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List of Acronyms

| Acronym | Meaning |
|---------|---|
| ASR | Antenna Structure Registry |
| BWSR | Board of Water and Soil Resources |
| CREP | Conservation Reserve Enhancement Program |
| CRP | Conservation Reserve Program |
| DNR | Minnesota Department of Natural Resources |
| ESA | Endangered Species Act |
| FAA | Federal Aviation Administration |
| FCC | Federal Communications Commission |
| FEMA | Federal Emergency Management Agency |
| FSA | Farm Service Agency |
| GIS | Geographic Information System |
| HDR | HDR Engineering, Inc |
| kV | Kilovolt |
| LGU | Local Government Unit |
| MBTA | Migratory Bird Treaty Act |
| MCBS | Minnesota County Biological Survey |
| MnDOT | Minnesota Department of Transportation |
| MSNRA | Metro Significant Natural Resource Area |
| MW | Megawatt |
| NEPA | National Environmental Policy Act |
| NHIS | Natural Heritage Information System |
| NRCS | Natural Resource Conservation Service |
| NRHP | National Register of Historic Places |
| NWI | National Wetland Inventory |
| NWR | National Wildlife Refuge |
| PWI | Public Waters Inventory |
| RIM | Re-Invest in Minnesota |
| ROW | Right-of-way |
| SHPO | State Historic Preservation Office |
| SNA | Scientific and Natural Area |
| SPC | Special Concern Species |
| SWCD | Soil and Water Conservation District |
| T&E | Threatened and Endangered |
| TH | Trunk Highway |
| US | United States Highway |
| USACE | United States Army Corps of Engineers |
| USDA | United States Department of Agriculture |
| USFWS | United States Fish and Wildlife Service |
| USGS | United States Geological Survey |
| WCA | Wetland Conservation Act |
| WMA | Wildlife Management Area |
| WPA | Waterfowl Production Area |

1.0 INTRODUCTION

Great River Energy, a Minnesota cooperative corporation (“Great River Energy”), and Northern States Power Company, a Minnesota corporation (“Xcel Energy”), (collectively, the “Applicants”), are applying to the Minnesota Public Utilities Commission (the “Commission”) for a Route Permit to construct the CapX2020 Brookings County – Hampton 345 kilovolt (“kV”) transmission line project (the “Project”), which consists of a series of 345 kV transmission line connections between Brookings County, South Dakota, and Hampton, Minnesota.

The new transmission facilities will require three crossings of the Minnesota River, the second largest river in the State of Minnesota. The Minnesota River acts as a major flyway for migratory birds and is an active acquisition area for U.S. Fish and Wildlife Service’s (“USFWS”) Minnesota Valley National Wildlife Refuge (“NWR”) expansion. The Minnesota River Valley is an important floodplain area, contains many conservation lands, harbors several rare and unique natural resources, and is the site of many cultural resources. The Minnesota River Valley is also home to many people and sustains local and state economies. In addition, the Minnesota River, as a navigable river of the United States, is subject to U.S. Army Corps of Engineers (“USACE”) regulation under Section 10 of the Rivers and Harbors Act 33 U.S.C. § 403. Portions of the river are additionally regulated by the Minnesota Department of Natural Resources as a scenic and recreational river under Minnesota Rules Chapter 6105.

Because of the size and regional significance of the Minnesota River, Applicants undertook an analysis of multiple crossing options early in the routing process, prior to developing the Preferred Route and Alternate Route in the Route Application. Applicants collected public comments, gathered environmental data and applied the factors listed in Minnesota Rule 7849.5910 (and reflected in Minnesota Statutes Section 216E.03, subdivision (7)) to develop 20 Minnesota River crossing locations. After a thorough analysis, five of these were incorporated into the Preferred Route and the Alternate Route for the Project (three crossings are required; one of the crossings, Granite Falls, is common to both routes). Specific impacts relating to these crossings based on the required ROW and centerline of the crossings included in the proposed Preferred Route and Alternate Route are contained in Chapters 6 and 8 of the Route Permit Application.

This “Report” summarizes the Applicants’ screening analysis of the Minnesota River crossings and is organized in the following sections:

- Section 2.0 of this Report provides a brief description of the initially proposed Project and the steps the Applicants took to conduct their analysis of the Minnesota River crossing locations.
- Section 3.0 identifies each of the Minnesota River crossing locations analyzed in this Report and summarizes the notable features at each crossing and general suitability of each crossing for transmission line routing.
- Section 4.0 provides a more detailed preliminary analysis of the environmental information for each Minnesota River crossing.
- Section 5.0 discusses construction and engineering considerations associated with the Minnesota River crossing locations, including the benefits and challenges of placing the proposed transmission line underground at the Minnesota River crossings.

2.0 PROJECT BACKGROUND

The Project is one of four transmission projects proposed as part of the CapX2020 Transmission Initiative (“CapX2020”). CapX2020 is a joint initiative of 11 transmission-owning utilities, including the Applicants, in Minnesota and the surrounding region whose goal is to study, develop, permit, and construct transmission infrastructure needed to implement long-term and cost-effective solutions for customers to meet the growth in energy demand expected over the next decade.

The Project will begin at the Brookings County Substation in South Dakota and will terminate at the proposed Hampton Substation near Hampton, Minnesota. See attached Overview Maps. At the time of this analysis, the Applicants have identified a Project Corridor that includes:

- An approximately 12-mile wide, 210-mile long east/west portion between Brookings County, South Dakota, and Hampton, Minnesota; and
- A six-mile wide and 30-mile long south/north-northeast section from the Lyon County Substation (near Marshall, Minnesota) and the Minnesota Valley Substation (near the City of Granite Falls, Minnesota)¹

Applicants identified the need for the transmission line facilities to cross the Minnesota River in three locations: 1) the Granite Falls crossing area; 2) the Upper Mississippi River crossing area in Sherman Township between Redwood and Renville Counties; and 3) the Lower Mississippi River crossing area between Belle Plaine and Le Sueur on the border of Sibley and Scott counties. The Applicants identified multiple crossings in each crossing area and examined them to determine potential feasibility from a socioeconomic, environmental, and engineering/constructability standpoint, while applying the state routing criteria as described in Minnesota Rules Chapter 7849. A one-mile study area surrounding each crossing location was used for most analyses; variations from the one-mile area are noted, where applicable.

For the river crossing analysis, the Applicants conducted a Geographic Information System (“GIS”) analysis of the environmental characteristics within a one-mile radius of each potential river crossing location, called the “study area.” The analysis included the following information:

- United States Geological Survey (“USGS”) topographic maps and digital elevation data
- Federal Aviation Administration (“FAA”) airport location data
- Minnesota Department of Transportation (“MnDOT”) base map and municipal boundaries
- U.S. Department of Agriculture (“USDA”) Farm Service Agency (“FSA”) color aerial photographs
- USFWS National Wetland Inventory (“NWI”) maps

¹ The Project Corridor initially also included an east-west corridor section between the Minnesota Valley Substation (near the City of Granite Falls) and the West Waconia Substation (near Belle Plaine, Minnesota). This section was included to accommodate a system configuration alternative that would include a 345 kV connection between the Minnesota Valley Substation and the West Waconia Substation. This configuration was not carried forward in the Certificate of Need proceeding and is no longer under consideration.

- Federal Emergency Management Agency (“FEMA”) 100-year floodplain data
- USGS Gap Analysis land cover data and International Coalition land use data
- Minnesota Department of Natural Resources (“DNR”) information on public recreation and environmentally protected areas
- DNR Natural Heritage Information System (“NHIS”) Database of threatened and endangered species
- U.S. Census Data
- Minnesota County Biological Survey (“MCBS”) natural community data
- Federal Communications Commission (“FCC”) Antenna Structure Registry (“ASR”)
- Existing utility data
- Statewide conservation easement data compiled by the Board of Water and Soil Resources (“BWSR”)
- Existing zoning and long-range land use plans for counties and cities
- State Historic Preservation Office (“SHPO”) archaeological and historic resources records

In addition, the Applicants visited the majority of the river crossing locations to conduct initial on site reviews and natural community surveys. The Applicants also sought input from agencies, the public, State and local government representatives, city planners, landowners, and other stakeholders. Two of the Minnesota River crossings evaluated in this report, the North and South Henderson crossings, were recommended by stakeholders during these meetings.

3.0 MINNESOTA RIVER CROSSING LOCATIONS

3.1 SUMMARY OF NOTABLE FEATURES AT EACH MINNESOTA RIVER CROSSING LOCATION

The following subsections describe each of the Minnesota River crossings that the Applicants analyzed, summarizing the notable features at each river crossing.

