such as wetlands, forested land, stream crossings and steep terrain. Where present, previously established access routes would be used. Where possible, access routes would utilize the ROW corridor or existing roads and trails. Access route locations would be selected to eliminate traversing waterways or wetlands, where practicable. No fill materials would be placed in waterways or wetlands to provide temporary access across waterways or wetlands. Based on the Applicants review of access routes, no wetland fill is anticipated for any of the access routes. It is the Applicants intent to avoid fill, however final access planning with the construction contractor may identify very few isolated areas where minimal temporary fill may be required. If such fill would be required, such locations would be handled through the appropriate use of temporary fill and coordinated with permitting agencies (USACE, USFWS and WDNR).

2.5.4.2. Methods of Preventing the Spread of Invasive Species

A general discussion of the dominant species found within each of the wetlands along each proposed route (where field access was available) is provided in Section 2.4.13.4. If it is evident that transmission line construction activities could spread invasive plant species to new areas, appropriate protection measures would be implemented. These measures may include avoidance of infested areas, removal or control of small populations of plants, cleaning construction equipment before leaving an area infested with invasives, scheduling construction activities during the plant's dormant period, utilizing construction mats and geotextile fabric as a barrier to equipment or cleaning equipment prior to accessing uninfested areas.

- Once a final route has been ordered, the Applicants would develop an invasive species plan to comply with Chapter NR40. The plan would provide information about the presence and extent of invasive species within the project area, and provide guidance on BMPs that may be utilized to avoid the spread of invasive species.
- An outline of example BMPs that may be implemented for the Project includes the following:
- Identifying areas of invasive species infestations and higher quality uninfested vegetative communities prior to equipment and vehicle access in the ROW
- Establishing construction access paths and construction activities in areas to avoid infestation locations when possible
- Isolating construction equipment from infested areas by altering access, placing a barrier between the vehicles and plants (i.e. construction matting, geotechnical fabric) or timing activities during periods of the year when invasive species are less likely to be encountered or spread.
- Cleaning soils, seeds, and plan material from all exterior surfaces of equipment prior to moving construction equipment out of an infested area and then into an uninfested area. Material removed from equipment would be collected and taken to a designated area for appropriate disposal.
- Locating and using staging areas that are free of invasive plants to avoid spreading seeds and other viable plant parts.
- Minimizing soil disturbance and utilizing gravel roads or established equipment access paths to the extent practicable.
- Avoiding movement of invasive material to non-infested areas. If possible, invasive material would be left within the ROW. For example, when clearing areas dominated by honeysuckle or

buckthorn shrubs, cut material would be left in place and not spread off-site or to uninfested areas.

- Transporting infested soil or vegetative material that must be moved from the ROW to a designated area for appropriate disposal. Managing the load to limit potential spread to uninfested areas prior to transporting material.
- Managing stockpiles onsite to prevent the spread to adjacent areas.
- Selecting appropriate species for restoration and landscaping activities. Invasive species would not be used for revegetation purposes.
- Revegetating disturbed soils as soon as possible to minimize invasive species establishment.
- Monitoring restoration activities onsite to ensure control of invasive species.

2.5.4.3. Excavated Materials

For pole placement in wetlands, the estimated area of excavation would vary by route and foundation type. The area of excavation per pole varies for all routes, from approximately 64 to 133 square feet, depending on foundation type. Refer to Table 2 (Appendix A) for the wetland impact by route.

The volume of excavated material is dependent on the area and depth of the foundations and would vary based on pole location (described in Section 2.5.1.4). Material not required for backfilling would be spread in an upland area within the ROW or placed in an appropriate soil disposal location. If there is a large amount of excess soil, other appropriate disposal methods would be evaluated.

2.5.4.4. Site Fill and Dewatering

The only fill required in wetlands for which the Applicants seek authorization would be for poles and backfilling excavations after pole placement. In wetlands, excavated material would be temporarily stockpiled, either on frozen ground or on wood matting and geotextile fiber. Fill is not proposed to be placed in wetlands to provide access to construction areas. Dewatering may be necessary at some locations. Refer to Section 2.5.8 for further discussion of dewatering methods.

2.5.5. Revegetation

The need for and approach to site restoration and revegetation would be based on the degree of disturbance caused by construction activities and the ecological setting of each site; it would also need to reflect and satisfy the requirements of the property owner. For instance, the property owner of an existing agricultural site may not wish for any revegetation, but would want careful replacement of topsoil. If construction can be accomplished without creating appreciable soil disturbance, restoration may not require revegetation efforts. Restoration activities would be implemented following completion of construction activities. These activities would begin as soon as practical and as allowed by weather conditions.

2.5.5.1. Revegetation and Site Restoration Plan and Schedule

The particular ecological setting at any disturbed location would allow the Applicants to identify the type of restoration and/or appropriate revegetation. For example, if construction results in disturbance of a turfgrass sod area, the type of seed mix used for revegetation would be different than if the disturbance occurred in a wet meadow community. Native seed banks and root stock, especially resilient species of common grasses and shrubs, would facilitate revegetation in most disturbed areas.

Once a final route has been ordered, an Erosion Control Plan would be developed to meet the requirements outlined in NR 216 and NR 151. The plan would provide guidance on revegetation and site stabilization. Appropriate BMPs and technical standards would be utilized; and disturbed areas would be monitored weekly and after rain events as required by NR216.

The Applicants would coordinate with landowners and the WDNR when necessary during post-construction and restoration activities. Generally, permanent restoration of the ROW would involve the installation of seed to establish vegetation appropriate to the surrounding area. Seed utilized for the Project would not contain invasive species and would be appropriate for future land use. Depending upon the location and severity of disturbance, some areas may be monitored and allowed to re-vegetate without the need for seeding or mulching. Disturbed areas would be monitored until vegetative cover is greater than 70 percent. Restoration of agricultural areas would be negotiated with individual landowners depending on future use of the ROW.

A site-specific monitoring plan would be developed in coordination with the WDNR during the final stages of construction. The plan would identify appropriate areas for monitoring based on the level of disturbance and other site-specific considerations. The plan would address specific restoration concerns such as site goals for compliance and potential remedial actions. The Applicants would monitor the disturbed sites until vegetation is reestablished.

2.5.5.2. Post-Construction Monitoring and Operation-Phase Maintenance

Site restoration would be completed as described in Section 2.5.5. Restoration would be dependent on post-construction site conditions and landowner concerns. A post-construction monitoring plan would be developed once construction is complete and an assessment of environmental impacts has been conducted. The monitoring plan would focus on wetlands, waterway crossings and areas where special site-specific erosion controls were implemented. The Applicants would monitor the disturbed sites until vegetation is reestablished.

Appropriate measures, as described in Section 2.5.4.2, would be implemented if it is determined that construction activities may potentially contribute to the spread of invasive species. A post construction assessment of these areas would be conducted and, if necessary, the areas would be monitored for up to three years to evaluate the prevalence of invasive species

2.5.6. Erosion Control Plan

2.5.6.1. Methods and Materials

The proposed transmission line and Briggs Road Substation are subject to WDNR requirements for construction site stormwater management and erosion control. In addition, the proposed Briggs Road Substation is also subject to long-term stormwater management performance criteria.

WDNR permit requirements for construction site erosion control and long-term stormwater management are specified in Wis. Admin. Code ch. NR 216. Under NR 216, permits are required for construction sites disturbing more than 1 acre. The proposed transmission line and substations would exceed 1acre of disturbance. NR 216 authorizes the WDNR to issue a general WPDES permit after review of a Notice of Intent (NOI) submittal, except where the WDNR determines that stormwater runoff is a significant source of pollution, where previously issued general permit conditions have not been complied with, where technology changes have occurred, or where specific effluent limitations apply. None of these exceptions apply to the proposed transmission line, and therefore, the NOI submittal is expected to result in issuance of a general WPDES permit for the Project.

Performance standards for stormwater discharges authorized under NR 216 are specified in NR 151. Additionally, WDNR has developed guidance criteria for design of erosion control measures to meet these standards, also known as Technical Standards or Conservation Practice Standards.

NR 151 specifies that erosion control plans include:

Best Management Practices that, by design, achieve, to the maximum extent practicable, a reduction of 80 percent of the sediment load carried in runoff, on an average annual basis, as compared with no sediment or erosion controls, until the construction site has undergone final stabilization. No person shall be required to exceed 80 percent sediment reduction to meet the requirements of this paragraph. Erosion and sediment control BMPs may be used alone or in combination to meet the requirements of this paragraph. Credit toward meeting the sediment reduction shall be given for limiting the duration or area or both of land disturbing construction activity, or other appropriate mechanism.

Wis. Admin. Code § NR 151.11(6)(a). The NR 151 standard listed above suggests that the same level of erosion control would be required for sites, regardless of area or erosion potential, since the criterion is "compared to no controls." Discussions with WDNR staff on previous transmission line projects indicate that the intent of the criterion is to encourage temporary and final restoration as soon as possible after disturbance and to focus on more robust perimeter controls for larger sites. This approach recognizes that the primary focus in erosion control is preventing total sediment loss from a given area rather than a percentage reduction from a given area. Establishing a performance objective that meets this goal involves setting a maximum acceptable soil loss rate for the entire Project.

Use of a maximum sediment loss rate standard instead of a percentage reduction standard allows for:

- Development of erosion control practices and groups of several BMPs in series that achieve the numeric loss rates.
- Use of data on specific soil types, slopes and land cover in developing BMP plans.
- Analysis of the benefit of reducing the duration of exposure of unstabilized soil during the construction program.
- More robust erosion control methods in areas of high erosion potential (compared to a typical construction site) based on the absolute threshold criterion than would be required for the percentage reduction threshold.

2.5.6.2. Site Plan

Site maps showing the proposed Briggs Road Substation and transmission line route, along with construction information, natural resource features, site physical features and erosion control information would be prepared and included in the Erosion Control Plan and WDNR NOI once a route is selected ordered by the PSCW.

2.5.6.3. Sequence

Anticipated sequencing for transmission line construction along with minimum construction site erosion control practices includes:

- Surveying and staking of ROW – requires no erosion control measures.
- Development of ROW access – silt fence, vehicle tracking pads and other applicable erosion control measures would be installed as ROW access is gained. Since disturbance of the access path would be intermittent, placement of temporary erosion control measures (erosion control mats, seeding or mulching) on the access path would be performed if the anticipated time interval between disturbance causing activities is more than one month.
- Temporary staging and materials storage areas – staging and storage areas that are constructed and result in ground disturbance would have perimeter sediment controls placed on the downslope side of the site. If access to the storage area is off a permanent road, a vehicle-tracking pad would be placed at the intersection if field conditions require.
- Clearing of ROW – perimeter sediment control measures would be installed downslope of the cleared areas that result in ground disturbance. Areas that would only be cleared and would not sustain further disturbance during construction would be permanently restored as necessary (within 30 days of the end of clearing operations or per applicable regulatory requirements), if conditions allow. Final restoration in areas of minimal disturbance may not require the application of any measures, or it may require erosion control mats, seeding, mulching or a combination of these.
- Structure site preparation, installation and wire stringing – perimeter sediment control measures would be installed downslope prior to pole site preparation if conditions warrant. Since disturbance at pole and wire stringing locations may not be continuously active throughout construction, temporary restoration or other BMPs would be instituted within 30 days or per applicable regulatory requirements.
- Cleanup and restoration of ROW – cleanup and site restoration would occur as described in Section 2.5.5.

