2.1 DEVELOPMENT OF ALTERNATIVES

As discussed in Section 1, Dairyland needs additional transmission capacity and intends to apply to RUS for financing assistance for its 11% ownership interest in the Proposal. RUS' decision is whether or not to provide the financing assistance for Dairyland's Proposal.

2.1.1 NEPA Evaluation Process and Criteria

Under the CEQ regulations established to implement NEPA,[61] RUS is required to identify and evaluate reasonable alternatives to the Proposal, as well as the no action alternative. Reasonable alternatives are those that are "practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant" (CEQ 1981, Question 1). In determining reasonable alternatives, RUS is required to consider a number of factors that may include, but are not limited to "the proposed action's size and scope, state of the technology, economic considerations, legal considerations, socioeconomic concerns, availability of resources, and the timeframe in which the identified need must be fulfilled."[62]

2.1.2 Previous Studies

RUS has established procedures for determining if a proposed project for which a loan or loan guarantee is sought is both technically and financially feasible. Following RUS' procedures, Dairyland prepared several studies prior to this EIS, including an Alternatives Evaluation Study (AES) and a Macro- Corridor Study (MCS) that were subject to RUS' review and approval (Dairyland 2009a and 2009b). The studies were made available for public and agency comment and review during the scoping period. The information and analyses from the AES and the MCS are incorporated by reference into this Final EIS.

[61] 40 CFR 1500 - 1508
[62] 7 CFR 1794.12

2.2 ALTERNATIVES CONSIDERED BUT NOT STUDIED IN DETAIL

This section discusses both transmission and non-transmission alternatives to meet the purpose and need for Dairyland's action as described in Section 1.1.2.3.

The non-transmission alternatives evaluated each have the potential, at least conceptually, to reduce loadings on transmission lines either by decreasing demand or by providing electricity by means of generating units that do not use the potentially overloaded lines. See the *Community Reliability* subsection in Section 1.1.2.1 for a discussion of the potentially overloaded transmission lines.

Transmission alternatives include the use of new or existing lines other than those included in the Proposal, in addition to Proposal route alternatives that are not evaluated in detail.

2.2.1 Demand Side Management

The AES evaluated the two components of demand side management, load management and conservation. Demand side management is important for reducing the need for both new generation and transmission facilities. However, as explained in the AES, demand side management and energy efficiency are measures that are already incorporated into a utility's projections and therefore are not available to further reduce load (Dairyland 2009b, pp. 3-14 and 3-15**). In other words, when utilities project future electricity needs, their projections include the expected effects of DSM. MISO likewise includes the effects of DSM in its growth projections (Webb 2012 p. 4).**

While there is the potential that future legislative or private action may result in implementation of additional DSM measures beyond those already incorporated into projections, these potential future measures are speculative.

Because DSM is already included in the projections upon which the need for the Proposal is based, it cannot independently meet the need for community or regional reliability. DSM would also not address the need for generation outlet.

2.2.2 Use of Existing Generation and/or Transmission Lines

2.2.2.1 Rochester Area Generation

The AES also evaluated the use of the RPU's existing generating units in the Rochester area. Use of these internal units could reduce some of the demand on the incoming, overloaded lines. These facilities consist of old coal-burning units and gas combustion turbines, plus two very small hydroelectric plants. The oldest gas combustion unit is scheduled to be retired by 2015, as are the three oldest coal-burning units. Furthermore, the capacity on the remaining coal unit may need to be reduced by approximately 10 MW based on new emissions controls (Dairyland 2009b, pp. 3-15 and 3-16). Regardless, because of the long ramp-up times required for coal units, the coal units are not useful to address peaking needs, which is when the reliability issues occur.

In his testimony in the PUC hearings on behalf of MISO, Jeffrey Webb explained that MISO considered the local RPU generation in its analysis. He reported that in the 2011 peak period study, "even with all the local generation on we found numerous line overload conditions will result for various combinations of facility-forced outages" (Webb 2008, p. 27). Outages do occur and need to be accounted for. MISO is required by NERC standards to consider the potential for transmission line and generator forced outages in its reliability analyses.

Of course, the system overloads were greater in the modeled scenarios that did not include all the local generation (Webb 2008, p. 27). In summary, as Webb stated, "there are no local generation dispatch options that will provide solutions into the future" (Webb 2008, p. 29). **MISO's updated analysis, discussed in Section 1.1.2.1, supports the same conclusion (MISO 2012 p. 3).**

2.2.2.2 La Crosse Area Generation

As discussed in the *Community Reliability* subsection of Section 1.1.2.1, there has been some controversy aired before the PSC about whether the oil-fired Units 3 and 4 at French Island, which are located within La Crosse, could meet the community reliability part of the need for La Crosse. Unit 3 is currently inactive and would need major repairs to be operable and Unit 4 is operated only 5 to 10 hours per year (Beuning 2012a, p. 3;

Hubbuch 2012). Petroleum-fired electric generating units are very expensive to operate. Primarily because of rising fuel costs, petroleum as fuel for generating electricity has declined dramatically since Units 3 and 4 were built, and by 2010 accounted for less than 1% of electricity generated in the US (EIA 2011b, EIA 1998 pp. 57 and 58). There are also concerns about the increase in truck traffic for fuel delivery and the ability of the units to meet emission limits related to existing and proposed air pollution regulations.

In its brief entry into the PSC docket for the CPCN application, MISO stated that the French Island generating Unit 4 "cannot be relied upon under NERC standards and approved MISO business practices to be the only generator available to mitigate a serious contingency in the La Crosse area. NERC rules are the foundation for the MISO business practices that determine whether the transmission system will meet the performance requirements under the NERC prescribed contingency testing" (MISO 2012 p. 6). Even if the inactivated Unit 3 were repaired and made operational, NERC and MISO standards would not be met (MISO 2012 p. 6). MISO reported that Units 3 and 4 "would not support NERC and MISO standards that require that where there is uncertainty about the viability of any existing generation unit over the planning horizon, additional generating units must be available to provide the needed capacity to maintain loadings and voltages, without reliance on any single unit. "With no additional uncommitted units available in the area, the 345 kV project is needed as a substitute for generation in the local area" (MISO 2012 p. 6).

2.2.2.3 Reconductoring Existing Transmission Lines

Reconductoring (replacing conductors with higher-capacity conductors) is a means of providing additional capacity to existing transmission lines. Reconductoring was evaluated as a means of meeting the community reliability part of the Proposal need.

In the Rochester area, the analysis of reconductoring showed that the process would be insufficient for the project planning horizon, and additional 161 kV lines would be needed. The addition of both the North Rochester – Northern Hills 161 kV line and the North Rochester – Chester 161 kV line would increase the system capability such that needs will be met until approximately 2050 (Dairyland 2009b pp. 2-14 and 2-15).

The CPCN Applicants evaluated reconductoring the 161 kV lines in the La Crosse area and concluded that is it not a reasonable alternative:

> It would require the rebuilding of 200 miles of existing 161 kV transmission lines in the La Crosse area. Due to critical load serving functions of these lines, outages would have to be staged for rebuilding. Applicants estimate it would take six years to complete construction of the rebuild option. This is not acceptable as each year the load is above 430 MW, the system is at risk. In addition, once completed, this option would provide 150 MW less of load-serving ability than the Project (King 2012a, p. 5; testimony before the PSC).

The PSC concurred with the CPCN Applicants' conclusions. In any case, reconductoring the 161 kV lines at La Crosse would address only the La Crosse part of the community reliability need, and not the other needs addressed by the Proposal. As discussed in Section 1.1.2.1, MISO's conclusion is that the Proposal is needed (MISO 2012).

2.2.2.4 Summary

The use of existing RPU **and/or French Islands Units 3 and 4 generation or reconductoring existing 161 kV lines supplying Rochester and/or La Crosse** is relevant only to the community reliability component of need, and, as summarized above, **MISO has concluded that** these measures are not adequate to address that need. In addition, use of the existing RPU **and/or French Island Units 3 and 4** generation **or reconductoring existing 161 kV lines** would not address the need for regional reliability or for generation outlet.

2.2.3 New Generation and Transmission

The AES considered the potential for new peaking units in the Rochester **and La Crosse areas**, and concluded that would not be a cost-effective solution. **Aside from the capital costs, maintenance costs for transmission lines are low compared to maintenance costs for generators.** New generation would also require new transmission lines (Dairyland 2009b, pp. 3-21). **Transmission lines, once constructed, consume fewer resources compared to generators.** Generating units also have environmental impacts, particularly air emissions.

As noted in the AES, new generating units would also not address the need for regional reliability or generation outlet (Dairyland 2009b, pp. 3-25). As discussed in Section 1.1.2.3, inadequate generation is not a concern in the Proposal area; the concern is with the inability to get the electricity where it is needed. Adding generation would be counterproductive to meeting the need for generation outlet (and, unless it is renewable, for meeting the current Minnesota and Wisconsin renewable energy standards). Also, because MISO has full responsibility for transmission reliability, it has to have full control of access to the transmission grid within the MISO footprint. Any new proposed generator would need to apply through the MISO generator interconnection queue, which may require approximately two years.

New renewable energy sources are not available in the Rochester or La Crosse metropolitan areas in sufficient quantities to address the community reliability need. Importing renewable energy from outside the area would not address the community transmission reliability concerns.

2.2.4 Decentralized Generation Systems

Decentralized generation systems can provide local power through connections to lower-voltage lines (138 kV or less), and, in theory, can reduce the loads on the high-voltage lines. This is analogous to the use of local roads to reduce traffic on the Interstate system. Decentralized generation can be used primarily at a site (usually referred to as distributed generation), or it could potentially be developed solely for the purpose of supplying the electric grid (dispersed generation). In either case, generators would need to apply to MISO for interconnection. Decentralized generation systems are evaluated by category below.

2.2.4.1 Net Metering

EPAct 2005 encourages decentralized generation by requiring utilities to allow customers the opportunity for a two-way movement of electricity from the grid, and compensation to the customer for its supply. Net metering is defined in EPAct 2005, Section 1251 as:

> Service to an electric consumer under which electric energy generated by that electric consumer from an eligible on-site generating facility and delivered to the

local distribution facilities may be used to offset electric energy provided by the electric utility to the electric consumer during the applicable billing period.

The DOE's Energy Information Administration (EIA) tracks the number of net metering customers, but not the quantity of electricity provided. In Minnesota in 2008, the latest year for which data is available, 588 electric utility customers participated in net metering. This represents approximately 0.02% of Minnesota utility customers. In Wisconsin 344 customers participated in net metering (EIA 2010a Table 5.2; MDC 2008 Table 2). Based on current participation, without additional incentives, net metering would not be expected to have an impact on transmission needs.

2.2.4.2 Distributed Generation

The AES addresses distributed generation, which is generation that is intended primarily to serve on-site needs, with the excess going to the transmission system (EIA 2011a). The AES notes that the most likely fuel for distributed generation would be diesel, which introduces concerns for air quality impacts. The assessment included in the AES found that distributed generation as an alternative to the Proposal would also not be cost-effective. Distributed generation would also address only the community reliability component of the need, and would not address regional reliability or generation outlet.

2.2.4.3 Dispersed Generation

The potential for dispersed renewable generation has been studied in Minnesota, based on legislative mandate. In May 2007 the Minnesota Legislature approved the Next Generation Energy Act of 2007, which, among other things, directed the MDC to manage a statewide transmission study of dispersed renewable generation (DRG) potential. The study, which was done by the MTO for the MDC, was divided into two phases of 600 MW each. The study evaluated renewable generation projects in the 10 to 40 MW range, and interconnected on the lowest voltage level transmission that exists in the vicinity of the projected generation sites. The DRG study was part of an effort to advance effective development of renewable energy, to help meet Minnesota's renewable energy standard (RES) requiring 25% of the energy produced by the state's utilities to come from renewable sources by 2025 (MTO 2008, 2009). The study focused on wind energy, which is by far the primary renewable energy source in Minnesota, in

terms of both capacity and actual generation (EIA 2010b). Wisconsin's primary renewable source is hydroelectricity (EIA 2010c).

The study found that even dispersed generation can have substantial impacts to the grid. While the first phase of the study found that 600 MW of new generation projects in the 10 to 40 MW range could potentially be sited without the need for transmission upgrades, it did not account for other energy projects already in the MISO queue. In the second phase of the study, an analysis of the MISO queue suggested "that the transmission system has limited opportunities for new DRG requests since the outlet capability identified in the first phase will likely be consumed by the prior queued generation requests" (MTO 2008, p. 13; MTO 2009 pp. 5 and 15).

In 2010, MISO reported 41 gigawatts (GW) (41,000 MW) capacity in its queue for projects planned to go on line between 2010 and 2019, including 34 GW of wind capacity (MISO 2010a Table 5.3-10). While the MISO queue process has since undergone reform for streamlining, wind projects in the Buffalo Ridge area alone – Minnesota's prime wind energy location - were seeking to transmit 23 GW in 2008 (NREL 2008).

In his cover letter to the legislature and the PUC for the 2009 DRG report, William Glahn, the then MDC Office of Energy Security Acting Reliability Administrator, reported (in bold text): "The bottom line of the Phase II study is that, after rigorous expert engineering assessments, the lower and higher voltage transmission grid is essentially constrained in Minnesota when viewed in aggregate statewide" (MTO 2009, p. 5). Glahn concluded with the following:

> In conclusion, when the Governor's Next Generation Energy Initiative was enacted, the 2007 legislature established nation-leading renewable electricity requirements and greenhouse gas emissions reduction goals. These targets must be met, and must be met in timely, reliable, and cost-effective ways. It is a fundamental policy of the Minnesota Office of Energy Security that, in order to do so, we must employ the dual strategy of:
>
> - Using our existing transmission infrastructure more efficiently, through increased energy conservation and efficiency, demand response, emerging efficiency technologies and dispersed renewable generation where it can be interconnected reliably, and
> - Significantly increasing high-voltage transmission capacity in the state (MTO 2009, p. 6).

2.2.5 Alternatives Considered by MISO and Others

MISO considered other new 161 kV transmission line alternatives for the Rochester area; however, they were comparable in cost to the Rochester upgrades included in the Proposal and did not address the needs in La Crosse (Webb 2008, p. 29).

For the La Crosse area, MISO considered the effects of adding two oil-fired peaking units (at French Island). However, this option did not relieve all the 2011 overload conditions. It also considered a rebuild of the 161 kV lines in the area at a cost of approximately $173 million. This would not provide the same level of support as the Proposal, and would not accommodate future load (Webb 2008). This option would also not address the need for regional reliability or generation outlet.

In testimony before the PSC on behalf of the Citizen Utility Board of Wisconsin, Richard Hahn proposed that a 161-kV line from Rochester to La Crosse, along the same route as the Proposal, would address community reliability needs in Wisconsin (Hahn 2012 p. 28). Hahn's conclusions were based on using lower growth rates than used by MISO or the Applicants and including French Island Unit 4. Hahn also felt that MISO's proposed cost allocation for the Proposal put an undue burden on Wisconsin rate payers (Hahn 2012). As with other issues that have been aired before the PSC, the CPCN application decision resolves this issue. In any case, the 161-kV line from Rochester to La Crosse would not address other need elements and was not carried forward for further consideration in the EIS.

2.2.6 HRL Routes Not Studied in Detail

During the development and scoping processes, through public and agency input and additional engineering studies, some alternative alignments were dropped from further consideration and some were added. This section describes route alternatives removed from detailed consideration after the MCS was completed (Dairyland 2009a).

The final macro-corridor as presented in the MCS was based on RUS guidance for macro-corridors and Minnesota and Wisconsin requirements for siting transmission lines. Further development of route alternatives was guided by public and agency input and Minnesota and Wisconsin criteria, summarized below. In particular, at the

Mississippi River crossing, the Minnesota Route Permit (MRP) Applicants and the CPCN Applicants worked closely with the MDNR, the WDNR, and especially the USFWS to identify feasible crossing options that minimize impacts to the important state and federal ecological, aesthetic and recreational resources along the Mississippi River in the Proposal area.

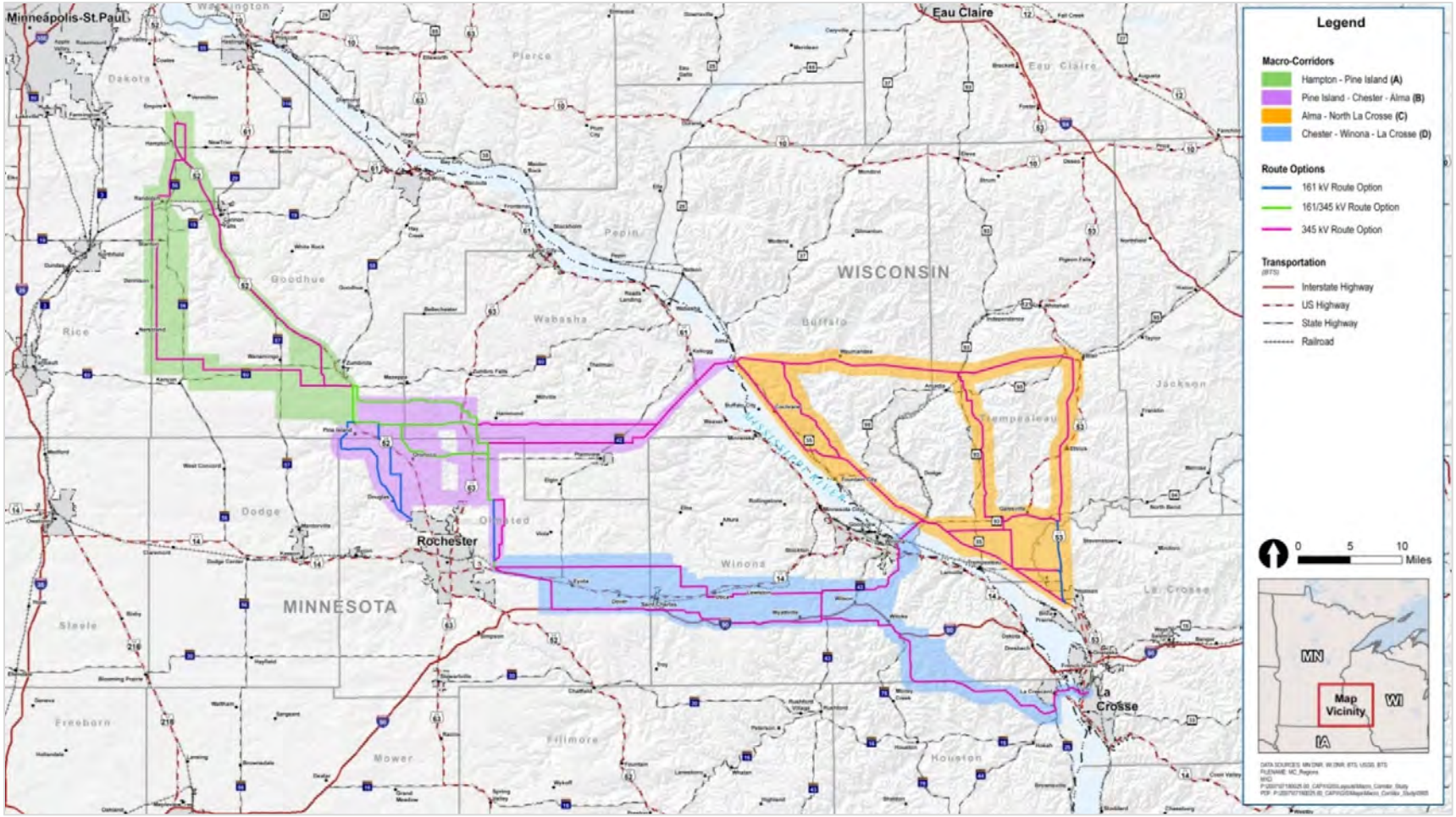

Figure 2-1: Final Macro-Corridors
Source: Dairyland 2009a, Figure 7-1

Minnesota Criteria – In Minnesota, an applicant identifies a "route," which, based on Minnesota regulations, can be up to 1.25 miles wide.[63] The MRP application requests a 1,000-foot wide route for the majority of the route with the exception of specific locations where it is wider to allow for the avoidance of MnDOT interchanges or county conservation easements. The narrower right-of-way (ROW) within the route is defined as "the land interest required within a route for construction, maintenance, and operation of a high voltage transmission line."[64] A high voltage transmission line, by definition, operates at 100 kV or more.[65] The applicant must identify at least two routes for consideration.[66]

Minnesota law requires the PUC, in its evaluation of a Route Permit Application, to consider locating a route for a high-voltage transmission line on an existing high-voltage transmission route and paralleling existing highway rights-of-way.[67] **In what has come to be known as Minnesota's "non-proliferation doctrine", the State Supreme Court has interpreted the law to require that "a pre-existing route" must be chosen "unless there are extremely strong reasons for not doing so." Furthermore, the Court interprets the law has having a preference for "containment of powerlines."[68]** The PUC is also required to consider survey lines and "other natural division lines of agricultural land so as to minimize interference with agricultural operations."[69] In considering a route permit, the PUC is further charged with being "guided by the state's goals to conserve resources, minimize environmental impacts, minimize human settlement and other land use conflicts, and ensure the state's electric energy security through efficient, cost-effective power supply and electric transmission infrastructure."[70]

[63] Minn. Rules ch. 7850.1000 Subpart 16
[64] Minn. Rules ch. 7850.1000 Subpart 15
[65] Minn. Rules ch. 7850.1000 Subpart 9
[66] Minn. Stat. 216E.03 Subd 3
[67] For Route Permit Applications filed after May 1, 2010, the Commission must make specific findings that it considered locating a route on an existing high voltage transmission line route and along an existing highway. If a route along these corridors is not selected, the Commission must identify the reasons. Minn. Stat. 216E.03 Subd 7(e)
[68] 266 N.W.2d 858
[69] Minn. Stat. 216E.03 Subd 7(b)(9)
[70] Minn. Stat. 216E.03 Subd 7

Minnesota regulations prohibit routing through state and national wilderness areas. State or national parks and state scientific and natural areas are also excluded from routing "unless the transmission line would not materially damage or impair the purpose for which the area was designated and no feasible and prudent alternative exists. Economic considerations alone do not justify use of these areas for a high voltage transmission line."[71]

Wisconsin Criteria – The Wisconsin CPCN Application identifies a specific ROW location for the transmission line, unlike the Minnesota application, where a route of a certain width is identified within which the ROW can be located.

Following is the Wisconsin policy for siting high voltage transmission lines:

> It is the policy of this state that, to the greatest extent feasible that is consistent with economic and engineering considerations, reliability of the electric system, and protection of the environment, the following corridors should be utilized in the following order of priority:
> (a) Existing utility corridors.
> (b) Highway and railroad corridors.
> (c) Recreational trails, to the extent that the facilities may be constructed below ground and that the facilities do not significantly impact environmentally sensitive areas.[72]

2.2.6.1 Mississippi River Crossings

Two of the original three Mississippi River crossing alternatives under consideration in the MCS were eliminated from detailed consideration: the crossings at Winona (the middle option) and the crossing at La Crescent (the southern option). **The elimination of these alternatives also results in the elimination of the macro-corridors and alternative routes that would be used exclusively with these alternative river crossings. The corridors (which include the potential alternative routes within the corridors) eliminated from detailed consideration as a result of the elimination of the Winona and La Crescent Mississippi River crossings are shown in light blue in Figure 2-1.**

[71] Minn. Rules ch. 7850.4300
[72] Wis. Stat. 1.12(6). A "high voltage transmission line" is defined at 196.491(1)(f) as "a conductor of electric energy exceeding one mile in length designed for operation at a nominal voltage of 100 kilovolts or more, together with associated facilities, and does not include transmission line relocations that the commission determines are necessary to facilitate highway or airport projects."

Aerial photographs of the Winona and La Crescent crossings are included as Figure 2-2 and Figure 2-3.

The three crossing alternatives are compared in Table 2-1. All three alternatives cross the Mississippi River at an existing transmission line crossing - that was the basis for identifying these alternatives. However, on the Minnesota side, the existing transmission corridors at Winona and La Crescent are not available to the west for many miles. Furthermore, there are no major roadways within the MCS final corridors at either Winona or La Crescent on the Minnesota side. On the Wisconsin side at La Crescent/La Crosse, alignment options are limited to heavily developed land or wetlands (Figure 2-3).

The existing ROW at all three crossings is at least partially on USFWS Wildlife Refuges; however, the Winona crossing requires a much greater length through Refuge property, and crosses large areas of marshland (Table 2-1). Winona and La Crescent have much smaller available existing ROWs than Alma. While the Alma crossing has nearby eagles' nests, the crossing is not located near known bird concentration points. The Winona crossing is located near bird concentration points, and the La Crescent crossing is located near a very large active rookery.

Substation locations may not be feasible for the La Crescent crossing.

Table 2-1: Comparison of Preliminary River Crossing Alternatives.

Alma Crossing	Winona Crossing	La Crescent Crossing
Use of Existing Corridors, MN		
No new corridor required.	10 miles new corridor required.	15 miles new corridor required.
Use of Existing Corridors, WI		
Two feasible route options that follow existing transmission lines.	Two feasible route options: 1) an existing transmission line and 2) property boundaries/roads.	Route options may not be feasible due to potentially unpermittable wetland impacts and/or displacement of business
Length in Floodplain		
1.4 miles	3.25 miles	2.5 miles
Information on ROW within Refuge Land (USFWS 2009a)		
Existing 125 feet, permitted 180 feet, established 12/23/1948; indefinite, general stipulations.	Existing < 100 feet, permitted 100 feet. New metal poles installed 2003.	Existing < 100 feet, permitted width 100 feet, issued 6/6/1967 and expires 6/5/2017; general stipulations.
Length through Refuge Property		
2,900 feet	13,540 feet	2,790 feet
Area of Refuge Open Water/Marsh within 150 ft. of Centerline (USFWS 2009a)		
10 acres open water/1.9 acres marsh. Marshes: silver maple and green ash with Eastern cottonwood and swamp white oak.	45.7 acres. No description.	15.5 acres. No description.
Forested Refuge Area within 150 ft. of Centerline (USFWS 2009a).		
9.6 acres. Mature floodplain forest dominated by silver maple and green ash with Eastern cottonwood and swamp white oak.	7.8 acres. No description.	19.9 acres. No description.
Estimated Number of Poles in Wetlands[73]		
7	28	15
Estimated Permanent Wetland Impacts, Acres (80 sq ft per pole)		
0.01	0.05	0.03

[73] 600-foot spacing on USFWS property, 1,000-foot elsewhere, plus open water crossings.

Alma Crossing	Winona Crossing	La Crescent Crossing
Nearby Biological Features (USFWS 2008a, 2009b)		
Two active eagle nests on the Minnesota side: one adjacent to the existing line and one 1,800 ft. from the corridor.	Large numbers of migratory birds that use the open water/marsh area.	Active eagle nest 0.5 mile from line; active rookery with hundreds of great blue heron, great egret, and double-crested cormorant nests is located 0.3 mile upriver on the WI side.
USFWS Position (USFWS 2008a, 2009a)		
Alma crossing may pose least environmental impact because of existing ROWs and because it is least likely to impact migratory birds since it is some distance from known bird concentration points.	Due to the predominantly wetland habitat crossing and the importance of the refuge to migratory birds, this alternate is opposed by the USFWS.	Route is of concern due to proximity of eagle nest and the rookery.
Engineering Considerations		
Narrowest river crossing.	Widest river crossing.	New corridor required in blufflands, limited access. Narrow ROW through refuge property results in tall structures causing greater potential impacts to birds and aesthetics.
Route follows existing transmission corridor through blufflands. Wider ROW through refuge property allows flexibility to design lower structures to mitigate potential impacts to birds and aesthetics.	New corridor required in blufflands, limited access. Narrow ROW in refuge results in tall structures and potential impacts to birds and aesthetics.	
Feasible Substation Locations		
Three potential substation sites.		Wetlands make La Crosse Substation not feasible; other alternatives require business displacement or an upgraded line in the La Crosse Marsh.