3.1.1 GRANITE FALLS CROSSING AREA

Granite Falls (Figure 1): The Granite Falls Minnesota River crossing is east of the City of Granite Falls. The proposed transmission line route will replace an existing 115 kV transmission line that currently crosses the river at this location. As a result, new impacts to the resources in the area will be limited. The Minnesota River is approximately 270 feet wide and only 350 feet from bluff to bluff. High minority populations (11 percent) are associated with the block groups encompassing the Upper Sioux Reservation. The number of people living below the poverty level is comparable to State and county averages. Historic structures occur in Granite Falls. One microwave tower and one FM radio tower are located here. Agricultural land use is approximately 13 percent of land area. Woodland impacts will be low due to the use of an existing ROW in routing the Project. Sensitive natural resources include a high concentration of dry prairie, mesic prairie, rock outcrops, USFWS

easements, the Blue Devil SNA, and MCBS areas of moderate and high significance. At this crossing, the transmission line will cross a scenic highway and the Minnesota River where it is designated Recreational. No mines are documented. Many historic features are found in the one-mile study area but are not near the probable route. Twelve State protected species occur within the study area.

3.1.2 UPPER MINNESOTA RIVER CROSSING AREA

Redwood (Figure 2): On the Alternate Route, the Redwood Minnesota River crossing is north of Redwood Falls and will follow an existing 115 kV transmission line and road that crosses the river at this location. A Scenic Byway runs along the east side of the river, and routing to the top of the eastern river bluff may create a visual impact in addition to the existing 115 kV transmission line. The river is designated Scenic, requiring coordination with the DNR to permit a crossing. The river is approximately 230 feet wide and 1.5 miles from bluff to bluff. Surrounding land uses include a sewage treatment pond, a rendering plant, and several occupied residences. Minority populations and people living below the poverty level are comparable to State and county averages. Agriculture practices cover approximately 37 percent of land area. One aggregate mine is found within one mile of the crossing. Woodland impacts would be moderate. Sensitive natural resources include rock outcrops, mesic and dry prairie communities, a wet meadow, the Klabunde WMA, and moderate and high significance MCBS areas. Fourteen different State protected rare and unique species occur in the study area, of which one is also federally threatened.

Morton (Figure 3): The Morton Minnesota River crossing occurs west of the City of Morton, and follows a road and railroad that crosses the river at this location. This crossing is in proximity to the Lower Sioux Reservation and will require coordination with Tribe representatives. The City of Morton and other nearby high-density residential areas pose a challenge to routing if the highway corridor is used. The river is designated as Scenic and therefore this crossing requires coordination with the DNR. The river is approximately 180 feet wide and 1.6 miles from bluff to bluff. A wetland larger than 1,000 feet wide occurs along the probable route. High minority populations (16 percent) are associated with the block group encompassing the Lower Sioux Reservation. People living below the poverty level are comparable to State and county averages. One FM radio tower is located in the area. Agricultural land use is relatively high at approximately 52 percent of land area. One gravel mine is found within one mile of the crossing. Woodland impacts will be minor. Sensitive natural resources include Tiger Lake WMA, rock outcrops, silver maple floodplain forest, and moderate and outstanding significance MCBS areas. Ten different State protected rare and unique species occur in the study area, of which one is also federally threatened.

Franklin 69 kV (Figure 4): The Franklin 69 kV Minnesota River crossing is located 1.6 miles west of Franklin and follows an existing 69 kV transmission line. The river is designated as Scenic and therefore this crossing requires coordination with the DNR. The river is approximately 250 feet wide and 1.1 miles from bluff to bluff. An unspannable wetland occurs in the river valley. High minority populations (16 percent) are associated with the block group encompassing the Lower Sioux Reservation. Archaeological resources are known to occur on the western bluff of the river. Coordination with SHPO would be necessary to avoid or minimize impacts to these features. Agricultural land use is relatively high at approximately 52 percent of land area. Woodland impacts will be moderate. Sensitive natural resources include wet prairie, four moderate and one outstanding significance MCBS areas, a maple-basswood forest, and one State protected species.

Cedar Mountain (Figure 4): The Cedar Mountain Minnesota River crossing is located approximately 0.3 miles south of Franklin, and follows a county highway and an existing 69 kV transmission line. The river is approximately 160 feet wide and 1.8 miles from bluff to bluff. The river is designated as Scenic and therefore this crossing requires coordination with the DNR. An unspannable wetland occurs in the river valley. High minority populations (16 percent) are associated with the block group encompassing the Lower Sioux Reservation. Historic resources occur in Franklin. Two microwave towers are located in the area. Agricultural land use is relatively high at approximately 52 percent of land area. Woodland impacts would be moderate. Sensitive natural resources include eight moderate and five outstanding significance MCBS areas and the Cedar Mountain SNA and WMA. Floodplain forests are relatively narrow. Four State protected species occur in the study area.

South Franklin (Figure 4): The South Franklin Minnesota River crossing is located approximately 0.3 miles south of Franklin. It follows no existing infrastructure crossings of the river. The river is approximately 100 feet wide and 1.8 miles from bluff to bluff. The Minnesota River loses its Scenic designation at the County Road 11 Bridge, so this crossing does not have any state Wild, Scenic, and Recreational River protection. High minority populations (17 percent) are associated with the block group encompassing the Lower Sioux Reservation. Historic resources are known to occur in Franklin. Two microwave towers are located here. The level of Agricultural land use is the highest of the options studied, at approximately 57 percent of land area. Sensitive natural resources include eight moderate and three outstanding significance MCBS areas and the Cedar Mountain SNA and WMA. Floodplain forests are relatively narrow. One State protected species occurs in the study area.

Wabasha Creek (Figure 5): The Wabasha Creek Minnesota River crossing is located approximately 1.1 miles south of Franklin. It follows no existing infrastructure crossings of the river. The river is approximately 90 feet wide and 1.7 miles from bluff to bluff. High minority populations (12 percent) are associated with the block group encompassing the Lower Sioux Reservation. Two microwave towers are located here. Agricultural land use is relatively high here at approximately 51 percent of land area. Woodland impacts will be high because this crossing will not use an existing ROW. Sensitive natural resources include a mesic prairie, oak woodland-brushland, 14 moderate, one high, and three outstanding significance MCBS areas, and the Cedar Mountain SNA and WMA. Floodplain forests are wider than 1,000 feet. Five State protected species occur in the study area.

Brown County (Figure 6): On the Preferred Route, the Brown County Minnesota River crossing follows Brown County Highway 8 and Renville County Highway 3 which cross the river at this location. No cities are within three miles. The river is approximately 110 feet wide and 1.3 miles from bluff to bluff. Minority populations and people living below the poverty level are comparable to State and county averages. Large transmission structures will be required to cross an existing 115 kV transmission line on the eastern river bluff, which may create some visual impact in addition to the existing 115 kV transmission line. Agricultural land use is relatively high here at approximately 51 percent of land area. Woodland impacts will be moderate. Sensitive natural resources include a dry prairie, wet meadow, and 11 moderate significance MCBS areas. Floodplain forests are wider than 1,000 feet. One State protected species occurs in the study area.

3.1.3 LOWER MINNESOTA RIVER CROSSING AREA

South Le Sueur (Figure 7): The South Le Sueur Minnesota River crossing is located approximately one mile south of Le Sueur. It follows no existing infrastructure crossing the river. The river is

approximately 300 feet wide and 0.9 miles bluff to bluff. An unspannable wetland occurs in the river valley. Minority populations and people living below the poverty level are comparable to State and county averages. The Le Sueur Airport is within one mile of the river crossing. Agricultural land use is relatively high here at approximately 52 percent of land area. Three aggregate mines are located within 1.5 miles. Woodland impacts will be high due to lack of an existing ROW. Sensitive natural resources include a State protected calcareous seepage fen, a wet meadow shrub community, and four moderate significance MCBS areas. One State protected species occurs in the study area.

Central Le Sueur (Figure 8): The Central Le Sueur Minnesota River crossing follows a road directly into downtown Le Sueur and into a residential and commercial area that will conflict with transmission line routing. The transmission line will parallel a scenic byway. The river is approximately 300 feet wide and 1.6 miles from bluff to bluff. An unspannable wetland occurs in the river valley. Minority populations and the number of people living below the poverty level are comparable to state and county averages. Many historic buildings are located in downtown Le Sueur. One microwave tower is located here. Agricultural land use is relatively low here at approximately 27 percent of land area. One aggregate mine is located within one mile. Woodland impacts will be moderate. Sensitive natural resources include two moderate significance MCBS areas. Floodplain forests are wider than 1,000 feet. One State protected species occurs in the study area.

Le Sueur 69 kV (Figure 8): The Le Sueur 69 kV Minnesota River crossing follows an existing 69 kV transmission line directly into a densely populated residential area of Le Sueur. The river is approximately 280 feet wide and one mile from bluff to bluff. Minority populations and people living below the poverty level are comparable to State and county averages. Many historic buildings are located in downtown Le Sueur. One microwave tower is located here. Agricultural land use is moderate at approximately 39 percent of land area. One aggregate mine is located within one mile. Woodland impacts would be moderate. Sensitive natural resources include one moderate significance MCBS area. Floodplain forests are wider than 1,000 feet. Three State protected species occur in the study area.