2.5.6.4. Off-Site Diversion Methods

It is not anticipated that off-site diversion of stormwater would be used as a construction site erosion control practice for the proposed transmission line. However, off-site diversions are planned as part of the post-construction stormwater management plan for the proposed Briggs Road Substation as well. The diversions would reduce the volume of stormwater runoff from entering the substation areas and the stormwater retention and infiltration areas by routing run-on drainage in constructed swales to existing drainage features. Other BMPs would be utilized to control flow velocities until the constructed swales are stabilized.

2.5.6.5. Provisions for Inspection and Maintenance

To comply with applicable regulations during active construction, a qualified environmental compliance staff person would inspect erosion and sediment control practices once per week and within 24 hours following a rainfall of 0.5 inches or more, in accordance with Wis. Admin. Code NR ch. 216 and WPDES general permit conditions. Written documentation of the inspection would be maintained by the environmental monitor and/or construction coordinator and would describe any corrective measures taken, if applicable. All corrective action would be taken within 24 hours of inspection unless soil conditions are such that taking the corrective action would cause excessive erosion, soil disturbance or environmental impact. The decision on the timing of the corrective action would be made by the qualified environmental compliance staff person with documentation provided to the appropriate agencies.

2.5.7. Materials Management Plan

The information in this section is a summary of the Applicants' materials management practices and addresses the applicable portions of Sections 2.5.7.1 through 2.5.7.11 of the AFR.

Access to the transmission line ROW for construction and material hauling is described in Section 2.4.11.

<u>Equipment Staging Areas</u>

Construction materials, transmission line poles, cables, equipment, vehicles and related materials would be stored within the ROW and at temporary staging areas. Construction staging areas would be required throughout construction for the storage and staging of construction equipment and materials. Potential staging areas have been identified based on the construction requirements of the Project, proximity to work areas and environmental and landowner impacts. These sites are listed in Section 2.5.1.7. The selection of any additional staging areas would be reviewed and approved by the Applicants prior to use by the contractor. Identified sites have been evaluated for potential impacts or concerns with respect to wetlands, waterways, natural features, grading and clearing requirements, threatened and endangered resources and cultural or archaeological concerns.

Staging areas have been selected to minimize the amount of disturbance and preparation required to provide suitable surfaces for temporary storage and staging of construction materials and equipment. The amount of grading and clearing at these sites would be kept to a minimum, as sites are chosen with these considerations in mind. It is preferable to secure sites that require minimal site preparation. For example, sites that are paved and have been previously graded and cleared of vegetation (parking lots, old gravel pits and fields) are ideal locations for staging areas.

Staging areas would not be located within wetlands. If a selected site is located in proximity or upslope of a wetland or waterway, appropriate erosion control measures would be implemented to prevent impacts. In addition, access points for and the haul routes to and from these work sites, would be selected, located and designed to minimize disturbance to soils and sensitive natural resources to the greatest degree practicable as well as to minimize off-site tracking.

Based on the criteria discussed above, the Applicants have identified nine potential sites that can be utilized as staging areas for the Project (see Section 2.5.1.7).

An off-site environmental review of the staging areas was conducted using existing GIS data and aerial photography. Resources utilized in the evaluation included WNHI database, WWI, Wisconsin State Historical Society database, county soil maps and aerial photography.

The selected sites shown in Environmental Features Maps (Appendix D) are primarily agricultural; however, portions of some of the sites have other features as described below:

- Staging Area 1 is a 40-acre parcel, 20 acres of which would be used for a staging site. The property has an approximately 3-acre WWI mapped wetland in the northeast corner, no mapped hydric soils, no WDNR hydrography, some residential trees in the southern end and is otherwise agriculture.
- Staging Area 2 is primarily agricultural with no mapped hydric soils, WDNR hydrography or WWI mapped wetlands.
- Staging Area 3 is about 75 percent forested with the remaining area residential. There are no mapped hydric soils, WDNR hydrography or WWI mapped wetlands.
- Staging Area 4 is entirely agricultural with no mapped hydric soils, WDNR hydrography, or WWI mapped wetlands.
- Staging Area 5 is within the proposed Briggs Road Substation West property and is entirely agricultural, with no mapped hydric soils, WDNR hydrography or WWI mapped wetlands.
- Staging Area 6, although predominantly agricultural, has a small wood lot adjacent to the parcel in the southwest corner. There are no mapped hydric soils, WDNR hydrography or WWI mapped wetlands present on the property.
- Staging Area 7 appears to be fallow or grazed. An area in the northwest corner contains approximately 1 acre of mapped hydric soils and is a potential wetland area. The southern boundary of Staging Area 7 is adjacent to and slightly overlapping with a WWI mapped wetland following an intermittent UNT.
- Staging Area 8 is a gravel quarry with no mapped hydric soils, WDNR hydrography or WWI mapped wetlands.
- Staging Area 9 is almost entirely agricultural except for a small area of forest and shrub land surrounding a DNR intermittent UNT. There are no mapped hydric soils or WWI wetlands present on the property.

In general, the Applicants plan to utilize approximately 20 acres at each site; a minimum 30-foot-wide access path would be required for ingress and egress. Upon approval of this Joint Application and final route selection, the actual site and the exact locations of staging areas would be based on several factors, including Project needs and environmental constraints. If it becomes necessary for the Applicants or their contractor to secure additional areas near the route to temporarily store transmission line construction materials, they would follow a similar selection process, including an environmental review.

None of the staging areas directly impacts archaeological sites. However, Staging Area 1 is located approximately 316 feet from a documented archaeological site (47BF64).

Construction materials stored on site generally consist of transmission line poles and cables, equipment used in construction activities and related materials and equipment. The Applicants would require all contractors to have a Spill Prevention Control and Countermeasure (SPCC) Plan in place that addresses both the contractor's construction equipment and construction activities.

Temporary wire pulling/handling areas would be set up approximately every 5,000 to 10,000 feet along the route. The exact distance would depend on the type of conductor, terrain and alignment. A typical area used for wire pulling/handling would be approximately 100 feet by 200 feet; no permanent wetland fill would be needed. The Applicants would attempt to locate wire pulling/handling areas outside of wetlands; however, based on these assumptions, it may be necessary to locate wire pulling/handling areas in some of the more extensive wetlands along Segment 8B.

Potentially Contaminated Material

If potentially contaminated materials are encountered during construction, the Applicants would isolate the soils and conduct analytical testing to determine proper disposal of these materials.

No excavation would take place in navigable waterways, with the exception of poles below the OHWM, as described in Section 2.8.1. Wetland excavated materials would either be backfilled in the transmission pole location, evenly spread in an upland area within the ROW or hauled off site for disposal. Upland excavated materials would either be backfilled in the transmission pole location or evenly spread in an upland area within the ROW.

2.5.8. Dewatering Plan

At this time, the location and amount of dewatering activities are unknown. Upon final route selection, geotechnical information, including depth to groundwater, would be collected. The Applicants would then be able to make assumptions regarding the necessity to dewater at construction locations. If dewatering is necessary, it would be completed as described below and comply with Wis. Admin. Code § NR 216. The following is a general summary of the Applicants' dewatering practices and addresses the applicable portions of Sections 2.5.8.1 through 2.5.8.8 of the AFR.

The presence of groundwater at or near the ground surface can impact the construction procedures used when boring holes for transmission poles. If groundwater flow into an excavation results in the excavation becoming unstable, it is often necessary to support the walls of the excavation and/or dewater the site. Depending on site conditions and permit requirements, the extracted groundwater is generally discharged to an upland area where it is allowed to reinfiltrate or to the local storm or sanitary sewer system. Extracted groundwater may also be discharged to a nearby water body if there is no indication of contamination and sediments and it is free of fines. Water that may contain solids from the construction process is most often pumped out of the excavation and trucked to an upland site where it can be allowed to settle and reinfiltrate.

2.6. Substation Information

2.6.1. Substation Location, Dimension and Layout

To satisfy the Project's purpose and need, a new 345/161 kV transmission substation is necessary to allow the proposed 345 kV line to connect to two existing 161 kV lines serving the greater La Crosse area. These 161 kV lines are the:

- Alma – Marshland – La Crosse Tap – Genoa 161 kV (Marshland line)
- Tremval – Mayfair – La Crosse 161 kV (Tremval line)

Planning studies generally allowed for this substation to be located anywhere that both of the existing 161 kV lines could be connected to the proposed 345 kV line. There was a slight preference, however, to locate the substation as close to the La Crosse load center as reasonably possible.

This flexibility allowed for multiple substation sites to be considered during the route development process. To integrate the proposed new transmission line into the existing electrical system, a new Briggs Road substation would be constructed near the intersection of US-53 and Briggs Road near Holmen. The Applicants identified two potential substation sites at the southern terminus of the Project (Figures 4 and 5 and Appendix K). The west site is a relatively flat, irrigated farm field while the eastern site is a rolling, partially-wooded site occupied by a horse rider/rodeo club. Based on the factors presented in Table 2.1-16, the western site is the preferred site.

A general arrangement drawing is provided (Figure 1, Appendix K) for the proposed Briggs Road Substation West and East Sites showing the new facilities.

2.6.1.1. Briggs Road Proposed Sites

Two Briggs Road Substation sites are described in this Application. Both sites are located in the town of Onalaska, immediately south of the village of Holmen corporate limits.

The Briggs Road West Site is located west of Briggs Road and south of US-53. This site was proposed because in the Applicant's view it best balanced routing and siting considerations. The West Site is located near the Marshland and Tremval 161 kV lines, has good road access and good transmission route access and is a relatively flat agricultural field which will keep grading costs reasonable. The site provides adequate flexibility for foreseeable future needs including a potential 69 kV connection to the existing North La Crosse substation and will not adversely impact routing of the proposed American Transmission Company Badger-Coulee 345 kV line. Approximately 40 acres would be acquired to allow for the 10 acre fenced substation area, future substation expansion, area for routing transmission lines and a buffer area to homes and future development. An active farming operation would be displaced.

The Briggs Road East Site is provided as an alternative and is located east of Briggs Road and south of US-53. The site also is located near the 161 kV lines, has good road access and good transmission route access and can adequately facilitate future expansion. However, the site is hilly and would require extensive grading. The site is also partially wooded and would require fairly significant tree removal. An equestrian facility would need to be relocated.

There are no documented occurrences of archaeological resources on the Briggs Road West Site. The area has been heavily cultivated. If archaeological resources had been present in such an environment, the disturbance from cultivation would have likely compromised the context of those artifacts.

Archeological sites have been documented on the eastern area of Briggs Road East Site. The potential to find additional sites in this particular area remains high. Portions of the Briggs Road East Site have been disturbed with, roads, the riding arena and parking and other various structures.