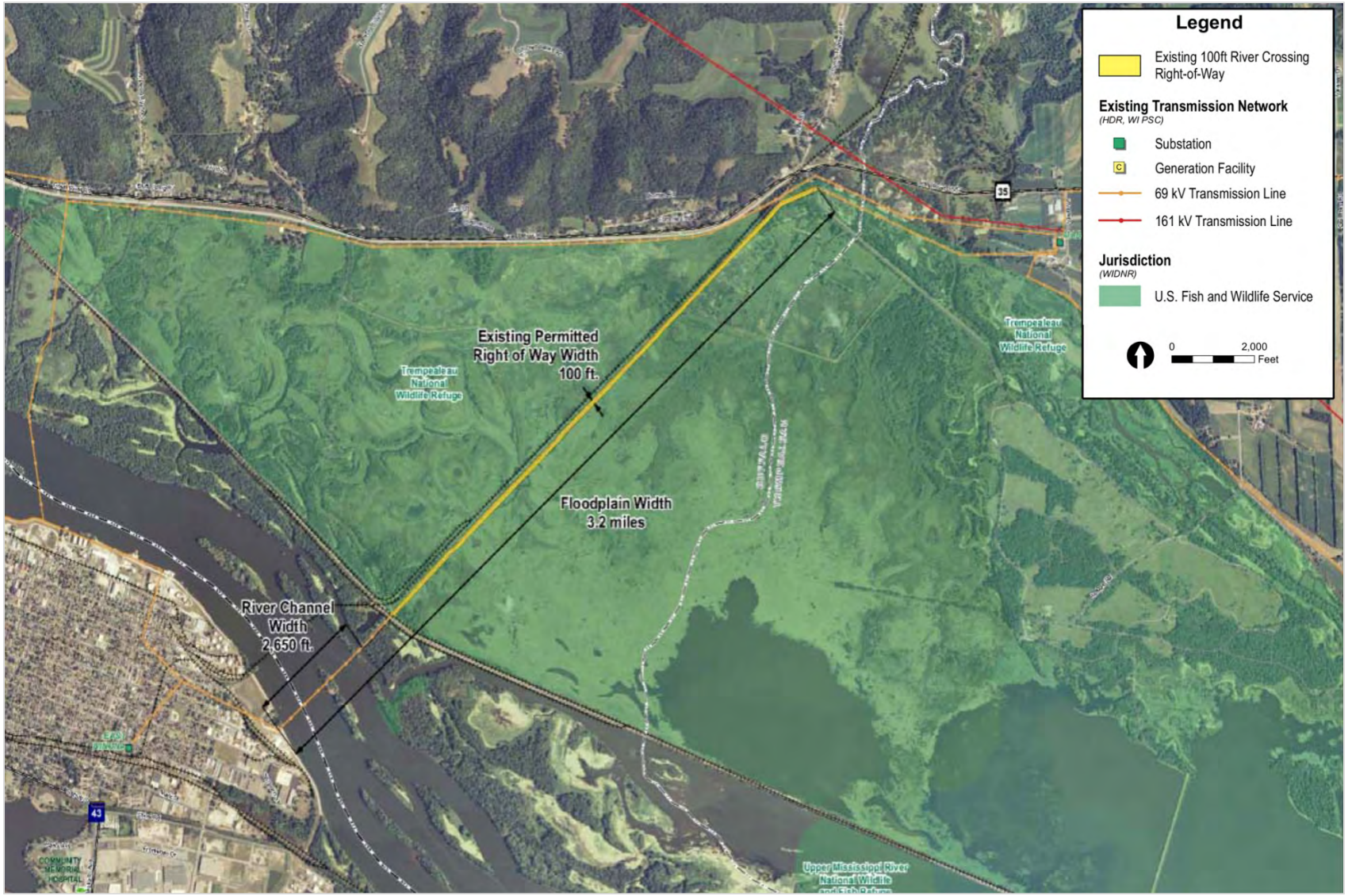

Figure 2-2: Winona Mississippi River Crossing Alternative

Source: Xcel et al. 2010 Appendix E.

Figure 2-3: La Crescent - La Crosse Mississippi River Crossing Alternative
Source: Xcel et al. 2010 Appendix E.

In summary, primarily because the Winona and La Crescent crossings require many miles of new corridor and because they represented the most environmental impact for USFWS refuge resources, they were eliminated from detailed evaluation. In addition, substation alternatives may not have been feasible for the La Crescent alternative, and USFWS found the Winona crossing to be unacceptable. Only the Alma crossing was retained for detailed evaluation.

2.2.6.2 Underground Option at Mississippi River

Undergrounding – The MRP Application includes an engineering evaluation of underground construction of two 345 kV circuits at the Mississippi River crossing (Xcel et al. 2010 Appendix E). The potential benefits of placing the line underground would be aesthetics and reduced risk of bird impact. There is an existing 161/69-kV transmission line and a power plant (Dairyland's Alma Station) at the river crossing. The existing 161/69-kV line, which crosses approximately 0.5 mile of the UMRNW&FR and includes two poles on Refuge property, has a cleared area approximately 125 feet wide and 1,900 feet long. **There are six conductors on the existing transmission line, "stacked three high" (in three rows when viewed from the side).** The two main river crossing structures are 180 feet tall. With the 345 kV line installed above ground, the existing 161/69-kV line structures would be removed and the lines would be added to the 345 kV structures. With the USFWS preferred option (Option C), the two main channel crossing structures would be 199 feet tall and part of the ROW would need to be expanded up to 180 feet wide. **The Proposal would have nine conductors at the Mississippi River crossing. With Option C, these conductors would be three high by three wide for the two short spans west of the Zumbro River, and would have a flat arrangement (all in one row when viewed from the side) for the remainder of the crossing. The two short spans, with corresponding shorter poles (approximately 105 to 130 feet tall), allow for a narrow ROW through Refuge property. The flat arrangement of the majority of the crossing is designed to reduce the potential for collision impacts for birds. Option C and the other options considered are shown graphically in the drawings in Appendix M.** If the 345-kV line were placed underground the existing 161/69-kV line would remain in place (Xcel et al. 2010, Appendix E). Thus aesthetically and in terms of potential for bird

impact the differences between the above ground and the underground alternatives would be an approximate 10% increase in pole height at the two main structures and more conductors, **but in fewer horizontal planes.** In addition, the new above ground line would have bird flight diverters installed. The relative risk of bird impacts is unknown; there is no data on bird impacts at the existing line.

The estimated cost of undergrounding a 1.3-mile length at the Mississippi River is approximately $90 million (Power Engineers 2009). The cost is approximately $70 million per mile for underground single circuit 345 kV compared to approximately $12 million per mile for an overhead triple circuit river crossing (Xcel et al. 2010, Appendix E). The river crossing costs more per mile than conventional overhead construction because four conductors per phase are required, due to costs associated with constructing an underground duct bank including directional drilling under the river, the higher cost for underground conductors, and more difficult construction access. **Maintenance and repairs are also more costly and time-consuming.** While the underground line could be constructed below the existing 161/69-kV line, additional ROW would be required and the entire ROW would require vegetation control. The underground option is compared with the USFWS-preferred Option C in Table 2-2. RUS concurs with the MRP Applicants' conclusion that undergrounding is not feasible. More information regarding the underground assessment is included the MRP application, Appendix E (Xcel et al. 2010).

Table 2-2: Undergrounding vs. Option C for 1.3 Miles at Mississippi River.

	Underground Option	Option C
ROW width requiring permanent clearing of trees, ft.	235 to 360	125 to 280
Maximum structure height, ft.	180	199
Bird flight diverters on above-ground line?	No	Yes
Estimated cost	$90 million	$15.6 million

2.2.6.3 Minnesota Route Options Not Evaluated in Detail in the EIS

Route Alternatives Added During MN DEIS Scoping

As discussed in Section 1.4.2.2, a large number of alternatives were added during the scoping process for the MN DEIS. In keeping with the naming convention used in the Minnesota EIS, the Minnesota part of the Proposal area is evaluated in three segments and the route segments are named based on the respective segment numbers and alternative. For example, Route 1P is the MRP Applicants' preferred route in Segment 1 and Route 3A is the MRP Applicants' alternate route in Segment 3. For most of the other alternatives, each is numbered based on whether it is an alternative to the MRP Applicants' preferred route (e.g., Route 1P-003), alternate route (e.g., Route 1A-002), or both (e.g., Route 1B-005). Some routes that are applicable to both Segment 2 and 3 are designated with "C."

Tabulated information on routes identified in the MN DEIS scoping process is included in Appendix R. Table R-1 lists the routes identified in the MN DEIS scoping process, and, where information is available, notes the reason for including the route. It also includes other routes that were included in the MRP application. Tables R-2, R-3, and R-4 compare the scoping routes and the other routes included in the MRP application with Routes 1P and 1A for selected attributes: proximity to residences, length of route, and length of route on an existing transmission line ROW or following a roadway ROW. In Tables R-2 through R-4 these attributes are compared for each scoping route (or other MRP application route) and for the section of Route P or A that would be replaced by each scoping route.

In general, the comparative analysis shows that most of these alternatives do not meet the Minnesota siting criteria as well as Route P and/or they have more impacts than the sections of Route P or A they would replace. **Therefore, as discussed in Section 1.4.2.2, while all these alternatives were analyzed in detail in the Draft EIS for consistency with the Minnesota EIS process, most of them have been eliminated from detailed consideration in this Final EIS. Table 2-3 lists all the MN DEIS scoping routes that were evaluated in detail in the Draft EIS. For each route, the table provides the rationale for either eliminating the route from detailed evaluation, or retaining it for detailed evaluation. For the remainder of this Final**

EIS, all references to the routes eliminated from detailed consideration have been removed.

Detailed descriptions of all the Minnesota routes evaluated in the Draft EIS, including the MN scoping routes, are included in Appendix D. These routes are shown in Figure 2-4, Figure 2-5, Figure 2-6 and Figure 2-7.

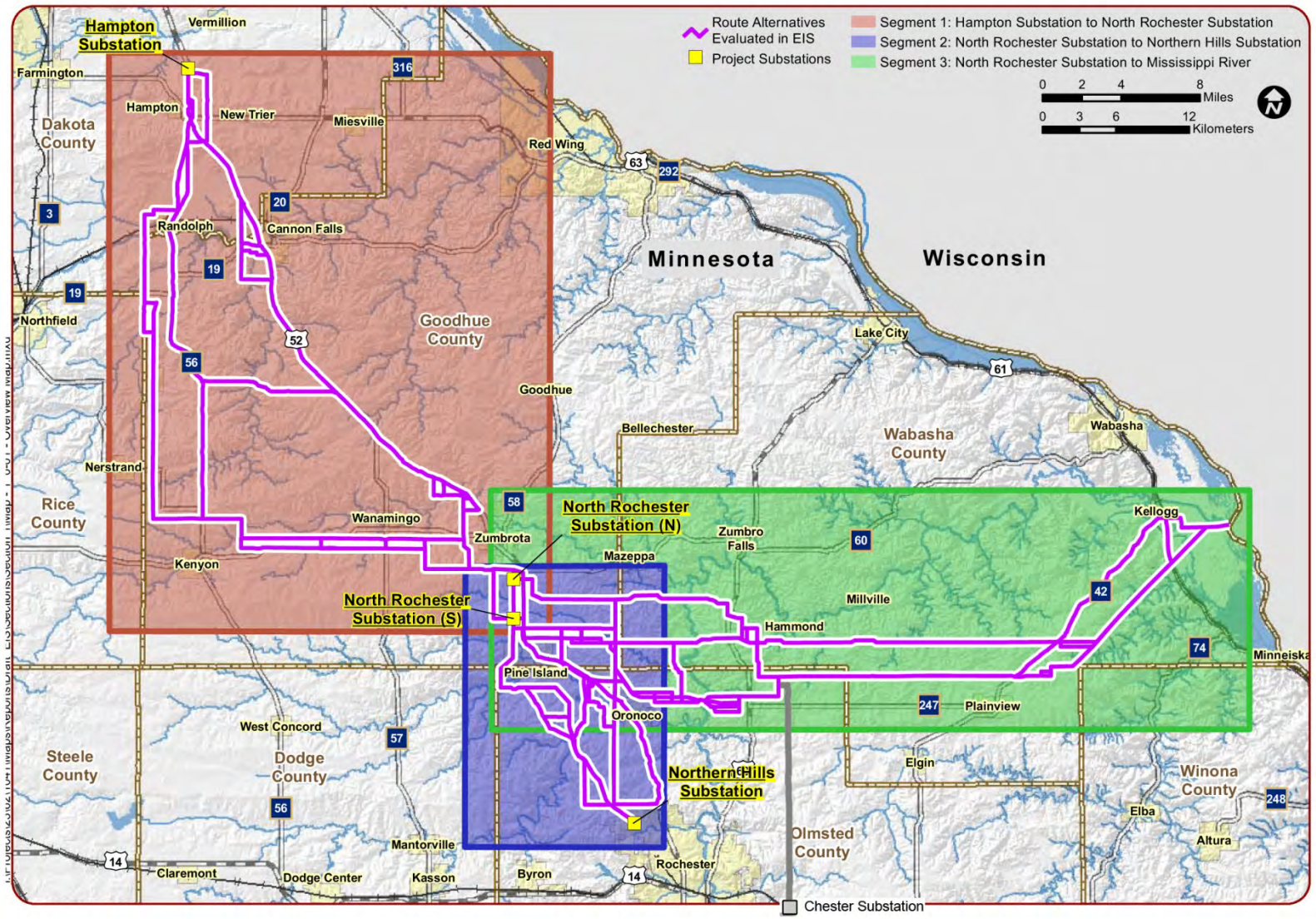

Figure 2-4: MN EIS Route Summary (with Chester Line Added)

Sources: MDC 2011c, p. 1 and Northern States Power Company 2011

Note: As shown in Figure 1-1, only the North Rochester Substation would be a new substation location.

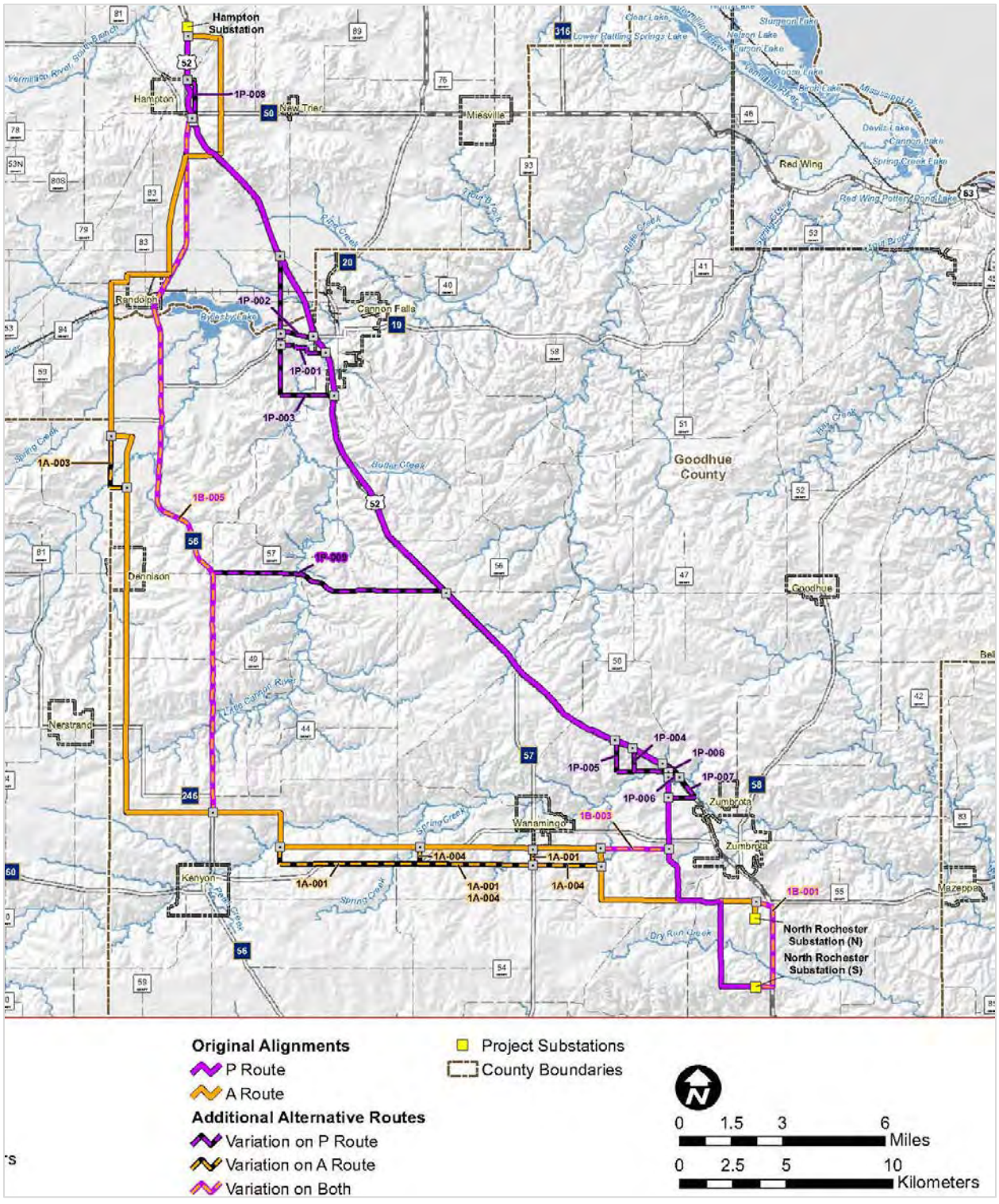

Figure 2-5: Segment 1 Overview from Minnesota DEIS

Source: MDC 2011b, Map 2.6-01.

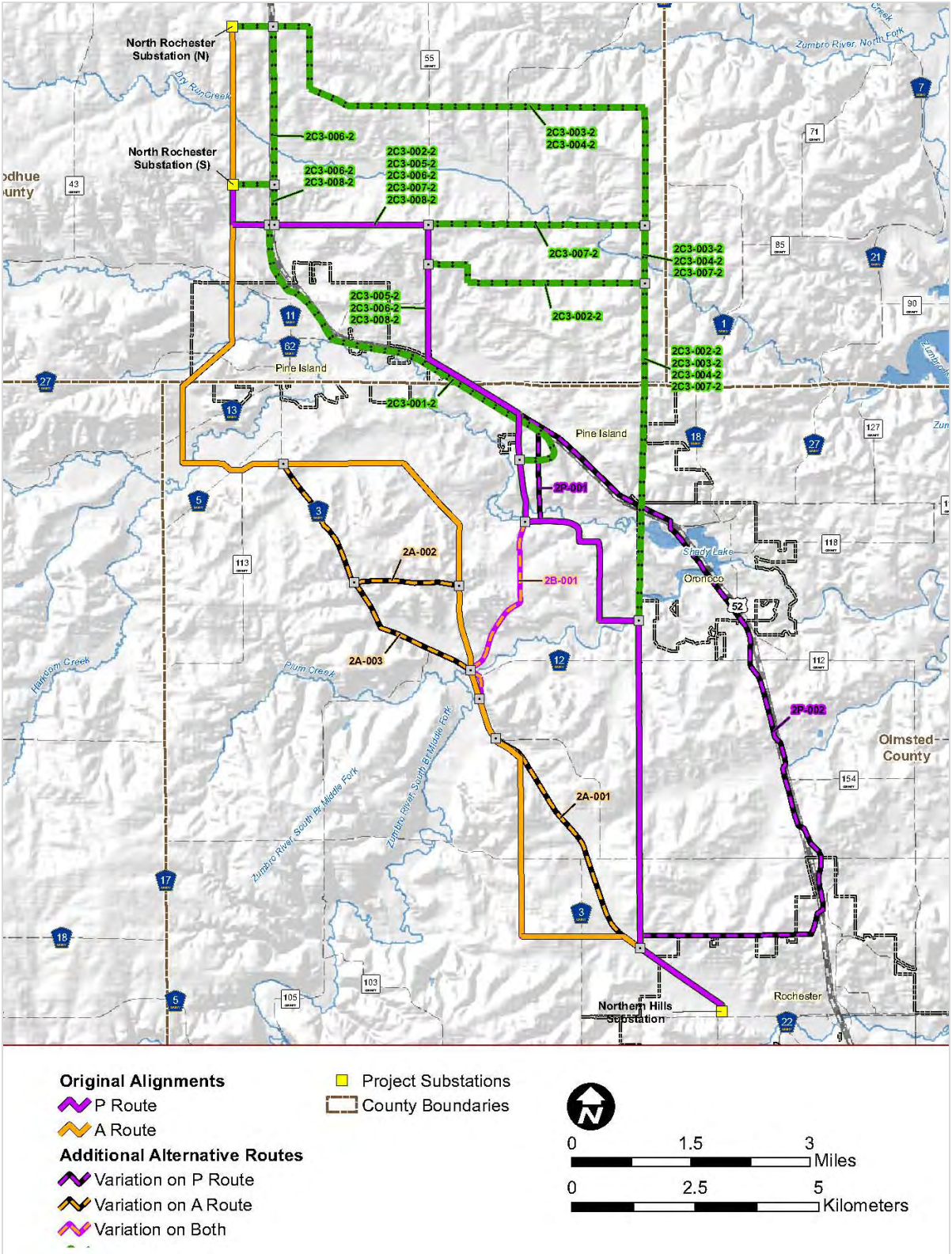

Figure 2-6: Segment 2 Overview from Minnesota DEIS

Source: MDC 2011b, Figure 2.6-02.

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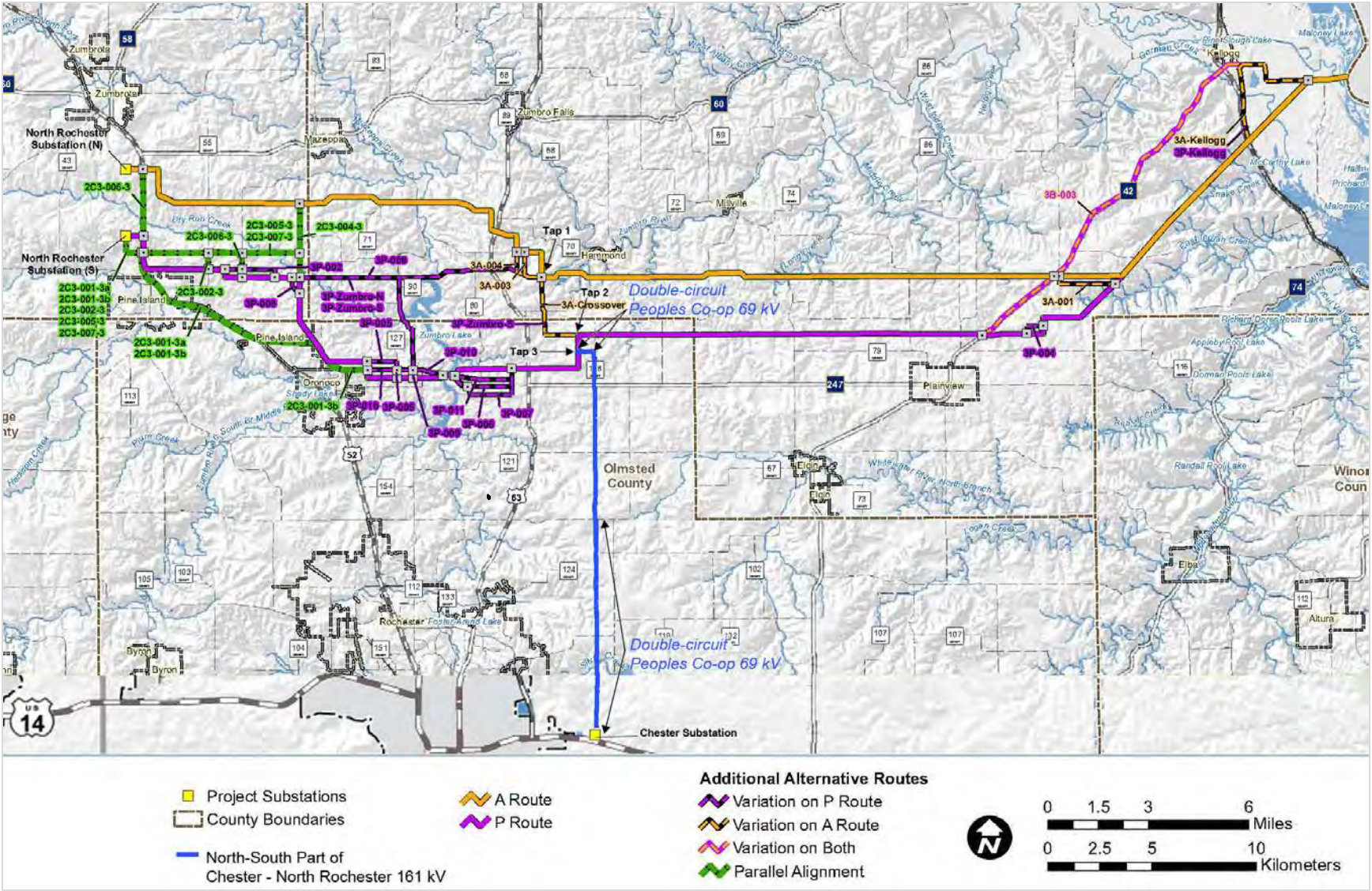

Figure 2-7: Segment 3 Overview from Minnesota EIS with North Rochester – Chester 161 kV Added

Source: MDC 2011b Figure 2.6-03 with North Rochester-Chester 161 kV information added from Northern States Power Company 2011.

Table 2-3: MN DEIS Scoping Routes Eliminated and Retained.

Route	Carried Forward for Detailed Analysis?	Rationale for Elimination or Retention, in Comparison to the Corresponding Segment of the Applicant-Proposed Route and/or Alternate
Segment 1		
1P-001, 1P-002 and 1P-003	N	These routes were eliminated from detailed consideration primarily because they would directly impact Lake Byllesby Regional Park, which is also an Important Bird Area (IBA). Based on the Lake Byllesby Regional Park boundaries as shown in the master plan for the park, these alternatives appear to cross the park boundary near the dam (Dakota County Parks 2005 pp. 6.3 and 7.7). Routes that directly impact the park may be inconsistent with Dakota County Park Ordinance #107, the goal of which is "…to provide for the protection and preservation of land in its natural state…." Lake Byllesby Regional Park is also subject to the requirements of the LWCF fund, discussed in Section 3.6.1.3. These route alternatives also parallel a planned Lake Byllesby Regional Park recreational trail and a bridge crossing at the Cannon River (Dakota County Parks 2005 pp. 6.2 and 6.3) that are planned for construction in 2013 (MDC 2011c, p. 106). The Dakota County Board of Commissioners submitted a resolution requesting that routes that directly impact Lake Byllesby not be selected (Appendix T). These routes would also result in greater incremental intrusion without benefits as they follow county road near parks rather than the major U.S. Highway that 1P follows. In addition, Route 1P-003 (though not 1P-001 or 1P-002) has greater potential natural resource impacts. The route would at least partially impact a maple-basswood forest State-designated Biodiversity Site of High Significance (BSHS), where the route runs along the site for 300 feet (Dunevitz and Epp 1995; MDNR database; MDC 2011c, Appendix A, Sheet NR9). Route 1P-003 also bisects 700 ft of a floodplain forest that is a Biodiversity Site of Moderate Significance (BSMS) (MDC 2011c, Appendix A, Sheet NR9).
1P-004	N	Avoidable floodplain impacts. Two crossings of North Fork Zumbro River at a curve in the river (route ends up on same side of river as it started), with 2,500 ft of floodplain. Other potential impacts appear comparable to the corresponding segment of Route 1P.

Route	Carried Forward for Detailed Analysis?	Rationale for Elimination or Retention, in Comparison to the Corresponding Segment of the Applicant-Proposed Route and/or Alternate
1P-005	N	Avoidable floodplain impacts. Two crossings of North Fork Zumbro River at a curve in the river (route ends up on same side of river as it started), with 2,500 ft of floodplain. Other potential impacts appear comparable to the corresponding segment of Route 1P.
1P-006	Y	Would avoid potential impacts to quarry.
1P-007	Y	Would avoid potential impacts to quarry. However, may interfere with MnDOT plans for interchange at County Road 7 (MOAH 2012, p. 46).
1P-008	N	Eastern bypass of Hampton. Route has zero residences within 300 ft of centerline (compared to 3 for 1P); however, it is entirely cross-country and does not meet MN siting criteria. Based on comments to the PUC, this line may also impact irrigation systems MOAH 2012, p. 46). Because the line does not meet state statutory siting criteria and there is no strong reason for it, this route was eliminated from detailed evaluation.
1P-009 and 1B-005	N	These routes are not feasible due to safety and operational impacts to Stanton Airport (MnDOT 2011c, p. 2). These routes also lie immediately adjacent to the entire western side of the Nansen Agricultural Historic District National Register of Historic Places (NRHP) Site. These routes would cross Lake Byllesby Regional Park, a state IBA, at MN-56 adjacent to the exposed mudflats and shallow water that is preferred habitat for many migratory bird species, including "shorebirds, ducks, geese, swans, herons, pelicans, gulls and terns" (National Audubon Society 2011; Dakota County Parks 2005 p. 6.4). These routes would also result in avoidable wetland and other potential biological impacts. Along a tributary of Prairie Creek, the route would cross 1,800 feet of a wetland, bordering a BSHS (MDC 2011c, Appendix A, Sheet NR30). On the east side of MN-56 at this location, the wetland is a BSHS emergent marsh. The creek itself parallels MN-56 on the west, limiting the options for the transmission line route at this location. Another constraint occurs along this same tributary, further south. At this location there is 2,300 feet of wetland adjacent to MN-56 on the west; on the east there are two residences next to the highway[74] (MDC 2011c, Appendix A, Sheet NR 31). In addition, Route 1P-009 would cross 700 ft of a maple-basswood forest that is a Biodiversity

[74] These residences are visible on NR31; however, only one is marked in MDC 2011b and neither are in MDC 2011c.