Highway 169 (Figure 9): The Highway 169 Minnesota River crossing follows US Highway 169 to the north of Le Sueur. Land use is industrial. The river is approximately 570 feet wide and one mile from bluff to bluff. A city park is located on the east side of the river crossing. Routing options on the east side of the river may be challenging, but feasible. Particularly, minimizing impacts to the Highway 169 corridor as it climbs out of the Minnesota River Valley will be an important factor to consider. Minority populations and the number of people living below the poverty level are comparable to state and county averages. Two microwave towers are located here. Agricultural land use is moderate at approximately 40 percent of land area. One aggregate mine is located within two miles. Woodland impacts would be moderate. Sensitive natural resources include one moderate significance MCBS area and a colonial water bird nesting site. Floodplain forests are wide south of US Highway 169. Two State protected species occur in the study area.

Le Sueur Treatment Pond (Figure 9): On the Preferred Route, the Le Sueur Treatment Pond Minnesota River crossing is located approximately 0.8 miles north of Le Sueur. Although it follows no existing infrastructure crossings of the river, the existing Le Sueur water treatment ponds is a disturbance corridor that allows few new impacts to human and environmental impacts, particularly on the west side of the river if the Project is routed at this crossing. Coordination with Le Sueur Public Works is necessary for this crossing. Land use is industrial. The river is approximately 330 feet wide and one mile from bluff to bluff. An unspannable wetland occurs in the river valley. A city

park is located on the east side of the river crossing. Minority populations and the number of people living below the poverty level are slightly higher than State and county averages. One microwave tower is located on the eastern bluff. Agricultural land use is moderate at approximately 44 percent of land area. No aggregate mines are located within two miles. Woodland impacts will be moderate to high. Sensitive natural resources include a colonial water bird nesting site, an oak forest, a silver maple floodplain forest, and two moderate significance MCBS areas. Four State protected species occur in the study area.

South Henderson (Figure 10): The South Henderson Minnesota River crossing is located one mile south of Henderson. It follows no existing infrastructure crossings of the river. The river is approximately 390 feet wide and 0.9 miles from bluff to bluff. Minority populations and the number of people living below the poverty level are slightly higher than State and county averages. Two microwave towers are located here. Agricultural land use is relatively high at approximately 51 percent of land area. One aggregate mine is located within one mile. Woodland impacts will be high because there is no existing ROW. Sensitive natural resources include a dry hill oak savanna and six moderate significance MCBS areas. Five State protected species occur in the study area.

Henderson (Figure 10): The Henderson Minnesota River crossing follows a road into downtown Henderson. Residential and commercial zoning designations conflict with transmission line routing. The river is approximately 320 feet wide and 1.3 miles from bluff to bluff. Minority populations and the number of people living below the poverty level are comparable to State and county averages. Over 100 historic buildings are located in downtown Henderson. Agricultural land use is moderate at approximately 43 percent of land area. No aggregate mines are located within two miles. Woodland impacts will be moderate. Sensitive natural resources include a dry hill oak savanna, rock outcrops, seven moderate significance MCBS areas, a MSNRA, and the Ney WMA. Floodplain forests are wider than 1,000 feet. Six State protected species occur in the study area.

North Henderson (Figure 11): The North Henderson Minnesota River crossing is located one mile north of Henderson. It follows no existing infrastructure crossings of the river. Due to an oxbow in the river, the transmission line will cross the main channel and a large secondary channel of the river three times. The river is approximately 350 feet wide and 1.2 miles from bluff to bluff. An unspannable wetland occurs in the river valley. Minority populations and the number of people living below the poverty level are comparable to State and county averages. Agricultural land use is moderate at approximately 43 percent of land area. Two aggregate mines are located within one mile. Woodland impacts will be high because there is no existing ROW along which to route the Project. Sensitive natural resources include a silver maple floodplain, three moderate significance MCBS areas, a MSNRA, and the Ney WMA. Two State protected species occur in the study area.

Blakeley (Figure 12): The Blakeley Minnesota River crossing follows a road into the community of Blakeley. Steep ravines and bluffs occur in this area. Local government is planning a park in the vicinity. The river is approximately 390 feet wide and 0.8 miles from bluff to bluff. Minority populations and the number of people living below the poverty level are comparable to State and county averages. Archaeological resources are dispersed across the study area. Agricultural land use is moderate at approximately 40 percent of land area. Three aggregate mines are located within two miles. Woodland impacts would be high because there is no existing corridor. Sensitive natural resources include silver maple floodplain forests, maple-basswood forests, 10 moderate and four high significance MCBS areas, and a MSNRA. Floodplain forests are wider than 1,000 feet. Nine

State protected species, of which one is a federally endangered mussel species, occur in the study area.

Pipeline (Figure 12): The Pipeline Minnesota River crossing follows a crude oil pipeline across the river approximately two miles west of Belle Plaine. However, the pipeline has been directionally drilled underneath the river, thus there is no existing aboveground infrastructure crossing of the river. The river is approximately 260 feet wide and 0.8 miles from bluff to bluff. Minority populations and the number of people living below the poverty level are comparable to State and county averages. One microwave tower is located here. Agricultural land use is moderate at approximately 47 percent of land area. Three aggregate mines are located within two miles. Woodland impacts will be moderate. Sensitive natural resources include dry sand-gravel prairie, maple-basswood forests, silver maple floodplain forests, three moderate and six high significance MCBS areas, and a MSNRA. Two State protected species occur in the study area.

West Belle Plaine (Figure 13): On the Alternate Route, the West Belle Plaine Minnesota River crossing follows a 69 kV transmission line across the river approximately one mile west of Belle Plaine. Belle Plaine's Comprehensive Plan 2007 Update zones this area for future industrial development. A sewage treatment pond is located less than one mile southeast of the crossing location. The river is approximately 420 feet wide and one mile from bluff to bluff. Minority populations and the number of people living below the poverty level are slightly lower than State and county averages. One microwave tower is located here. Agricultural land use is moderate at approximately 43 percent of land area. Three aggregate mines are located within two miles. Woodland impacts will be moderate. Sensitive natural resources include one moderate and one high significance MCBS areas and a MSNRA. Floodplain forests are wider than 1,000 feet. Two State protected species occur in the study area.

Belle Plaine (Figure 13): The Belle Plaine Minnesota River crossing follows a road and a sub-transmission line (less than 69 kV) across the river into downtown Belle Plaine. Residential and commercial areas will be impacted by this crossing. The river is approximately 340 feet wide and one mile from bluff to bluff. Unspannable wetlands occur in the river valley. Oxbow lakes also occur in the river valley. Several historic buildings are located in downtown Belle Plaine. Minority populations and the number of people living below the poverty level are lower than State and county averages. Agricultural land use is low at approximately 25 percent of land area. One aggregate mine is located within two miles. Woodland impacts will be moderate. Sensitive natural resources include a silver maple floodplain forest, six moderate significance MCBS areas, and a MSNRA. The route will abut Minnesota Valley State Park. While structures can be located outside of State Park property, DNR strongly encourages avoiding the park by a greater distance. Floodplain forests are wider than 1,000 feet. One State protected species occurs in the study area.

3.2 SUMMARY OF RELATIVE IMPACTS OF THREE MINNESOTA RIVER CROSSING AREAS

The following subsections compare the impacts of each option at a specific location.

3.2.1 GRANITE FALLS RIVER CROSSING AREA

There are several habitat conservation easements and sensitive natural resources in the Granite Falls crossing area, but because the proposed transmission line will replace an existing 115 kV transmission line that currently crosses the river, new impacts to the resources in the area will be

minimal. Sensitive features are uncommon near the existing 115 kV transmission line and structure placement will further minimize impacts.

The Applicants concluded that this crossing is suitable for transmission line routing and should be considered in the development of the Preferred Route and the Alternate Route for the Project.

3.2.2 UPPER MINNESOTA RIVER CROSSING AREA

Four crossings were analyzed in the Upper Minnesota River Crossing Area south of Franklin, including Cedar Mountain, South Franklin, Wabasha Creek and Brown County. The Brown County crossing follows Brown County Highway 8 and Renville County Highway 3 across the river. The Cedar Mountain crossing follows Redwood County Highway 11 and a 69 kV transmission line across the river. The South Franklin and Wabasha Creek crossings do not follow existing infrastructure. Impacts through the floodplain and bluffs will be highest at the South Franklin and Wabasha Creek crossings because they do not parallel or utilize existing infrastructure ROWs. Cedar Mountain SNA limits routing options from the west and will create visual impacts for the Cedar Mountain, South Franklin and Wabasha Creek crossings. The resulting potential routes for the transmission line east from the Cedar Mountain crossing crosses the municipal boundaries of the City of Franklin, including a residential area. Relatively moderate sensitive resources are found at the Brown County crossing. Woodland impacts on the eastern river valley bluff may occur depending on the overland route. Of these options, the Brown County crossing maximizes use of existing ROWs and affects the fewest human and natural resources, followed by the Cedar Mountain crossing.