Early analysis of necessary electrical connections showed advantages to placing the substation at or near Dairyland's existing North La Crosse 69 kV substation at Briggs Road and US-53:

- The Marshland line crosses over this location
- The Tremval line is approximately 0.5 miles from the location
- This area contains or is near an existing 69 kV substation which could eventually connect to the 345/161 kV substation

Initially the Applicants assumed that the existing North La Crosse site would be expanded with a small acquisition of adjacent property. The evaluation indicated several items that were deemed imprudent:

- Would required demolition and reconstruction of the existing 69 kV yard. This increases costs and would increase local reliability risks during construction
- Would result in a more expensive design to fit on a small, triangular-shaped property
- Would allow little room for future needs.

Therefore, the siting analysis was expanded to include parcels in the vicinity of the North La Crosse Substation. Parcels southwest of County Road XX are 40 to 50 feet lower in elevation than the proposed Briggs Road sites, are prone to flooding and were eliminated from consideration. Parcels north of US-53 are dense residential developments in the village of Holmen and were not considered. Parcels northwest of Briggs Road would require longer 161 kV relocations. Parcels southeast of Briggs Road are hilly and wooded, contain an active gravel pit which results in uneven terrain or are located closer to more homes. Parcels east of US-53 and WI-35 were not considered as this area contains dense residential developments.

2.6.2. Size (acres) and Orientation

It is proposed that the Applicants would purchase approximately 40 acres for the proposed Briggs Road Substation West Site. The Applicants would initially construct the proposed Briggs Road Substation West Site on approximately 10 acres of the 40 acres purchased, which would allow for future expansion. The general substation arrangement is provided in Figures 1 and 1A (Appendix K).

The Briggs Road Substation East Site is an alternative site for the substation. The site would be located directly southeast of the Briggs Road Substation West Site on a 70-acre parcel of land east of Briggs Road. If the PSCW selects the alternative site, the Applicants would acquire a 40-acre parcel and initially construct the proposed Briggs Road Substation East Site on approximately 10 acres, which would allow for future expansion. The general substation arrangement is provided in Figure 1 (Appendix K).

The proposed Briggs Road Substation would be owned solely by Xcel Energy.

2.6.3. Landscaping

No landscaping is anticipated at the proposed Briggs Road Substation West or East Site

2.6.4. Ownership Plat and Topography Maps

The proposed Briggs Road Substation West and East Sites are identified on the Topographic Map 9, Appendix B. A plat map showing the proposed substation sites is provided in Figure 2 (Appendix K).

2.6.5. Location of Transmission Lines and Structures

The Briggs Road Substation West Site was used for describing the routing in this section. Locating the substation on the Briggs Road Substation East Site is a shift of only 1,600 feet; therefore, the impacts would be essentially the same. The lines approaching the substation from the northwest would become approximately 1,600 feet longer, but lines entering the substation from the east would become approximately 1,600 feet shorter.

Regardless of the route selected, Xcel Energy's Tremval-Mayfair 161 kV line and Dairyland's Q1 161 kV line must be routed into the Briggs Road Substation to connect the 345 kV line to the existing system. The longest of the reroutes is approximately 0.75 miles and shown if Figures 3 and 4 and Appendix K. These reroutes are described in more detail below by route.

2.6.5.1. Q1-Highway 35 Route

2.6.5.1.1. Dairyland's Existing Alma-La Crosse (Q1) 161 kV Line

The Q1 line would be routed to the Briggs Road Substation West Site as follows:

- The portion of the Q1 line from the northwest would be double-circuited with the proposed 345 kV line as discussed in Section 2.1. The line would enter the substation from the north.
- The Q1 would exit the substation to the south on substation property, then turn east on land owned by Dairyland for its North La Crosse Substation and reconnect with the existing Q1 alignment approximately 1,200 feet east of Briggs Road. The length of new route is approximately 0.35 miles.

The 161 kV poles would be self-supporting, single pole weathering steel type on concrete foundations. Heights would range between 85 to 110 feet. Foundation diameters would range between 5.5 to 8 feet. Span lengths range from 300 to 700 feet. The proposed pole drawings are provided in Figures S6-8 and S6-29 through S6-32 (Appendix L).

The 345 kV poles would be self-supporting, single pole weathering steel type on concrete foundations. Heights would range between 100 to 140 feet. Foundation diameters would range between 7 to 9 feet.

Span lengths range from 300 to 700 feet. The proposed pole drawings are provided in Figures S6-9 and S6-18 (Appendix L).

2.6.5.1.2. Xcel Energy's Tremval-Mayfair 161 kV Line

The existing Tremval-Mayfair 161 kV line crosses US-53 approximately 3,500 feet southeast of the Briggs Road Substation West Site. The line would be routed to the substation as follows:

- A new segment of the line would be routed along the south side of US-53 from the highway crossing point to the substation, a distance of approximately 0.75 miles. The Tremval connection enters the substation from the north.
- The line would exit the substation to the south on substation property, then turn east on land owned by Dairyland for its North La Crosse Substation and continue southeast to connect with the existing line near where it currently crosses US-53. The new route length is approximately 0.75 miles.

The 161 kV poles would be self-supporting, single pole weathering steel type on concrete foundations. Heights would range between 70 to 110 feet. Foundation diameters would range between 5.5 to 8 feet. Span lengths range from 300 to 700 feet. The proposed pole drawings are provided in Figures S6-8 and S6-29 through S6-32 (Appendix L).

2.6.5.2. Q1-Galesville Route and Arcadia Route

2.6.5.2.1. Dairyland's Existing Alma-La Crosse(Q1) 161 kV Line

The Q1 line would remain on its existing alignment, which crosses the Briggs Road Substation West Site. The Q1 would be routed into the Briggs Road Substation West Site as follows:

- From the northwest, the Q1 line would turn south into the substation using a single span of approximately 400 feet.
- The Q1 would exit the substation to the south on substation property, then turn east and cross land owned by Dairyland for its North La Crosse Substation and reconnect with the existing Q1 alignment approximately 1,200 feet east of Briggs Road. The length of new alignment is approximately 0.35 miles.

The 161 kV poles would be self-supporting, single pole weathering steel type on concrete foundations. Heights would range between 85 to 110 feet. Foundation diameters would range between 5.5 to 8 feet. Span lengths range from 300 to 700 feet. The proposed pole drawings are provided in Figures S6-8 and S6-29 through S6-32 (Appendix L).

2.6.5.2.2. Xcel Energy's Tremval-Mayfair 161 kV Line

The line would be routed to the Briggs Road Substation West Site as follows:

- As described in Section 2.2, the line from the Tremval Substation would be double-circuited with the proposed 345 kV line. The line would enter the substation from the north. A 3.5-mile segment of the existing Tremval 161 kV line through the Village of Holmen line would be removed.

- The line would exit the substation to the south on substation property, then turn east and cross land owned by Dairyland for its North La Crosse Substation and continue southeast to connect with the existing line near where it currently crosses GRR/ US-53. The new route length is approximately 0.75 miles.

The 161 kV poles would be self-supporting, single pole weathering steel type on concrete foundations. Heights would range between 70 to 110 feet. Foundation diameters would range between 5.5 to 8 feet. Span lengths range from 200 to 650 feet. The proposed pole drawings are provided in Figures S6-8 and S6-29 through S6-32 (Appendix L).

The 345 kV poles would be self-supporting, single pole weathering steel type on concrete foundations. Heights would range between 100 to 140 feet. Foundation diameters would range between 7 to 9 feet. Span lengths range from 300 to 700 feet. The proposed pole drawings are provided in Figures S6-9 and S6-18 (Appendix L).

2.6.6. Access Roads

Briggs Road is located east of the proposed Briggs Road Substation West Site and would provide access to the substation. A new driveway access off of Briggs Road into the proposed Briggs Road Substation West Site would be required. The proposed driveway access would be approximately 24 feet wide and 672 feet long.

The proposed Briggs Road Substation East Site has an existing driveway access that would be utilized.

2.6.7. Construction and Erosion Control Procedures

Construction of the proposed Briggs Road Substation West or East Site would involve grubbing existing vegetation, removing topsoil, performing necessary grading to establish rough grades and constructing required stormwater management facilities. The drilled pier foundations would be installed by use of appropriate size drill rigs. Any excess soil from foundation installation would either be distributed across the site or at another approved off-site upland location. After foundations have been installed, a crushed rock surface would be placed over the site.

Construction procedures would be in accordance with all applicable state permit requirements. Appropriate erosion control and stormwater management measures (described in Section 2.5.6) would be implemented.

2.6.8. Environmental Information

2.6.8.1. Land Use and Zoning

2.6.8.1.1. Current Land Use at Substation Sites

Land use information for the proposed Briggs Road Substation West and East Sites was obtained from the La Crosse County Comprehensive Plan (2006), the Town of Onalaska Comprehensive Plan (2005) and the Village of Holmen Comprehensive Plan (2004).

The existing land use at the proposed Briggs Road Substation West Site is currently active agriculture. There are three main roads/highways in close proximity to the proposed site: Briggs Road to the east, County Road XX to the south and GRR/US-53 to the north. Land use within 0.5 mile south of the proposed site is recreational land and wetlands/woodlands. Land use within 0.5 mile west of the proposed site is agricultural land and includes a farmstead. Land use within 0.5 mile north of the proposed site is currently under the jurisdiction of the village of Holmen and is used as open space and single family residences. US-53 would physically separate the proposed Briggs Road Substation West Site from these land uses. The area directly north of the proposed site appears to be densely populated. Land use within 0.5 mile east of the proposed site is primarily woodlands/wetlands (La Crosse County 2006). According to the town of Onalaska, future land use for the site is transitional agriculture.

The existing land use at the proposed Briggs Road Substation East Site is recreation and a tree farm. There are three main roads/highways in close proximity to the proposed site; Briggs Road to the east, County Road XX to the south and US-53 to the north. Land use within 0.5 mile south of the proposed site is active agriculture and rural residential. Land use within 0.5 mile west of proposed site is agricultural land and forested woodland. Land use within 0.5 mile north of the proposed site is currently under the jurisdiction of the village of Holmen and a substation. US-53 would physically separate the proposed Briggs Road Substation East Site from the residential and recreation lands to the north. Land use within 0.5 mile east of the proposed site is a forested woodland and natural resource extraction operation (La Crosse County 2006). According to the town of Onalaska, future land use for the site is conservation/cluster residential with an urban reserve area (2025) overlay.

2.6.8.1.2. Current Zoning at Substation Sites

Zoning information for the proposed Briggs Road Substation West Site was obtained from the La Crosse County Zoning Code (2006). The proposed site is wholly located in La Crosse County and is currently zoned agricultural transition. A transitional agriculture zoning district is identified as growth areas that are anticipated to require water, sewer or other related services because the lands are planned for eventual urban development (La Crosse County 1983, 2007). The county’s zoning code identifies a procedure for the review and approval of orderly development of the agricultural transition district as it is rezoned to a use other than agriculture.

The area within 0.5 mile to the south and east of the proposed Briggs Road Substation West Site is currently zoned industrial. The area within 0.5 mile west of the site is currently zoned transitional agriculture, and the area within 0.5 mile north of the site is currently under the jurisdiction of the village of Holmen and is zoned single family residential (R1: New Single Family Residential District).

Zoning information for the proposed Briggs Road Substation East Site was obtained from the La Crosse County Zoning Code (2006). The proposed site is wholly located in La Crosse County and is currently zoned industrial. An industrial zoning district allows for a variety of light and heavy industrial uses, but excludes residential (La Crosse County 1983, 2007).