Route	Carried Forward for Detailed Analysis?	Rationale for Elimination or Retention, in Comparison to the Corresponding Segment of the Applicant-Proposed Route and/or Alternate
		Site of Outstanding Significance (BSOS) (Dunevitz and Epp 1995; MDNR database; MDC 2011c, Appendix A, Sheet NR53).
1A-001	N	Route 1A-001 would result in avoidable potential wetland and biological impacts: the route crosses 300 ft of a Biodiversity Site of High Significance (BSOS) willow swamp near Spring Creek (Dunevitz and Epp 1995; MDNR database; MDC 2011c, Appendix A, Sheet NR41). The route was proposed to reduce residential impacts, but actually impacts more residences than the segment of Route 1A it would replace. Other potential impacts appear comparable to the corresponding segment of Route 1A.
1A-003	N	Route 1A-003 results in avoidable potential biological impacts: the route crosses 1,200 ft of BSMS and is in area of influence of several Natural Heritage Sites (NHS) (MDC 2011c, Appendix A, Sheets NR29 and 30). Other potential impacts appear comparable to the corresponding segment of Route 1A.
1A-004	N	Route 1A-004 results in avoidable wetland and biological impact: the route crosses 1,700 ft BSOS willow swamp near Spring Creek (Dunevitz and Epp 1995; MDNR database; MDC 2011c, Appendix A, Sheet NR41). Other potential impacts appear comparable to the corresponding segment of Route 1A.
1B-001	N	Route 1B-001 offers no discernible benefits over Routes 1A or 1P. The route has 4 times as many residences within 300 ft of centerline as the route it would replace.
1B-003	N	Route 1B-003 offers no discernible benefits over Routes 1A or 1P. It is a 3-mile long segment that has one additional residence within 300 ft of centerline, compared to the segment of Route 1A it would replace.

Route	Carried Forward for Detailed Analysis?	Rationale for Elimination or Retention, in Comparison to the Corresponding Segment of the Applicant-Proposed Route and/or Alternate
Segment 2		
2P-001	Y	Fewer nearby residences and the least wetland impacts of all Segment 2 routes (MDC 2011c, Figure 8.2.4.8-2).
2P-002	N	Route 2P-002 would result in avoidable potential floodplain and wetland impacts: the route includes a 2,500-ft crossing of the Middle Fork Zumbro River at former Shady Lake with 600 ft of wetlands; and a 1,200-foot crossing of the floodplain of the South Branch of the Middle Fork of the Zumbro River, also formerly part of Shady Lake (MDC 2011c, Appendix A, Sheet NH16). Shady Lake no longer exists: the Olmsted County Board voted to remove the dam that formed the lake it after it was heavily damaged in a flood in September 2010 (Bonestroo 2011a, KTTC 2010). Olmsted County is evaluating options for use of the former lakebed site and has developed conceptual plans for restoring the former lakebed to a park (Bonestroo 2011b, 2011c; Olmsted County 2011a, 2011b). Other potential impacts appear comparable to the corresponding segment of Route 2P.
2A-001	N	Route 2A-001 would result in avoidable wetland impacts: this route crosses two NWI wetlands that are greater than 1,000 ft across and would therefore not be spanned (MDC 2011c, Appendix A, Sheets NH9, NH10 and NH11; and Figure 8.2.4.8-2). These wetlands are avoided by the comparable section of Route 2A. Other potential impacts appear comparable to the corresponding segment of Route 2A.
2A-002	N	Route 2A-002 would result in avoidable biological impacts: the route bisects 1,500 ft of BSMS oak forest, then follows the edge of the BSMS forest for 2,300 ft, then follows edge of a BSHS forest for 600 ft (Dunevitz and Epp 1995; MDC 2011c, Appendix A, Sheet NH7). The route has more residences within 300 feet of centerline than the segment of 2A it would replace. Other potential impacts appear comparable to the corresponding segment of Route 2A.

Route	Carried Forward for Detailed Analysis?	Rationale for Elimination or Retention, in Comparison to the Corresponding Segment of the Applicant-Proposed Route and/or Alternate
2A-003	N	Route 2A-003 would result in avoidable biological impact: edge impact to 800 ft BSMS oak forest. The BSMS forest is adjacent to the roadway Route 2A-003 follows, and there are two residences along the road on the opposite side of the oak forest (MDC 2011b,[75] Appendix A, Sheet NH7). The route has more residences within 300 feet of the centerline than the segment of 2A it would replace. Other potential impacts appear comparable to the corresponding segment of Route 2A.
2B-001	N	Route 2B-001 would result in avoidable floodplain impacts: the route has a 3,600-ft crossing of the South Branch Middle Fork Zumbro River, within area of influence of 2 zoological NHSs (MDC 2011c, Appendix A, Sheet NH8). Other potential impacts appear comparable to the corresponding segments of Route 2A and 2B.
2C3-001-2	N	Route 2C3-00102 would result in avoidable wetland impacts and conversion of forested wetland: the route has two crossings of a continuous BSHS forested floodplain wetland at the Middle Fork of the Zumbro River (1,200 ft and 1,500 ft). . A subdivision adjacent to US-52 on the north constrains the transmission line location (MDC 2011c, Appendix A, Sheets NH 4 and 13). In addition, all the "2C3" routes involve double-circuiting with short segments of either Route 3A or 3P. This eliminates the potential for double-circuiting the North Rochester to Chester 161 kV on much longer segments of Route 3A or 3P.[76] Based on this, none of the "2C3" routes would be retained unless they showed substantial benefit over the comparable applicant proposed or alternate route.
2C3-002-2	N	This route would result in avoidable wetland and floodplain impacts: the route crosses 1,300 ft of wetlands, some forested, and 1,500 ft floodplain at South Branch Middle Fork Zumbro River and 1,500 of floodplain at the Middle Fork of the Zumbro River (MDC 2011c, Appendix A, Sheets NH15 and NH16). See also note regarding the "2C3" routes under 2C3-001-2 above.

[75] These appear to be residences and are shown as such in MDC 2011b; however, they are not shown in MDC 2011c.

[76] This was not an issue in the MN EIS because the North Rochester to Chester Line was not evaluated, as it is in this RUS EIS. The 161 kV lines supplying the Rochester area need to be kept on separate circuits.

Route	Carried Forward for Detailed Analysis?	Rationale for Elimination or Retention, in Comparison to the Corresponding Segment of the Applicant-Proposed Route and/or Alternate
2C3-003-2	N	This route would result in avoidable wetland and floodplain impacts: the route crosses 1,300 ft of wetlands, some forested, and 1,500 ft floodplain at South Branch Middle Fork Zumbro River and 1,500 of floodplain at the Middle Fork of the Zumbro River (MDC 2011c, Appendix A, Sheets NH15 and NH16). See also note regarding the "2C3" routes under 2C3-001-2 above.
2C3-004-2	N	This route would result in avoidable wetland and floodplain impacts: the route crosses 1,300 ft of wetlands, some forested, and 1,500 ft floodplain at South Branch Middle Fork Zumbro River and 1,500 of floodplain at the Middle Fork of the Zumbro River (MDC 2011c, Appendix A, Sheets NH15 and NH16). In addition, approximately 40% of the route is cross country (i.e., does not follow existing infrastructure or field lines). See also note regarding the "2C3" routes under 2C3-001-2 above.
2C3-005-2	N	This route would have impacts similar to the corresponding section of Route 2P. Route eliminated from detailed consideration because its use would eliminate the potential for double-circuiting the North Rochester to Chester Line with the 345 kV line. See note regarding the "2C3" routes under 2C3-001-2 above.
2C3-006-2	N	This alternative follows a short segment of US-52 where Route 2A follows an existing transmission line. It would result in two closely spaced transmission lines, rather than the one line of Route 2A, and had no apparent benefits. See also note regarding the "2C3" routes under 2C3-001-2 above.
2C3-007-2	N	This route would result in avoidable wetland and floodplain impacts: the route crosses 1,300 ft of wetlands, some forested, and 1,500 ft floodplain at South Branch Middle Fork Zumbro River and 1,500 of floodplain at the Middle Fork of the Zumbro River (MDC 2011c, Appendix A, Sheets NH15 and NH16). See also note regarding the "2C3" routes under 2C3-001-2 above.
2C3-008-2	N	This route is a slight variation on 2P, over an approximately 1-mile distance. The only noted difference in potential impacts is that 2P follows an existing transmission line rather than a roadway for approximately half the distance. Since the existing lines would be placed on the same poles with the Proposal lines, Route 2P results in less overall length of transmission line. Therefore, in this segment, Route 2C3-008-2 was eliminated from further consideration. See also note regarding the "2C3" routes under 2C3-001-2 above.

Route	Carried Forward for Detailed Analysis?	Rationale for Elimination or Retention, in Comparison to the Corresponding Segment of the Applicant-Proposed Route and/or Alternate
Segment 3		
3P-001	Y	Appears to meet MN siting criteria better (follows a roadway where Route 3P follows neither a roadway nor a transmission line). (However, this route would not be an option with Route 2P because it coincides with a segment of Route 2P, which would eliminate the potential for a double-circuit with the North Rochester to Chester 161 kV Line).
3P-002	Y	Appears to meet MN siting criteria better (follows a roadway where 3P follows neither a roadway nor a transmission line).
3P-003	N	Route 3P-003 coincides for much of its length but does not take full advantage of the alternative route potential, as 3P-001 does. To avoid redundancy 3P-003 was not retained.
3P-004	Y	Meets MN siting criteria better. Follows more roadway and avoids tree clearing. Would minimize impacts to dairy farm operation by moving line to property line rather than middle of property.
3P-005	N	This route offers no discernible benefits over Route 3P and has one residence within 300 ft of the centerline where Route 3P had none.
3P-006	Y	Avoids impacts to BSMS forest.
3P-007	Y	Avoids impacts to BSMS forest.
3P-008	N	Offered no discernible benefits over the section of 3P it would replace.
3P-009	N	This route would result in avoidable visual/recreational impacts: it crosses a cove of Zumbro Lake. For several thousand feet north of the Zumbro River crossing this route borders a large tract of BSMS oak forest along the ROW of the roadway it follows (MDC 2011c, Appendix A, Sheet MR 8). It also impacts more residences than the comparable section of 3P. Other potential impacts appear comparable to the corresponding segments of Route 3P.
3P-010	N	While this route follows an existing roadway where 3P does not (along a 1.72 mile stretch), it has 13 residences within 300 ft of the centerline compared to none for Route 3P, and has no other discernible benefits. Other potential impacts appear comparable to the corresponding segments of Route 3P.
3P-011	Y	Avoids impacts to BSMS forest.

Route	Carried Forward for Detailed Analysis?	Rationale for Elimination or Retention, in Comparison to the Corresponding Segment of the Applicant-Proposed Route and/or Alternate
3A - Crossover	Y	Allows for combinations of segments of Route 2A and 2P.
Zumbro Dam Option	Y	Potential alternative for crossing Zumbro River.
3P-Kellogg	Y	Avoids impacts to McCarthy Lake WMA.
3A-001	N	No notable benefits over 3A. Route 3A-001 is a short segment just east of MN-42. The rationale for including the route is that it may reduce impacts on a horse training farm. It is slightly longer than Route 3A; however, it follows existing roadways and transmission lines for part of its length. Potential impacts appear comparable to the corresponding segments of Route 3P.
3A-003	Y	Follows roadway ROW more closely and would result in less tree clearing.
3A-004	Y	Follows roadway ROW more closely and would result in less tree clearing.
3B-003	Y	Avoids McCarthy Lake Wildlife Management Area (WMA) and associated wetlands.
2C3-001-3a	N	This route would result in avoidable wetland impacts and conversion of forested wetland: the route has two crossings of a continuous BSHS forested floodplain wetland at the Middle Fork of the Zumbro River (1,200 ft and 1,500 ft). See also note regarding the “2C3” routes under 2C3-001-2 above.
2C3-001-3b	N	This route would result in avoidable wetland impacts and conversion of forested wetland: the route has two crossings of a continuous BSHS forested floodplain wetland at the Middle Fork of the Zumbro River (1,200 ft and 1,500 ft). See also note regarding the “2C3” routes under 2C3-001-2 above.
2C3-002-3	N	This route would result in avoidable wetland and floodplain impacts: the route crosses 1,300 ft of wetlands, some forested, and 1,500 ft floodplain at South Branch Middle Fork Zumbro River and 1,500 of floodplain at the Middle Fork of the Zumbro River (MDC 2011c, Appendix A, Sheets NH15 and NH16). See also note regarding the “2C3” routes under 2C3-001-2 above.

Route	Carried Forward for Detailed Analysis?	Rationale for Elimination or Retention, in Comparison to the Corresponding Segment of the Applicant-Proposed Route and/or Alternate
2C3-003-3	N	In Segment 3, this route alternative is the same as Route 3A, except that it includes a short segment of double-circuiting of the North Rochester – Northern Hills 161 kV line with the 345 kV line. See note regarding the "2C3" routes under 2C3-001-2 above.
2C3-004-3	N	This route provides an additional cross-over from Route 3A to Route 2P. However, the 3.5-mile cross-over is entirely cross country, and the route has no quantifiable benefits over other options considered. See also note regarding the "2C3" routes under 2C3-001-2 above.
2C3-005-3	N	This is an option for double-circuiting the 161-kV line of Segment 2 with the 345 kV line over a half-mile section. It would eliminate the option of double-circuiting the North Rochester to Chester 161 kV line over a much greater length and was therefore eliminated from detailed consideration.
2C3-006-3	N	This alternative follows a short segment of US-52 where Route 2A follows an existing transmission line. It would result in two closely spaced transmission lines, rather than the one line of Route 2A, and had no apparent benefits. See also note regarding the "2C3" routes under 2C3-001-2 above.
2C3-007-3	N	This route does not appear to offer benefits over Route 3P or 3A. See also note regarding the "2C3" routes under 2C3-001-2 above.
2C3-008-3	N	This route is a slight variation on 2P, over an approximately 1-mile distance. The only noted difference in potential impacts is that 2P follows an existing transmission line rather than a roadway for approximately half the distance. Since the existing lines would be placed on the same poles with the Proposal lines, Route 2P results in less overall length of transmission line. See also note regarding the "2C3" routes under 2C3-001-2 above.

North Rochester-Chester Alternatives

The North Rochester to Chester 161 kV line (Chester Line) would extent eastward from the proposed North Rochester Substation to a point east of the Zumbro River, where it would head south to the existing Chester Substation. The east-west section of the Chester Line would be double-circuited with whichever 345 kV alignment is selected. For the north-south section of the Chester Line, the Applicants have proposed a direct route that follows either existing transmission line or roadway corridors for its full length and, as described in Section 2.4.2.5, has few impacts. This route is included in this Draft EIS for detailed analysis.

The Applicants also identified an alternative route that generally parallels the proposed route and has fewer residences within 300 feet of the route centerline **(7 compared to 19 for the proposed route).** However, this alternative does not meet the **statutory** Minnesota siting criteria as well as the proposed alternative:

- The proposed route follows 6.9 miles of existing transmission line compared to 2.8 miles for the alternative route.
- The alternative route has 10.3 miles that follows neither transmission lines nor roads, while the proposed route follows transmission lines or roads for 100% of its length.

In addition, the alternative route is 1.2 miles longer than the proposed route.

The Applicants also evaluated six alternative segments, all of which were rejected either because they did not meet the Minnesota siting criteria as well as the proposed route **(Alternative segments 1, 2, 3 and 6)**, or because they resulted in more impacts to residences **(Alternative segments 4 and 5). The Applicants' proposed alternative follows more transmission line and/or roadway ROW than any of the alternative segments 1, 2, 3 and 6. Compared to the Applicants' proposed alternative, for residences within 300 feet of the proposed centerline, Alternative segment 4 had seven more residences, and alternative segment 5 had 86 more residences.** More details are included in the Minnesota route permit application for the Chester Line, the text of which (without appendices) is included as Appendix O. The detailed route maps are included as Appendix P.

2.2.6.4 Wisconsin Route Options and Corridor Segments Not Evaluated in Detail in the EIS

Figure 2-8 uses the final macro-corridor map (from Figure 2-1 above) as the base map, with the final CPCN routes (shown in Figure 2-14) as a layer on top. As shown in Figure 2-8, there are four route option segments from the final macro-corridors that are not included in the final CPCN routes. These segments have also been eliminated from detailed consideration in this Final EIS. The rationale for the elimination of each is discussed below.

Bluff Route – The Bluff Route was originally included as an option to avoid the GRRNSB/WI-35 south of Alma. The route was eliminated from detailed consideration primarily because it did not meet the Wisconsin criterion of following an existing linear corridor.

Blair Route –The Blair Route, like the Arcadia Route, was another alternative to the Q1 Route along the Mississippi River, and, like the Arcadia Route, would follow an existing 161-kV transmission line. Compared with the Arcadia Route, the Blair Route would add approximately 5 miles of length **(9% more)** and cost an additional $13 million (Xcel et al. 2011, Appendix M). **While the impacts for Blair were not evaluated in detail, since both routes would follow an existing 161-kV transmission line, the additional length represents 9% more land impacts, which would be primarily to agricultural land and some forest. An advantage of the Blair Route over the Arcadia Route is that it does not pass by Galesville, where there are housing developments on both sides of the roadway that the Proposal follows, as the Arcadia Route does. The routes that pass by Galesville have more residences in the range of 151 to 300 feet from the route centerline (but not necessarily at the closer distances) (Table 2-7). The USFWS indicated in a letter dated December 7, 2011, that it believes the Blair Route, in addition to the Arcadia Route, is a reasonable and prudent alternative and should be evaluated as part of the NEPA process (Melius 2011). In the December 7 letter the USFWS did not make a distinction between the Arcadia and Blair Routes in terms of expected impacts, but rather stated "The Arcadia and/or Blair Routes would entirely avoid the river corridor, would cross through areas where wildlife habitat is already highly fragmented, and would**

avoid impacts to the eastern massasauga rattlesnake (*Sistrurus cantenatus*), a candidate for listing under the Endangered Species Act" (Melius 2011 p. 2). Generally, when two route alternatives are very similar in attributes, one is eliminated from detailed study. Since the Arcadia Route accomplished the same purpose of avoidance of the Q1 Route and its attendant concerns at less cost and length, the Blair Route was eliminated from detailed evaluation and the Arcadia Route was retained. The one noted advantage of the Blair Route, its avoidance of the more populated area at Galesville, was included in another route option, the Arcadia-Ettrick Option (Figure 2-8), that was included in the CPCN application at the request of the WDNR. Use of the Arcadia-Ettrick Option results in an additional 2.2 miles and $10 million compared to the Arcadia Route. The Arcadia-Ettrick Option is evaluated in detail in this EIS.

Connector – The connector shown in Figure 2-8 was originally considered as an option for the Arcadia Route (Figure 2-14) to use the Q1 Black River Bottoms segment, or the Q1 Highway 35 segment. Because the Q1 Black River Bottoms segment was not retained, as discussed below, the only potential use for the Connector would be to allow use of the Arcadia Route in combination with the Q1-Highway 35 Route. This would combine a major disadvantage of the Arcadia Route (length and cost) with a major disadvantage of the Q1 Route (crossing of the Black River Bottoms), and therefore the Connector was eliminated from further consideration.

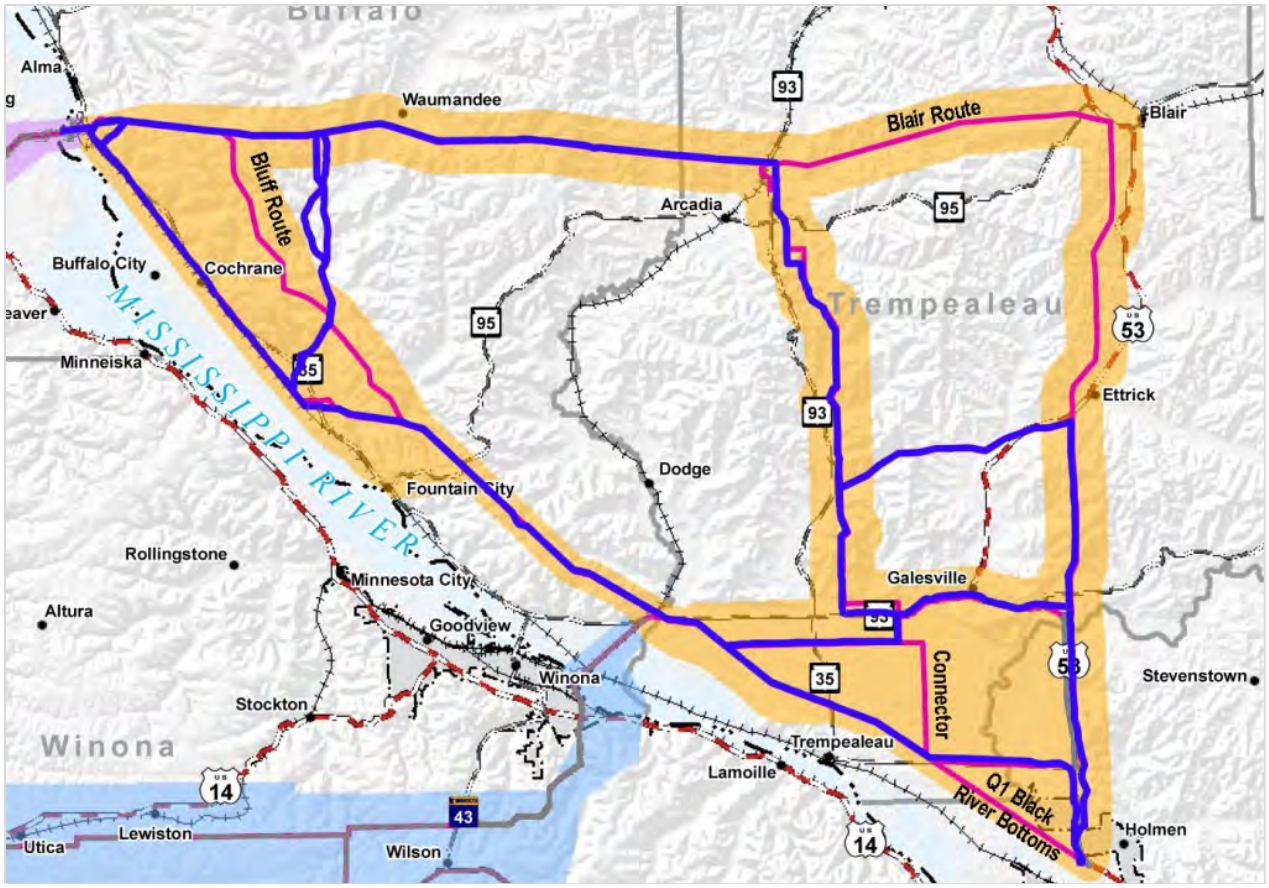

Figure 2-8: Final CPCN Routes (Blue) over Final MCS Route Options
Sources: Xcel et al. June 2011, Dairyland 2009a

Q1 Black River Bottoms – This segment crosses the Black River Bottoms area of forested wetland on the UMRNW&FR and the Van Loon State Wildlife Area. The location of the crossing is shown in Figure 2-9, with a detailed location map in Figure 2-10.

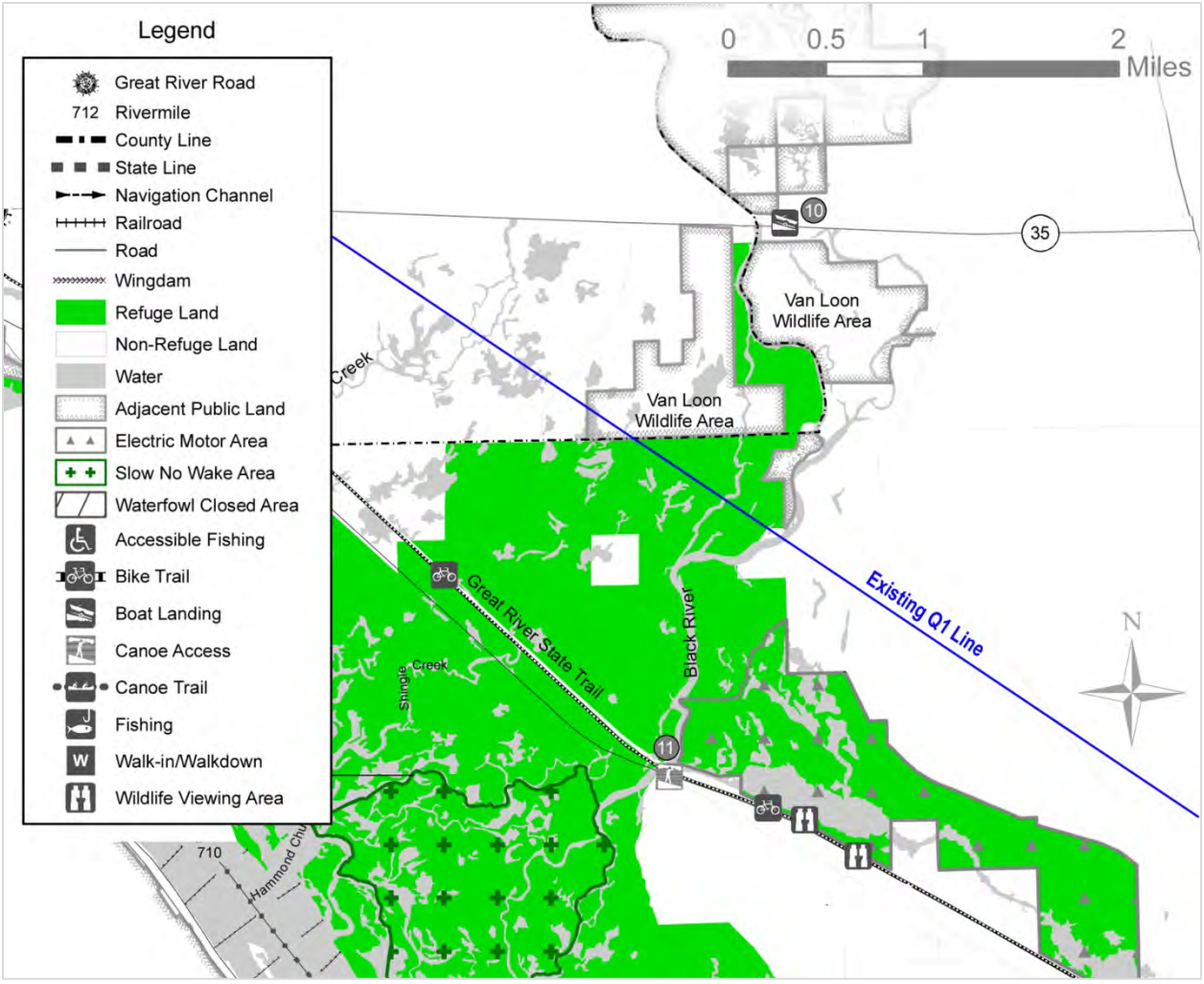

Figure 2-9: Existing Q1 161 kV Line, Black River Bottoms/Van Loon Area
Source: USFWS 2011k.

Figure 2-10: Detail - Existing Q1 161 kV Line in Forested Bottomland
Source: USGS 7.5 minute quadrangle, Holmen, WI

The USFWS has identified the Black River Bottoms as a “Classification A” resource, which means that as a habitat for fish or wildlife it is unique or irreplaceable on a national basis or within the ecoregion (`USFWS 2006). The area is one of only a few sites in Wisconsin that provide habitat for the eastern massasauga rattlesnake, Wisconsin’s most endangered reptile. Massasaugas are also a candidate species for federal listing (USFWS 2009a). According to the comprehensive conservation plan (CCP) for the refuge, the massasauga’s habitat (wet sedge meadow, emergent wetland

and shrub-carr wetland) has been lost to natural succession, conversion and changes in hydrology (prolonged saturation of soil) (USFWS 2006, p. 49).

The Black River Bottoms also provide habitat for the Blanding's turtle (Wisconsin - threatened) red-shouldered hawk (Wisconsin - threatened) (USFWS 2009a) and an number of other migratory birds. The biological resources in this area are discussed in more detail in Section 3.5.

The existing permit for the Q1 route has expired, and additional ROW, clearing of forested wetland, and a new permit would be required for this alternative.

The USFWS regulations for land use on refuges state: "No right-of-way will be approved unless it is determined by the Regional Director to be compatible."[77] "Compatible use" is defined as follows:

> …a proposed or existing wildlife-dependent recreational use or any other use of a national wildlife refuge that, based on sound professional judgment, will not materially interfere with or detract from the fulfillment of the National Wildlife Refuge System mission or the purposes of the national wildlife refuge.[78]

For a compatibility determination USFWS policy requires "written determination signed and dated by the refuge manager and Regional Chief signifying that a proposed or existing use of a national wildlife refuge is a compatible use or is not a compatible use. The Director makes this delegation through the Regional Director" (USFWS 2000). **The compatibility determination process begins when the party seeking the ROW submits an application to the USFWS Regional Director in accordance with USFWS regulations. If ROW is granted, the regulations require that the applicant reimburse the USFWS for any costs incurred by the USFWS as a result of processing or granting the ROW.[79]**

An application for ROW for the Proposal was not submitted to the USFWS; thus, the USFWS did not implement the compatibility determination process. In addition, USFWS policy allows refuge managers to deny proposed uses without

[77] 50 CFR 29.21-1(a). Note that the USFWS "appropriate use" policy does not apply to ROWs (Federal Register, Vol. 71, No. 122/Monday, June 26, 2006, p. 36415.
[78] 50 CFR 29.21
[79] 50 CFR 29.21-2

compatibility determinations if any one of ten situations exists regarding the proposed use (USFWS 2000).