Therefore, for the Upper Minnesota River Crossing Area, the Applicants concluded that the Brown County and the Redwood crossings should be considered in developing the Preferred Route and Alternate Route for the Project.

3.2.3 LOWER MINNESOTA RIVER CROSSING AREA

The following Minnesota River crossings are in the Le Sueur area: South Le Sueur, Central Le Sueur, Le Sueur 69 kV, Highway 169, and Le Sueur Treatment Ponds. The South Le Sueur crossing does not follow existing infrastructure across the river and is located near the Le Sueur Airport. Impacts to natural resources and proximity to the airport make this crossing infeasible. See 14 CFR Part 77. The Central Le Sueur and Le Sueur 69 kV crossings route directly into dense residential areas of Le Sueur and could create many displacements. The Highway 169 crossing follows a major highway, and avoids human and natural resource impacts. Routing options in the eastern bluff are limited and would include crossing a city park. Although there is no existing infrastructure crossing across the Minnesota River at the Le Sueur Treatment Pond crossing, the wastewater treatment ponds provide an infrastructure corridor with no impacts to homes or sensitive environmental features. Similar routing constraints associated with the Highway 169 crossing occur on the eastern river bluff, although land use is industrial. Both the Highway 169 and Le Sueur Treatment Pond crossings are potentially suitable for a transmission line crossing.

All three Henderson crossings cross the Minnesota River near Henderson. The Henderson crossing contemplates placing facilities through dense residential areas of Henderson and may affect several historic structures. Both the North and South Henderson crossings could have large impacts to natural resources because there are no existing infrastructure corridors to follow. For these reasons, none of the Henderson crossings is practical.

The Blakeley, Pipeline, West Belle Plaine and Belle Plaine crossings are all west of Belle Plaine. The Blakeley crossing goes through a small community and through a future park location in the Blakeley Bluffs. The Blakeley Bluffs are a sensitive natural resource. Due to impacts to human and natural resources, this crossing is not practical. The Pipeline crossing has limited routing options from the west due to mining activity, and there is no existing above ground infrastructure crossing of the river at this location. There would be moderate impacts to natural resources. The West Belle Plaine crossing involves few sensitive natural resources, though routing options may be limited by mines on the northwest side of the river. The Belle Plaine crossing would require crossing a residential area of Belle Plaine.

Based on the foregoing, the Applicants concluded that the Le Sueur Treatment Plant and West Belle Plaine crossings should be considered in developing the Preferred Route and the Alternate Route.

4.0 ENVIRONMENTAL INFORMATION FOR THE MINNESOTA RIVER CROSSING LOCATIONS

A preliminary description of the environmental resources and potential impacts associated with each of the potential Minnesota River crossing locations is provided in more detail below.

4.1 HUMAN SETTLEMENT

The issues examined for potential impacts to human settlement included land use, recreation and visual resources, socioeconomic conditions, and public services.

4.1.1 LAND USE

Land use analyses focused on how a potential river crossing could affect existing and planned land use. Consideration was given to the use of existing river crossings, proximity to towns or other residential areas, and potential to use existing corridors along the approaches to the river. Table 1 summarizes the land use analysis for the river crossings. The Applicants sought to parallel existing infrastructure where reasonably possible, consistent with the State's policy of non-proliferation. Collocation of new transmission facilities with existing ROW can minimize impacts to existing and planned land use and environmental resources by sharing ROW with the existing corridor. Affected agencies also stated a preference for corridor sharing, particularly collocation with existing transmission facilities. USFWS service noted that crossings where there is no existing transmission line facility may be considered a new river crossing.

The majority of river crossings analyzed are located along existing transmission lines, road crossings, or both. Transmission line crossings occur at Granite Falls, Redwood, Franklin 69 kV, Cedar Mountain, Le Sueur 69 kV, and West Belle Plaine. Road crossings occur at Redwood, Morton, Cedar Mountain, Brown County, Central Le Sueur, Highway 169, Henderson, Blakeley, and Belle Plaine. Morton also follows a railroad crossing, and Pipeline follows a pipeline. The Cedar Mountain crossing represents a corridor that includes a 69 kV transmission line and a county highway that are within 1,000 feet of each other. The Pipeline crossing would create a new above-ground river crossing.

The crossings that do not include existing infrastructure were considered because they minimized impacts to residential areas near the river crossing or provided access to possible new substations north or south of Franklin. The South Franklin and Wabasha Creek crossings, for example, do not

coincide with existing infrastructure crossings but are within 1.5 miles of the Cedar Mountain Substation South area along the Preferred Route south and east of Franklin. The South Le Sueur crossing would also be a new crossing but avoids urban development in the city of Le Sueur. The North and South Henderson crossings are also new crossings, analyzed at the request of local agencies and landowners. The Le Sueur Treatment Pond crossing does not coincide with an existing infrastructure crossing. However, there are existing water treatment ponds near the river crossing location. The Pipeline crossing collocates with a pipeline that was directionally drilled under the river, thus no structures exist above the river.

Existing infrastructure corridors at river crossings often lead into urban areas. Crossings that are close to urban and high-density residential areas include Granite Falls (City of Granite Falls), Morton (City of Morton), Cedar Mountain and South Franklin (City of Franklin), South Le Sueur, Central Le Sueur, Le Sueur 69 kV, and Highway 169 (City of Le Sueur), Henderson Crossing (City of Henderson), Blakeley (City of Blakeley), and Belle Plaine (City of Belle Plaine). Crossings that are located away from relatively high-density residential areas include Franklin 69 kV, Wabasha Creek, Brown County, Le Sueur Treatment Pond, Pipeline, and West Belle Plaine.

Generally, land use near potential crossings is a mix of agricultural, commercial, residential, and woodland. Industrial aggregate mining, water treatment, and industrial use are other land uses that occur at some crossings. Agricultural and mining activities are discussed further in the Land-based Economies section of this analysis. A portion of the Lower Sioux Reservation is located at the Morton crossing. Crossing Tribal land requires coordination with and approval from the Tribe and the Bureau of Indian Affairs.

Airports or heliports are located within a mile of the South Le Sueur and Central Le Sueur crossings. The FAA requires minimum clear zones around airports based on runway length and surface, and other air traffic factors. Regional airports typically have clearance zones ranging from 1:20 to 1:40 feet from the runway. For example, a 150-foot tall transmission structure would be located at least 6,000 feet from the end of a runway for an airport with a 1:40 clearance zone. Locating transmission lines farther than the minimum distance required could minimize conflicts with airport upgrades in the future. If the selected crossing location is in the vicinity of an airport, early coordination should occur to obtain any ordinances or maps designating the clearance zones for planning and design purposes. See 14 CFR Part 77.

Long-range comprehensive plans are developed by agencies (counties, cities, DNR, etc.) to describe desired future land use, development and management. County and city plans, when available, were reviewed to determine planned development and changes in land use zonings. Most crossings are located in areas that have little or no planned urban development or proposed changes to existing land use; agricultural zoning is prevalent. Transmission lines are generally permissible uses with agricultural zoning. Crossings near the City of Le Sueur (the South and Central Le Sueur, Le Sueur 69 kV, and Highway 169 crossings) are in areas of planned urban development. Coordination with city and county planners would minimize land use conflicts as these areas develop into the next decade.

Table 1. Land Use

| Crossing | Existing Infrastructure Crossing/Type | Potential for Corridor Sharing | Distance to Nearest Town | Existing Land Use in Vicinity | Planned Land Use in Vicinity | Comments |
|------------------------------|---------------------------------------|--------------------------------|----------------------------|---|--|--|
| Granite Falls | | | | | | |
| Granite Falls | Yes - Transmission line | Yes – Transmission line | 0 miles (in Granite Falls) | Industrial (Substation)/ Forest/ Recreational | The City of Granite Falls Comprehensive Land Use Plan does not identify any urban growth areas into Yellow Medicine County. The zoning map indicates that there are two small zoned low density residential developments that are located just north and just west of the city boundaries. | |
| Upper Minnesota River | | | | | | |
| Redwood | Yes - Transmission line & Highway | Yes – Transmission line & Road | 0.1 mile (North Redwood) | Agriculture/ Water treatment/ Recreational | Page 75 of the Redwood County Comprehensive plan describes a “City of Redwood Falls Protection Zone” (“RFPZ”), the bounds of which are yet to be formally defined. The RFPZ seems to generally prohibit agricultural activities. The Zoning map also shows a County Future Development Zone (“CFDZ”) that provides a buffer between the city and the adjacent Lower Sioux Indian Reservation. The RFPZ is generally a ~1.5 mile buffer around the north, west, and south sides of the city. The CFDZ extends from the east side of the city boundaries to the Minnesota River. The CFDZ ranges from ~0.5 mile to 4 miles in width (east west direction). | Because boundaries for RFPZ and CFDZ have not been defined, ramifications of routing through these areas are undetermined. |
| Morton | Yes - Railroad & Highway | Yes – Railroad & Highway | 0.1 mile (Morton) | Woodland/ Reservation land/ Recreational | The City of Morton abuts the north side of the Minnesota River. No urban development is planned (Birch Coulee Township Zoning Map, see Renville County Comprehensive Plan). Depending on routing, the over-land approach could cross the Redwood CFDZ described for the Redwood crossing. No restrictions on transmission lines are expressed, but the topic is not discussed. | There are 482 acres of the Lower Sioux Reservation in this area. Crossing the river at this location will require crossing Lower Sioux Reservation |