The area within 0.5 mile to the south and east of the proposed Briggs Road Substation East Site is currently zoned Industrial. The area within 0.5 mile west of the site is currently zoned transitional agriculture, and the area within 0.5 mile north of the site is currently under the jurisdiction of the village of Holmen and is zoned single family residential (R1: New Single Family Residential District).

2.6.8.2. Impacts to Agricultural

The proposed Briggs Road Substation West Site is currently used for active agricultural operations; construction of the substation would result in the agricultural operations to cease on approximately 40 acres.

The proposed Briggs Road Substation East Site is currently used for an equestrian riding center and pine plantation. Construction of the substation would not result in any agricultural operations to cease.

2.6.8.3. Impacts to Forest Lands

The proposed Briggs Road Substation West Site is currently used for active agricultural operations. No forest land would be impacted by construction of the proposed substation.

The proposed Briggs Road Substation East Site is currently used for an equestrian riding center and pine plantation. The property contains approximately 48 acres of forested lands generally pine and spruce plantations with the exception of about 6 acres of deciduous forest in the southeast portion of the property. Various riding trails exist throughout the property, including the forested areas. The majority of the forested areas is located in the area of future development and would not be directly impacted by construction of the substation. However, approximately 1 acre of forested land would be impacted by construction of the substation. Implementation of environmental BMPs would reduce indirect impact to these forested lands.

2.6.8.4. Endangered, Threatened and Special Concern Species

Information concerning the presence of rare species, including threatened, endangered, or special concern, within 2 miles of the proposed Briggs Road Substation West and East Sites was obtained through review of the WNHI database, dated March 15, 2010, by qualified environmental specialists.

The WNHI database identifies two threatened non-historic NHI species and five special concern non-historic NHI species within 2 miles of the Briggs Road Substation West Site. Three special concern historic species and seven non-historic natural communities were identified within 2 miles of the property boundary. Of all these occurrences, three special concern species (one of which is non-historic) actually intersect the property boundary. Because there is no evidence of wetlands or waterways (Sections 2.6.8.6 and 2.6.8.7), it is unlikely that any of the aquatic species or communities would be found on the site. Furthermore, because this site is currently farmed, natural or other significant features are not likely present on the site.

The WNHI database identifies three threatened non-historic NHI species and five special concern non-historic species within 2 miles of the Briggs Road Substation East Site. Three special concern historic NHI species and eight non-historic natural communities are identified within 2 miles of the property boundary. Of all these occurrences, four special concern species (one of which is historic) actually intersect the property boundary. Because there is no evidence of wetlands or waterways (Sections 2.6.8.6 and 2.6.8.7), it is unlikely that any of the aquatic species or communities would be found on the site. Depending on the nature of the equestrian activities and degree of disturbance taking place on the site, some natural or other significant features, excluding waterways and wetlands, may be present.

A confidential report describing the results of the WNHI review was submitted to the WDNR OES and to the PSCW under separate cover. A copy of the cover letter submitted with that report is located in Appendix P.

Two other potential substation sites, the New Amsterdam and the Galesville sites, were reviewed but found to have flaws related to land use incompatibility, engineering and Project need issues. These sites are not proposed substation sites and therefore, no environmental reviews were completed for these sites.

2.6.8.5. Archaeological and Historic Resources

The Mississippi Valley Archaeological Center (MVAC) at the University of Wisconsin has conducted an archival and literature review of the substation sites for the Applicants. The information is summarized here and the report will be submitted to the SHPO in early 2011. The initial archaeological surveys in the vicinity of the proposed substation sites were conducted by the Wisconsin Historical Society's Museum Archaeology Program (MAP) during the late 1970s and early 1980's.

The MVAC report identified five archaeological sites as potentially within or immediately adjacent to the proposed substation sites. Findings included campsites, a village, various artifacts and grave sites. The proposed substation sites are in La Crosse County. Table 2.6-1 details the location of each archaeological site in context to each site.

Table 2.6-1: Revised
Substation Sites that are in Proximity to Documented Archaeological Sites

	Substation that is in Proximity to a Documented Archaeological Site	Section – Township – Range Quarter-Quarter	Documented Archaeological Site
Briggs Road Substation	Briggs Road Substation West Site	NW ¼, NW ¼ of S13 T17N R8W	47LC119
	Briggs Road Substation East Site	SW ¼, NE ¼ of S13 T17N R8W	47LC111
		SW ¼, NE ¼ of S13 T17N R8W	47LC657
		Center of S13 T17N R8W	47LC781
		SE¼ S13 T17 R8W SW¼ of S18 T17N R7W	47LC19

Source: MVAC, 2010

The documented archaeological site LC119 is located west of the Briggs Road Substation West Site and is located outside the proposed footprint and transmission line corridor. According to the Wisconsin Historic Preservation Database (WHPD), no archaeological surveys have been conducted within the boundaries of the proposed Briggs Road Substation West Site.

There are four archaeological sites reported within the boundaries of the proposed Briggs Road Substation East Site. 47LC19 is listed on the NRHP and is an extensive, multi-component site. The Wisconsin SHPO would likely recommended Phase I testing of areas along the site's current boundaries and full-scale mitigation of any portion of the site slatted for construction. 47LC111 is a campsite. 47LC657 is a campsite located west of Briggs Road. 47LC781 was destroyed during the Briggs Road re-alignment. No further investigations of these sites are recommended.

Based upon the literature review and the October 2010 site visit, MVAC has made a recommendation based on the information available, as to whether or not field investigation is recommended for each of the five sites. During the final design phase, further archaeological review would be undertaken by the Applicant to ensure that the documented sites at the selected substation site are properly protected.

In order to preserve the archaeological integrity of documented archaeological sites, the Applicants would locate poles in at locations that avoid the archaeological sites. If avoidance of the archaeological sites cannot be avoided, Phase I survey would be conducted to confirm the location and determine if evidence of the site remains.

2.6.8.6. Affected Waterways

The proposed Briggs Road Substation West Site is located approximately 0.75 miles west of Halfway Creek and 0.25 miles north of an unnamed perennial ditched stream. This property is also located 2 miles north of Lake Onalaska and approximately 0.9 mile east of Black River Unnamed Slough; both waterways are classified by the WDNR as ASNRI waters.

The proposed Briggs Road Substation East Site is located approximately 0.1 mile west of Halfway Creek and 0.1 mile northeast of an unnamed perennial ditched stream. This property is also located approximately 1.75 miles north of Lake Onalaska and approximately 1 mile east of Black River Unnamed Slough; both waterways are classified by WDNR as ASNRI waters.

No waterways would be directly affected by development of either the Briggs Road Substation West or the East Sites. Implementation of stormwater BMPs would minimize indirect impacts, such as erosion, to nearby waterways.

2.6.8.7. Affected Wetlands

The Briggs Road Substation West and East Site were reviewed for potential impacts or concern with respect to wetlands. The off-site environmental review was based on the following sources:

- 2008 NAIP orthophotography
- NRCS, Soil Survey of La Crosse County, Wisconsin
- NRCS list of hydric soils for La Crosse County
- WDNR 1:24,000-scale hydrography
- WDNR WWI Maps

The soils on the Briggs Road Substation West Site are excessively drained soils, including Linchford loamy sand, Chelsea fine sand and Plainfield sand (Sheet Maps 14 and 15, Appendix K). Wet signatures are absent from both the 2008 NAIP orthophotography and imagery that was flown for this Project in April 2008. WDNR does not identify any WWI wetlands or waterways on the property. It is unlikely that any part of this property would meet wetland criteria.

The soils on the Briggs Road Substation East Site are almost entirely excessively drained soils, including Chelsea fine sand, Plainfield sand and a small sliver of moderately well drained Huntsville silt loam along the US-53 corridor. Wet signatures are absent from both the 2008 NAIP Orthophotography and imagery that was flown for this Project in April 2008. The WDNR does not identify any WWI wetlands or waterways on the property. It is unlikely that any part of this property would meet wetland criteria.

No wetlands would be directly affected by development of either the Briggs Road Substation West or East Sites. Implementation of stormwater and environmental BMPs would minimize indirect impacts, such as erosion, to nearby wetlands.

2.7. Electric and Magnetic Fields (EMF) Information

The term EMF refers to electric and magnetic fields that are associated with all electrical devices. For the lower frequencies associated with power lines, EMF should be separated into electric fields and magnetic fields.

Electric and magnetic fields arise from the flow of electricity, are dependent on the voltage and current carried by a transmission line, and are measured in kilovolts per meter (kV/m) and milliGauss (mG), respectively. The intensity of the electric field (EF) is proportional to the voltage of the line, and the intensity of the magnetic field (MF) is proportional to the current flow through the conductors. Transmission lines operate at a power frequency of 60 hertz (cycles per second).

Current passing through any conductor produces an MF in the area surrounding the wire. The MF associated with an HVTL surrounds the conductor and decreases rapidly with increasing distance from the conductor. The MF associated with a transmission line is expressed in units of magnetic flux density, or mG.

There is no federal or Wisconsin state standard for transmission line EFs. However, the Minnesota Environmental Quality Board (MEQB) has imposed a maximum EF limit of 8 kV/meter measured at 1 meter above the ground. The standard was designed to prevent serious hazard from shocks when touching large objects parked under AC transmission lines of 500 kV or greater. The maximum EF associated with the Project, measured at 1 meter above ground, is calculated to be 5.39 kV/m (on line Segments B and D, as shown in Figure 5, Table 5, Appendix U).

The maximum MF associated with the Project, measured at 1 meter above ground, is calculated to be 122.87 mG (on line Segment G, as shown in Figure 2, Table 11c (Appendix U).

Considerable research has been conducted throughout the past three decades to determine whether exposure to power-frequency (60 Hz) MFs cause biological responses and health effects. Epidemiological and toxicological studies have shown no statistically significant association or weak associations between EMF exposure and health risks.

The possible impact of exposure to EMFs upon human health has been investigated by public health professionals for the past several decades. While the general consensus is that EFs pose no risk to humans, the question of whether exposure to MFs can cause biological responses or health effects continues to be debated.

The most recent reviews of research regarding health effects from power-frequency MFs conclude that the evidence of health risk is weak. The National Institute of Environmental Health Sciences (NIEHS) issued its final report on June 15, 1999, following six years of investigation. NIEHS concluded that there is little scientific evidence linking extra low frequency MF exposures with health risk.

In 2007, the World Health Organization (WHO) concluded a review of the health implications of EMFs. In this report, the WHO stated:

Uncertainties in the hazard assessment [of epidemiological studies] include the role that control selection bias and exposure misclassification might have on the observed relationship between magnetic fields and childhood leukemia. In addition, virtually all of the laboratory evidence and the mechanistic evidence fail to support a relationship between low-level ELF magnetic fields and changes in biological function or disease status. Thus, on balance, the evidence is not strong enough to be considered causal, but sufficiently strong to remain a concern. (Environmental Health Criteria Volume N°238 on Extremely Low Frequency Fields at p. 12, WHO [2007]).