The refuge manager concluded that four of the 10 situations exist, and that therefore the use could be denied without completing the compatibility determination process. These are summarized below. The refuge manager's determination is included in Appendix X.

- **While the refuge manager concluded that the proposed use did not conflict with any law or regulation, he concluded that it conflicted with Fish and Wildlife Service Policy: "It is the policy of the Service to discourage the types of uses embodied in right-of-way requests" (USFWS 1993).**
- **The refuge manager concluded that expansion of the existing Q1 ROW to accommodate the 345 kV line conflicted with refuge goals and objectives because of visual intrusion, an increase in "the risk of negative interactions between invasive plants and adjacent forested/grassland habitats, potential impacts on the eastern massasauga rattlesnake (a candidate for listing as a threatened/endangered species), potential for impact to bald eagles and other migratory birds, impacts to floodplain forest, and increased habitat fragmentation beyond that created by the existing Q1 ROW."**
- **The refuge manager concluded that the proposed use is not manageable within available budget and staff.**
- **The refuge manager concluded that the proposed use conflicts with other resource and management objectives, because it would be "damaging to the natural and cultural values of the Refuge. In particular, the scenic quality and values of the Black River bottoms would be compromised by the right-of-way."**

2.3 NOT USED

2.4 DESCRIPTION OF ALTERNATIVES EVALUATED IN DETAIL

This section describes the alternatives that are evaluated in detail in the EIS.

2.4.1 No Action

CEQ regulations require consideration of the no action alternative.[80] In this Draft EIS the action evaluated in detail is the construction of the Proposal. Therefore, under the no action alternative the Proposal would not be constructed. Dairyland's share would be 11%, and although Dairyland has the option to find alternate financing, no other no-action scenarios are evaluated.

The no action alternative would result in no impacts to the physical environment at the Proposal area. The Proposal would not be constructed or operated, and therefore, there would be no effects on environmental resources such as air quality, geology and soils, groundwater, surface water, floodplains, farmland, etc.

However, because the Proposal would not be constructed in this scenario, the reliability of the transmission network would likely be negatively impacted. As discussed in Section 1.1.2.3, the efficiency of the transmission system within MISO would also be impacted, resulting in energy losses.

2.4.2 Proposal

This Final EIS evaluates in **detail those alternatives included in the MRP Application and in the final CPCN Permit Application (Xcel et al. 2010 and 2011). It also includes selected alternatives from among those proposed during the MN DEIS scoping process (see discussion in Section 2.2.6.2 for details). Note that the MN DEIS and FEIS evaluated in detail the MRP Application alternatives as well as a larger number of the alternatives proposed during the MN DEIS scoping process (MDC 2011b and 2011c). The RUS Draft EIS included a detailed evaluation of all the MN DEIS scoping alternatives that were also included in the MN DEIS and FEIS. However, for clarity, as discussed in Section 2.2.6.2, most of these routes have been eliminated from the detailed analysis included in this Final EIS. The alternatives evaluated in detail in the WI DEIS and FEIS (PSC-WDNR 2011 and 2012) are the same as those evaluated in detail in this EIS.**

[80] 40 CFR 1502.14(d)

The discussion below includes a general description of the transmission lines, ROW acquisition, and construction that is applicable to all alternatives, followed by a description of each of the alternatives included in the Proposal.

2.4.2.1 Transmission Lines

A high-voltage transmission circuit consists of three phases, each at the end of a separate insulator string, all physically supported by structures (poles). Each phase consists of one or more electrical conductors, which are metal cables consisting of multiple strands of steel and aluminum wire wound together. Shield wires are strung above the conductors to prevent damage from lightning strikes. The shield wire can also include fiber optic cable, which provides a communication path between substations for transmission line protection equipment. Typical designs that would be used for most of the Proposal are summarized in Table 2-4.

In addition to the structures described in the table, H-frame structures may be used in certain areas. H-frame structures consist of two poles connected with cross-braces and a beam that supports the conductors. These structures may be used where longer spans are desired, such as in environmentally sensitive areas, areas of difficult topography and elevation changes, or in the presence of poor soil conditions. The use of these structures typically minimizes the overall total number of structures required in an area as well (e.g., minimizing the number of structures in a river's riparian zone); however, the ROW requirement is greater, approximately 180 feet. H-frames also allow all of the conductors to be strung in a single horizontal plane, therefore minimizing the vertical barrier that avian wildlife would cross. H-frame structures will consist of two steel poles with cross bracing. Two-pole structures may also be required when the alignment turns at a 45- to 90-degree angle to reduce foundation size and aid constructability. The 345 kV transmission line will have a minimum ground clearance of 34 feet, while the 161 kV lines will be designed with a minimum 26-foot ground clearance.

Steel single-pole structures, also known as monopoles, require only one pole along the ROW, with a relatively narrow footprint compared to steel lattice or other types of structures. This reduces the impact on farming operations and other impacts compared

to the two poles required for H-frames, or the wide bases of steel lattice structures. For the Proposal's 345 kV line, most structures would consist of single-pole, self-weathering steel, double-circuit capable structures. Self-weathering steel alloys were developed to eliminate the need for painting and are commonly used throughout the industry. The steel alloy develops a stable, rust-like appearance (dark reddish-brown color) when exposed to the weather for several years. The wetting and drying cycles cause rust to form a protective layer on its surface, preventing further rusting. This layer develops and regenerates continuously when subjected to the influence of the weather. In Minnesota, Proposal structures and substation locations would be designed to accommodate a future second 345 kV circuit on the 345 kV poles and at substation locations. Where the 345 kV line is not co-located with an existing lower voltage transmission line, only one circuit would be strung and the other side of the pole would be available for adding a second 345 kV circuit in the future, if and when conditions warrant. Where the new 345 kV line is co-located with existing facilities, the second position will be built to 345 kV specifications, but operated at the lower voltage.

Table 2-4: Typical Structure Design Summary

Line Type (Design Configuration)	Initial Configuration	Structure Type/Material	ROW Width (ft.)	Structure Height (ft.)	Structure Base Diameter (in.)		Foundation Diameter (ft.)	Span between Structures (ft.)
					Tangent structure	Angle structure		
345 kV/345 kV Double Circuit	345 kV circuit operational	Single-Pole Davit Arm / Steel	150	130-175	36-48	48-72	6-12	700-1,000
	345 kV circuit operational/161 kV circuit operational							
345 kV/345 kV Double-Circuit w/69 kV Underbuild	345 kV circuit and 69 kV underbuild circuit operational			135-185	40-52	48-84		500-1,000
161 kV Single Circuit	161 kV circuit operational		80	70-105	24-36	32-64	4-9	400-700

Source: Xcel et al. 2010 Table 3.1-1

Adding a second 345 kV circuit would require approval from the PUC (in Minnesota) and the PSC (in Wisconsin). In some locations, proposed triple-circuit structures would hold one 345 kV circuit, provide a location for a future 345 kV circuit, and carry an existing 69 kV circuit under the 345 kV transmission lines (a configuration known as "underbuilding"). Representative structures are shown in Figure 2-11 and Figure 2-12.

The foundations are proposed to be made of poured concrete and would typically be 6 to 12 feet in diameter. In sensitive environmental areas, an alternative design may be used to minimize impacts. For example, a lower-impact vibratory caisson may be used in wetland areas to limit ground disturbance. In areas of poor soil strength and for angle and dead-end structures, a rock-filled galvanized steel culvert or drilled pier concrete foundation may also be inserted for additional stability. Support cables (guying) may also be used for angle structures.

When the transmission line parallels existing infrastructure ROW (e.g., existing transmission lines, roads, railroads or other utilities), the new ROW required may be reduced. The Applicants' practice when paralleling existing ROW is typically to place the poles on adjacent private property, approximately 5 feet off the existing ROW. With this pole placement, the transmission line shares the existing infrastructure ROW, thereby reducing the size of the easement required from the private landowner(s). For example, if the required ROW is 150 feet, and the transmission pole is placed 5 feet off an existing road ROW, only an 80-foot ROW easement would be required from the landowner, while the additional 70 feet of required ROW would be shared with the existing road ROW. As discussed in Section 2.4.2.2, additional requirements would apply to US-52.

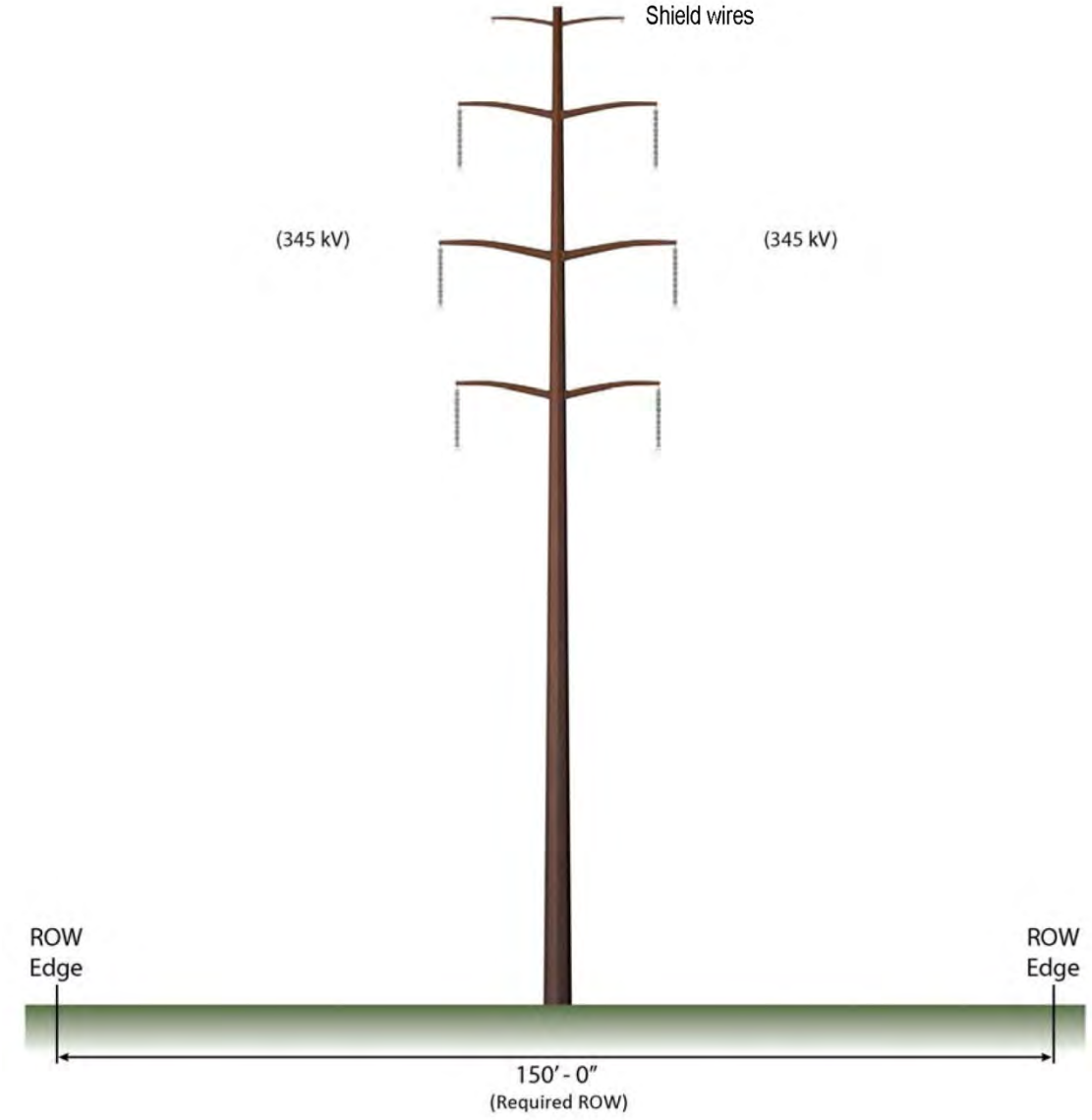

Figure 2-11: Typical Double-Circuit 345 kV Single-Pole Structure (Davit Arm)
Source: Xcel et al. 2010, Figure 3.1-3

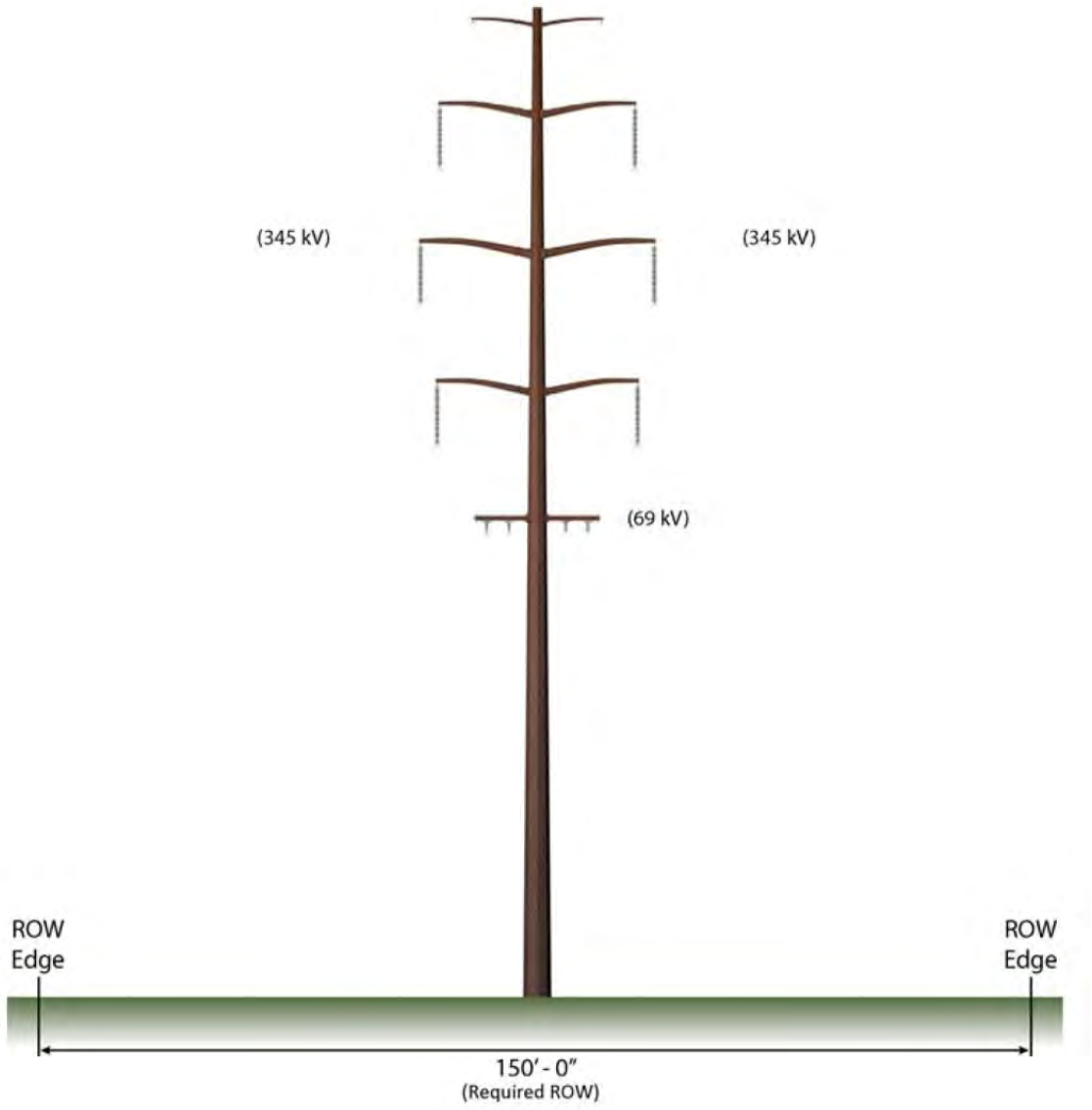

Figure 2-12: Typical Double-Circuit 345/345 kV Structure with 69 kV Underbuild
Source: Xcel et al. 2010, Figure 3.1-2.

The arms on the pole would be approximately 85 feet aboveground, depending on span length, and extend approximately 18 feet from the center of the pole. In each instance of ROW sharing, the Applicants would acquire the necessary approvals from the ROW owner (e.g., railroad company for railways), or the agency overseeing use of a particular ROW (e.g., MnDOT for state trunk highways, including U.S. highways and interstates).

Mississippi River Crossing

The Mississippi River presents unique challenges that will require the use of multiple-circuit specialty structures. A portion of this crossing is on UMRNW&FR lands managed

by the USFWS. A Special Use Permit from USFWS will be required to cross the Refuge, and the Applicants (RPA and CPCN Application) will work closely with the USFWS to identify the most appropriate structure design.

An existing double-circuit transmission line crosses the Mississippi River and the Refuge at the Proposal's proposed crossing location. The existing line crosses approximately 0.5 mile of Refuge lands and includes two structures on Refuge property. The line is constructed on a 180-foot-wide permitted ROW. An area approximately 125 feet wide and 1,900 feet long is maintained cleared of trees. The two main river crossing structures are 180 feet tall.

Several possible designs for the proposed river crossing are described in detail in the MRP Application, Appendix E (Xcel et al. 2010) and in the CPCN Application (Xcel et al. 2011). The design options demonstrate compromises between structure height and easement width while maintaining only three structures on refuge lands.

- Option A: A design that stays within the existing 125-foot tree clearing results in main channel crossing structures of 275 feet in height. The Federal Aviation Administration (FAA) requires lighting of poles exceeding 200 feet above ground level, and may also require poles to be painted alternating red and white.
- Option B: The shortest possible pole design keeps the main channel crossing structures less than 200 feet. This avoids FAA lighting requirements and keeps all the conductors in one plane, but requires a 280-foot cleared ROW.
- Options C and D: A combination of options A and B keeps main channel crossing structures of less than 200 feet while using narrower structures elsewhere to minimize the need for additional ROW and tree clearing on Refuge lands.
- Option E: Requested in 2010 by USFWS. This design uses the full 180 foot permitted ROW on refuge property.

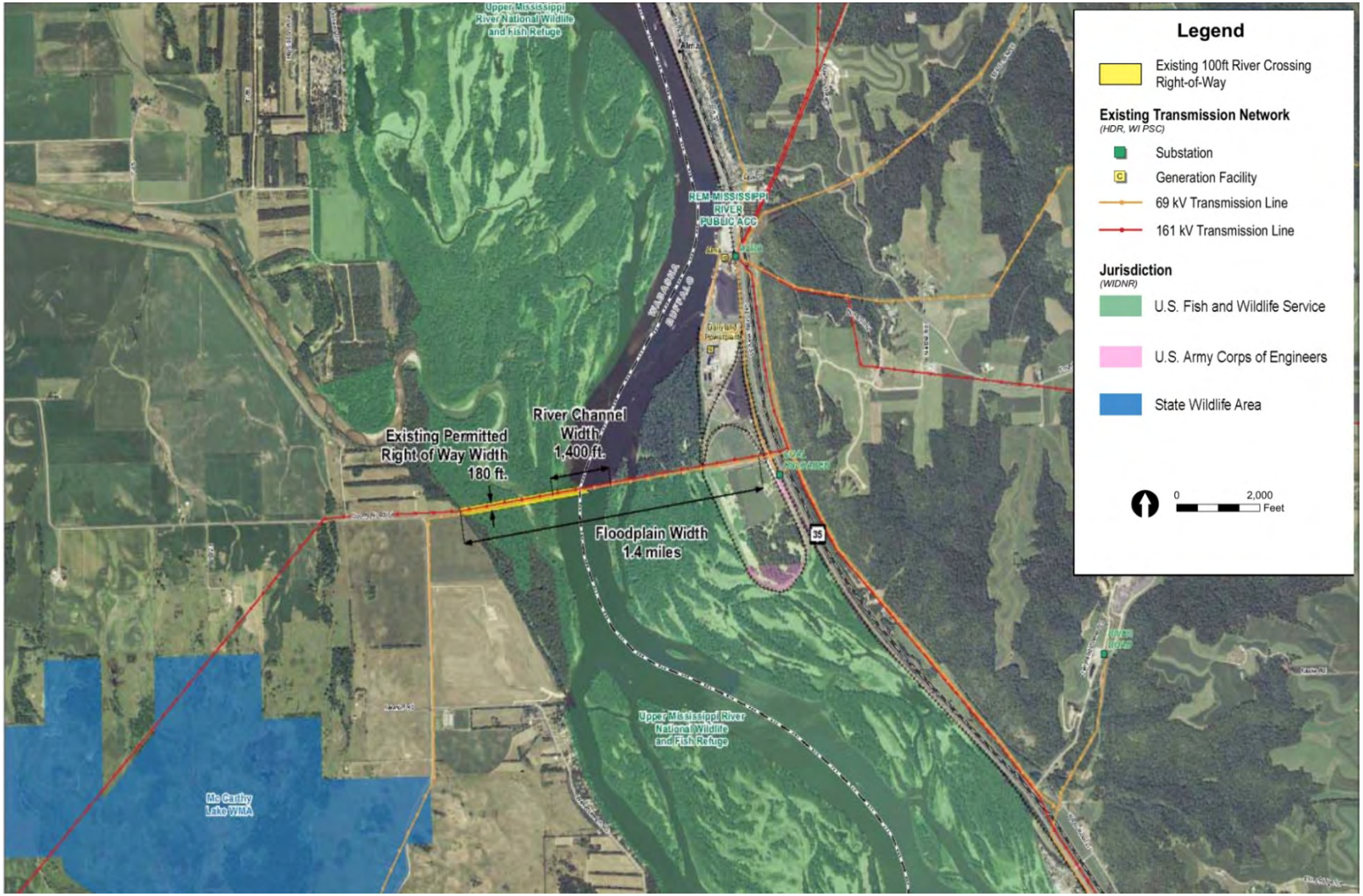

Figure 2-13: Mississippi River Crossing at Alma

Source: Xcel et al. 2010 Appendix E.

Table 2-5: Option C – Mississippi River Crossing

Structure	Height (ft.)	Width of ROW at Structure (ft.)	Location Comment
#1	105	125	Private property
#2	130	125	Wildlife refuge
#3	130	125	Wildlife refuge
#4	199	280	Wildlife refuge, river crossing structure
#5	199	280	Dairyland Power property, river crossing structure
#6	80	280	Dairyland Power property
#7	140	280	Dairyland Power property
#8	140	280	Dairyland Power property
#9	60	270	Private property

Source: Xcel et al. 2010 Appendix E.

The USFWS initially stated they preferred Option C, and is investigating whether the USACE and the Coast Guard would grant a waiver for a lower required clearance over the river. The Alma River Crossing is shown in Figure 2-13 and Option C is summarized in Table 2-5. Later the USFWS requested the Applicants prepare a fifth crossing design, Option E, a combination of components from the previous four designs. The CPCN Application includes drawings from Power Engineering with more detail for the river crossings (Xcel et al. 2011). These drawings are included as Appendix M.

2.4.2.2 ROW Acquisition

When a transmission line is placed across private land, a ROW agreement, typically an easement (not a fee title), is required. When a transmission line is placed entirely across private land, an easement for the entire 150-foot ROW (for 345 kV transmission lines) or 80-foot ROW (for 161 kV transmission lines) would need to be acquired from the landowner(s). The Applicants have indicated a preference for locating poles as close to property division lines as reasonably possible to reduce the amount of ROW on a particular property.

Because of the numerous notices published and mailed and the public meetings held during the Applicants' development of the Proposal and the environmental review of the Proposal, as well as the hearings held in the Proposal area as part

of the Minnesota and Wisconsin route permitting processes, it is likely that the majority of landowners would be aware of the Proposal prior to contact from a right-of-way agent. Once the property owners along the approved route have been identified, a right-of-way agent would inform them of the construction of the transmission line and how it may affect their property. With a property owner's permission, survey crews would enter the property to complete the preliminary survey work and possibly conduct soil investigations for structure location. As the design of the transmission line nears completion, the survey crews would stake the structure locations. The right-of-way representative would show the landowner where the structure is proposed to be located on the property and would discuss any location concerns.

As described in the preceding section, when a transmission line parallels roads, railroads, or other transmission lines, a landowner may be able to have a narrower easement.

Sharing ROW with railroads requires contractual approval from the railroad company, while sharing ROW with a state or U.S. highway requires permit approval from the MnDOT or the WisDOT.

The MnDOT Utility Accommodation Policy (MnDOT 2005) and the WisDOT Utility Accommodation Policy (WisDOT 2011c) describe the policies and procedures governing use and sharing of state trunk highway ROWs by utilities. The policies were developed in accordance with the requirements of state and federal laws and regulations.[81] They are designed to ensure that the placement of utilities does not interfere with the flow of traffic and the safe operation of vehicles.

MnDOT and WisDOT have a responsibility to preserve the public investment in the transportation system and to ensure that non-highway uses of the ROW do not interfere with the ability of the state to make long-term highway improvements, such as adding lanes, interchanges, or bridges; or to safely operate and maintain the existing system.

[81] 23 CFR 645 Subpart B

The requirements of each Utility Accommodation Policy vary based on whether the utility is crossing the highway or being installed parallel to it and on the type of highway. For controlled access highways or freeways in Minnesota, “the installation of new utility facilities shall not be allowed longitudinally within the ROW of any freeway, except in special cases under strictly controlled conditions” (MnDOT 2005). This means that the transmission structures–the poles and davit arms–must be completely outside of the freeway ROW. For the Proposal, this would mean placing a pole approximately 20 to 25 feet outside the ROW. This would be applicable for US Highway 52 (US-52). No freeways would be affected in Wisconsin. WisDOT requires a permit for utility construction **or occupation** that affects a state or U.S. highway ROW. **This includes any utility that physically occupies or overhangs the ROW including any blowout clearance required by state and federal codes.**

2.4.2.3 Transmission Line Construction

Construction activities are summarized below in the general sequence of occurrence: acquiring ROW access, establishing staging and laydown areas, grading (where needed), pole installation, and conductor installation.

The precise timing of construction would take into account factors including permit conditions, system loading issues, and available workforce.

ROW Access – Typically, existing roads or trails that run parallel or perpendicular to the transmission line are used to access the actual transmission line ROW. Where use of private field roads or trails is necessary, permission from the property owner is obtained prior to access. In some cases, new access roads may have to be constructed when no current access is available or existing access is inadequate for the heavy equipment used in construction. Access may be needed from highways when topographic features such as wetlands or steep terrain prevent access from private lands. **Helicopters may be used for access in highly sensitive areas.**

Establishing Staging and Laydown Areas – The materials are stored on-site at staging areas until they are needed for construction. Larger temporary lay down areas may also be needed in some areas depending on access, security, efficiency, and safety for warehousing supplies. Permission would be obtained from land owners

through rental agreements. Where feasible, a previously-disturbed or developed area will be used to minimize impacts. **Wetlands will not be used for staging. Sites that are paved or otherwise previously graded and cleared of vegetation (e.g., parking lots, old gravel pits and fields) are ideal for staging and will be used when feasible. Such an area includes sufficient space to lay down material and pre-assemble some structural components or hardware. Other staging areas located along the ROW are limited to a structure site for lay down and framing prior to structure installation. Stringing setup areas are also used to store conductors and the equipment necessary for stringing operations.**

Clearing - Preparation for construction begins with development of temporary access points from existing roads. Within the ROW, trees and brush would be removed within the area directly below the structures. In the outside strips of the ROW, beyond the edge of the structures, bushes or shrubby vegetation could be left in place. Rootstock would be left in place to stabilize existing soils and to regenerate vegetation after construction. With the approval of the landowner or land manager, stumps of tall-growing species would be treated with an approved herbicide to discourage re-growth. When the landowner or land manager prefers not to use herbicides, alternative means of stump control would be identified in consultation with the land managers.

Temporary Access. If temporary removal or relocation of fences is necessary, the installation of temporary or permanent gates would be coordinated with the landowner. The right-of-way agent would also work with landowners for early harvest of crops, where possible. During the construction process, the Applicants may ask the property owner to remove or relocate equipment and livestock from the ROW.

Grading – Transmission line structures are generally installed at existing grades. However, along areas with more than 10% slope, working areas would have to be graded level or fill would be brought in to create working pads. If the landowner permits, it is preferred to leave the leveled areas and working pads remaining in place for future maintenance activities. Otherwise, the site is graded back to its original condition as

much as possible and all imported fill is removed. The MnDOT has expressed concern that in areas with more than 10% slope, grading and working pads could impact DOT ROW in some areas and has requested further evaluation once specific pole locations are known. **In locations where Proposal structures would be located within or in proximity to highway ROW, the Applicants would need to communicate with MnDOT to determine suitable structure locations and grade restoration to prevent erosion and maintain appropriate surface water drainage along the highway.**

Power Pole Installation – When sites are prepared for installation, the poles are generally moved from the staging areas and delivered to the staked location and placed within the ROW. Insulators and other hardware are attached while the pole is on the ground. The pole is then lifted, placed, and secured using a crane.