| Crossing | Existing Infrastructure Crossing/Type | Potential for Corridor Sharing | Distance to Nearest Town | Existing Land Use in Vicinity | Planned Land Use in Vicinity | Comments |
|------------------------------|---------------------------------------|--------------------------------|--------------------------|--|--|---|
| Franklin 69 kV | Yes - Transmission line | Yes – Transmission line | 1.6 miles (Franklin) | Woodland/ Agriculture/ Recreational | Zoned agricultural. No changes in land use are planned. Transmission lines are generally permissible uses in agricultural areas. | |
| Cedar Mountain | Yes - Transmission line & Highway | Yes – Transmission line & Road | 0.3 mile (Franklin) | Agriculture/ Recreational | Minnesota River is Zoned as a Special Protection District “SSP” under the Renville County Shoreline Protection District. This classification does not appear to affect transmission line routing. The City of Franklin’s municipal boundaries are north of Highway 19 and do not directly abut the Minnesota River. No urban development is planned (Camp Township Zoning Map, see Renville County Comp Plan). | |
| South Franklin | No | No | 0.3 mile (Franklin) | Woodland/ Agriculture | See information for the Cedar Mountain crossing. | |
| Wabasha Creek | No | No | 1.1 miles (Franklin) | Woodland/ Agriculture | Zoned agricultural. No changes in land use are planned. Transmission lines are generally permissible uses in agricultural areas | |
| Brown County | Yes - Highway | Yes – Road | 3.6 miles (Franklin) | Woodland/ Agriculture | Zoned agricultural. No changes in land use are planned. Transmission lines are generally permissible uses in agricultural areas | |
| Lower Minnesota River | | | | | | |
| South Le Sueur | No | No | 1 mile (Le Sueur) | Woodland/ Agriculture/ Rural Residential | The City of Le Sueur is planning commercial and industrial development to the northeast along the Hwy 169 corridor. The existing water treatment plant will be replaced by a new facility in 2008. The existing treatment ponds may be converted to wetland. | Le Sueur Airport - 1 mile northeast. FAA height restrictions may limit transmission line routing. |
| Central Le Sueur | Yes - Highway | Yes – Road | 0 miles (in Le Sueur) | Woodland/ Residential | See information for the South Le Sueur crossing. Existing residential and commercial uses in Le Sueur conflict with transmission line routing. | MN Valley Health Center Heliport, Le Sueur. 3,300 ft east |

| Crossing | Existing Infrastructure Crossing/Type | Potential for Corridor Sharing | Distance to Nearest Town | Existing Land Use in Vicinity | Planned Land Use in Vicinity | Comments |
|-------------------------|---------------------------------------|--------------------------------|--------------------------|----------------------------------|--|----------|
| Le Sueur 69 kV | Yes - Transmission line | Yes – Transmission line | 0 miles (in Le Sueur) | Woodland/ Residential | See information for the Central Le Sueur crossing. | |
| Highway 169 | Yes - Highway | Yes – Road | 0.4 mile (in Le Sueur) | Woodland/ Residential | See information for the South Le Sueur crossing. Coordinate with City of Le Sueur water department regarding plans for a new water treatment system. | |
| Le Sueur Treatment Pond | No - Wastewater treatment facility | No | 0.8 mile (in Le Sueur) | Woodland/ Water Treatment | See information for the South Le Sueur crossing. Coordinate with City of Le Sueur water department regarding plans for a new water treatment system. | |
| Henderson | Yes - Highway | Yes – Road | 0 miles (in Henderson) | Residential/ Woodland | No comprehensive plan was identified for the City. The Sibley County Comprehensive Plan shows no urban development planned for Henderson. Residential zoning predominates near the crossing. | |
| North Henderson | No | No | 1 mile (Henderson) | Agricultural/ Woodland/ Parkland | Zoned agricultural/conservation. No changes in land use are planned. Transmission lines are generally permissible uses in agricultural areas | |
| South Henderson | No | No | 1 mile (Henderson) | Agricultural/ Woodland | Zoned agricultural/conservation. No changes in land use classifications are planned. | |
| Blakeley | Yes - Highway | Yes – Road | 0.1 mile (Blakeley) | Residential/ Woodland | The land around the Blakeley crossing is zoned as an agricultural preservation district according to the Scott County 2030 Comprehensive Plan. | |
| Pipeline | Yes - Pipeline | Yes - Pipeline | 1.2 miles (Blakeley) | Agriculture/ Woodland | Zoned agricultural preservation district according to the Scott County 2030 Comprehensive Plan. | |
| West Belle Plaine | Yes - Transmission line | Yes – Transmission line | 1.1 miles (Belle Plaine) | Woodland | Belle Plaine planned expansion areas include possible industrial zoning about 0.5 miles east of the crossing. Residential expansion is planned about one mile southeast of the crossings. | |

| Crossing | Existing Infrastructure Crossing/Type | Potential for Corridor Sharing | Distance to Nearest Town | Existing Land Use in Vicinity | Planned Land Use in Vicinity | Comments |
|--------------|---------------------------------------|--------------------------------|---------------------------|-------------------------------|--|----------|
| Belle Plaine | Yes - Highway | Yes – Road | 0 miles (in Belle Plaine) | Residential/Woodland | Belle Plaine is zoned to expand ~0.5 miles to the east and south, and ~ 0.25 miles to the west. The north side of the city is bounded by the Minnesota River. The north side is zoned floodplain, and the northeast and northwest sides are zoned industrial (Belle Plaine Comprehensive Plan Future Use map). | |

4.1.2 RECREATION AND VISUAL RESOURCES

Recreational areas and resources used for recreation are found throughout the Minnesota River Valley. Regional, State, and federal parks and reserves were analyzed. This analysis considered county or city parks wherever GIS data for these features was available. Local and county parks have been noted where they have been identified by field visits or from comments at public meetings. Other recreational resources included in this analysis are USFWS Waterfowl Production Areas (“WPAs”), DNR Scientific and Natural Areas (“SNAs”) and Wildlife Management Areas (“WMAs”), state-designated trout streams, snowmobile trails, and Wild, Scenic and Recreational segments of the Minnesota River. The visual resources analysis considered the resources listed above, but also included occupied residences, proximity to residential and urban viewsheds, and Scenic Highways and Byways. Table 2 summarizes the recreational and visual resource analysis for the potential river crossings. Some land use considerations, including proximity to occupied residences, are summarized above in Table 1. The Analyses covered a one-mile area around the potential crossing.

4.1.2.1 Recreation

This section of the analysis considers direct impacts to recreation resources. A direct impact is considered as routing a transmission line through a park or other recreational resource. Visual impacts, where transmission lines are routed near recreational resources, are addressed in the Visual Resource section below. Other indirect impacts may include construction-related activities such as noise or increased traffic. These impacts are highly dependent on route and transmission line alignment and are discussed in Chapters 6.2.8 and 8.2.8 of the Route Permit Application.

Transmission lines routed on lands owned by, managed by, or under easement with the USFWS are subject to approval by the USFWS. USFWS lands within the Project corridors include the Minnesota Valley NWR, WPAs, and lands under USFWS easements. Recreational uses for these lands include hunting, hiking, boating, fishing, bird watching, and viewing wildlife. It is possible to route a transmission line around or away from the NWR at all crossing locations. No WPAs or lands under USFWS easement are found within one mile of any river crossing except at the Granite Falls crossing. There are two Farmers Home Administration USFWS easements located about one mile west and southwest of the Granite Falls river crossing. The proposed 345 kV transmission line facilities would replace the existing 115 kV transmission line at the Granite Falls crossing, but additional ROW may be needed.

Recreational uses at SNAs include plant and wildlife watching and some hiking opportunities; hunting is not allowed in SNAs. There are two SNAs in the study areas. The Blue Devil Valley SNA is located one mile west of the Granite Falls crossing, and is avoidable. The Cedar Mountain SNA is located approximately one mile southwest of the Cedar Mountain, South Franklin, and Wabasha Creek crossings, and would be difficult to avoid if the route approaches these crossings from the west. Approaching from the south is practical.

Minnesota Valley State Park is located near the Belle Plaine crossing. There is, however, an existing road corridor. Construction at this crossing would require extensive coordination with the DNR, and significant mitigation may be required by the DNR to obtain the necessary License to Cross Public Land. Additionally, a 23 CFR 7874 Section 4(f) evaluation would be required if the Project is routed through a park. The Minnesota River is designated Recreational at the Granite Falls crossing.