Also, regarding disease outcomes, aside from childhood leukemia, the WHO stated that:

A number of other diseases have been investigated for possible association with ELF magnetic field exposure. These include cancers in both children and adults, depression, suicide, reproductive dysfunction, developmental disorders, immunological modifications and neurological disease. The scientific evidence supporting a linkage between ELF magnetic fields and any of these diseases is much weaker than for childhood leukemia and in some cases (for example, for cardiovascular disease or breast cancer) the evidence is sufficient to give confidence that magnetic fields do not cause the disease.

(Id. at p.12.)

Furthermore, in their “Summary and Recommendations for Further Study,” WHO emphasized that:

the limit values in [EMF] exposure guidelines [not] be reduced to some arbitrary level in the name of precaution. Such practice undermines the scientific foundation on which the limits are based and is likely to be an expensive and not necessarily effective way of providing protection.

(Id. at p. 12).

WHO concluded that:

given both the weakness of the evidence for a link between exposure to ELF magnetic fields and childhood leukemia, and the limited impact on public health if there is a link, the benefits of exposure reduction on health are unclear. Thus, the costs of precautionary measures should be very low.

(Id. at p.13).

Wisconsin, Minnesota and California have all conducted literature reviews or research to examine this issue. Since 1989, PSCW has periodically reviewed the science on EMF, and has held hearings to consider the topic of EMF and human health effects. The most recent hearings on EMF were held in July 1998. In January 2008, the PSCW published a fact sheet regarding EMF. In it, PSCW noted that:

Many scientists believe the potential for health risks for exposure to EMF is very small. This is supported, in part, by weak epidemiological evidence and the lack of a plausible biological mechanism that explains how exposure to EMF could cause disease. The magnetic fields produced by electricity are weak and do not have enough energy to break chemical bonds or to cause mutations in DNA. Without a mechanism, scientists have no idea what kind of exposure, if any, might be harmful. In addition, whole animal studies *investigating long-term exposure to power frequency EMF have shown no connection between exposure and cancer of any kind. (EMF-Electric & Magnetic Fields, Public Service Commission of Wisconsin [January 2008]).*

In 2002, Minnesota formed an Interagency Working Group (Working Group) to evaluate the body of research and develop policy recommendations to protect the public health from any potential problems resulting from HVTL EMF effects. The Working Group consisted of staff from various state agencies and published its findings in a White Paper on Electric and Magnetic Field Policy and Mitigation Options in September 2002 (Minnesota Department of Health, 2002). The report summarized the findings of the Working Group as follows:

Research on the health effects of EMF has been carried out since the 1970s. Epidemiological studies have mixed results – some have shown no statistically significant association between exposure to EMF and health effects, some have shown a weak association. More recently, laboratory studies have failed to show such an association, or to establish a biological mechanism for how magnetic fields may cause cancer. A number of scientific panels convened by national and international health agencies and the United States Congress have reviewed the research carried out to date. Most researchers concluded that there is insufficient evidence to prove an association between EMF and health effects; however, many of them also concluded that there is insufficient evidence to prove that EMF exposure is safe.

(Id. at p. 1.)

2.7.1. Transmission Line EMF

2.7.1.1. Existing Electric Distribution Facilities

There are no plans to allow distribution to be underbuilt on the 345 kV transmission line. The transmission line would parallel existing distribution lines in some sections of the route segments. In those segments, and after consultation with the local distribution companies (LDCs), the distribution lines would be moved or replaced if the distribution lines are close to the transmission line.

2.7.1.2. New Transmission Line EMF Calculations

A summary of EMF calculations for the proposed Project are found in Appendix U, Tables 1 through 18. Structure type drawings for the proposed Project are found in Figures 1 through 7 (Appendix U).

The strength of the EF, defined as the electric field intensity, is measured in kilovolts per meter (kV/m) and is dependent on the charge of the object (a transmission line in this case) creating the field. The charge at ground level is strongly influenced by the system voltage level. The nominal voltages of the lines being constructed by the proposed Project are 345 kV, 161 kV and 69 kV. The EFs in Figures 1 through 7 (Appendix U) and Tables 1 through 7 are calculated using the maximum operating voltage, which is assumed to be 105 percent of the nominal voltage. For any specific design, the height of the set of phase conductors above ground has a marked influence on the maximum EF.

Magnetic field density is measured in mG and is used to describe the MF generated by current flowing in the conductors of transmission lines. MF calculations for the proposed lines in Figures 1 through 7 and

Tables 8 through18 (Appendix U) are based on the summer peak and average (80 percent peak load) current flows projected for the planned in-service year of the final component (2015) and 10 years following (2025) under normal system conditions.

The values presented in the table are calculated at the low point (typically mid-span) of the transmission line where the conductor is closest to the ground. Vertical clearance measurements are based on Xcel Energy's minimum design clearances (more conservative than National Electric Safety Code [NESC] Section 23 requirements) at highest conductor operating temperature. The MF levels presented in Figures 1 through 7 and Tables 8 through 18 (Appendix U) are calculated at 1 meter above ground.

2.7.1.3. Existing Transmission Line EMF Calculations

A summary of the existing EMF calculations for the proposed Project are found in Tables 19 through 24 (Appendix U). Structure type drawings for the proposed Project are found in Figures 8 through11 (Appendix U).

The nominal voltages of the existing transmission lines affected by the proposed Project are 161 kV and 69 kV. The EFs in Figures 8 through11 and Tables 19 through 21 (Appendix U) are calculated using the maximum operating voltage, which is assumed to be 105 percent of the nominal voltage. For any specific design, the height of the set of phase conductors above ground has a marked influence on the maximum EF.

MF calculations for the existing lines in Figures 8 through11 and Tables 22 through 24 (Appendix U) are based on the summer peak and average (80 percent peak load) current flows under existing system conditions.

The values presented in the table are calculated at the low point (typically mid-span) of the transmission line where the conductor is closest to the ground. Vertical clearance measurements are based on Xcel Energy's minimum design clearances (more conservative than NESC Section 23 requirements) at highest conductor operating temperature. The MF levels presented in Figures 8 through11 and Tables 19 through 24 (Appendix U) are calculated at 1 meter above ground.

2.7.1.4. Current and Future EMF Estimates

All requirements for this section are satisfied in the EMF calculation tables and figures in Appendix U.

2.7.1.5. EMF Modeling Assumptions

EMF effects on transmission lines presented in Figures 1 through11 and Tables 1 through 24 (Appendix U) were obtained from ENVIRO, a software program, licensed by Electric Power Research Institute, Inc. (EPRI).

All information under this section (phase angles, pole design diagrams and height of lowest conductors at mid-span) are shown on the Figures 1 through11 (Appendix U).

2.7.2. *Existing Substations Affected by New Transmission Lines*

No existing substations would be impacted by the proposed Project.

2.7.3. *New Power Plants Requiring No Line Additions*

This Application does not involve a new generation source.

2.7.4. *Stray Voltage (Neutral to Earth Voltage – NEV)*

Except in rare situations, transmission lines do not alone create stray voltage. However, in some circumstances, transmission lines can induce stray voltage on nearby distribution lines that run parallel to the transmission line. Consistent with Xcel Energy's policy guideline on addressing this issue "Neutral to Earth (NEV) Consideration for Construction and Maintenance Projects – Version 1.0," the Applicants identified areas where the distribution line was located 150 feet or less from the proposed transmission line and paralleled it for 1,000 feet or more. After the areas were identified, a screening for any confined animal operations (CAO) within 0.50 mile was conducted as well as field verification. The complete CAO inventory is shown in Figure 12, Appendix U.

The results were reviewed by the affected distribution utilities (Xcel Energy and Riverland Power Cooperative). Where the criteria described above was met and when confined animal facilities were present, both distribution utilities choose to relocate distribution lines to remove the potential conflict. The costs to relocate the distribution lines are described in Section 2.1.7.

The Applicants would offer (to potentially affected landowners) the option to perform the appropriate testing on the CAO before and after the Project is placed in service, working in coordination with the cooperative and Commission staff. If, as a result of the testing, it is found that off-farm sources of stray voltage contribute more than 0.5 volts at this CAO and that problems have developed as a result of the Project, the Applicants would work with the cooperative to resolve any NEV issues. Prior to any testing, the Applicants would work with Commission staff, the local cooperative and landowners to determine the manner in which stray voltage measurements would be conducted and on which properties. The Applicants would report the results of the testing to Commission staff.

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2.8. WDNR Permits and Approvals

2.8.1. Joint Federal State Permit

A WDNR Utility Permit is anticipated to be required for this Project. Throughout the process of route evaluation and selection, the Applicants engaged with both WDNR and PSCW staff in the Project pre-application/consultation process described in Wis. Stat. § 30.025(1m). By participating in the consultation process, the Applicants were able to share information regarding the proposed Project with both agencies, receive and incorporate feedback on both the initial route segments and the later defined routes from the PSCW and WDNR, and ensure that CapX2020 Partnership's Utility Permit Application would contain all the data identified as being required by the PSCW and WDNR to review and permit the proposed Project.

The Applicants submitted Part 1 of an Application on September 20, 2010, as provided for in Wis. Stat. § 30.025(1b), (1e) and (1s) for all WDNR permits required for construction of the facilities proposed in this Joint Application. These permits include:

- Chapter 30 Permit to place temporary bridges in or adjacent to navigable waters, pursuant to Wis. Stat. § 30.123 and Wis. Admin. Code ch. NR 320;
- Wetland Water Quality Certification to discharge fill in wetlands, pursuant to Wis. Stat. § 28 1.36 and Wis. Admin Code chs. NR 103 and NR 299;
- Chapter 30 Permit to place miscellaneous structures within navigable waterways, pursuant to Wis. Stat. § 30.12 and Wis. Admin. Code ch. NR 329;
- Chapter 30 Permit for grading on the bank of a navigable waterway, pursuant to Wis. Stat. § 30.19 and Wis. Admin. Code ch. NR 341;
- WPDES Stormwater Discharge Permit pursuant to Wis. Stat. ch. 283 and Wis. Admin. Code ch. NR 216;
- Incidental take authorization pursuant to Wis. Stat. § 29.604 if the need for that permit is identified by WDNR;
- Any other applicable required permit, if the need for that permit is identified by the WDNR.

A copy of the WDNR Utility Permit Application, Part 1, is included in Appendix T. Detailed technical information supporting the application for permits is contained in this TSD and is being provided to the WDNR as Part 2 of CapX2020's Utility Permit Application by copy of this Joint Application.

2.8.1.1. Q1-Highway 35 Route

For the Q1-Highway 35 Route, temporary bridge crossings would be required at waterways as described in Section 2.4.12. The proposed locations are specified and enumerated in Table 1 (Appendix T) and are shown on Environmental Features Maps (Appendix D). These crossings require WDNR approval under Wis. Stat. Ch. 30.123. It appears that all of these waterways are less than 35 feet wide; however, full property access and inspection are required to provide accurate numbers. With the exception of the minimum clearance standard, all of the shorter span bridges are designed to meet the standards and conditions for TCSB crossings in Wis. Admin. Code NR § 320.04. The Applicants are requesting that the WDNR waive the clearance standard for all the shorter span bridge crossings as authorized by Wis. Admin. Code NR § 320.04(3). Approximate channel dimensions are detailed for each proposed bridge crossing location (where access was allowed) in Table 3 (Appendix T) and photographs are provided in Appendix A-5 for those waterways observed in the field. A typical detail drawing for each of the two types of bridges proposed is provided in Appendix T.