In nearly all cases, the poles would be installed using concrete foundations or direct embedment into the soil. Where single pole structures are under higher stress (medium angle, heavy angle or dead-end structures) drilled pier concrete foundations are required.

If concrete foundations are needed, holes 5 to 7 feet in diameter and up to 25 or more feet deep (depending on soil conditions) are drilled. After the concrete is set, the pole is bolted to it. No guy wires are required in this setup.

If the poles are directly embedded, holes approximately six feet in diameter are augured or excavated. The hole is partially filled with crushed rock, the pole is set on top of the rock base, and the hole is backfilled with crushed rock and/or soil. In poor soil conditions, a galvanized steel culvert may be installed vertically with the structure set inside. No guy wires are required.

Conductor Installation – After pole placement, conductors are installed in stringing setup areas located approximately every two miles along a Proposal route, either within the ROW or on temporary construction easements. Brief access to each structure is needed to secure the conductor wire to the insulator hardware and the shield wire. Where the transmission line crosses streets, roads, highways, or other obstructions, temporary guard or clearance poles may be installed to protect conductors and to ensure safety during installation.

Helicopters may be used for foundation, conductor and structure installation in environmentally sensitive areas to reduce the time of construction and minimize ground disturbing impacts. Helicopters may also be used to install hardware and conductors in other areas. The CapX 2020 Applicants have prepared a detailed description, with photographs, of the use of helicopters for conductor installation (CapX 2020 2011).

Implosive connectors may be used to join conductors and dead-end hardware rather than hydraulic splices. Implosive connectors use a specific controlled detonation to fuse the conductors and hardware together. The process creates noise equivalent to a clap of thunder or commercial fireworks, which lasts only an instant. The implosive process provides for a specific engineered connection, which improves the strength and quality of the connections that can be a potential failure point in the transmission system. In addition, it takes less time than installing hydraulically-compressed connectors and reduces the number of set up areas required on the ground. This further reduces ground-disturbing activities.

2.4.2.4 Substation Construction

The Proposal would require construction of two new substations, the North Rochester Substation in Minnesota and the Briggs Road Substation near La Crosse, Wisconsin. The Hampton Substation has been permitted separately in the Brookings to Hampton CapX 2020 project. The proposed Briggs Road Substation would be permitted in a separate proceeding before the PSCW.

North Rochester Substation

The North Rochester Substation would be located in the area between Zumbrota and Pine Island (Figure 1-1). The specific location of the new substation will be determined through the route permitting process; however, the proposed siting area lies within a portion of southern Goodhue County west of US-52, south of State MN-60 and north of 500th Street. Approximately 8 acres of fenced and graded land would be required for substation construction; however, the Proposal includes approximately 40 acres to provide adequate buffer and to allow for transmission lines to connect to the substation. Clearing and grading of the site would be required for the new North Rochester Substation, and it would include six 345 kV circuit breakers, a 345 kV/161 kV

transformer, three 161 kV circuit breakers, a control house and associated line termination structures, switches, controls, and associated equipment. **Detailed locations of potential substations are included in Appendix E (Sheet Maps NR23 and NR45) and Appendix G (Sheet Map 116).**

Briggs Road Substation

The Briggs Road Substation, which would accommodate the selected route alternative within Wisconsin, would be located near the intersection of US-53 and Briggs Road near the Village of Holmen, WI. Two sites are being considered for this substation: the Briggs Road West Site and the Briggs Road East Site.

The Briggs Road West Site is located west of Briggs Road and south of US-53. The West Site is located near the Marshland and Tremval 161 kV lines, has good road and transmission route access, and is a relatively flat agricultural field that 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 (ATC) 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 and 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 substantial tree removal. An equestrian facility would need to be relocated.

Expansion of Existing Substations

The existing Northern Hills Substation would require an approximately 0.5-acre expansion of the graded and fenced area to accommodate the new 161 kV transmission line and related equipment. No additional property would be required to construct the expansion. Improvements would include an expansion of the existing graded area by

approximately 30 feet and the addition of equipment for a 161 kV line, including one circuit breaker and associated switches and controls. Construction would include the switches, foundations, steel structures, and control panels.

Modifications to the Chester substation would consist of the addition of a 161 kV circuit breaker, switches, line termination and expanded box structure, electrical bus and associated equipment. The substation yard would be expanded by approximately one acre to accommodate the equipment.

2.4.2.5 Description of the Proposal

The MN EIS evaluates the Proposal as three segments (Figure 2-4). This Draft EIS follows the MN EIS convention, and adds the Wisconsin CPCN alternatives as a fourth segment. Naming conventions from the MN EIS and the CPCN Application are retained throughout. Consistent with the MN EIS, for the Minnesota routes, the route alternatives that the MRP Applicants identified as preferred and alternate are labeled with a two-character code where the first character designates the segment and the second character designates the route. For example, "1P" indicates the MRP Applicants' preferred route in Segment 1 and "2A" indicates the Applicants' alternate route in Segment 2. Routes identified in the Minnesota EIS scoping process are designated according to whether they represent an alternative to the Applicants' preferred route (designated "P") or alternate route ("A"); if the scoping route can be an alternative to both it is designated "B." The scoping routes were then numbered in the order in which they were proposed during the MN EIS scoping (MDC 2011b).

Segment 1 – Hampton to North Rochester Substation 345 kV Line

Segment 1 is 36 to 49 miles long, depending on the route, and passes through Dakota and Goodhue Counties, MN (Figure 1-1). **Four route alternatives are considered: 1P. 1A, and two short alternative segments northwest of Zumbrota proposed during MN DEIS scoping, 1P-006 and 1P-007. Routes 1P-006 and 1P-007 were retained because they appeared to offer the option of avoiding potential impacts to future quarry development.** Route 1P follows US-52 for most of its length from Hampton Station south, diverging at the south end to bypass the City of Zumbrota. It also follows

a 69-kV transmission line for 16 miles, from just north of Cannon Falls to just south of Zumbrota.

The northern part of Segment 1 is in the Cannon River watershed and the southern part is in the Zumbro River watershed. All of the routes under consideration in Segment 1 cross the Cannon River near or west of Cannon Falls. Lake Byllesby, a reservoir on the Cannon River **with an associated regional park**, lies west of Cannon Falls. **Route 1P crosses the Cannon River approximately one mile downstream of Lake Byllesby and Route 1A crosses the Cannon River just upstream of Lake Byllesby.** Communities near route alternatives are shown in Figure 2-5. Cannon Falls and Zumbrota, both located near US-52, are the largest communities.

Segment 2 – North Rochester Substation to Northern Hills 161 kV

This segment would be 15 to 18 miles long, depending on the route, and would pass through Goodhue and Olmsted Counties, MN (Figure 1-1).

Three route alternatives are considered for Segment 2: Route 2P, Route 2A, and one short alternative segment to Route 2P that was proposed during the MN DEIS scoping process, Route 2P-001. Route 2P-001 was retained because it appeared to affect fewer residences, would have the least wetland impacts of all Segment 2 routes, and did not have other obvious disadvantages. Route 2P follows mainly roadways in this segment. Route 2A follows a mix of transmission lines, county and township roads, and field lines, with some cross-country stretches.

Alternatives in this area are in or near the cities of Pine Island and Oronoco.

Segment 3 - North Rochester Substation to Mississippi River 345 kV

Segment 3 is 42 to 45 miles long, depending on the route, and passes through Goodhue, Olmsted and Wabasha Counties, MN (Figure 1-1). East of the Pine Island area, all alternatives cross the Zumbro River near a reservoir on the river called Lake Zumbro. Three alternative routes are evaluated at the Zumbro River crossing: one upstream (south) of the reservoir, one on the dam, and one downstream of the reservoir. All routes follow a combination of field lines, county and township roads and existing transmission lines. Short segments are cross-country. Routes 3P and 3A share a common existing transmission line alignment, the Dairyland Q3 line, for approximately

the last 9 miles. This route traverses the blufflands west of the Mississippi River and several state and federal lands including the Snake Creek Management Area of the Richard J. Dorer Memorial Hardwood State Forest (RJD Forest) (subject to LWCF requirements as discussed in Section 3.6.1.3), McCarthy Lake Wildlife Management Area (WMA) (subject to Pittman-Robertson Act requirements, as discussed in Section 3.6.1.3), other portions of the RJD Forest, and the UMRNW&FR. The Applicant has been conducting ongoing coordination with the MDNR regarding these issues. These resources are discussed in Section 3.6. At the Mississippi River, the existing Dairyland Q-3 line is collocated with the existing Alma-Harmony 69 kV transmission line.

A roughly parallel alternative route through this section, Route 3B-003, follows Minnesota Highway 42 (MN-42). A total of 12route alternatives are considered for Segment 3. **These include Routes 3P and 3A, Route 3A/P Kellogg (a short option to avoid McCarthy WMA), and nine other route options from the MN DEIS scoping process.**

North Rochester to Chester 161 kV line – The proposed North Rochester to Chester 161 kV line (Chester Line) is in Segment 3. This line would consist of two major sections: an east-west section, with the North Rochester Substation at the west end, which would be co-located with the 345 kV line; and a north-south segment that would extend south from the 345 kV line to the Chester Substation (Figure 1-1).

East-West section – To minimize the amount of ROW needed, the Applicants propose to place the Chester Line on the same structures as the 345 kV Proposal for approximately 13 to 19 miles from the North Rochester Substation to east of the Zumbro River. This approach takes advantage of the double-circuit capable design that the State of Minnesota required in the CON. Because the 161 kV circuit would be strung on the same poles as the 345 kV circuit, no additional right-of-way would be required. This double-circuit would be built as a 345kV/345kV double-circuit, but would be energized as a 345 kV/161 kV double-circuit (Northern States Power Company 2011). The east-west portion of the Chester Line is proposed to be co-located on the 345 kV transmission line from the North Rochester Substation to a point southwest of Hammond, Minnesota that is dependent on the 345 kV Route selected. Depending on

the 345 kV route selected, the east-west portion of the Chester line would end at one of three locations, referred to as “tap” points. These tap locations are identified Tap 1, Tap 2 and Tap 3 on Figure 2-7. Tap 1 would be the end point for Route 3A and associated sub-routes, Tap 2 would be the endpoint if the Route 3A crossover (connecting the east part of Route 3A with the west part of Route 3P) was used, and Tap 3 would be the endpoint for Route 3P and associated sub-routes.

North-South section –

Tap 1 scenario:

- From Tap 1, the Chester 161 kV line would continue 3.2 miles south and east as 161 single-circuit to 125th Street NE. From there the Chester Line would continue approximately 0.5 mile east along 125th Street NE as a double-circuit with the Peoples Cooperative 69 kV line.
- The Chester Line would then turn south and continue along 50th Avenue NE as a 161 single-circuit line for approximately 5 miles to 75th Street NE.
- From 75th Street NE for approximately 6.5 miles south to the Chester Substation, the Chester Line would be double-circuited with the Peoples Cooperative 69 kV line.

Tap 2 scenario:

- From Tap 2, the Chester Line would continue 0.5 mile south from as 161 single – circuit to 125th Street NE. From there the Chester Line would be identical to that described under Tap 1 scenario.

Tap 3 scenario:

From Tap 3, the Chester Line would continue approximately 0.5 mile east along 125th Street NE as a double-circuit with the Peoples Cooperative 69 kV line. From there, the Chester Line would be identical to that described under the Tap 1 scenario.

Impacts of the Chester Line are summarized in Table 2-6. As shown in the table, no federally-listed threatened or endangered species are known to occur within the ROW. The Blanding’s turtle, a state-listed threatened species, may be found within one mile of the proposed route centerline. The proposed ROW does not cross any Important Bird Areas, Grassland Bird Conservation Areas, High or Outstanding Biodiversity Sites, or formally classified lands. Construction of the line would result in no permanent or temporary impacts to wetlands. Approximately 6 acres of forest would need to be removed. This would all be

forest edge: either along an existing transmission line or roadway ROW. One structure on the National Register of Historic Places, the Benike Barn, is located within one mile of the proposed route centerline. Potential impacts to the Benike Barn are discussed in Section 3.9.

Segment 4 – Wisconsin Alternatives

The Wisconsin route alternatives extend from Alma at the Mississippi River to the Briggs Road Substation near the Village of Holmen (Figure 2-14). Segment 4 would be approximately 40 to 55 miles long, depending on the route, and would include parts of Buffalo, Trempealeau and La Crosse Counties, WI.

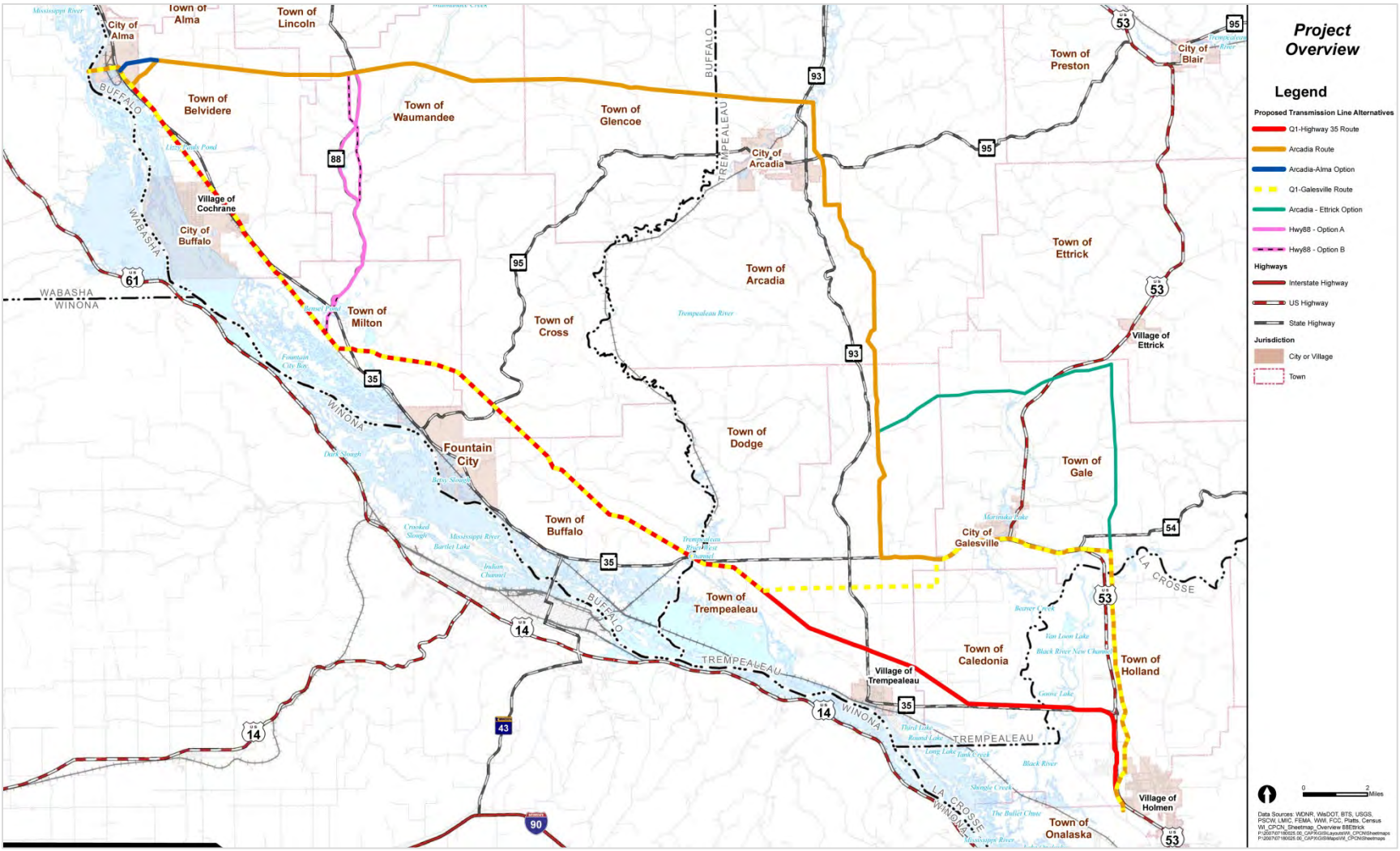

Figure 2-14: Final Wisconsin CPCN Alternative Routes
Source: Xcel et al 2011

The primary existing transmission corridor between Alma and the Briggs Road Substation is the Dairyland 161 kV Q1 transmission line (Q1) corridor, which was identified as a potential route corridor early in the route development process. . The changes from the MCS final corridors and route options center on avoidance options for potential impacts from using the Q1 route, which is Dairyland's existing 161 kV line along the Mississippi River. **The Q1-Highway 35 Route would follow the existing Q1 Line except for the segment near the southern terminus of the Proposal where the Q1 Line crosses the UMRNW&FR (Figure 2-14). As discussed in Section 2.2.6.4, this segment was eliminated from detailed consideration.**

While it is the most direct and shortest of the Wisconsin routes and meets the criteria of following an existing transmission line, the Q1 also has some potential impacts and agency concerns. The northern 8 miles of this corridor is near Wisconsin Highway 35 (WI-35), which, in this area, is designated as GRRNSB, 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 GRRNSB/WI-35 and the feasibility of permitting the route across state (Van Loon Wildlife Area) lands and wetland areas in the Black River Bottoms. As discussed in Section 2.1.2.3, the Q1 Galesville Route was developed to avoid potential impacts at the state wildlife areas at the Black River.

The routes included in the finalized CPCN Application (Xcel et al. 2011) are shown in Figure 2-14. As shown in Figure 2-14, two options for use of the majority of the Q1 route are included: the first uses WI-35 at the south end, and another uses a route through Galesville, then follows US-53.

In addition to the Bluff Route and the Blair Route, which were eliminated from detailed evaluation as discussed in Section 2.2.6.4, the Arcadia Route was developed as an alternative to the Q1 Route. 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-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 that

avoids a residential development at the top of the bluff. It follows a short part of the existing 161 kV corridor then diverts up the bluff through a forested area, some agricultural land and a rural residential development, then connects with the existing 161 kV corridor and the Arcadia Route.

Additional route options are shown in Figure 2-14 that were not included in the MCS: the WI-88 Options and the Arcadia-Ettrick Option. These were proposed by the WDNR and WisDOT to address potential impacts to the GRRNSB/WI-35. The WI-88 Route follows Wisconsin Highway 88 (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 part of the Q1 Route, where it follows the GRRNSB/WI-35. The Arcadia-Ettrick Option was suggested by the WDNR as a potential substitute for a portion of 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.[82] Using this connector segment yields a route that is approximately 55 miles long.

As noted in the Draft EIS, Dairyland plans to rebuild the Q1 line in its present location (Q1 Rebuild), regardless of where the 345 kV line may be built, except for potentially the southernmost segment, from Trempealeau to Holmen. (The Q1 line needs to stay at or near its present location from Alma to Trempealeau, to provide local service.)

Detailed descriptions of the Wisconsin (Segment 4) alternatives are included in Appendix F.

[82] Part of what was originally called the Blair Route is now part of the Arcadia-Ettrick Option, since the remainder of the Blair Route was eliminated from consideration.

2.5 COMPARISON OF ALTERNATIVES

2.5.1 Minnesota Segments

Routes 1P and 1A are compared by resource area in Table 2-6. **Additional comparative analysis of Routes P and A, along with the other routes retained for detailed analysis, is provided by segment below.**

This section has many references to the detailed sheets showing route alternatives on aerial photographs included in Appendix A of the Minnesota Final EIS (MDC 2011c). For convenience, these sheets are included in this EIS as Appendix E.

2.5.1.1 Segment 1 - Hampton to North Rochester Substation 345 kV Line

Comparison of Routes 1P and 1A

At 49 miles in length compared with Route 1P's 36 miles, Route 1A is 36% longer than Route 1P. Minnesota's main siting criterion is the use of existing ROW, via either an existing transmission line or roadway. Eighty-two percent of the Route 1P follows a transmission line or roadway, compared to 8% for Route 1A. In addition, the roadway that Route 1P follows is a major highway, US-52, and Route 1P also follows 16 miles of 69-kV transmission line along US 52. Route 1A has 44 miles that do not follow a transmission line or road, which is 8 miles more than the total length of Route 1P. Route 1A is estimated to cost 15% more than Route 1P.

Route 1A appears to parallel the western end of Lake Byllesby Regional Park; and it is unclear from available mapping if direct impacts would be completely avoided (Dakota County Parks 2005 p. 6.23).

There are a number of MDNR-designated biodiversity sites and/or Natural Heritage Sites (NHS) within or near Route 1A. Most of these are associated with stream crossings or areas of remnant prairie.

Route 1A has an estimated 4.7 acres of forested wetland that would be converted to emergent wetlands, and Route 1P has none. Neither Route 1P nor 1A would have other permanent wetland impacts. Construction of Routes 1P and 1A would require 223 and 74 acres of forest removed, respectively.

Potential impacts to natural communities along Route 1P are discussed in detail in Section 3.5.2.1. The most notable impact is south of Butler Creek where Route 1P crosses approximately 3,000 feet of a BSHS maple-basswood forest (Dunevitz and Epp 1995; MDNR database; MDC 2011c, Appendix A, Sheet NR12).

As an option to avoid the developed area at the US 52/MN 19 interchange on Route 1P, on behalf of the MRP Applicants, Xcel filed an alternative route segment with analysis of impacts with the PUC. This filing was entered into the PUC Docket 09-1448 on August 2, 2011, and is included in Appendix J.

Other Segment 1 Alternatives

Routes 1P-006 and -007, are located northwest of Zumbrota and are short segments that would replace a part of Route 1P. Route 1P-007 was proposed to avoid potential impacts to a quarry, and Route 1P-006 is a variation on Route 1P-007. Based on aerial photography, there are active parts of quarries both east and west of Route 1P, but not within the 1P ROW; the road to the western quarry passes beneath the ROW. Routes 1P-006 and -007 are located at the point just north of Zumbrota where Route 1P-001 diverges from US-52 and heads south to the North Rochester Substation. Both allow for more length on US-52 compared to the Route 1P section they replace; however, both are substantially longer, especially Route 1P-007, which is more than twice the length of the comparable Route 1P section. There are also three residences within the 1P-007 ROW, including one within 75 feet, while there are no residences within 300 feet of the ROW of the comparison segment of Route 1P.

Both routes impact the floodplain of the North Fork of the Zumbro River. The Route 1P-007 crossing is 2,300 feet long and Route 1P-006 is located entirely in floodplain for its 1,800-foot length. In addition, Route 1P-006 diverts from Route 1P at right angles (where a post would need to be located, with guy wires or a deep foundation), at a location that appears to be in the river itself, or at least very close (MDC 2011c, Appendix A, Sheet NR18).

2.5.1.2 Segment 2 – North Rochester Substation to Northern Hills 161 kV

Route 2P has a 1,000-foot floodplain crossing of the Middle Fork of the Zumbro River, along an existing roadway. Five hundred feet of the floodplain crossing is forested

(MDC 2011c, Appendix A, Sheet NH15). There is no existing infrastructure at the crossing. To the east of the crossing, Route 2P intersects a portion of the same floodplain without crossing the river. The intersection covers a distance of 600 feet and occurs at a right angle turn (MDC 2011c, Appendix A, Sheet NH16). Thus, a deep foundation or guy wires would be needed.

Route 2A parallels the Douglas Trail and crosses multiple forested floodplains. The Douglas Trail has received grants through the Land and Water Conservation Fund (LWCF) (see discussion in Section 3.6.1.3).

Other Segment 2 Alternatives

Route 2P-001, near Pine Island, was proposed to reduce the number of residences impacted. The comparable section of Route 2P has 1, 0 and 8 residences within 75, 76-150 and 151-300 feet of the alignment centerline, respectively, while Route 2P-001 has one residence within 300 feet of the alignment centerline, and it is in the 151-300 foot interval. However, while the comparable section of Route 2P follows a roadway, most of Route 2P-001 does not parallel existing features (MDC 2011c, Appendix A, Sheets NH14 and NH15).

2.5.1.3 Segment 3 – North Rochester Substation to Mississippi River 345 kV

The main differences between Routes 3P and 3A are at the crossing of the Zumbro River.

Route 3P crosses the Zumbro River at the existing crossing of White Bridge Road, with an 800-foot floodplain crossing. On the east side of the river, just outside the floodplain, Route 3P crosses 500 feet of BSMS oak forest, along the edge of the roadway ROW. Route 3P then moves northeast away from the roadway and generally follows the boundary between agricultural fields and the BSMS forested tract that continues for several thousand feet, with a few southward extensions that cross the ROW. The Route 3P alignment follows this boundary and crosses the forest at the southward extensions. Total forest crossing is approximately 1,600 feet, with no existing roadway or transmission line ROW (MCBS 1997b, MDC 2011c, Appendix A, Sheets MR10 and 11). By following the forest edge, Route 3P reduces agricultural impacts.

Route 3A crosses the Zumbro River north (downstream) of Lake Zumbro, at a location where there is no existing road or transmission line. The floodplain crossing is 2,000 feet long, includes 400 feet of BSMS floodplain forest wetlands, and lies within the area of influence of two NHSs. On the east side of the river the ROW bisects two tracts of BSMS forest with a total length of 1,500 feet (MDC 2011c, Appendix A, Sheet MR29). East of the Zumbro River, at Long Creek, a Zumbro River tributary, Route 3A crosses another MSBS forested area, first for a distance of 700 feet, then 1,000 feet, again at a location with no existing transmission line or roadway (MDC 2011c, Appendix A, Sheets MR33 and 34). Further east, on Indian Creek Route 3A crosses a BSOS forested area for a distance of 1,000 feet, in an area of influence of two NHSs (MDC 2011c, Appendix A, Sheet MR36).

Routes 3P and 3A are coincident for the eastern part of the route and the Mississippi River crossing, where the joint route follows an existing transmission line. As Route 3A/3P moves away from agricultural land and into the steeply wooded blufflands, it has the following crossings of BSMS upland forest, along the existing transmission line ROW: one at 600 feet, one at 1,100 feet, then another at 600 feet. This section also passes through the area of influence of two zoological NHSs (MDC 2011c, Appendix A, Sheets MR 20 and 21). Route 3P/3A, still following the existing transmission line, then enters the Mississippi/Zumbro River floodplain just beyond the point where Route 3P/3A crosses US-61. The route also crosses part of the formally classified McCarthy Lake WMA in the Mississippi River floodplain. Most of this area is also wetland, and much of the wetland is BSHS meadow-marsh-swamp complex. The route crosses 1,400 feet of continuous wetland, and then passes out of wetland and then crosses another 6,000 feet of continuous wetland. The part of the route within the floodplain lies within the area of influence of three zoological NHSs (MCBS 1997c, MDC 2011c, Appendix A, Sheets MR22 and MR23).

Other Segment 3 Alternatives

Routes 3P-001 and -002 are north of Pine Island and just east of the North Rochester Substation (S). The rationale for the inclusion of these routes was not found in the public record. The compared segments of Routes 3P -001 and -002 exclusively follow county or township roads, while the segment of Route 3P does not follow any

transmission lines or roads in this area. The MRP Applicants have identified the inclusion of the 3P-002 segment as preferred over the 3P segment (Hillstrom 2011 p. 12). As noted in Table 2-3, Route 3P-003 is not a feasible alternative in combination with Route 2P; however, it would be feasible with Route 2A.

Route 3P-004 is a very short segment in Wabasha County northeast of Plainview. It was proposed to reduce impact to a dairy farm and to reduce tree clearance. It is the same length as the comparable Route 3P segment, and neither have residences within 300 feet, and 3P-004 follows more roadway ROW.

Routes 3P-006, -007 and -011 are all short segments east of the Zumbro River and they all avoid the forest impacts just east of the river associated with Route 3P. The rationale for the inclusion of -006 and -011 was not found in the public record. The reasoning behind 3P-011 was to reduce the number of residences impacted and the number of trees removed; however, it appears to have one more residence within 300 feet than does the comparable section of Route 3P, although it results in less tree removal. Route 3P-006 follows the White Bridge Road alignment; however, it is slightly longer and has 3 residences within 150 feet of the ROW compared with none along the comparable section of Route 3P.

Alternative 3B-003 is an option for both Route 3P and 3A just west of the Mississippi River that avoids the McCarthy Lake WMA **and associated Robertson-Pitman Act involvement,** the associated BSHS, and several thousand feet of wetland crossing. It follows MN-42 instead of the existing transmission corridor. It has several more residences within 300 feet of the centerline of the alignment than the comparable section of Routes 3P/3A. The MRP Applicants requested a modification to Alternative 3B-003. The modification involves additional route width to accommodate steep wooded slopes. A map of the modification is included in Appendix J (Hillstrom 2011 p. 16 and Schedule 2).

Route 3P-Kellogg (same as Route 3A Kellogg) is near the Mississippi River. This route was included in the MRP application as an alternative to avoid direct impacts to the McCarthy Lake WMA. It mainly follows a railroad alignment along US-61 and county or township roads in an area where Route 3P follows an existing transmission ROW.