The Minnesota River is designated Scenic at all of the Upper Minnesota River crossings, except for the South Franklin, Wabasha Creek, and Brown County crossings, where the river has no designation. The river has no designation for all Lower Minnesota River crossings. Crossings where the river is designated Recreational or Scenic were considered only because the new line would follow an existing corridor and the agencies indicated a willingness to permit the line as long as it follows an existing crossing.

WMAs are managed by the DNR to promote wildlife habitat and game species production. Hunting, hiking, and birding are common activities on these lands. Transmission line routing across WMAs requires a land crossing license from the DNR. If the WMAs have received federal funding, a federal review by the USFWS may also be required. Mitigation, often through land purchases or habitat restoration, is typically required.

Routing options are feasible around all WMAs in the crossing areas. The Klabunde WMA is located about 0.5 miles west of the Redwood crossing, Tiger WMA is more than one mile west of the Morton crossing. Cedar Mountain WMA and SNA do limit routing options from the west to the Cedar Mountain, South Franklin, and Wabasha Creek crossings. Approximately one mile south of the North Henderson crossing, the Ney WMA was described by local agencies and landowners as an important local recreation area. Crossing at North Henderson would not impact the Ney WMA.

No state-designated trout streams are found in the Project area. Snowmobile trails managed by the DNR, counties, or local non-government organizations are found in the vicinity of most potential crossings. These resources could be spanned by transmission lines. Local agencies are considering park development in the Blakeley Bluffs area northeast of the City of Henderson near the Blakeley and Pipeline crossings. These areas were discussed at local agency and work group meetings as resources that should be avoided.

4.1.2.2 Visual Resources

New transmission line crossings will be visible from various locations. This study focused the analysis on the identification of visual impacts for sensitive viewsheds. Sensitive viewsheds occur where natural scenery and landscape are valued as a resource. Such viewsheds can occur along scenic roads, portions of the Minnesota River that are designated scenic or recreational, parks, and other public-use natural areas. Potential impacts to homes were also considered.

River crossings that are located within one mile of designated scenic roads include the Granite Falls crossing, all Upper Minnesota River crossings, and all Lower Minnesota River crossings. The Central Le Sueur crossing will collocate with a designated scenic road. Collocating the proposed transmission line with existing infrastructure crossings will minimize new impacts to visual resources. All crossings are also within a mile of residences (see the Land Use section for a discussion of which crossings are close to higher-density residential areas).

Potential new river crossings (*i.e.*, where no existing infrastructure occurs) will add a visual impact to the Minnesota River Valley. The South Franklin, Wabasha Creek, South Le Sueur, Le Sueur Treatment Pond, North Henderson, and South Henderson crossings do not follow existing corridors. The Le Sueur Treatment Pond crossing is located near treatment ponds, which can be considered a disturbed corridor. The Pipeline crossing collocates with a pipeline that has been directionally drilled under the river and would create a new aboveground river crossing.

Public comments regarding visual impacts included the suggestion to paint transmission structures to better blend in with the surrounding environment. Transmission line structures are typically not painted. Two different finishes can be used on steel pole structures resulting in either a standard grayish metal color or a rusted brown finish. The finish proposed for the Project is weatherizing steel, the rusted brown finish.

Table 2. Recreation and Visual Resources

| Crossing | Wild and Scenic River | WMAs w/in 1 mile | SNAs w/in 1 mile | Regional, State or Federal Parks w/in 1 mile | Snowmobile Trails w/in 1 mile | Distance to Other Sensitive Viewsheds | Comments |
|------------------------------|-----------------------|--------------------------------|--------------------------------|--|---|--|---|
| Granite Falls | | | | | | | |
| Granite Falls | Recreational | No | Blue Devil Valley SNA – 1.0 mi | No | No | State Hwy 67 – Scenic Byway – 0.4 miles USFWS Easements occur | Nearest residences in the southeast portion of Granite Falls are 1,400 feet from the crossing. |
| Upper Minnesota River | | | | | | | |
| Redwood | Scenic | Klabunde WMA – 0.5 miles | No | No | Minnesota Valley Snowriders Trail | County Hwy 15 – Scenic Byway – 0.8 miles | Nearest residences in North Redwood and along River Road are 2,000 feet from the crossing. |
| Morton | Scenic | Tiger Lake WMA – 0.9 miles | No | No | Minnesota Valley Snowriders Trail, Renville Co. Drift Runners | U.S. Hwy 71/State Hwy 19 – Scenic Byway – 0.3 miles | Nearest residences in Morton are 1,200 feet from the crossing location. |
| Franklin 69 kV | Scenic | No | No | No | Minnesota Valley Snowriders Trail, Renville Co. Drift Runners, Renville Co. Snow Drifters | County Hwy 51 – Scenic Byway – 0.6 miles | Nearest residences along County Highway 2 is 1,500 feet from the crossing. A golf course is located about 1.5 miles south. |
| Cedar Mountain | Scenic | Cedar Mountain WMA – 0.5 miles | Cedar Mountain SNA – 1.0 mi | No | Minnesota Valley Snowriders Trail, Renville Co. Drift Runners, | County Hwy 5 – Scenic Byway – 0.3 miles | Nearest residences in Franklin would be 2,000 feet from the crossing. |
| South Franklin | Scenic | Cedar Mountain WMA – 0.8 miles | Cedar Mountain SNA – 1.0 mi | No | Minnesota Valley Snowriders Trail, Renville Co. Drift Runners, | County Hwy 5 – Scenic Byway – 0.1 miles | Nearest residences in Franklin are 3,000 feet from the crossing. |

| Crossing | Wild and Scenic River | WMAs w/in 1 mile | SNAs w/in 1 mile | Regional, State or Federal Parks w/in 1 mile | Snowmobile Trails w/in 1 mile | Distance to Other Sensitive Viewsheds | Comments |
|------------------------------|-----------------------|-------------------------------|-----------------------------|--|--|--|--|
| Wabasha Creek | No | Cedar Mountain WMA – 1.0 mile | Cedar Mountain SNA – 1.0 mi | No | Minnesota Valley Snowriders Trail, Renville Co. Drift Runners, | County Hwy 5 – Scenic Byway – 0.5 miles | The nearest residences are along County Highway 5, 2,500 feet from the crossing. |
| Brown County | No | No | No | No | Renville Co. Drift Runners | County Hwy 5 – Scenic Byway – 0.5 miles | The nearest residences are along County Highways 5 and 10, 3,800 feet from the crossing. |
| Lower Minnesota River | | | | | | | |
| South Le Sueur | No | No | No | No | No | Ottawa Rd – Scenic Byway – 0.3 miles | Nearest home is approximately 800 feet from crossing. |
| Central Le Sueur | No | No | No | No | Le Sueur Trail | State Hwy 93 – Scenic Byway – 0 miles | Nearest residences in Le Sueur are 400 feet from crossing. |
| Le Sueur 69 kV | No | No | No | No | No | State Hwy 169 – Scenic Byway – 0.1 miles | Closest residence in Le Sueur is 550 feet from crossing. |
| Highway 169 | No | No | No | No | No | State Hwy 93 – Scenic Byway – 0.7 miles | Nearest home is 1,800 feet from the crossing. A city park is located about 0.5 miles east. |
| Le Sueur Treatment Pond | No | No | No | No | No | State Hwy 93 – Scenic Byway – 0.4 miles | Nearest residences are 2000 feet from the crossing. |

| Crossing | Wild and Scenic River | WMAs w/in 1 mile | SNAs w/in 1 mile | Regional, State or Federal Parks w/in 1 mile | Snowmobile Trails w/in 1 mile | Distance to Other Sensitive Viewsheds | Comments |
|-------------------|-----------------------|---------------------|------------------|--|-------------------------------|--|---|
| Henderson | No | Ney WMA – 1.1 miles | No | No | Snow Trails, Club Trail | State Hwy 93 – Scenic Byway – 0.3 miles Metro Regionally Significant Natural Resource Area (MSNRA) – 1 mile | Nearest residences in Henderson are 700 feet from the crossing. Two local parks are found east of the river. |
| North Henderson | No | Ney WMA – 1.0 miles | No | No | Club Trail | State Hwy 93 – Scenic Byway – 0.2 miles MSNRA – 0.0 miles | Ney WMA was described as an important local resource at work group meetings. |
| South Henderson | No | No | No | No | No | State Hwy 93 – Scenic Byway – 0.7 miles | |
| Blakeley | No | No | No | No | Snow Trails | County Hwy 6 – Scenic Byway – 0.4 miles MSNRA – 0.2 miles | Residences in Blakeley are 1,100 feet from the crossing. A park in the Blakeley Bluffs area is planned for 2030. |
| Pipeline | No | No | No | No | No | County Hwy 6 – Scenic Byway – 1.1 miles MSNRA – 0.4 miles | Scattered residences along Union Trail are up to 1,000 feet from the crossing. |
| West Belle Plaine | No | No | No | No | No | County Hwy 6 – Scenic Byway – 0.4 miles MSNRA – 0.8 miles | Scattered residences along County Highway 6 would be 1000 feet from the crossing. |
| Belle Plaine | No | No | No | Minnesota Valley State Park – 500 feet | Snow Trails, MN Valley State | County Hwy 6 – Scenic Byway – 0.7 miles MSNRA – 0.5 miles | Residences in Belle Plaine would be 1,500 feet from the crossing. |

4.1.3 SOCIOECONOMICS

2000 Census data were analyzed to determine socioeconomic conditions at the river crossings. Block groups are the most detailed census unit with available demographic data. At each crossing, all block groups that occurred within the one-mile buffer of the crossing point were included in this analysis with equal weight, regardless of the area of the block group actually included in the one-mile buffer. Results are shown in Table 3.