Transmission poles to be placed in wetlands on the Q1-Highway 35 Route are described in Section 2.4.13. The proposed locations are specified and enumerated in Table 1 (Appendix T) and the wetlands are shown on Environmental Features Maps (Appendix D). Placement of fill in wetlands and/or below the OHWM of federal navigable waterways may require approval under Section 404 of the Clean Water Act (CWA), or in the case of the Mississippi River, Section 10 of the Rivers and Harbors Act; water quality certification from the WDNR under Section 401 of the CWA; Wis. Stat. §§ 281.15, 281.31 and 281.36; Wis. Admin. Code ch. 299; and in some cases WDNR approval under Wis. Stat. § 30.12 (miscellaneous structures). The possible need for miscellaneous pole approval is identified in Table 1 (Appendix T) for wetlands contiguous with navigable waterways and relatively extensive areas that are presumably below the OHWM elevation, as is possibly the case along the Mississippi River. Pole spotting in such areas is unavoidable (refer to Section 2.4.12).

2.8.1.2. Arcadia Route and Arcadia-Alma Option

For the Arcadia Route and Arcadia-Alma Option, temporary bridge crossings would be required at waterways, as described in Section 2.4.12. The proposed locations are specified and enumerated in Table 1 (Appendix T) and are shown on Environmental Features Maps (Appendix D). These crossings require WDNR approval under Wis. Stat. Ch. 30.123. It appears that all these waterways are less than 35 feet wide; however, full property access and inspection are required to provide accurate numbers. With the exception of the minimum clearance standard, all of the shorter span bridges are designed to meet the standards and conditions for TCSB crossings in Wis. Admin. Code NR 320.04. The Applicants are requesting that the WDNR waive the clearance standard for all the shorter span bridge crossings as authorized by Wis. Admin. Code NR § 320.04(3). Approximate channel dimensions are detailed for each proposed bridge crossing location (where access was allowed) in Table 3 (Appendix T) and photographs are provided in Appendix T for those waterways observed in the field. A typical detail drawing for each of the two types of bridges proposed is provided in Appendix T.

Transmission poles to be placed in wetlands on the Arcadia Route and Arcadia-Alma Option are described in Section 2.4.13. The proposed locations are specified and enumerated in Table 1 (Appendix T) and the wetlands are shown on Environmental Features Maps (Appendix D). Placement of fill in wetlands and/or below the OHWM of federal navigable waterways may require approval under Section 404 of the CWA, or in the case of the Mississippi River, Section 10 of the Rivers and Harbors Act; water quality certification from the WDNR under Section 401 of the CWA; Wis. Stat. §§ 281.15, 281.31 and 281.36; Wis. Admin. Code ch. 299; and in some cases the WDNR approval under Wis. Stat. § 30.12 (miscellaneous structures). The possible need for miscellaneous structure approval is identified in Table 1 (Appendix T) for wetlands contiguous with navigable waterways and have relatively extensive areas that are presumably below the OHWM elevation, as is possibly the case along the Mississippi River. Pole spotting in such areas is unavoidable (refer to Section 2.4.12).

2.8.1.3. Q1-Galesville Route

For the Q1-Galesville Route, temporary bridge crossings would be required at waterways, as described in Section 2.4.12. The proposed locations are specified and enumerated in Table 1 (Appendix T) and are shown on Environmental Features Maps (Appendix D). These crossings require WDNR approval under Wis. Stat. Ch. 30.123. It appears that all these waterways are less than 35 feet wide; however, full property access and inspection are required to provide accurate numbers. With the exception of the minimum clearance standard, all of the shorter span bridges are designed to meet the standards and conditions for TCSB crossings in Wis. Admin. Code NR § 320.04. The Applicants are requesting that WDNR waive the clearance standard for all the shorter span bridge crossings as authorized by Wis. Admin. Code NR § 320.04(3). Approximate channel dimensions are detailed for each proposed bridge crossing location (where access was allowed) in Table 3 (Appendix T), and photographs are provided in Appendix T for those waterways observed in the field. A typical detail drawing for each of the two types of bridges proposed is provided in Appendix T.

Transmission poles to be placed in wetlands on the Q1-Galesville Route are described in Section 2.4.13. The proposed locations are specified and enumerated in Appendix T, Table 1 and the wetlands are shown on Environmental Features Maps (Appendix D). Placement of fill in wetlands and/or below the OHWM of federal navigable waterways may require approval under Section 404 of the CWA, or in the case of the Mississippi River, Section 10 of the Rivers and Harbors Act; water quality certification from the WDNR under Section 401 of the CWA; Wis. Stat. §§ 281.15, 281.31, and 281.36; Wis. Admin. Code ch. 299; and in some cases, WDNR approval under Wis. Stat. § 30.12 (miscellaneous structures). The possible need for miscellaneous structure approval is identified in Table 1 (Appendix T) for wetlands contiguous with navigable waterways and have relatively extensive areas that are presumably below the OHWM elevation, as is possibly the case along the Mississippi River. Pole spotting in such areas is unavoidable (refer to Section 2.4.12).

2.8.2. Wetlands Alternatives Analysis

2.8.2.1. Wetlands and Route Selection Process

During initial Project planning, environmental and social impacts, along with engineering feasibility and costs, were evaluated along 106 different line segments that could potentially be used to route a transmission line between Alma and the proposed Briggs Road Substation. The initial Project planning and route selection process are described in Sections 2.2.2 and 2.2.3.

Following this initial evaluation, three routes were identified for further evaluation and refinement. Proposed alignments along these routes were chosen based on a number of factors, including landowner input, engineering design criteria, impacts to residences and impacts to environmental features, including wetlands, waterways and forested areas. These routes are detailed in Section 2.4.

2.8.2.2. Wetland Avoidance and Minimization

All proposed routes would avoid and minimize wetland impacts where practicable. However, given the extent of wetlands in the area and pole spanning requirements, wetland impacts cannot be completely avoided along the routes. Based on standard design elements, transmission poles would typically span 600 to 1,000 feet. The distance is dependent upon several factors, including topography and ROW constraints. Shorter spans of about 300 feet were designed for Segments 2A1, 2A2 and 2A3 due to aesthetic considerations associated with the GRR/WI-35. These factors can restrict the Applicants' flexibility to completely avoid pole placement in wetlands. When possible, poles and foundations to be used in large wetland complexes such as the Black River floodplain and within the Mississippi River bottoms, would be designed to minimize wetland impacts, including vibratory caisson foundation design, minimizing angles to allow for smaller pole size and the installation of ladders to lessen the impacts during future maintenance. Refer to the Black River Construction Plan in Appendix J and Section 2.5.4 for further discussion of construction access methods within wetlands.

The number of poles preliminarily determined to be placed in wetlands represents a conservative estimate based on conceptual pole locations, as discussed in Section 2.4.13.3, and is further detailed by wetland in Tables 1 and 3 (Appendix T).

Upon route approval, the Applicants would attempt to further minimize wetland impacts in final design. For example, where possible, efforts would be made to move poles near a wetland edge or outside of the wetland. However, based on the number and extent of wetlands along each route, complete avoidance is not likely.

Access through wetlands would also be minimized to the maximum extent practicable. For example, if construction occurs during periods when the ground is not frozen or dry, wetlands occurring along most roads would be accessed from the adjacent roadway near the pole location, which would eliminate the need for heavy equipment access through the entire length of the wetland if practicable. However, it is unlikely that access to poles would be allowed from restricted access roads, such as US-53 or other state highways, at the discretion of WisDOT. In these instances, access along the entire length of these wetlands may be required unless alternate arrangements are made with WisDOT or private landowners.

As discussed in Section 2.5.4.1, the Applicants are continuing to evaluate conditions in the wetlands adjacent to the Mississippi River. If conditions allow, the Applicants would avoid or minimize the use of temporary fill for access in this area.

2.8.2.3. Construction and Restoration Methods to Minimize Wetland Impacts

The use of heavy equipment in wetlands would be minimized to the extent practical. When wetland access is required, disturbance to wetlands would be reduced by implementation of several specialized construction techniques described in Section 2.5.4. These techniques may include timing wetland construction during dry or frozen conditions, construction of ice roads and the use of low ground pressure equipment and/or construction matting materials to minimize soil and vegetation disturbances. In the wetlands adjacent to the Mississippi River, one of the potential construction methods may require the use of temporary fill for access.

Upon completion of the transmission line, the Applicants would complete site restoration and revegetation, consistent with the activities described in Section 2.5.5.

2.8.3. Stormwater Management

Coverage under the general permit for stormwater discharges associated with land disturbing construction activities is being requested in the WDNR Utility Permit Application, Part 1, and is further described in Section 2.5.6.

2.8.4. Endangered and Threatened Species Incidental Take

As described in Section 2.4.8, an evaluation of potential impacts to rare, endangered and threatened species was submitted under separate cover. The need for Incidental Take Authorization would be determined based on consultation with the WDNR. The Applicants would work with the WDNR to develop and implement avoidance protocols for identified threatened or endangered species for the approved route. However, if complete avoidance cannot be achieved, the Applicants would consult the WDNR to determine whether Incidental Take Authorization is necessary. Refer to Section 2.4.8 for additional discussion of Threatened and Endangered Species.

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2.9. Other Agency Correspondence

2.9.1. Applicants' State, Federal and Local Government Correspondence

The Applicants began engaging interested agencies in July 2007 with a notice letter of the CON application filing with the MPUC. The notice letter of the CON was the first phase of the CapX2020 Hampton-Rochester-La Crosse 345 kV Transmission Project process and included information on the proposed Project and contact information. The Applicants received agency comments throughout the process. Pre-application agency meetings pertinent to the Project are included in Table 2.9-1.

Table 2.9-1:
Agency Meetings Held During the Pre-Application Process

Agencies	Date
USFWS Project Kick-off Meeting	January 25, 2008
WDNR and PSCW Coordinated Filing, Fieldwork and Process Management Meeting	February 26, 2008
RUS Introduction Meeting	March 19, 2008
WDNR Field Survey Plan Review Meeting	March 28, 2008
Interagency Meeting (RUS, USACE, USFWS, PSCW, WDNR, MnDNR, MPUC, MNDOC)	April 2, 2008
RUS NEPA Process Determination Meeting	April 30, 2008
Mississippi River Parkway Commission / USFWS	August 8, 2008
RUS NEPA Process and RUS Role Determination Meeting	September 3, 2008
WisDOT Update	September 4, 2008
PSCW Project Update Meeting	September 8, 2008
USFWS Update and Mississippi River Crossing	November 12, 2008
Mississippi River Parkway Commission Field Trip	January 29, 2009
WisDOT Update	February 3, 2009
USFWS Mississippi River Crossing Discussion	February 11, 2009
PSCW and WDNR Update Meeting	February 12, 2009
WDNR Project Update	March 20, 2009
RUS Review of Alternative Evaluation Study (AES) and Macro-Corridor Study (MCS) and Scoping Process Meeting	April 23, 2009
WDNR Endangered Species Survey Plan	May 8, 2009
RUS Agency Scoping Meeting in La Crosse, Wisconsin	June 23, 2009
RUS and State (Wisconsin and Minnesota) Agency Coordination Meeting	August 31, 2009
RUS and USACE Coordination Meeting	September 22, 2009
RUS and Resource Agency Coordination Meeting	October 21, 2009
WisDOT Coordination	January 29, 2010
PSCW Route Review Net Meeting	February 10, 2010
PSCW and WDNR 2010 Field Work Coordination Meeting	February 24, 2010

Agencies	Date
USFWS Federal Lands	April 6, 2010
PSCW and WDNR Pre-Application Meeting	April 13, 2010
USFWS Routing Update	May 25, 2010
USFWS Routing Update	June 18, 2010
WisDOT Great River Road Coordination	July 29, 2010
PSCW, WDNR and USFWS Coordination Meeting	August 13, 2010
WisDOT Great River Road Coordination	August 31, 2010
WisDOT Great River Road Coordination	September 8, 2010
WDNR Update	September 15, 2010
USACE Update	October 22, 2010

2.9.1.1. Federal Agencies

Coordination with federal agencies included meetings with RUS in March 2008, April 2008, September 2008, November 2008 and March 2010. The topics of these meetings included discussions of the schedule, the NEPA and Section 106 process, MCS and AES documents, and the public scoping meetings schedule. RUS participated in the April 2008 interagency meeting held where agencies and the Applicants discussed the Project, potential Mississippi River crossing locations, permitting requirements and the Field Survey Plan. RUS sent a letter to tribal cultural leaders in May 2010 with information about the conference call and update on the spring field visit.