Route 3P-Kellogg also parallels the GRRNSB (US-61) for approximately 1.5 miles. It is nearly twice as long as the corresponding section of Route 3P (4.8 vs 2.5 miles).

Through the section that Route 3P Kellogg replaces, Route 3P has no residences within 300 feet of the alignment centerline. Route 3P-Kellogg has one residence within 75 feet of the alignment centerline and one residence in the 76 to 150 foot interval.

Route 3P Kellogg crosses 4,000 feet of wetland along US-61, within an area of influence of six NHSs that originates in the McCarthy Lake WMA, and/or the Mississippi River floodplain area that the Route 3P Kellogg follows (MDC 2011c, Appendix A, Sheets MR42 and MR23).

Route 3P Zumbro is the third alternative for crossing the Zumbro River, and it crosses at the Lake Zumbro dam, where there is no existing roadway or transmission line. It was included in the MRP application (Xcel et al. 2010). Just east of the dam, Route 3P Zumbro crosses 2,800 feet of BSHS forest, mostly oak. Within this region the route is in the area of influence of four NHSs (MCBS 1997b, MDC 2011c, Appendix A, Sheet MR45).

Routes 3A-003 and -004 are short segments west of Hammond. The rationale for inclusion was to preserve a natural wildlife corridor and reduce the number of trees removed. Both routes follow more roadway ROW than the comparable section of Route 3A.

Zumbro River Crossings – Three Zumbro River crossings were evaluated in the MRP application RPA (Xcel et al. 2010): They are first named below by the MN EIS designation.

Route 3P (Applicant-Preferred - White Bridge Road): Route 3P crosses US-52 from the southern end of the North Rochester Substation siting area, primarily following property lines for approximately five miles before turning southeast along Ash Road toward the City of Oronoco. The route then turns east and lies within 0.25 mile of White Bridge Road and crosses the Zumbro River on the north side of the bridge. The route continues east, crossing US-63.

Route 3A (Applicant Alternate): Route 3A exits the north end of the North Rochester Substation siting area and travels easterly following agricultural fields and property lines, crossing the Zumbro River approximately 0.75 mile north of the intersection of Wabasha County Road 7 and County Road 21. The route crosses US-63 and heads southwesterly.

Route 3P – Zumbro N and Route 3P – Zumbro S (Zumbro Dam Option): Zumbro N and Zumbro S are essentially the same option except that east of US-63 Zumbro N joins Route 3A and Zumbro S cuts back south to join Route 3P, using the route "3A-Crossover".

2.5.2 Wisconsin – Segment 4

The route alternatives in Section 4 are compared in Table 2-7. For clarity, the routes represented by each column are shown in Figure 2-16 through Figure 2-24.

The trade-offs in the Wisconsin part of the route are between the longer and costlier routes with greater impacts to agriculture and homes versus the potential impacts to the GRRNSB/WI-35 and the Van Loon Wildlife Area, including forested wetland impacts and potential impacts to important species.

In addition, selection of any CPCN alternative other than the Q1-Highway 35 Route would require partial or total rebuild of the Q1 line.

2.6 FEDERALLY PREFERRED ALTERNATIVE

NEPA requires identification of a preferred alternative by the lead federal agency. RUS is the lead federal agency for the Proposal, with the other federal agencies acting as cooperating agencies. RUS' preferred alternative is shown in Figure 2-15 and is discussed by state, below. The preferred alternative is consistent with the purpose and need of the Proposal and is in compliance with applicable laws and regulations. Route characteristics and potential impacts of the alternate routes are compared in Section 2.5 *Comparison of Alternatives*, and throughout Section 3 of the EIS.

2.6.1 Minnesota

As discussed in Section 1.3.2.2, the PUC has issued a draft route permit for the Proposal (Appendix AA), except for the North Rochester to Chester 161 kV line, which is included under a separate permit application. The PUC permit is for Routes 1P, 2A, and 3P, as addressed in this EIS, with minor modifications. Dairyland would be requesting financing assistance for its share in the permitted project plus the North Rochester to Chester 161 kV line, which has not yet been permitted. As discussed in Section 1.3.2.2, the PUC criteria for identification of a route is consistent with the criteria RUS has used in this EIS to evaluate the alternatives. RUS' preferred alternative for the Minnesota portion of the Proposal is consistent with the PUC's permitted route and consists of the following:

- In Segment 1, Route 1P, with the modification to avoid the developed area at the US 52/MN-19 interchange (discussed in Section 2.5.1.1 and included in Appendix J).
- In Segment 2, Route 2A.
- In Segment 3, Route 3P, as modified by the use of Route 3P-001 and 3P-004.

In addition, RUS' preferred alternative includes the Applicants' preferred alternative for the North Rochester to Chester 161 kV line. The rationale is summarized briefly below.

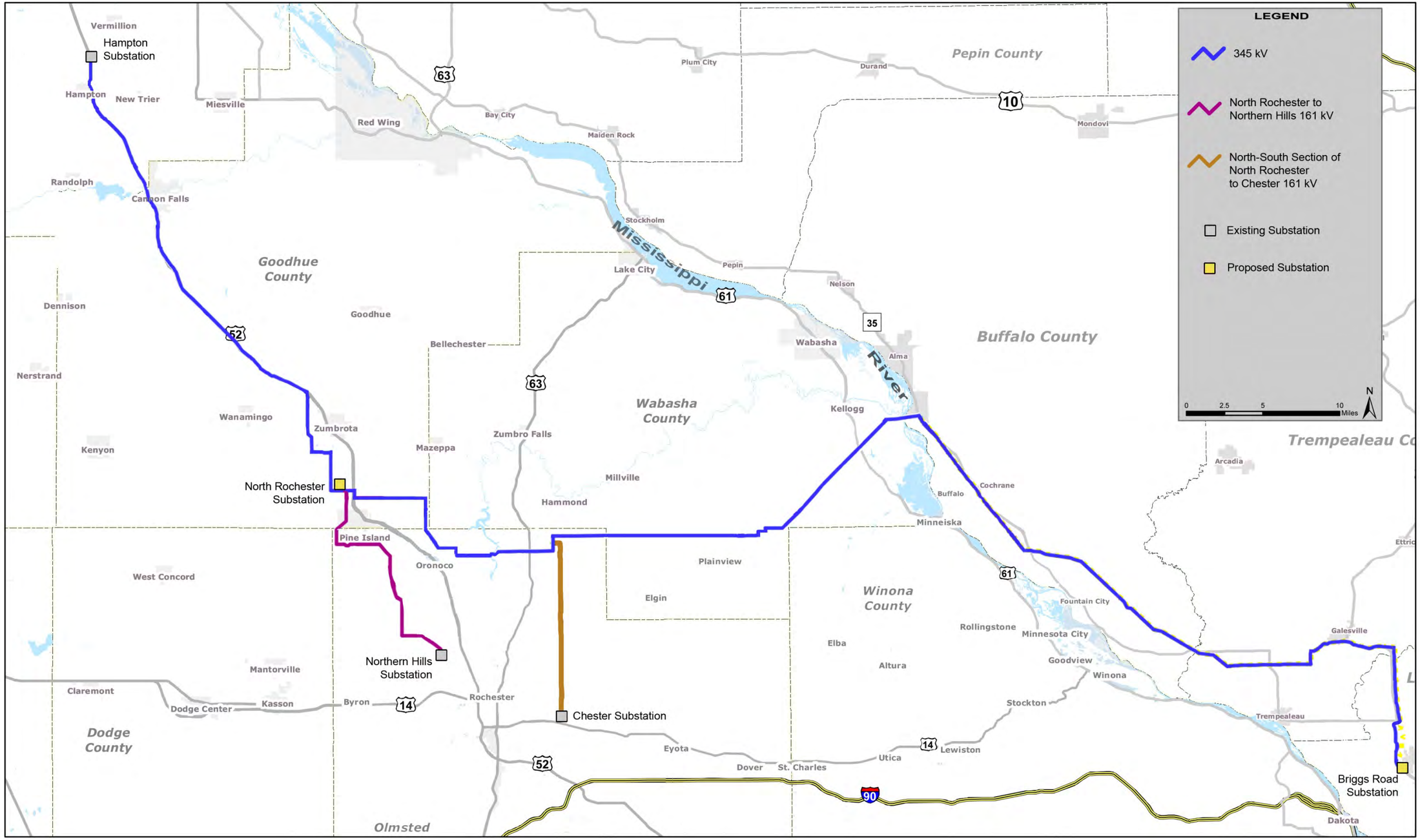

Figure 2-15: RUS Preferred Alternative.

Segment 1 – Hampton to North Rochester Substation 345 kV Line. Based on the analysis in Section 2.5.1.1 and the summary in Table 2-6, Alternative 1P, with 82% of its length following existing roadway or transmission ROW, is preferred over any of the other alternatives for following existing roadways and transmission lines (U.S. Highway 52 [US-52]). Compared to Route 1A, Route 1P is 36% shorter, has fewer stream crossings, fewer threatened or endangered species within the ROW, less potential impact on grassland bird conservation areas and BSOS (although it impacts a greater length of a BSHS), no conversion of wetland forest (compared to 4.7 acres for Route 1A), less temporary and permanent impacts on agricultural acreage (although it crosses more Conservation Reserve Program lands), a comparable number of residences within 300 feet of the centerline, and is less costly. The BSHS impact is to a forest along US 52, and impacts are limited to edge effects resulting from increased ROW needed. Route 1P has a greater area of forest removal: 223 acres compared to 74 for Route 1A. Neither alternative would have temporary or permanent wetland impacts (4.7 acres of converted forested wetland for Route 1A). In addition, Route 1P is the only alternative that would not affect Lake Byllesby, a state-level IBA and an important regional park. Route 1P (Appendix AA) includes a small modification at Cannon Falls. Due to constraints between the US-52 ROW and a developed area to the west, in the Cannon Falls vicinity, the route will move away from US-52 by approximately 1,000 feet and follow an existing transmission line, then return to the US-52 corridor. Overall impacts are essentially the same with this change (details in Appendix J).

Neither of the routes proposed during the MN scoping process and retained for detailed analysis were considered preferable to Route 1P. As discussed in Section 2.5.1.1, Routes 1P-006 and -007 may avoid potential impacts to additional development of a quarry. However, both of these routes are longer, have long floodplain crossings, and Route 1P-007 has more residences close by.

Segment 2 - North Rochester Substation to Northern Hills 161-V. As Table 2-6 shows, Routes 2P and 2A are generally comparable in terms of impacts, except that Route 2P has more than twice the number of homes within 300 feet of the route centerline (51 compared to 28). Route 2A has more length following transmission lines

and Route 2P has more length following roadways. Route 2A has slightly more impact to wetlands. Route 2A is approximately 6% more expensive than Route 2P.

Only one MN DEIS scoping alternative from Segment 2 was retained for detailed analysis, Route 2P-002 (Section 2.5.1.2). While it would have helped reduce the number of residences within 300 feet of the route centerline for Alternative 2P, it did not follow any existing corridors (Section 2.5.1.1).

Segment 3 – North Rochester Substation to Mississippi River 345 kV. The main differences between Routes 3P and 3A are at the crossing of the Zumbro River. As discussed in Section 2.5.1.3, Route 3P crosses the Zumbro River at the existing crossing of White Bridge Road, while the other two alternatives cross at locations with no existing infrastructure. Most impacts, such as potential impacts to threatened and endangered species, crossings of IBAs and Minnesota designated biodiversity sites, permanent and temporary wetland impacts, crossings of formally classified land, and impacts to residences are similar for both (Table 2-6). However, Route 3P has fewer acres converted from forested to emergent wetlands, and less impact on forests. The estimated cost of Route 3P is 4% greater than Route 3A.

As discussed in Section 2.5.1.3, Routes 3P-006, -007 and -011, which are just east of the Zumbro River, all avoid the tree clearing that would be needed with the comparable section of Route 3P. However, Routes 3P-006 and 3P-011 would have more nearby residences. The administrative law judge, in the recommendation to the PUC for the route alternatives, reported a landowner objection to Route 3P-007: it “would run through farming operation and disrupt terraces installed for water and soil erosion” (MOAH 2012 p. 74).

As noted in Table 2-3, Alternatives 3P-001 and 3P-002 follow roadways at locations where Route 3P follows neither a roadway nor a transmission line. Neither alternative has any noted disadvantages compared to Route 3P, except, as noted in Table 2-3, Route 3P-001 would not be available in combination with Route 2P. With Route 2A identified as preferred in Segment 2, however, Route 3P-001 is feasible, and preferable to the comparable section of Route 3P. As shown in Figure 1-1, Routes 3P-001 and 3P-002 are mutually exclusive. Because Route 3P-001 is longer than Route 3P-002

and therefore results in more use of existing roadway, it was identified as the part of the preferred alternative.

Route 3P-004 follows more roadway than the comparable section of Route 3P and avoids tree clearing. It also follows a section line where Route 3P goes cross country. It has no apparent disadvantages in comparison to the section of Route 3P it would replace and was therefore included as part of the preferred alternative.

Route 3B-003 is an option for both Route 3P and 3A just west of the Mississippi River that avoids the McCarthy Lake WMA, the associated Biodiversity Sites of High Significance (as designated by the State of Minnesota), and several thousand feet of wetland crossing. It follows MN-42 instead of the existing transmission corridor. However, it has several more residences within 300 feet of the centerline of the alignment than the comparable section of Routes 3P/3A. Also, the existing 161 kV line would remain in place, regardless of the route alternative chosen. If 3B-003 were chosen, a new transmission corridor about 11 miles long would be created 1.5 to two miles northwest of the existing 161 kV line. In addition, the MnDOT has expressed concerns regarding steep banks, erosion, slope failure, water drainage, and rock fall along MN-42 (MDC 2011c, p. 182). Route 3P would result in approximately 13 acres of forested wetland converted to emergent wetland, and 7 acres of temporary wetland impacts. However, although it would cross several thousand feet of wetlands, because impacts occur only at the pole locations, it would result in only 0.02 acre of wetland impact that is specifically covered under Section 404 of the Clean Water Act (permanent filling or impact). This is negligible in view of the other impacts described above, in the comparison of Route 3P and Route 3B-003.

The McCarthy Lake WMA was purchased with the support of funding through the Federal Aid in Wildlife Restoration (Pittman-Robertson) Act. The Applicants are currently reviewing the existing Dairyland Power easements to confirm that the proposed 345 kV double circuit transmission line can be constructed and maintained in compliance with these existing easements and would not require the taking or conversion of Pittman-Robertson grant funded lands. If the taking or conversion of Pittman-Robertson grant-funded lands would be required, the USFWS, a cooperating

agency on this EIS, may not consider Route 3P to be the environmentally preferred alternative in terms of impacts to USFWS trust resources.

Route 3P Kellogg, an alternative that avoids the McCarthy Lake WMA, crosses 4,000 feet of wetland along US-61 in the Mississippi/Zumbro River floodplain. It is approximately twice as long as the segment of Route 3P it would replace, and would follow the GRRNSB for approximately 1.5 miles at a location where there is no existing transmission line.

2.6.2 Wisconsin

As discussed in Sections 2.4.2.5 and 2.5.2, the most direct route for the Proposal in Wisconsin is the existing Dairyland Q1 161-kV Line that runs from Alma to Holmen. This Q1 Route would fully utilize an existing transmission line ROW, in a direct route from Alma to Holmen. In addition, the Q1 line is near the end of its useful life and use of the line for the Proposal would result in substantial cost savings for Dairyland's customers, since, if the route could be used for the Proposal, the cost of replacing Dairyland's Q1 Line would be incorporated into the Proposal.

Thus, the trade-offs in the Wisconsin part of the route are between the longer and costlier routes with greater impacts to agriculture and homes versus the potential impacts to the GRRNSB/WI-35 (along the northern part of the route) and impacts to resources in the Black River Bottoms, including forested wetland impacts and potential impacts to important species. In addition, the USFWS is concerned about potential impacts to Refuge resources from any use of the Q1 Line for the Proposal. In letters to both the PSC and RUS and in comments on the Draft EIS, the USFWS expressed its concerns about potential impacts to eagles and other migratory birds from alternatives that use all or part of the Q1 route because of the relative proximity of the Q1 corridor to eagles' nests, eagle use areas, and high use areas for other migratory birds (letters included in Appendices S and X).

As discussed in Section 1.3.2.2, the PSC has determined that the Proposal is needed and that a CPCN will be issued for the Q1-Galesville Route. The route selected by the PCS is included in Appendix BB.

RUS' preferred alternative is consistent with the route the PCS has selected. Because of the potential increased risk of collision to some birds that use the UMRNW&FR and Trempealeau Refuges, the Q1-Galesville Route is not the environmentally-preferred alternative in terms of the avian resources USFWS manages. However, the overall considerations of cost-effectiveness, technical feasibility, and environmental impacts to all resources – in combination with the use of the existing Q1 Route and proposed mitigation – has led RUS to identify the Q1-Galesville as its preferred route. The basis for RUS' preference is described below. Since the Q1 Route requires rebuilding (with funds anticipated to be requested from RUS) and is the most direct and lowest-cost alternative for Dairyland customers, the analysis is based on a comparison of environmental impacts of alternatives to the Q1 Route. Alternatives to the southern part of the Q1 Route are discussed first, followed by a discussion of alternatives to the northern part of the route.

Potential impacts from the Q1 Route are greatest in the southern part of the route, in the area of the Black River Bottoms, which is composed of forested wetlands and provides important habitat for a number of species including the massasauga rattlesnake (see discussion in Section 2.2.6.4). As discussed in Section 2.2.6.4, the original Q1 Route through the Black River Bottoms was eliminated from detailed consideration because of direct impacts to the UMRNW&FR at the Black River Bottoms. Among the routes evaluated in detail in the EIS, only one, the Q1-Highway 35 Route, crosses the Black River Bottoms. The Q1-Highway 35 Route is also the most direct and most closely follows the Q1 Line. Because the Applicants have agreed to rebuild Dairyland's Q1 line on the Q1-Highway 35 Route if it were selected, selection of any CPCN alternative other than the Q1-Highway 35 Route would require partial or total rebuild of the Q1 line. However, the Q1-Highway 35 Alternative crosses the Black River Bottoms at the Van Loon State Wildlife Area. All other alternatives cross the Black River at the location of an existing 161 kV line, upstream of the Black River Bottoms. As described in Section 3.5.2.3, at the location where the Q1-Highway 35 Route would cross the Black River Bottoms, the proposed transmission line centerline would cross a wetland forest parallel to and approximately 400 feet from the roadway. The purpose of this offset is to avoid the scenic easements associated with the GRRNSB at Highway 35, and to provide a

buffer strip of wooded land. However, this also results in greater fragmentation of the forested wetland in the Van Loon Wildlife Area. As noted in Section 3.6.2.3, the WDNR stated that it believes there are other feasible alternatives and therefore it "would not be able to issue wetland permits" for this route. The Q1-Galesville Route, though in comparison with the Q1-Highway 35 Route is longer, costlier, affects more residences and has less of its length following existing transmission line, avoids the Black River Bottoms completely, and allows for use of the majority of the Q1 Line ROW.

Alternatives to the northern part of the Q1 Route include the various Arcadia alternatives and the WI-88 Options (Table 2-7 and Figures 2-16 through 2-24). The Arcadia alternatives would use none of the Q1 Route and the WI-88 alternatives would allow avoidance of the northernmost part of the Q1 Route. In most areas of quantifiable impact, the Q1-Galesville Route is comparable to the Arcadia Route options (Table 2-7). None of the routes cross IBAs or public lands. The Q1-Galesville Route has slightly more impact to residences than the Arcadia or the Arcadia-Alma Routes, and slightly less permanent wetland impact than any of the Arcadia Routes. However, the Arcadia Route and the Arcadia-Alma Option both have 12% more conversion of forested wetland than the Q1-Galesville Route, as well as 16 and 22% more upland forest impact, respectively (Table 2-7). The Q1-Galesville Route has the fewest stream crossings by far, the least length in areas of steep slopes, and the lowest erosion potential. The Q1-Galesville Route has no crossings of designated trout streams, while all the Arcadia alternatives have at least one crossing. The Arcadia-Ettrick Option adds three additional crossings of Class I and II trout streams, and has more than twice the overall stream crossings of the Q1-Galesville Route. The Arcadia-Alma Option or the Arcadia Route are also 12-13% longer and 11% costlier than the Q1-Galesville Route. The Arcadia-Ettrick Option is comparable to the Q1-Galesville Route in terms of forested wetland conversion; however, it has 40% more impact on upland forest. The Arcadia-Ettrick Option is also 18% longer and 16% costlier than the Q1-Galesville Route. The major advantage of the Arcadia-Ettrick Option in comparison with the others is that, because it does not pass by the more populated area at Galesville, it has the least impact on residences.

Thus, in terms of quantifiable impacts, as summarized in Table 2-7, the Arcadia Routes do not appear to have advantages over the Q1-Galesville Route, and the added length and cost of these routes does not appear to be justified. However, as discussed in Sections 3.5.2.4 and 3.7.2, respectively, and summarized below, the USFWS has concerns about potential impacts from collisions with the transmission lines to eagles and other migratory birds with the use of any part of the Q1 Route, and the WisDOT and WI-MRPC have concerns about impacts to the scenic quality of the Q1 Route with the use of the Q1 Line between Alma and WI-88.

Of the routes under consideration in Wisconsin, the Q1 Line is closest to the UMRNW&FR and Trempealeau Refuges and other high-bird-use areas along the Mississippi River, and therefore more likely to pose a collision risk for Refuge birds. The USFWS has concluded that the Q1–Galesville Route poses substantially higher potential for local impacts to migratory birds flying to and from the UMRNW&FR and Trempealeau National Wildlife Refuge than does the Arcadia Route. Of the routes under consideration in Wisconsin, the Q1-Highway 35 and Q1-Galesville Routes are closest to the UMRNW&FR and Trempealeau Refuges and other high-bird-use areas along the Mississippi River, and therefore more likely to pose a collision risk for birds using these refuges. With the Q1-Galesville Route or the Q1-Highway 35 Route, the existing 60 to 80-foot tall poles of the Q1 Line would be replaced by poles approximately 130 to 175 feet tall. With the Arcadia Route alternatives, the existing Q1 Line would remain in place. Therefore, in terms of potential for bird collision, the increased risk is due to the increase in pole height (and resulting increase in height of the conductors). The USFWS has concluded that the Q1–Galesville Route poses substantially higher potential for local impacts to migratory birds flying to and from UMRNW&FR and Trempealeau National Wildlife Refuge than does the Arcadia Route. There is no baseline data for the existing 161-kV line, and thus no basis for an estimation of increased risk. The detailed analysis presented in Sections 3.5.1.4 and 3.5.2.4 identifies specific locations and species that may be at higher risk with the taller poles and conductors. These include Canada geese in the vicinity of Lizzy Paul's Pond and the Trempealeau Refuge, mallards near Buffalo City and Cochrane, and great blue herons that fly between Mertes Slough and Trempealeau Refuge. Populations of both

Canada geese and mallards are well above goals set by the USFWS in spite of large annual hunting harvests in the Mississippi Flyway (approximately 1 million for Canada geese and 2.2 million for mallards). In addition, the USFWS is concerned about potential impacts to bald and golden eagles that may roost and nest near the transmission line. There may be occasional impact to individual birds, depending on species, location, activity and susceptibility.

However, based on the detailed descriptions of the areas (Section 3.5.1.4), species-specific information regarding use of the area (Sections 3.5.1.4 and 3.5.2.4), and the bird collision susceptibility assessment (Section 3.5.2.4 and Appendix N), RUS has concluded that no or negligible (i.e., non-detectable) impacts are likely to result to populations of any Refuge bird species as a result of construction and operation of the Proposal on the Q1-Galesville Route or any other alternatives evaluated in detail. Although no population impacts are expected for the great blue heron, it is a species that is susceptible to power line collisions, and it, along with bald and golden eagles, will be addressed in a collision risk assessment that will be prepared by the Applicants (Section 3.5.3.4). If necessary, the Applicants will apply for a take permit for bald eagles.

As detailed in Section 3.7.2, the northern 12 miles of the Q1-Galesville Route (same as the Q1-Highway 35 Route in this area), where there is an existing transmission line, are in the vicinity of the GRRNSB. The WisDOT has purchased scenic easements in this area to help preserve the value of the GRRNSB (Section 3.71.1). The WI-88 Options are alternatives to the Q1 Route in this area. As described in Section 3.7.2, the GRRNSB extends the full length of the Mississippi River, and while many segments of it have views of the river, bluffs, and surrounding countryside, not all parts of it are scenic. The northern 12 miles of the Q1-Galesville Route, which does not have views of the river or bluffs, follows a busy railroad, and passes along Dairyland's Alma coal-fired generating station, have been rated by a WisDOT consultant as having poor scenic quality (Section 3.7.2). The WI-88 Options are in an agricultural valley with no transmission lines and fewer other visual intrusions, compared to the section of Highway 35 it would replace. Use of either WI-88 Option is costlier, and other impacts are similar to the Q1-Galesville Route. Because the WI-88 Options were included to

provide an alternative to avoid the scenic impact to the GRRNSB, and the visual analysis suggests that incremental visual impacts would likely be greater with the use of either of the WI-88 Options, RUS concluded that the WI-88 Options are not feasible alternatives to the Q1 section of the Q1-Galesville Route.

In summary, RUS has concluded that the use of the Q1-Galesville Route would not result in quantifiable environmental impacts greater than any alternatives to that route, except for the Q1-Highway 35 Route, which was eliminated due to impacts to the Van Loon State Wildlife Area in the Black River Bottoms (wetland impacts, fragmentation of forested wetland and potential threatened and endangered species impacts). Because the Q1-Galesville Route represents the most direct and lowest-cost route among the alternatives other than the Q1-Highway 35 Route – with no greater environmental impacts than other alternatives – RUS has identified it as its preferred alternative route in Wisconsin.

Furthermore, RUS has identified the West Site as its preferred alternative for the Briggs Road Substation. This is primarily because the East Site has high potential for archaeological resources and the West Site has low potential, and the East Site would require more tree clearing; with these exceptions, the two Briggs Road Substation Sites are generally comparable in terms of impacts. Compared to a substation, archaeological resources are more easily avoided with the transmission line because of the small footprint and flexibility of location. As discussed in Section 3.9.2.4, prior to RUS' issuance of the Record of Decision, additional survey work will be conducted at the Briggs Road Substation West Site.

2.6.3 Summary

Impacts of RUS' preferred alternative are summarized in Table 2-8.

Table 2-6: Comparison of Minnesota Routes 1P and 1A

Resource Category	Hampton – North Rochester 345 kV		North Rochester – Northern Hills 161 kV		North Rochester – Chester 161 kV	North Rochester – Mississippi River 345 kV	
	Route 1P	Route 1A	Route 2P	Route 2A		Route 3P	Route 3A
Soils and Geology							
Some short-term impacts will occur during construction; however, construction stormwater permits will be required, which will include storm water pollution prevention plans (SWPPPs) and construction best management practices (BMPs) to minimize soil disturbance and erosion. The only potential post-construction impacts would be related to line repair and maintenance, which would result in minimal, if any, soil disturbance. Steep slopes, erodible soil and exposed soil contribute to erosion potential. Land cover, which can affect soil impacts, is summarized below under land resources.							
Slopes (Figure 3-1)	Mostly gently rolling farmland.		Mostly gently rolling farmland. Steeper slopes at Zumbro River.		Mostly gently rolling farmland.	Steeper slopes on 3P at Zumbro River tributaries. Both have steep slopes at approach to Mississippi River.	
Erosion Potential (Figure 3-2)	Relatively low except for localized high potential areas.					Relatively high.	
Water Resources[83]							
Minimal impacts to water resources are expected with any alternative. Some short-term impacts to surface water bodies from runoff from disturbed areas may occur during construction; however, the required SWPPPs and BMPs will minimize these impacts. All water bodies will be spanned, and construction equipment will not enter water bodies. The only potential post-construction impacts would be related to line repair and maintenance, which would not result in any direct impacts to water bodies, but could result in minor soil disturbance that could have short-term and minor impacts on surface water runoff. Some very minor, localized and short-term impacts to groundwater could occur in areas with very shallow groundwater if tower foundations require dewatering. Post-construction impact on groundwater would not be expected, as no discharges or pumping would be expected.							
Stream crossings	35	44	18	18	15	95	87
Permanent impacts to floodplains (acres)	<1	<1	<1	<1	< 1	<1	<1
Section 10 Permit	No				No	Yes	
Air Resources							
Minimal impacts to air resources are expected with any alternative. Some short-term air impacts will occur during construction as a result of exhaust emissions from construction equipment; there is also the potential for minor, short-term fugitive dust emissions from areas of disturbed soil during construction. Post-construction air quality impact would be minimal, as transmission lines release negligible air emissions.							

[83] Xcel et al 2010, pg. 5-27, 7-70, 8-49.