On average, minority populations at crossing locations are within 0 to 5 percentage points of the average minority populations of the surrounding counties. Where population density is low, block groups cover large geographic areas that extend through several river crossing study areas. The Granite Falls, Morton, Franklin 69 kV, Cedar Mountain, South Franklin, and Wabasha Creek crossings have average minority populations that are approximately 7 to 13 percentage points greater than the average of the surrounding counties. These crossings include block groups with large Native American populations and/or include towns, which typically have higher minority concentrations than nearby rural areas. Granite Falls includes the block group that covers the Upper Sioux Reservation; the Reservation itself is not located within the one-mile study area. The Franklin 69 kV, Cedar Mountain, South Franklin, and Wabasha Creek crossings include the block group that includes a majority of the Lower Sioux Reservation. However, the Morton crossing is the only crossing area that overlaps with boundaries of the Lower Sioux Reservation. Avoiding the Upper and Lower Sioux Indian Communities, and the cities of Granite Falls, Morton, and Franklin will minimize impacts to communities with a higher than average minority population.

The two block groups that include the City of Le Sueur have 10 percent and 11 percent minority populations, as compared to a county average of 4.1 percent. Impacts to minority communities could be minimized by avoiding the Central Le Sueur and Le Sueur 69 kV crossings that lead into Le Sueur.

Most crossings are within approximately three percentage points of the average percentage of individuals living below the poverty level for surrounding counties, and within approximately three percentage points of the statewide average of 8.0 percent.

Table 3. Socioeconomics

| Crossing | Block Groups | Population | Percent Minority | Percent of Individuals Below Poverty Level | Comments |
|--|--------------|------------|------------------|--|---------------------|
| State and County Socioeconomic Data | | | | | |
| State of Minnesota | n/a | 4,919,479 | 10.5 | 8.0 | |
| Lincoln County | n/a | 6,429 | 0.7 | 9.7 | |
| Lyon County | n/a | 25,425 | 6.9 | 10.1 | |
| Redwood County | n/a | 16,815 | 4.8 | 7.7 | |
| Yellow Medicine County | n/a | 11,080 | 4.5 | 10.4 | |
| Chippewa County | n/a | 13,088 | 3.1 | 8.6 | |
| Renville County | n/a | 17,154 | 4.1 | 8.8 | |
| Brown County | n/a | 26,911 | 2.3 | 6.4 | |
| Nicollet County | n/a | 29,771 | 3.5 | 7.5 | |
| Sibley County | n/a | 15,356 | 4.6 | 8.1 | |
| Le Sueur County | n/a | 25,426 | 3.6 | 6.9 | |
| Scott County | n/a | 89,498 | 6.2 | 3.4 | |
| Rice County | n/a | 56,665 | 6.7 | 6.9 | |
| Dakota County | n/a | 355,904 | 8.7 | 3.6 | |
| Granite Falls (Yellow Medicine and Chippewa Counties) | | | | | |
| Granite Falls | 270239503002 | 1,113 | 15 | 9 | 11% Native American |
| | 271739701001 | 794 | 5 | 9 | |
| | 271739701002 | 632 | 15 | 15 | 11% Native American |
| | 271739701003 | 739 | 3 | 9 | |

| Crossing | Block Groups | Population | Percent Minority | Percent of Individuals Below Poverty Level | Comments |
|--|----------------|------------|------------------|--|---|
| | 271739701005 | 603 | 18 | 14 | 18% Native American |
| | Average | | 11 | 11 | Surrounding Counties Averages: 3.8 % minority, 9.5 % below poverty |
| Upper Minnesota River (Redwood, Renville, and Brown Counties) | | | | | |
| Redwood | 271279502002 | 1,573 | 4 | 7 | |
| | 271279504004 | 1,874 | 2 | 5 | |
| | 271299904002 | 719 | 2 | 7 | |
| | 271299904003 | 977 | 13 | 10 | 4% Native American, 3% Some Other Race (including Hispanic), 3% Two or More Other Races |
| | Average | | 5 | 7 | Surrounding Counties Averages: 4.4 % minority, 8.2 % below poverty |
| Morton | 271279501001 | 1,085 | 32 | 7 | 26% Native American |
| | 271279502002 | 1,573 | 4 | 7 | |
| | 271299904003 | 977 | 13 | 10 | 4% Native American, 3% Some Other Race (including Hispanic), 3% Two or More Other Races |
| | Average | | 16 | 8 | Surrounding Counties Averages: 4.4 % minority, 8.2 % below poverty |
| Franklin 69 kV | 271279501001 | 1,085 | 32 | 7 | 26% Native American |

| Crossing | Block Groups | Population | Percent Minority | Percent of Individuals Below Poverty Level | Comments |
|----------------|----------------|------------|------------------|--|---|
| | 271299904003 | 977 | 13 | 10 | 4% Native American, 3% Some Other Race (including Hispanic), 3% Two or More Other Races |
| | 271299906002 | 721 | 2 | 7 | |
| | Average | | 16 | 8 | Surrounding Counties Averages: 4.4 % minority, 8.2 % below poverty |
| Cedar Mountain | 271279501001 | 1,085 | 32 | 7 | 26% Native American |
| | 271299904003 | 977 | 13 | 10 | 4% Native American, 3% Some Other Race (including Hispanic), 3% Two or More Other Races |
| | 271299906002 | 721 | 2 | 7 | |
| | Average | | 16 | 8 | Surrounding Counties Averages: 4.4 % minority, 8.2 % below poverty |
| South Franklin | 271279501001 | 1,085 | 32 | 7 | 26% Native American |
| | 271299906002 | 721 | 2 | 7 | |
| | Average | | 17 | 7 | Surrounding Counties Averages: 4.4 % minority, 8.2 % below poverty |
| Wabasha Creek | 270159604002 | 946 | 2 | 7 | |
| | 271279501001 | 1,085 | 32 | 7 | 26% Native American |
| | 271299906002 | 721 | 2 | 7 | |

| Crossing | Block Groups | Population | Percent Minority | Percent of Individuals Below Poverty Level | Comments |
|---|----------------|------------|------------------|--|---|
| | Average | | 12 | 7 | Surrounding Counties Averages: 3.7 % minority, 7.6 % below poverty |
| Brown County | 270159604002 | 946 | 2 | 7 | |
| | 271299906002 | 721 | 2 | 7 | |
| | Average | | 2 | 7 | Surrounding Counties Averages: 3.2 % minority, 7.6 % below poverty |
| Lower Minnesota River (Sibley, Nicollet, Scott, and Le Sueur Counties) | | | | | |
| South Le Sueur | 270799502003 | 1,248 | 5 | 12 | |
| | 270799502004 | 1,058 | 0 | 1 | |
| | 271039802002 | 1,265 | 2 | 6 | |
| | Average | | 3 | 6 | Surrounding Counties Averages: 3.6 % minority, 7.2 % below poverty |
| Central Le Sueur | 270799502001 | 890 | 10 | 10 | 4% African American, 3% Some Other Race (including Hispanic) |
| | 270799502002 | 1,195 | 11 | 9 | 8% Some Other Race (including Hispanic) |
| | 270799502003 | 1,248 | 5 | 12 | |
| | 270799502004 | 1,058 | 0 | 1 | |
| | 271039802002 | 1,265 | 2 | 6 | |
| | 271439704003 | 847 | 2 | 10 | |

| Crossing | Block Groups | Population | Percent Minority | Percent of Individuals Below Poverty Level | Comments |
|-------------------------|----------------|------------|------------------|--|---|
| | Average | | 5 | 8 | Surrounding Counties Averages: 3.9 % minority, 7.5 % below poverty |
| Le Sueur 69 kV | 270799502001 | 890 | 10 | 10 | 4% African American, 3% Some Other Race (including Hispanic) |
| | 270799502002 | 1,195 | 11 | 9 | 8% Some Other Race (including Hispanic) |
| | 270799502003 | 1,248 | 5 | 12 | |
| | 271439704003 | 847 | 2 | 10 | |
| | Average | | 7 | 10 | Surrounding Counties Averages: 4.1 % minority, 7.5 % below poverty |
| Highway 169 | 270799501004 | 1,078 | 4 | 8 | |
| | 270799502001 | 890 | 10 | 10 | 4% African American, 3% Some Other Race (including Hispanic) |
| | 270799502002 | 1,195 | 11 | 9 | 8% Some Other Race (including Hispanic) |
| | 271439704003 | 847 | 2 | 10 | |
| | Average | | 7 | 9 | Surrounding Counties Averages: 4.1 % minority, 7.5 % below poverty |
| Le Sueur Treatment Pond | 270799501004 | 1,078 | 4 | 8 | |
| | 270799502001 | 890 | 10 | 10 | 4% African American, 3% Some Other Race (including Hispanic) |