The USACE provided concurrence with the 2008 Field Survey Plan. The USACE attended the interagency meeting in April 2008.

The USFWS met with the Applicants in January 2008 for a Project overview and introduction meeting. The agency also attended the April 2008 interagency meeting and another interagency meeting in August 2010. The USFWS issued a letter to the Applicants in April 2008 with feedback and information regarding the proposed Mississippi River Crossings. The USFWS met with the Applicants in November 2008 to discuss the preliminary engineering of the river crossing analysis. The USFWS issued a letter to the Applicants in April 2009 providing concurrence with the review of federally-listed species, candidate species and critical habitat in the Project area. The Applicants met with the USFWS, WDNR and PSCW at the Trempealeau National Wildlife Refuge in August 2010 to discuss the Project. The USFWS followed up, issuing a letter to the Applicants in August 2010 to provide direction regarding the Black River crossing through the Black River floodplain.

RUS had a conference call in April 2010 with tribal representatives, historical societies and other interested parties to set a date and location for local meetings to discuss the Project. The agency then conducted informational meetings (in Wabasha, Minnesota and La Crosse, Wisconsin) and site visits with the tribes in May 2010. The meeting structure and venues allowed participants to ask questions as well as visit the three river crossing sites. In June 2010, RUS sent a letter to tribal cultural resource representatives regarding the May 2010 informational meetings and site visit.

Copies of agency letters are organized by each federal agency and included in Appendix P.

2.9.1.2. Wisconsin Agencies

2.9.1.2.1. WDNR/PSCW

Coordination with WDNR and PSCW staff occurred through approximately two and a half years beginning in early 2008. Staff from both agencies often attended coordination meetings, therefore the two agencies are addressed together in the following discussion.

Early coordination in the spring of 2008 consisted of discussions of the three potential Mississippi River crossings, potential substation endpoints, potential routes and sensitive areas. A separate WDNR meeting was held to discuss environmentally sensitive areas and field survey details. During these meetings the WDNR voiced concerns about expanding the existing La Crosse Substation in the surrounding wetland area and routing through the Black River area northwest of Holmen.

During the summer of 2008, a meeting was held to discuss potential routes. At this time, all three Mississippi River crossing locations were being studied and only the Q1 Route corridor was actively being studied between Alma and Holmen. The possibility of adding routes, such as Arcadia and Blair, were discussed but not proposed at this time.

In early 2009, the Applicants met with PSCW and WDNR staff and introduced several new route corridors that were being included in the scope of route studies. These route corridors included the Bluff Route segment, Arcadia and Blair routes. These additional route segments were added to the scope of the Applicants study based on input and concerns brought up through previous consultation with WDNR, other agencies and public input. At this meeting the Applicants began discussing routes to be included in Application.

A meeting with La Crosse area WDNR staff along with PSCW and WDNR Office of Energy staff was held in March 2009. At this meeting, the WDNR indicated that potential expansion of the La Crosse Substation in the surrounding wetland was not a permittable action. WDNR also indicated that routes through the La Crosse Marsh (the wetland surrounding the La Crosse Substation in central La Crosse) may not be permittable through the WDNR. WDNR also indicated that routes through the Black River floodplain may not be permittable.

In May, 2009 another field survey and endangered species evaluation meeting was held to address the Arcadia route which the Applicant proposed as a likely route to be included in the CPCN.

During August, 2009, the WDNR and PSCW participated in a joint agency meeting where interstate coordination and Mississippi River crossings were discussed.

As route development continued through the fall and winter of 2009, it became apparent that routing data supported the use of a single Mississippi River crossing at Alma. By every measure data on both sides of the Mississippi River supported using the Alma river crossing as an endpoint. A meeting held on April 13, 2010, included PSCW and WDNR staff and discussed proposed routes between Alma and Holmen. The three routes included in this application were discussed (Q1, Arcadia and the Q1-Galesville routes). The meeting included a detailed discussion of the Q1 Route through the Black River area including a discussion of potential permanent and temporary impacts outlined in the Applicants' construction plan for the original Q1 alignment through the Black River floodplain (the construction plan for the original Q1 Route through the Black River Floodplain is included in Appendix N).

The WDNR also participated in an August 13, 2010 meeting with the USFWS where the USFWS indicated that the original Q1 Route through the Black River floodplain was not permittable through the portion of the alignment on federal lands.

A final WDNR meeting was held in September, 2010. The Applicants described the three routes included in this Application. The WDNR indicated that the Q1-Highway 35 Route was not considered a permittable route by the WDNR. The Applicants indicated that the route would be included in the Application unless there was a stated legal or regulatory reason the route could not be permitted. Applicants explained that the route should be considered in the CPCN process because it is the most direct route that complies with Wisconsin's siting priorities and that the WDNR had not provided a legal or regulatory reason why the route could not be permitted.

2.9.1.2.2. WisDOT

The Applicants initiated communications with WisDOT beginning in March 2008 to discuss agency coordination and appropriate contacts. The Applicants met with WisDOT in September, 2008 to introduce the Project and get WisDOT feedback. The meeting focused on WisDOT's aesthetic impact concerns and the presence of scenic easements along the GRR/WI-35. The Applicants met again with WisDOT in February 2009 to discuss transmission line routes and WisDOT the GRR/WI-35 concerns.

In order to assess potential aesthetic impacts and to interpret scenic easement restrictions, the Applicants prepared a Draft Visual Assessment Memo and provided it to WisDOT in January 2010. The Visual Assessment Memo provided a series of photo simulations showing what the proposed Project would look like along the GRR/WI-35. Also presented in the memo was the Applicants interpretation that the scenic easements recognized electric transmission lines as permitted uses within the scenic easements.

The Applicants reviewed the Visual Assessment Memorandum with WisDOT and WI-MRPC staff on January 29, 2010. During that meeting, WisDOT requested four additional photo simulations and suggested a new alignment for a section of the route south of Cochrane. The Applicants revised the draft Visual Assessment Memorandum and provided it to WisDOT and the WI-MRPC on April 21, 2010.

In response to requests from WisDOT for updated mapping, the applicants developed a "flyover" video of the Q1 Route. The video was presented at a meeting held on July 29, 2010. The video included overlays indicating locations of existing road right of way, scenic easements, existing transmission line rights of way and the location of the proposed transmission line route. In addition to presenting the video, the Applicants also presented adjustments to the Q1 Route alignment that were done in response to suggestions made at the January 29, 2010 meeting. The major change in alignment presented at this meeting was to move the proposed route from the existing 161 kV alignment on the east side of the GRR/WI-35 to the west side for a 1.5 mile stretch south of Cochrane . This change would consolidate all proposed and existing transmission on the west side of the road away from the bluffs to a location where there are no scenic easements.

Another meeting was held on August 31, 2010 with WisDOT and WI-MRPC staff. The meeting participants discussed potential alignments along WI-93 south of Galesville where WisDOT the Applicants to minimize the number of highway crossings. The pre and post-applications processes were discussed. Both WisDOT and WDNR suggested the Q1 Route was not permittable but were not able to provide documentation demonstrating why it was not permittable. WisDOT strongly encouraged the Applicants to avoid the GRR/WI-35 corridor and propose other routes instead. WisDOT also indicated that it would respond to the Applicants scenic easement interpretation of transmission lines being a permitted use.

On September 8, 2010, another meeting was held with WisDOT to discuss the Q1 Route and to further refine the route to minimize visual impacts to the GRR/WI-35. At this meeting, WisDOT suggested several route alignments and pole placement changes as well as specifying which poles would be weathering steel or galvanized. WisDOT also asked for several more photosimulations and updating of all previous photosimulations to characterize all the changes the Applicants have made based on WisDOT input. A revised and finalized Visual Assessment Memo was provided to WisDOT on November 18, 2010.

The Applicants believe that the coordination described above has resulted in the Q1-Highway 35 Route proposed in this Application being optimized to minimize aesthetic impacts. Applicants also contend that the scenic easements in place along the GRR/WI-35 allow transmission poles as a permitted use. Nevertheless, the Applicants have worked with WisDOT to minimize the number of poles proposed to be constructed in scenic easements. Furthermore, as detailed in Section 2.2.3.1.6.1.1, the Applicants proposed Q1-Highway 35 Route would reduce the number of poles in the scenic easements from 51 to 15.

Copies of the letters are organized by each Wisconsin state agency and included in Appendix P.

2.9.1.3. Local Units of Government

The Applicants organized meetings with the local units of government, including counties, towns, cities and regional planning organizations. All cities and towns in the Project corridor were contacted and given an opportunity to request an informational meeting. These meetings allowed coordination with local governments to participate in the route refinement process.

The Applicants sent a letter to all local units of government in September 2008, notifying them of the upcoming Minnesota RPA filing and indicating that the Applicants were available to discuss the Project if requested. The following local governmental units attended the agency scoping meetings in La Crosse: La Crosse County, La Crosse County Zoning and Planning Department, city of La Crosse, city of Onalaska and the town of Onalaska Planning and Zoning Department. The Applicants met with local governmental units (LGUs) throughout the life of the Project to discuss the Project details and potential routing issues specific to each local area. The LGUs meeting schedule is provided in Table 2.9-2.

Table 2.9-2:
Local Government Meetings Held during the Pre-Application Process

Local Government Unit	Meeting Date
Mississippi River Parkway Commission / USFWS	August 8, 2008
Alma City Council	October 6, 2008
Mississippi River Regional Planning Commission	October 8, 2008
La Crosse County Planning, Resource and Development Committee	October 27, 2008
Trempealeau County Supervisors	November 12, 2008
Mississippi River Parkway Commission	January 29, 2009
Town of Arcadia	May 26, 2009
La Crosse County Planning, Resource and Development Committee	June 1, 2009
Village of Holmen	September 28, 2010
City of Galesville	November 8, 2010

2.9.2. Agency Responses to Applicants' Inquiries

Copies of agency correspondence with the Applicants concerning the proposed Project are included in Appendix P. Communication with agencies is described below.