<table>
<tr><th rowspan="2">Resource Category</th><th colspan="2">Hampton – North Rochester 345 kV</th><th colspan="2">North Rochester – Northern Hills 161 kV</th><th rowspan="2">North Rochester – Chester 161 kV</th><th colspan="2">North Rochester – Mississippi River 345 kV</th></tr>
<tr><th>Route 1P</th><th>Route 1A</th><th>Route 2P</th><th>Route 2A</th><th>Route 3P</th><th>Route 3A</th></tr>
<tr><td colspan="8">Acoustic Environment</td></tr>
<tr><td colspan="8">Minimal noise impacts are expected with any alternative. There will be some short-term noise from construction equipment. Post-construction noise levels are expected to be minimal as transmission lines produce only very low levels of noise.</td></tr>
<tr><td colspan="8">Biological Resources[84,85]</td></tr>
<tr><td colspan="8">Bird collisions with power lines are a potential impact with all routes.</td></tr>
<tr><td colspan="8">The following species and designated habitat areas are known to occur within the proposed ROWs. However, the presence of a species or habitat area does not mean it will be impacted. For example, since water bodies will be spanned, impacts to aquatic species are not expected. Surveys for threatened or endangered species would be conducted in suitable habitat within the permitted route corridor as directed by state agencies or by the USFWS. If impacts to protected species are unavoidable, a Takings Permit from the MDNR and potentially the USFWS may be required along with other conditions. In addition, both Routes 1P and 1A pass through an area that may contain unrecorded populations of the federally endangered Minnesota dwarf trout lily (Erythronium propullans).</td></tr>
<tr><td colspan="8">*Species*[86]</td></tr>
<tr><td>Federal-listed threatened species within ROW</td><td>None</td><td>Prairie bush clover</td><td colspan="5">None</td></tr>
<tr><td>Federal-listed endangered species in ROW</td><td colspan="7">None</td></tr>
<tr><td rowspan="3">State-listed threatened species within ROW</td><td colspan="2">Loggerhead shrike</td><td>Tuberous Indian-plantain</td><td>Blanding’s turtle, timber rattlesnake</td><td rowspan="2">Blanding’s turtle within one mile of centerline</td><td rowspan="2">Blanding’s turtle, paddlefish, timber rattlesnake</td></tr>
<tr><td>Paddle-fish</td><td>Mucket, Prairie bush clover</td><td colspan="2">Elktoe</td></tr>
<tr><td colspan="5"></td><td>Tuberous Indian-plantain</td></tr>
<tr><td rowspan="2">State-listed endangered species within ROW</td><td colspan="5" rowspan="2">None</td><td>Rock pocketbook</td></tr>
<tr><td>Sheepnose</td></tr>
</table>

[84] MDC 2011b, listed species obtained from pg. 87, 126, and 160.
[85] Xcel et al 2010, notable habitat areas and wetland data obtained from pg. 5-26 - 5-28, 7-69 - 7-70, 8-49 - 8-50.
[86] Scientific names are included in the discussion in the Draft EIS text.

Resource Category	Hampton – North Rochester 345 kV		North Rochester – Northern Hills 161 kV		North Rochester – Chester 161 kV	North Rochester – Mississippi River 345 kV	
	Route 1P	Route 1A	Route 2P	Route 2A		Route 3P	Route 3A
Notable habitat areas							
Length crossed (miles)							
Important Bird Areas	0	0	0	0	0	1.9	1.9
Grassland Bird Conservation Areas	1.1	3.9	0	2.6	0	0	0
Outstanding Biodiversity Sites	0	0.3	0	0	0	0.5	0.5
High Biodiversity Sites	0.5	0.1	0	0.7	0	0.9	0.9
Wetlands and Forest							
Permanent wetlands	0	0	0	0	0	0.02	0.02
Temporary wetlands	0	0	2	3	0	7	7
Wetland Acres Permanently Changed	0	4.7	1.3	1.7	0	13.1	15.2
Acres forest removed[88]	223	74	103	109	6.0	621	873
Land Resources[89]							
Land cover							
Percent cropland	63	87	70	74	47.8	63	58
Percent grassland	20	11	22	20	18.7	22	21
Percent shrubland	<1	<1	<1	<1	0	2	2
Percent forested land	5	1	5	5	4.8	11	17
Percent aquatic	<1	<1	<1	0	0	<1	<1
Percent marsh	<1	<1	<1	<1	0	1	1
Percent developed	10	<1	2	<1	15	<1	<1
Agriculture							
Permanent impact (acres)	42.6	45.1	42.4	42.6	9	44.4	44.1

[87] Water Resources summary table from Minnesota EIS (MDC 2011b) Appendices H-J.
[88] GAP data from Minnesota EIS (MDC 2011b) Appendices H-J. Forty acres of cropland attributed to the North Rochester substation for all routes.
[89] Xcel et al 2010, land resource data obtained from pg. 5-26 - 5-28, 7-69 - 7-70, 8-49 - 8-50. Forty acres of permanent impact to agricultural cropland for all routes attributed to the North Rochester substation.

Resource Category	Hampton – North Rochester 345 kV		North Rochester – Northern Hills 161 kV		North Rochester – Chester 161 kV	North Rochester – Mississippi River 345 kV	
	Route 1P	Route 1A	Route 2P	Route 2A		Route 3P	Route 3A
Temporary impact (acres)	200	270	139	161	69	338	323
Conservation Reserve Prog. Lands crossed	51	31	4	2	6	33	25
Forestry	No impacts to economically important forestry areas are anticipated.						
Mining	No impacts to mines are anticipated.						
Formally Classified Lands							
UMRNW&FR	0					0.5	0.5
McCarthy WMA crossed	0					0.9	0.9
RJD State Forest crossed	0					2.1	2.4
Visual Resources							
The transmission line as a visual intrusion will have the greatest impact on those living near the ROW. The 3A and 3P Routes are joined at the crossing of the Great River Road National Scenic Byway (GRRNSB).							
Residences near ROW	See Socioeconomics below						
Crossing of GRRNSB?	No					Yes	
Cultural Resources (within ½ mile of each alternative; except for North Rochester-Chester, within 1 mile of route centerline)[90]							
Archaeological	4	5	6	4	1	7	8
Architectural							
National Register of Historic Places	7	1	0	3	0	0	0
Other	54	38	26	26	10	12	9
Socioeconomics							
Number of residences within 300 feet of route centerline[91]							
Hampton-North Rochester (345kV) North Rochester-Mississippi River (345kV) and North Rochester–Chester (North South Section) (161kV)							
0-75 feet from route centerline	1	4	N/A	N/A	0	0	0

[90] MDC 2011c, pp. 100 and 141; MDC 2011b, p. 170; with revisions. Northern States Power Company 2011 Table 27.
[91] MDC 2011c, pp. 86, 128, and 164.

Resource Category	Hampton – North Rochester 345 kV		North Rochester – Northern Hills 161 kV		North Rochester – Chester 161 kV	North Rochester – Mississippi River 345 kV	
	Route 1P	Route 1A	Route 2P	Route 2A		Route 3P	Route 3A
76-150 feet from route centerline	11	7	N/A	N/A	8	0	0
151-300 feet from route centerline	25	29	N/A	N/A	11	5	4
North Rochester – Northern Hills (161kV)							
0-40 feet from route centerline	N/A	N/A	0	0	N/A	N/A	N/A
41-100 feet from route centerline	N/A	N/A	7	1	N/A	N/A	N/A
101-300 feet from route centerline	N/A	N/A	51	27	N/A	N/A	N/A
State Criteria: Use or Paralleling of Existing Right-of-Way (ROW) and Property Lines[92]							
Total length of route	36	49	15	18	11.9	57	54
Following transmission line							
Length (miles)	15	1.4	1.9	7.2	6.9	18	16.2
Total percentage	41.5%	2.8%	12%	40.2%	58%	31.6%	30.0%
Following road but not transmission line							
Length (miles)	14.6	2.7	12.1	6	5	7.5	6.7
Total percentage	40.5%	5.5%	78.6%	33.2%	42%	13.2%	12.4%
Following property line but not transmission line or roads							
Length (miles)	5.8	41.5	0.95	3.1	0	27.6	24.6
Total percentage	16%	85.2%	6.2%	17.1%	0%	48.4%	45.6%
Following transmission line, roads, or property lines							
Length (miles)	35.4	45.6	14.9	16.3	11.9	53.1	47.5
Total percentage	98%	93.5%	96.8%	90.5%	100%	93.2%	88.0%
Not following transmission line, roads, or property lines							
Length (miles)	0.7	3.2	0.5	1.7	0	3.7	6.67
Total percentage	2%	6.5%	3.2%	9.5%	0%	6.5%	12.4%

[92] MDC 2011c, pp. 66, 67, 110, 113, 148 and 149. Northern States Power Company 2011, Table 27.

Resource Category	Hampton – North Rochester 345 kV		North Rochester – Northern Hills 161 kV		North Rochester – Chester 161 kV	North Rochester – Mississippi River 345 kV	
	Route 1P	Route 1A	Route 2P	Route 2A		Route 3P	Route 3A
Estimated Cost (million)							
Cost[93]	$88	$101	$16	$17	$14	$131	$126

[93] MDC 2011c, pg. 8. Northern States Power Company p. 3-2.

Table 2-7: Comparison of Wisconsin Route Alternatives

Resource Category	Q1-Highway 35 Route	Arcadia Route	Arcadia-Alma Option	Q1-Galesville Route	WI-88 Option A Connector		WI-88 Option B Connector		Arcadia-Ettrick Option (Arcadia Route)
					(Q1-Highway 35 Route)	(Q1-Galesville Route)	(Q1-Highway 35 Route)	(Q1-Galesville Route)	
Soils and Geology									
Some short-term impacts will occur during construction; however, construction stormwater permits will be required, which will include storm water pollution prevention plans (SWPPPs) and construction best management practices (BMPs) to minimize soil disturbance and erosion. The only potential post-construction impacts would be related to line repair and maintenance, which would result in minimal, if any, soil disturbance. Steep slopes, erodible soil and exposed soil contribute to erosion potential. Land cover, which can affect soil impacts, is summarized below under land resources. Note									
Slopes (Figure 3-1)	Lower slopes except for middle third	Steeper slopes for much of route		Lower slopes except for middle third	Mostly steeper except for southern third.				Steeper slopes for much of route
Erosion Potential (Figure 3-2)	Mostly low except for middle third	Moderate, but would increase with exposure.		Mostly low except for middle third	Moderate (but would increase with exposure) for northern two-thirds and low for southern third.				Moderate.
Water Resources									
Minimal impacts to water resources are expected with any alternative. Some short-term impacts to surface water bodies from runoff from disturbed areas may occur during construction; however, the required SWPPPs and BMPs will minimize these impacts. All water bodies will be spanned, and construction equipment will not enter water bodies. The only potential post-construction impacts would be related to line repair and maintenance, which would not result in any direct impacts to water bodies, but could result in minor soil disturbance that could have short-term and minor impacts on surface water runoff. Some very minor, localized and short-term impacts to groundwater could occur in areas with very shallow groundwater if tower foundations require dewatering. Post-construction impact on groundwater would not be expected, as no discharges or pumping is expected.									
Line stream crossings[94]	38	45	44	25	47	36	47	36	65
Permanent impacts to floodplains (acres)	<1	<1	<1	<1	<1	<1	<1	<1	<1

[94] CPCN June 2011, Appendix T, Table 3

Resource Category	Q1-Highway 35 Route	Arcadia Route	Arcadia-Alma Option	Q1-Galesville Route	WI-88 Option A Connector		WI-88 Option B Connector		Arcadia-Ettrick Option (Arcadia Route)
					(Q1-Highway 35 Route)	(Q1-Galesville Route)	(Q1-Highway 35 Route)	(Q1-Galesville Route)	
Air Resources									
Minimal impacts to air resources are expected with any alternative. Some short-term air impacts will occur during construction as a result of exhaust emissions from construction equipment; there is also the potential for minor, short-term fugitive dust emissions from areas of disturbed soil during construction. Post-construction air quality impact would be minimal, as transmission lines release negligible air emissions.									
Acoustical Environment									
Minimal noise impacts are expected with any alternative. There will be some short-term noise from construction equipment. Post-construction noise levels are expected to be minimal as transmission lines produce only very low levels of noise.									
Biological Resources									
Bird collisions with transmission lines are a potential impact for all routes.									
As shown below, threatened, endangered or special concern species are known to occur within two miles of the routes. Surveys for threatened or endangered species would be conducted in suitable habitat within the permitted route corridor as directed by state agencies or by the USFWS. If impacts to rare species are unavoidable, a Takings Permit from the DNR may be required along with other conditions.									
Species[95]									
Threatened, endangered or special concern species within two miles of the route									
Non-historic occurrences	129	69	69	124	117	103	117	103	66
Historic occurrences	40	23	23	29	40	42	40	42	16
Natural communities within two miles of the route	34	2	2	31	34	31	34	31	21
Notable habitat areas									
Does the route cross Important Bird Areas and/or large areas of forested wetlands?	Black River Bottoms	No	No	No	Black River Bottoms	No	Black River Bottoms	No	No

[95] Species information presented based on a two mile radius search, per compliance with WDNR reporting guidelines. Species in the proximity of the Arcadia-Alma Option Route assumed to be identical to the Arcadia Route.

Resource Category	Q1-Highway 35 Route	Arcadia Route	Arcadia-Alma Option	Q1-Galesville Route	WI-88 Option A Connector		WI-88 Option B Connector		Arcadia-Ettrick Option (Arcadia Route)
					(Q1-Highway 35 Route)	(Q1-Galesville Route)	(Q1-Highway 35 Route)	(Q1-Galesville Route)	
Does route potentially impact the WI-GRRNSB?	Yes	No	No	Yes	Yes	No	Yes	No	No
Wetlands:									
Perm. wetland impact, acres[22]	0.13	0.14	0.14	0.10	0.09	0.06	0.06	0.06	0.13
Temp wetland impact, acres[96]	6.3	4.8	4.8	6.1	N/A	N/A	N/A	N/A	4.7
Wetland acres changed from forested to emergent[97]	48.5/55.1	37.9/38.8	37.9/38.8	33.9/34.9	NA/69.1	NA/48.9	NA/67.9	NA/47.8	33.8/56.9
Upland forest impact, acres	186	267	252	218	227	261	225	259	305
Total forest impact, acres[98]	241	305	291	253	296	310	293	306	362
Land cover[99]									
Percent cropland	51	47	48	52	49	50	51	52	45
Percent pasture	1	4	4	<1	3	2	2	2	4
Percent specialty (tree farm)	0	1	1	<1	0	<1	0	<1	<1
Percent prairie/grassland	4	5	5	4	3	3	4	3	5
Percent upland shrub	<1	0	0	<1	<1	<1	<1	<1	<1
Percent upland forest	26	28	27	28	27	29	26	28	29
Percent forested wetland	8	4	4	5	8	5	8	5	5
Percent non-forested	4	6	6	4	5	4	5	5	8

[96] CPCN June 2011, Appendix T, Table 1, and route maps included in this Draft EIS Appendix G.
[97] CPCN June 2011, Supplemental Connector Information, Appendix T, Summary of Wetland Impacts / Total forested wetland within ROW from Appendix A, Table 2
[98] CPCN June 2011, Appendix A, Table 2, Sum of upland forest and wetland forest
[99] Includes 40 acres of cropland for the Briggs Road West substation

Resource Category	Q1-Highway 35 Route	Arcadia Route	Arcadia-Alma Option	Q1-Galesville Route	WI-88 Option A Connector		WI-88 Option B Connector		Arcadia-Ettrick Option (Arcadia Route)
					(Q1-Highway 35 Route)	(Q1-Galesville Route)	(Q1-Highway 35 Route)	(Q1-Galesville Route)	
wetland									
Percent residential	4	2	2	4	3	3	2	3	1
% commercial/industrial	2	2	2	3	1	2	1	2	2
Land Resources									
Agriculture									
Permanent impact (acres)[100]	41.0	41.3	41.3	41.2	41.2	41.4	41.2	41.4	41.3
Temporary impact (acres)[101]	325/116	445/150	455/153	367/133	399/136	442/154	418/137	460/155	468/146
Great River Road National Scenic Byway (GRRNSB)									
Current miles of transmission line paralleling the GRRNSB along Q1-Highway 35	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1
Post-Proposal miles of transmission line paralleling the GRRNSB along Q1-Highway 35	2.7	8.1	8.1	2.7	8.1	8.1	8.1	8.1	8.1
Cultural Resources									
Archaeological sites near route[102]	13	8	8	15	10	12	11	13	4

[100] Assumes permanent impact of 200 sq ft/pole with 500-ft span. Includes 40 acres of cropland for the Briggs Road West substation.
[101] CPCN June 2011, pg. 2-167 and ROW totals in Appendix A, Table 2 for a maximum estimated impact/Estimate assuming 0.2 acre/mile for staging areas, 1600 ft^2 per 2 miles for spooling locations, and 0.5 acre/pole with a 500-ft span between poles within agricultural areas of the route.
[102] CPCN June 2011, pg. 2-143, Table 2.4-7 and CPCN June 2011, Supplemental Connector Information, pg. 2-45, Table 2.4-1

Resource Category	Q1-Highway 35 Route	Arcadia Route	Arcadia-Alma Option	Q1-Galesville Route	WI-88 Option A Connector		WI-88 Option B Connector		Arcadia-Ettrick Option (Arcadia Route)
					(Q1-Highway 35 Route)	(Q1-Galesville Route)	(Q1-Highway 35 Route)	(Q1-Galesville Route)	
Socioeconomics									
Number of residences within 300 feet of route centerline[103]									
Total	74	102	102	109	79	114	67	102	57
0-100 feet from centerline	14	9	9	14	13	13	12	12	8
101-150 feet from centerline	8	15	15	11	13	16	7	10	7
151-300 feet from centerline	52	78	78	84	53	85	48	80	42
Property Lines and State Criteria: Use or Paralleling of Existing Right-of-Way (ROW)[104]									
Total length of route (miles)	43.0	54.8	54.4	48.4	49.7	55.0	49.0	54.4	57.0
Following transmission line									
Length (miles)	30.6	39.6	39.0	28.2	29.4	27.1	29.2	26.8	47.2
Total percentage	71.2%	72.3%	71.7%	58.3%	59.1%	49.3%	59.6%	49.3%	82.8%
Following road but not transmission line									
Length (miles)	6.5	9.7	9.7	6.8	14.9	15.1	8.7	9.0	2.9
Total percentage	15.1%	17.7%	17.7%	14.0%	30.0%	27.4%	17.8%	16.5%	5.1%
Following railroads but not transmission line or roads									
Length (miles)	3.1	0.0	0.0	3.1	0.6	0.6	0.6	0.6	0.0
Total percentage	7.2%	0%	0%	6.4%	1.2%	1.1%	1.2%	1.1%	0%
Following transmission line, roads, or railroads									
Length (miles)	40.2	49.3	48.7	38.1	44.9	42.8	38.5	36.4	50.1
Total percentage	93.5%	90.0%	89.5%	78.7%	90.3%	77.8%	78.6%	66.9%	87.9%
Not following transmission line, roads or railroads									
Length (miles)	2.8	5.5	5.7	10.3	4.8	12.2	10.5	18.0	6.9
Total percentage	6.5%	10%	10.5%	21.3%	9.7%	22.2%	21.4%	33.1%	12.1%

[103] CPCN June 2011, Supplemental Connector Information, pg. 2-5, Table 2.1-2
[104] CPCN June 2011, Supplemental Connector Information, pg. 2-5, Table 2.1-2

Resource Category	Q1-Highway 35 Route	Arcadia Route	Arcadia-Alma Option	Q1-Galesville Route	WI-88 Option A Connector		WI-88 Option B Connector		Arcadia-Ettrick Option (Arcadia Route)
					(Q1-Highway 35 Route)	(Q1-Galesville Route)	(Q1-Highway 35 Route)	(Q1-Galesville Route)	
Add'l ROW required (acres)	366	497	497	456	487	577	515	605	519
Estimated Cost (million)									
Cost	$195	$224	$224	$202	$213	$221	$208	$215	$234

Table 2-8: Summary of Impacts of Preferred Alternative

Resource Category	Impacts
Soils and Geology	
Implementation of construction stormwater permits, SWPPPs and construction BMPs will minimize impacts.	
Water Resources	
Implementation of SWPPPs and BMPs will minimize impacts. All water bodies will be spanned, and construction equipment will not enter water bodies. Some very minor, localized and short-term impacts to groundwater could occur in areas with very shallow groundwater if tower foundations require dewatering. Post-construction impact on groundwater would not be expected, as no discharges or pumping would be expected.	
Stream crossings	188
Permanent impacts to floodplains (acres)	< 1
Air Resources	
Short term, local emissions from construction equipment and fugitive dust during construction. Post-construction air quality impact would be minimal, as transmission lines release negligible air emissions.	
Acoustic Environment	
Short-term noise from construction equipment. Minimal post-construction noise as transmission lines produce only very low levels of noise.	
Biological Resources	
Bird collisions with power lines are a potential impact. Additional surveys will be required. No impacts to threatened or endangered species are expected, except that if sheepnose (*Plethobasus cyphyus*) and/or Higgins eye pearlymussel (*Lampsilis higginsii*) are found in that part of Pool 5 of the Mississippi River that must be entered during construction, they will be relocated.	
Notable habitat areas	
Important Bird Areas, miles crossed	1.9
Grassland Bird Conservation Areas, miles crossed	3.7
Outstanding Biodiversity Sites (MN only), miles crossed	0.5
High Biodiversity Sites (MN only), miles crossed	2.1
Wetland and forest	
Permanent wetlands impacts (acres)	0.12
Temporary wetlands impacts (acres)	16
Wetland Acres permanently changed from forested to emergent (acres)	49
Total area of forest removed (acres)	1,177
Land Resources	
Agriculture	
Permanent impact (acres)	180
Temporary impact (acres)	1,136
Forestry	No impacts to economically important forestry expected.
Mining	No impacts to mines are anticipated.

Resource Category	Impacts
Formally Classified Lands (miles)	
Upper Mississippi River National Wildlife and Fish Refuge crossed, miles	0.5
Douglas Trail paralleled, miles	2.9
McCarthy Lake WMA crossed, miles	0.9
RJD State Forest crossed, miles	2.1
Visual Resources	
The transmission line as a visual intrusion will have the greatest impact on those living near the ROW.	
GRRNSB	Crossing in MN and paralleling for 2.7 miles in WI.
Cultural Resources	
No impacts to cultural resources are expected. Surveys will be done. It is anticipated that archaeological sites of cultural significance can be avoided.	
Socioeconomics	
Number of residences within 300 feet of route centerline	
Minnesota 345 kV and Chester 161 kV:	
0-75 feet from route centerline	1
76-150 feet from route centerline	19
151-300 feet from route centerline	41
Minnesota 161 kV:	
0-40 feet from route centerline	0
41-100 feet from route centerline	1
101-300 feet from route centerline	27
Wisconsin 345 kV:	
0-100 feet from route centerline	14
101-150 feet from route centerline	11
151-300 feet from route centerline	84
Corridor Sharing	
345-kV lines:	
Total length of route (miles)	141
Length following transmission lines (miles)	61
Length following roads but not transmission lines (miles)	29
Length following railroad but not transmission line or road (mile)	3
Length following property lines but not transmission lines or roads (MN)	33
Length not following transmission lines, property lines or roads (MN) (miles)	4
Length not following transmission line, roads or railroads (WI) (miles)	10

Resource Category	Impacts
161-kV lines:	
Total length of route (miles)	30
Length following transmission lines (miles)	14
Length following road but not transmission lines (miles)	11
Length following property lines but not transmission lines or roads (miles)	3.1
Length not following transmission lines, property lines or roads (miles)	1.7
Estimated Cost (million)	
Cost	$452

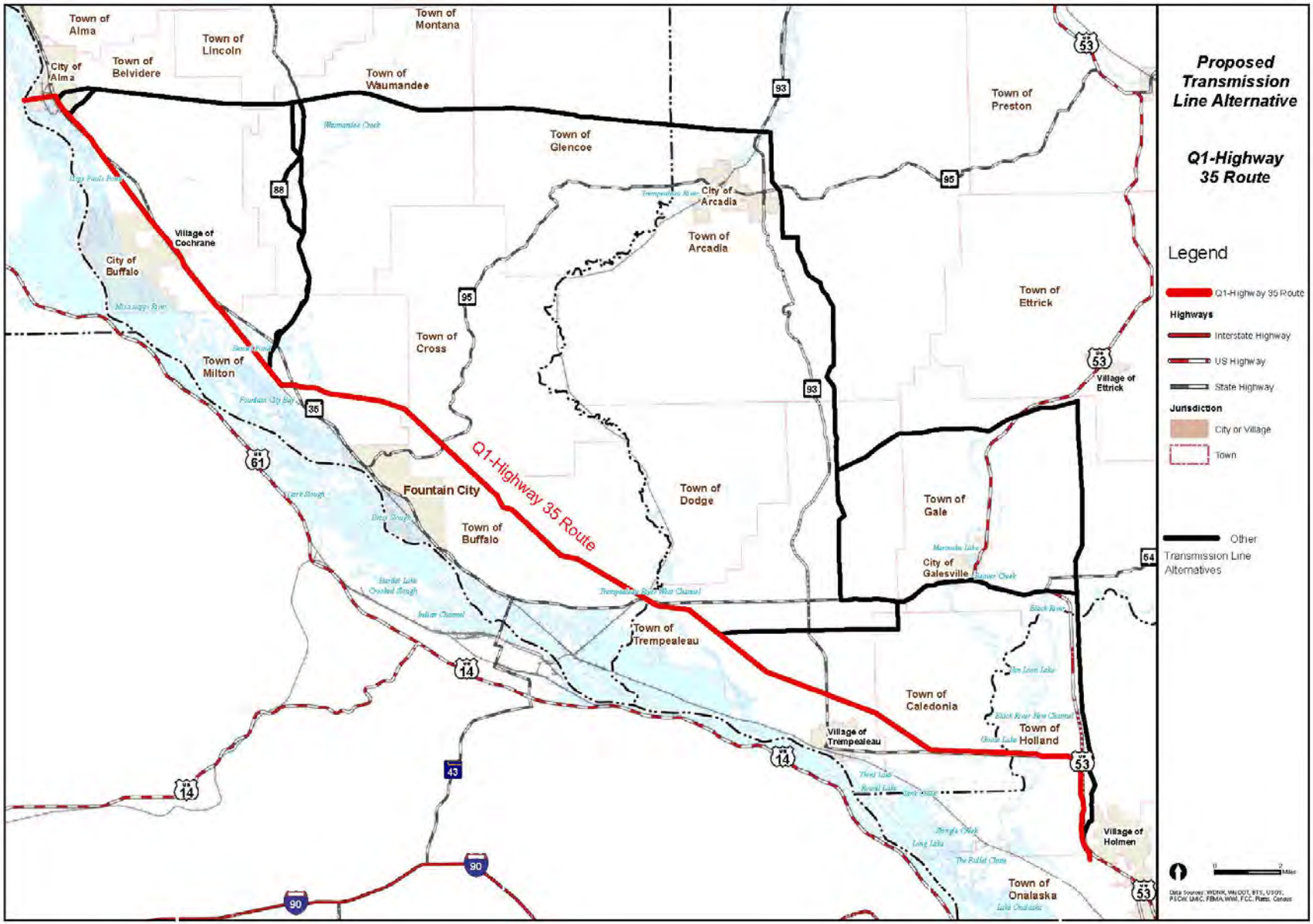

Figure 2-16: Segment 4 Alternative - Q1 - Highway 35 Route

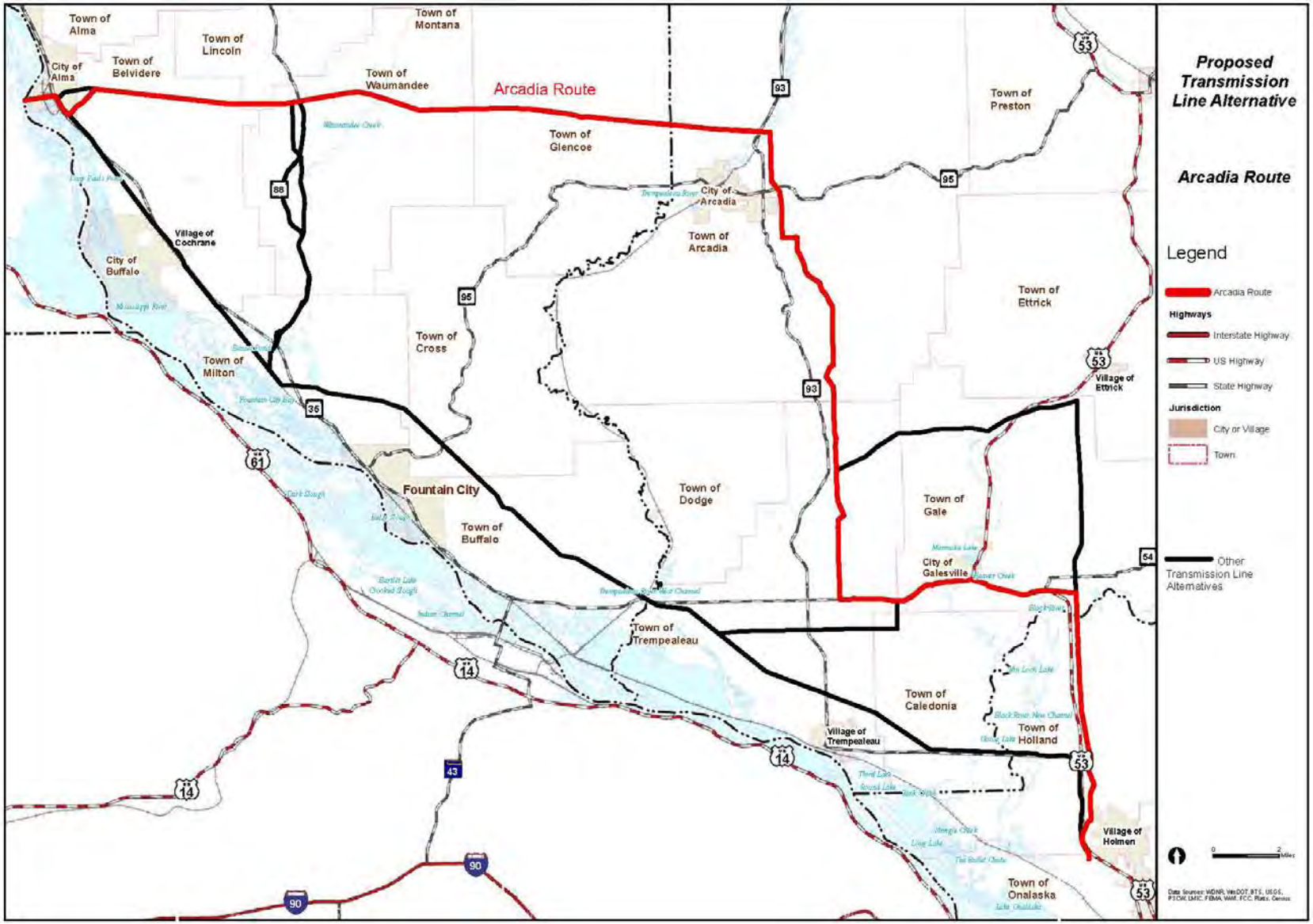

Figure 2-17: Segment 4 - Arcadia Route

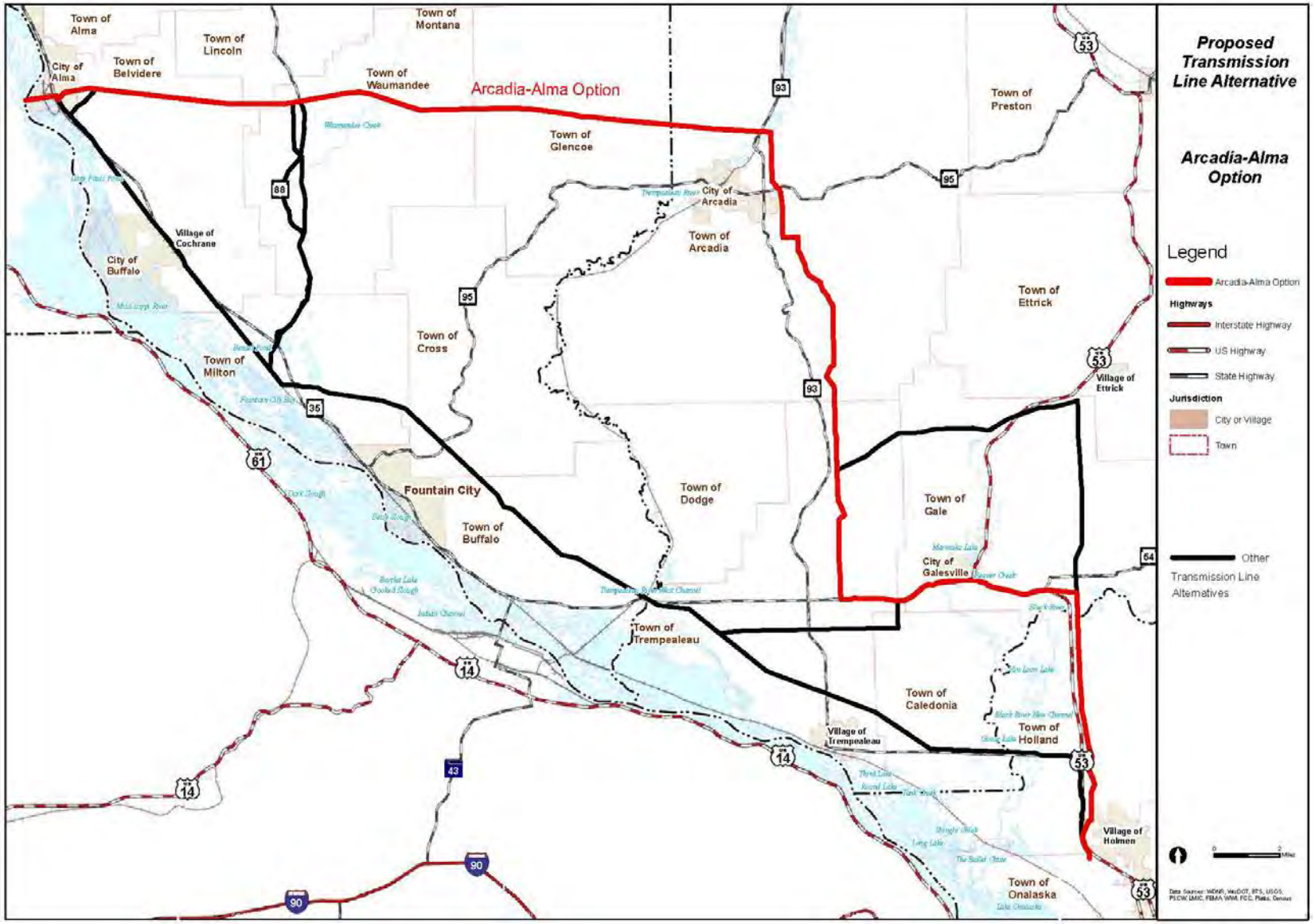

Figure 2-18: Segment 4 - Arcadia - Alma Option

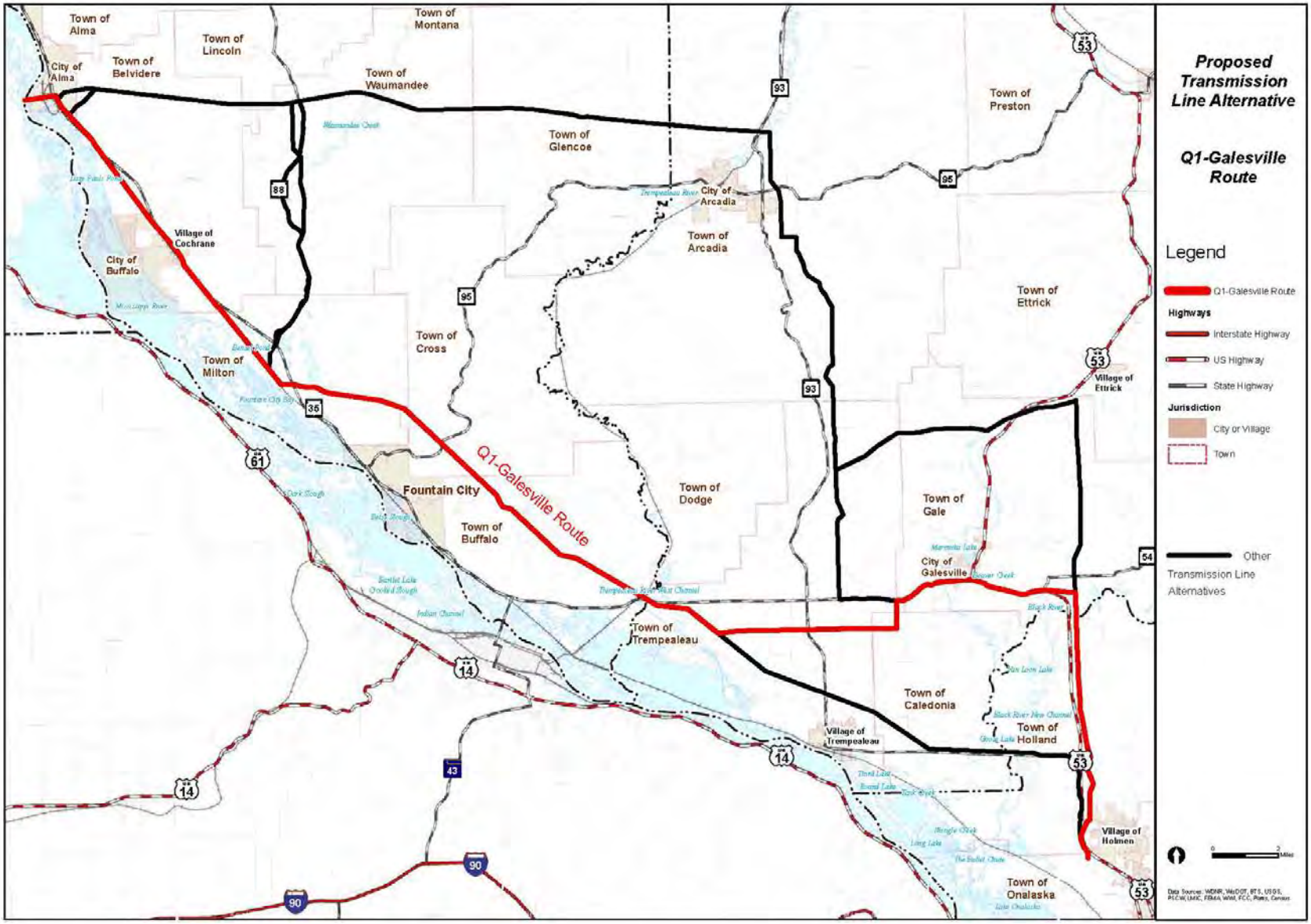

Figure 2-19: Segment 4 - Q1 - Galesville Route

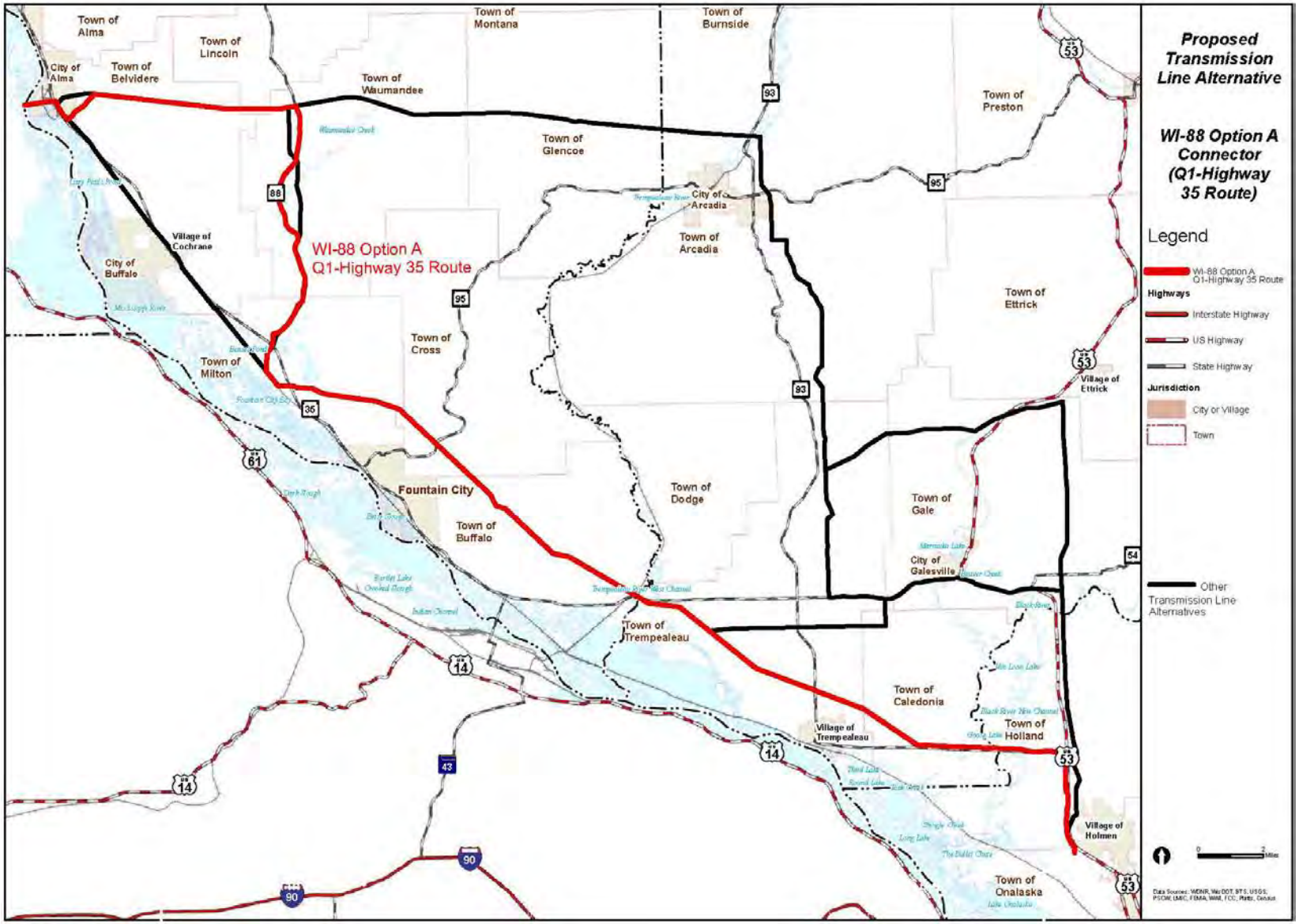

Figure 2-20: Segment 4 - WI-88 Option A Connector (Q1 – Highway 35)

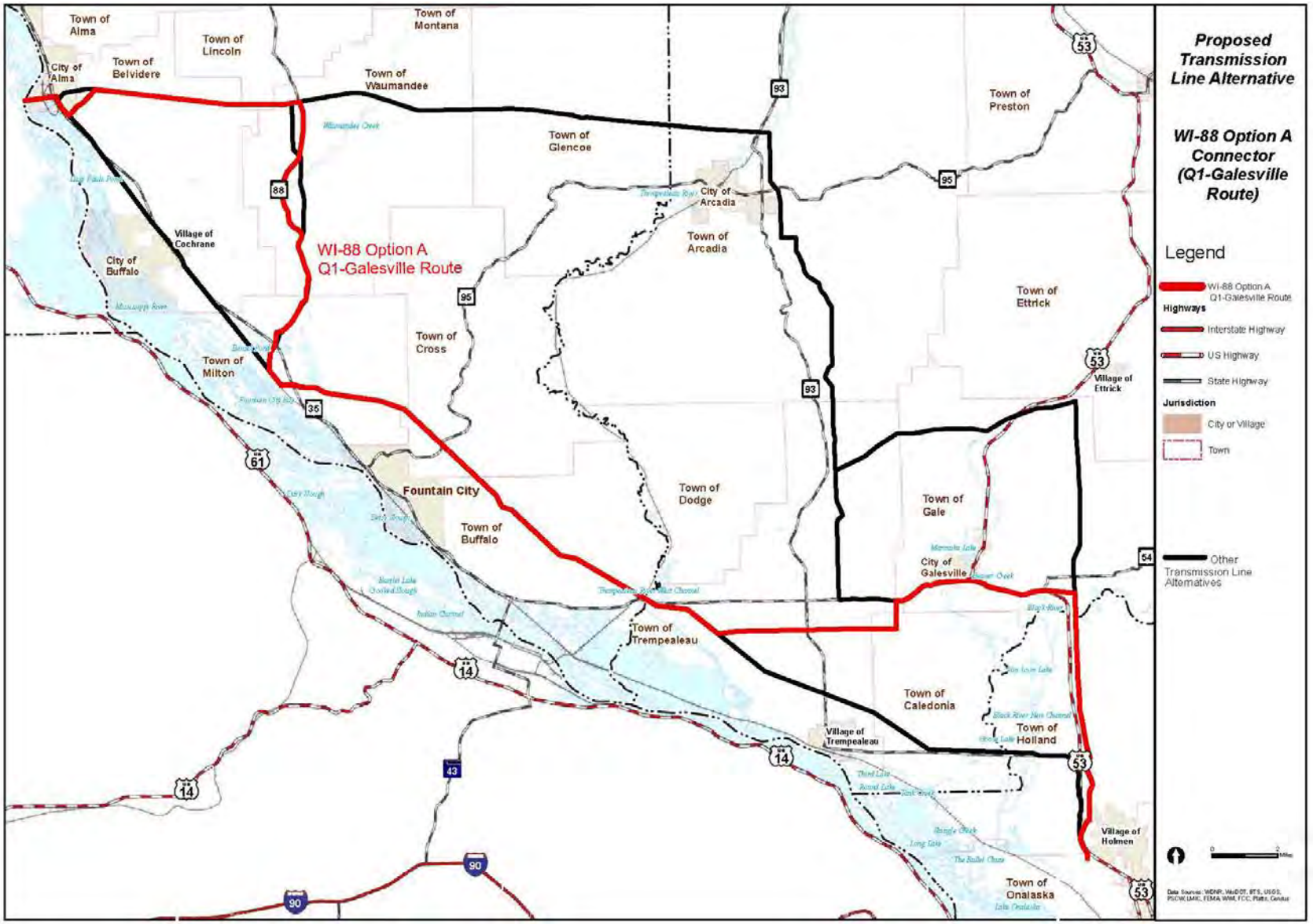

Figure 2-21: Segment 4 - W-88 Option A Connector (Q1 Galesville)

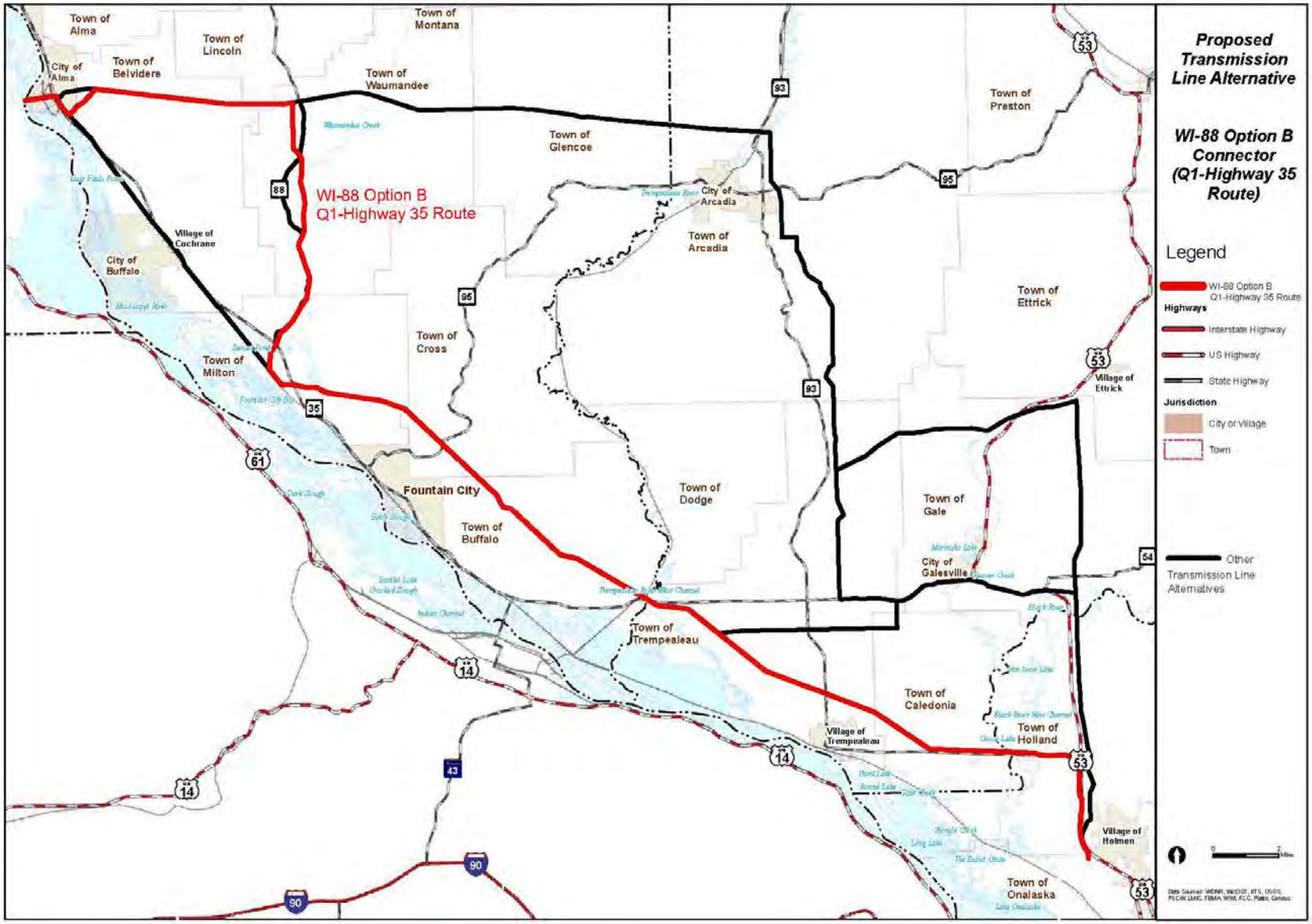

Figure 2-22: Segment 4 - W-88 Option B Connector (Q1 Highway 35)

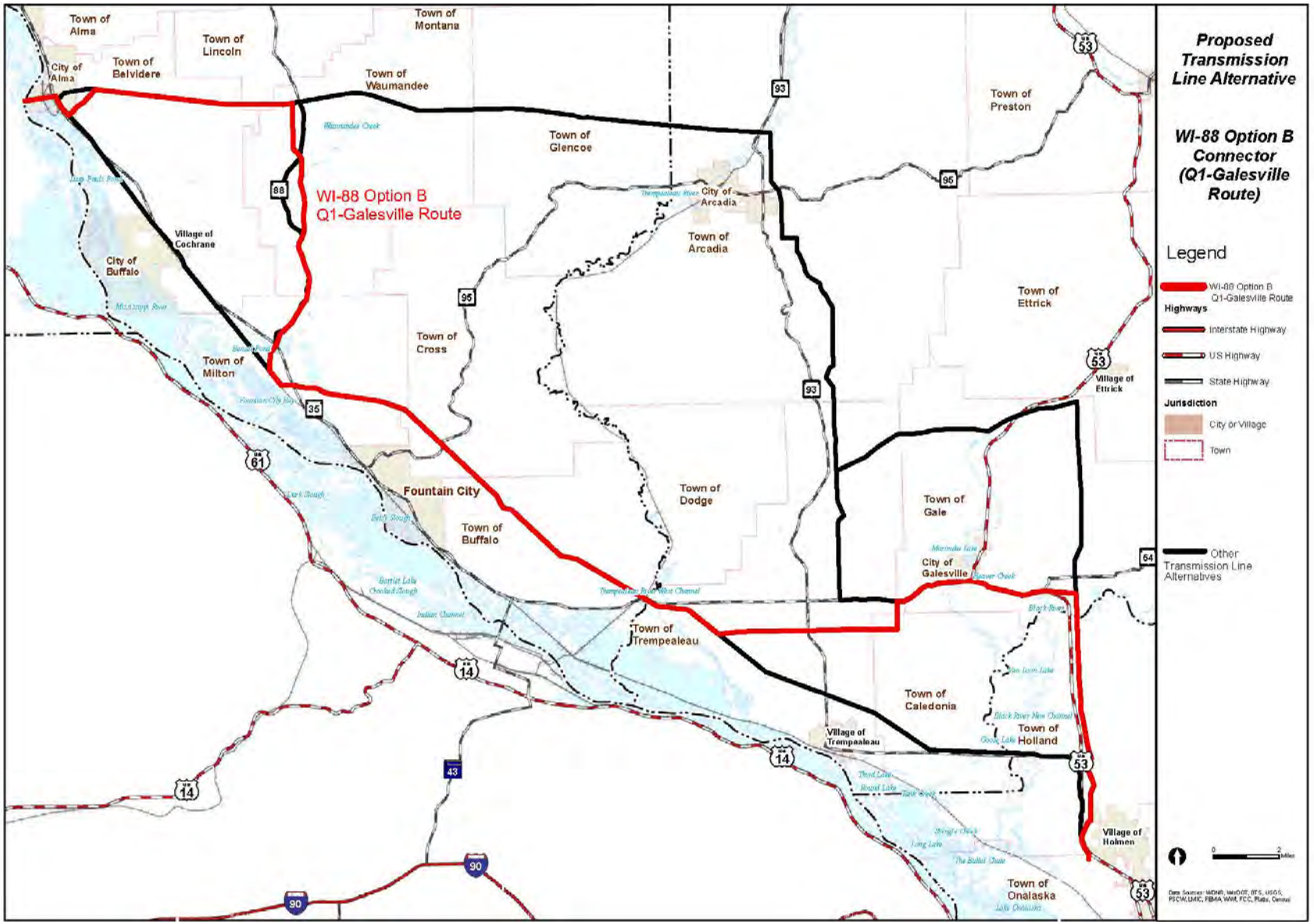

Figure 2-23: Segment 4 - WI-88 Option B Connector (Q1 Galesville)

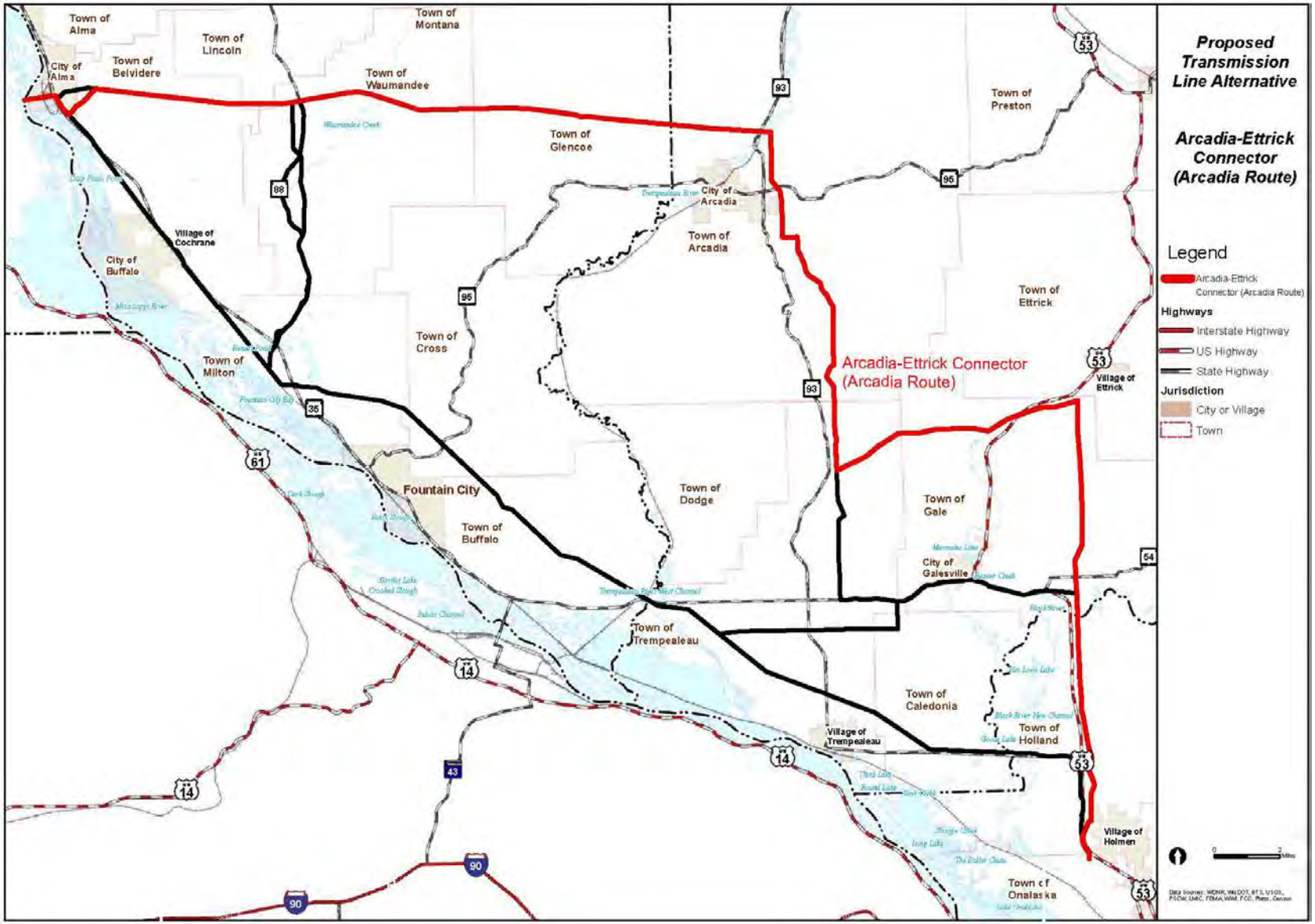

Figure 2-24: Segment 4 - Arcadia - Ettrick Option