2.9.2.1. Wisconsin Department of Transportation

Several segments are parallel to existing state road ROWs or cross state roads. A WisDOT ROW permit is required for working within a state road ROW. WisDOT defines work as the surveying, excavating, placement of fill material, grading, installation of an overhead line or blocking traffic. The transmission line would also have to comply with the Utility Accommodation Policy (Highway Maintenance Manual, Chapter 96).

The WI-MRPC provided a letter dated September 10, 2008. The letter outlined concerns with routes along the GRR/WI-35. The WisDOT has indicated that it intends to provide an assessment of scenic easement restrictions. The Applicant has not received this as of the date of application.

2.9.2.2. Wisconsin Department of Agriculture, Trade and Consumer Protection

If the proposed Project impacts more than 5 acres of agricultural land, then an agricultural impact statement may be required by the DATCP. The department would perform an analysis based upon required information submitted by the Applicants and determine the impacts to the land as well as economic impacts. The impacts would also include identification of crops, livestock buildings and other agricultural operations that would be impacts by the transmission line.

2.9.2.3. Wisconsin Historical Society

Archaeological and historical resource information is included in Appendix P. The PSCW's Historic Preservation Officer reviews the information and, if necessary, consults with the historical society.

Section 2.4.9 contains additional information on archaeological and historic resources potentially affected by the proposed Project.

In May 2010, representatives from the La Crescent Area Historical Society, Onalaska Area Historical Society and the Mississippi Valley Historical Society attended the informational meeting and site visit hosted by RUS.

2.9.2.4. Wisconsin Department of Natural Resources

In a September 2008 email, the WDNR approved the Field Survey Plan submitted as part of the early planning process. The department mailed a letter to the Applicants in May 2009 reviewing the March 2009 meeting and discussed concerns regarding the potential impacts of the transmission line and substation expansion in the La Crosse Marsh. In a separate letter dated May 2009, the department reviewed the March 2009 meeting and discussed concerns about the potential impacts of the transmission line on the Black River floodplain.

2.9.3. Agency Permits

2.9.3.1. Local Zoning Permits

Once the PSCW issues a CPCN, the decision is controlling over local ordinances relating to any matter the PSCW address or could have addressed in the administrative proceeding. Wis. Stat. 196.491(3)(i); American Transmission Co. v. Dane County, No. 2008AP2604, 772 N.W.2d 731 (Wis. Ct. App., 2009).

Discussions with local units of government have taken place regarding construction related permits (where applicable) for such matters as construction in ROWs, temporary storage of poles in road ROWs, oversize load limitations, weight restrictions and driveway permits. The Applicants will coordinate with the local units of government on these issues once a CPCN has been issued.

2.9.3.2. Federal Permits

Federal permits and approvals are required by several agencies. RUS requires compliance with NEPA as well as the preparation of an EIS. The USACE requires a Section 404 Permit for compliance with the CWA and a Section 10 Permit for compliance with the River and Harbors Act. If applicable, the FAA requires completion of Form 7460, Notice of Proposed Construction or Alteration near an airport. The USFWS requires a Special Use Permit if the Project crosses a wildlife refuge and compliance with Section 7 of the Endangered Species Act (ESA), Bald and Golden Eagle Protection Act (BGEPA) and Migratory Bird Treaty Act (MBTA).

The USACE granted a General Permit in May 2010 to allow geotechnical exploration in the form of soil borings between Alma and La Crosse, Wisconsin. The permit is valid until April 16, 2011.

2.9.3.3. Other Permits

Any construction within state or federal highway ROW, or the crossing of those highways would require a WisDOT permit. The link to the permit is:
http://www.dot.wisconsin.gov/forms/docs/dt1553.doc

All construction within highway ROW would be subject to WisDOT's Utility Accommodation Policy. That policy can be found at:
http://www.dot.wisconsin.gov/business/rules/property-96.htm

Oversize vehicle loads are governed by Wisconsin statutes, with reference at:
http://www.legis.state.wi.us/statutes/Stat0348.pdf

Required permits and approvals required for the Project are included in Table 2.9-3.

Table 2.9-3:
Required Permits and Approvals

Jurisdiction	Permits and Approvals
Federal	
U.S. Department of Agriculture – Rural Utility Service	NEPA Compliance – Environmental Impact Statement (7 C.F.R. § 1794) Section 106 National Historic Preservation Act Compliance
U.S. Army Corps of Engineers	Nationwide Permit or Individual Permit – Section 404 of the CWA (33 U.S.C. § 1251) Section 10 Permit of the Rivers and Harbors Act of 1899 (33 U.S.C. § 403) for crossing the Mississippi River
Federal Aviation Administration	Form 7406-1, Objects Affecting Navigable Airspace (14 C.F.R. § 77)
U.S. Fish and Wildlife Service	Use authorization if ROW required on Wetland Management District Lands (Standard Form 299) Special Use Permit for crossing a National Wildlife Refuge Section 7 of the Endangered Species Act of 1973 (16 U.S.C . §1531-1544; 50 C.F.R. § 22 Consultation) Bald and Golden Eagle Protection Act (16 U.S.C. § 668, 50 C.F.R. §2 2) Migratory Bird Treaty Act (16 U.S.C. § 701-712)
Environmental Protection Agency	Spill Prevention, Control and Countermeasure Plan (40 C.F.R. § 112)
U.S. Department of the Treasury, Bureau of Alcohol, Tobacco, Firearms and Explosives	Explosive Users Permit
State of Wisconsin	
Public Service Commission of Wisconsin	Certificate of Public Convenience and Necessity
Wisconsin Department of Natural Resources	Joint state-federal application for impacts to waterways and wetlands (may also include Wisconsin Chapter 30 application) Indication of Endangered/Threatened Species Incidental Take Authorization Construction Site Erosion Control and Stormwater Discharge Permit National Pollutant Discharge Elimination System (NPDES) Permit General Utility Crossings Permit for Wetlands Section 401 Water Quality Certification (if 404 Permit is required by the US Army Corps of Engineers)

Jurisdiction	Permits and Approvals
Wisconsin Department of Agriculture, Trade and Consumer Protection	Agricultural Impact Statement Notification Packet
Wisconsin Department of Transportation	Application to Construct and Operate Utility Facilities on Highway ROW (Form DT 1553) Access Driveway Permit Drainage Permit (may be required)
Wisconsin Historical Society/Office of Preservation Planning	National Historic Preservation Act, Section 106 compliance
Local Government	
County, Town, City	Right-of-Way Usage Permit Over-Width Load Permit Road Crossing Permit Driveway/Access Permit from county/local roads General planning coordination for utilities/energy
Other	
Approval to cross lands with conservation easements	Various, depending on program, including USDA, Natural Resources Conservation Service and local implementing governmental entities

2.9.3.4. Contact Information

Table 2.9-4 provides the contact information for each regulatory agency.

Table 2.9-4:
Agency Contact Information

Agency	Contact Information
Federal	
Federal Aviation Administration	Bruce Beard National Operations Manager for the Obstruction Evaluation Services 2601 Meacham Boulevard Fort Worth, Texas 76137-4298 (817) 222-5600
US Army Corps of Engineers	David Studenski / Bruce Norton 1114 South Oak Street La Crescent, Minnesota 55947-1338 (507) 895-8059
US Fish and Wildlife Service	Kevin Foerster Upper Mississippi River Refuge Manager 51 East 4th Street Winona, Minnesota 55987 (507) 452 4232
State	
Public Service Commission of Wisconsin	Bob Norcross, Administrator, Gas & Energy Division 610 North Whitney Way P.O. Box 7854 Madison, Wisconsin 53707-7854 (608) 266-0699
Wisconsin Department of Agriculture and Consumer Protection	Peter Nauth, Director Agricultural Impact Program P.O. Box 8911 Madison, Wisconsin 53708-8911 (608) 224-4650
Wisconsin Historical Society (SHPO)	Mary Georgeff 816 State Street Madison, Wisconsin 53706 (608) 264-6498

Agency	Contact Information
Wisconsin Department of Natural Resources (cross state lands)	DNR West Central Region Headquarters 1300 West Clairemont Avenue P.O. Box 4001 Eau Claire, Wisconsin 54702-4001 (715) 839-3700
Wisconsin Department of Natural Resources (wetlands)	DNR Service Center 1701 North 4th Street Superior, Wisconsin 54880
Wisconsin Department of Transportation	Richard Ricksecker WisDOT Utility Coordinator, NW Region 718 West Clairemont Avenue Eau Claire, Wisconsin 54701 (715) 833-5560 Gary Jackson Utility Coordinator Division of Transportation System Development Southwest Region - La Crosse Office 3550 Mormon Coulee Road La Crosse, Wisconsin 54601 (608) 785-9032
Local	
La Crosse Area Planning Committee	Tom Faella, Executive Director La Crosse County Administrative Center Room 2300 400 North Fourth Street La Crosse, Wisconsin 54601
Mississippi River Regional Planning Council	Greg Flogstad, Director 1707 Main Street Suite 435 La Crosse, Wisconsin 54601 (608) 785-9396
Buffalo County	Paul van Eijl, Zoning Administrator 407 South Second Street PO Box 492 Alma, Wisconsin 54610-0492 (608) 685-6218

Agency	Contact Information
La Crosse County Zoning, Planning and Land Information	Jeff Bluske, Director County of La Crosse Administration Center Room 3170 400 4th Street North La Crosse, Wisconsin 54601 (608) 785-9722
Trempealeau County Land Management Department	Kevin Lien, Director & Emery Palmer, Zoning Specialist 36245 Main Street PO Box 67 Whitehall, Wisconsin 54773 (715) 538-2311

2.10. Property Owner Information

2.10.1. Contact Lists

Separate alphabetized lists are provided in Appendix I and as Microsoft© Excel files for the following:

2.10.1.1. Property Owners

A list of property owners along each alternative route was compiled and includes property owners along both sides of streets or roads as well as other linear corridors, adjacent landowners on cross-country segments and property owners adjacent to the proposed Briggs Road Substation. This list is alphabetized by county and is provided in Appendix I.

Buffalo County has digital parcel mapping available to the public, which is shown on the general Route Maps, Appendix C. Upon review, the Applicants determined that the GIS parcel mapping reflected inaccurate landowner data. The Applicants hired a local abstractor to determine appropriate landowner identification as outlined above. The Buffalo County landowner list (Appendix I) reflects the abstracted parcel information.

2.10.1.2. Public Property

A list of publicly owned property along and adjacent to the route centerlines for the alternative routes and substation is provided in Appendix I.

2.10.1.3. Clerks

A list of clerks of cities, villages, towns, counties and Regional Planning Commissions affected by the Project is provided in Appendix I.

2.10.1.4. State and Federal Agencies

State and federal agencies with which the Applicants are or would interact as a result of this proposed Project include the WDNR, WisDOT, USACE, Wisconsin Bureau of Aeronautics, the FAA, USFWS and DATCP. A mailing list for these agencies can be found in Appendix I.

2.10.1.5. Libraries and Print and Broadcast Media

Libraries within the Project area and media contacts are listed in Appendix I.

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