| Crossing | Block Groups | Population | Percent Minority | Percent of Individuals Below Poverty Level | Comments |
|-----------------|----------------|------------|------------------|--|--|
| | 270799502002 | 1,195 | 11 | 9 | 8% Some Other Race (including Hispanic) |
| | 271439701984 | 936 | 6 | 10 | |
| | 271439704003 | 847 | 2 | 10 | |
| | Average | | 7 | 9 | Surrounding Counties Averages: 4.1 % minority, 7.5 % below poverty |
| Henderson | 270799502001 | 890 | 10 | 10 | 4% African American, 3% Some Other Race (including Hispanic) |
| | 271390813005 | 433 | 3 | 4 | |
| | 271439701981 | 1,761 | 2 | 5 | |
| | 271439701984 | 936 | 6 | 10 | |
| | 271439704003 | 847 | 2 | 10 | |
| | Average | | 5 | 8 | Surrounding Counties Averages: 4.8 % minority, 6.2 % below poverty |
| North Henderson | 270799502001 | 890 | 10 | 10 | 4% African American, 3% Some Other Race (including Hispanic) |
| | 271390813005 | 433 | 3 | 4 | |
| | 271439701981 | 1,761 | 2 | 5 | |
| | 271439701984 | 936 | 6 | 10 | |
| | Average | | 5 | 7 | Surrounding Counties Averages: 4.8 % minority, 6.2 % below poverty |

| Crossing | Block Groups | Population | Percent Minority | Percent of Individuals Below Poverty Level | Comments |
|-------------------|----------------|------------|------------------|--|--|
| South Henderson | 270799502001 | 890 | 10 | 10 | 4% African American, 3% Some Other Race (including Hispanic) |
| | 271439701984 | 936 | 6 | 10 | |
| | 271439704003 | 847 | 2 | 10 | |
| | Average | | 6 | 10 | Surrounding Counties Averages: 4.1 % minority, 7.5 % below poverty |
| Blakeley | 271390813005 | 433 | 3 | 4 | |
| | 271439701981 | 1,761 | 2 | 5 | |
| | Average | | 3 | 5 | Surrounding Counties Averages: 5.4 % minority, 5.7 % below poverty |
| Pipeline | 271390813005 | 433 | 3 | 4 | |
| | 271439701981 | 1,761 | 2 | 5 | |
| | Average | | 3 | 5 | Surrounding Counties Averages: 5.4 % minority, 5.7 % below poverty |
| West Belle Plaine | 271390813004 | 2,143 | 3 | 6 | |
| | 271390813005 | 433 | 3 | 4 | |
| | 271439701981 | 1,761 | 2 | 5 | |
| | Average | | 3 | 5 | Surrounding Counties Averages: 5.4 % minority, 5.7 % below poverty |

| Crossing | Block Groups | Population | Percent Minority | Percent of Individuals Below Poverty Level | Comments |
|--------------|----------------|------------|------------------|--|----------|
| Belle Plaine | 270190911001 | 1,896 | 1 | 1 | |
| | 270190911002 | 1,711 | 1 | 2 | |
| | 271390813003 | 1,462 | 0 | 5 | |
| | 271390813004 | 2,143 | 3 | 6 | |
| | 271439701981 | 1,761 | 2 | 5 | |
| | Average | | | 1 | 4 |

4.1.4 PUBLIC SERVICES

The public service analysis identified microwave, radio and television antennas, and MnDOT roadways in the vicinity of the potential river crossings. Antenna structures were analyzed using data from the FCC ASR, which include all tower structures registered with the FCC. A two-mile radius was used to analyze antenna structures. The Applicants did not specifically analyze rural water systems, oil and gas pipelines, fiber optic cables, and other public services because transmission lines typically do not interfere with these services. Table 4 summarizes public services that are located near the river crossings.

Transmission lines have been known to cause interference with microwave, television, radio, and other communication signals. Microwave transmitters affixed to towers send audio and video information in line-of-sight paths to microwave receivers. Physical interference with the line-of-sight path, such as construction of a transmission line, can degrade the quality of microwave signal transfer. Coordination with owners of microwave towers is important to minimize microwave interference.

Gap discharge and corona can cause radio frequency electrical interference. Gap discharge can occur where small gaps (spaces) develop between mechanically connected metal parts. As sparks discharge across a gap, they create the potential for interference. Gap discharges can be repaired by replacing faulty parts. Corona is the result of a localized electric field near energized components ionizing air molecules near the wires. High voltage lines including 345 kV have larger corona and greater potential affect on radio and television signals. Standard transmission designs minimize corona. Proper maintenance of transmission lines and hardware minimizes gap discharge. Signal interference is uncommon.

Antenna structures are common throughout southern Minnesota. Only the Redwood, Franklin 69 kV, Brown County, South Le Sueur and Blakeley crossings are without any antenna structures within two miles of the crossing. All other river crossing study areas include at least one microwave, radio, television, cellular, or communication tower, or other structure documented in the ASR. Microwave towers are found near the Granite Falls, Cedar Mountain, South Franklin, Wabasha Creek, Central Le Sueur, Le Sueur 69 kV, Highway 169, Le Sueur Treatment Pond, North Henderson and South Henderson crossings. Antenna structures require no special setback distances for transmission lines.

The Morton, Central Le Sueur, Highway 169, Henderson, and Belle Plaine crossings would share ROW with MnDOT-managed state Trunk Highway (“TH”) or US Highway (“US”). Other crossings may involve sharing county highway ROW or may share MnDOT ROW in the approach to the river crossing but not the crossing itself. MnDOT highways that are likely to be paralleled are noted in the Comments column of Table 4.

Table 4. Public Services

| Crossing | Microwave Antennas w/in 2 Miles | TV/Radio Antennas w/in 2 Miles | Road ROW Sharing at Crossing | Comments |
|------------------------------|---------------------------------|--------------------------------|------------------------------|--|
| Granite Falls | | | | |
| Granite Falls | 1 Microwave | 1 FM | No | Likely to cross TH 67 and TH 23 4 ASR, 1 broadcast tower, 1 cellular tower |
| Upper Minnesota River | | | | |
| Redwood | None | No | No | |
| Morton | None | 1 FM | US 71 | Likely to cross US 71 2 ASR |
| Wabasha Creek | None | None | No | |
| Cedar Mountain | 2 Microwave | None | No | Likely to share ROW with County Hwy 11 1 ASR |
| South Franklin | 2 Microwave | None | No | 1 ASR |
| Wabasha Creek | 2 Microwave | None | No | 1 ASR |
| Brown County | None | None | No | Likely to share ROW with County Hwy 8 |
| Lower Minnesota River | | | | |
| South Le Sueur | None | None | No | Likely to cross US 169 |
| Central Le Sueur | 1 Microwave | None | TH 93 | Likely to share ROW with or cross US 169 1 cellular tower |
| Le Sueur 69 kV | 1 Microwave | None | No | Likely to share ROW with or cross US 169 1 cellular tower |
| Highway 169 | 2 Microwave | None | US 169 | 1 ASR, 2 cellular towers, 1 communication tower |
| Le Sueur Treatment Pond | 1 Microwave | None | No | Likely to share ROW with or cross TH 93 2 ASR, 2 cellular towers, 1 communication tower |
| Henderson | None | None | TH 19 | 1 ASR |
| North Henderson | None | None | No | 2 ASR |
| South Henderson | 2 Microwave | None | No | 4 ASR, 1 cellular tower, 2 communication towers |

| Crossing | Microwave Antennas w/in 2 Miles | TV/Radio Antennas w/in 2 Miles | Road ROW Sharing at Crossing | Comments |
|-------------------|---------------------------------|--------------------------------|------------------------------|---|
| Blakeley | None | None | No | Will share ROW with County Highway 5 |
| Pipeline | 1 Microwave | None | No | Likely to cross US 169 1 cellular tower, 1 communication tower This crossing coincides with an underground pipeline |
| West Belle Plaine | 1 Microwave | None | No | Likely to cross US 169 |
| Belle Plaine | None | None | TH 25 | Likely to cross US 169 1 ASR, 1 cellular tower, 1 communication tower |

4.2 LAND-BASED ECONOMIES

The issues examined for potential impacts to land-based economies included agriculture, forestry, and mining operations. Table 5 summarizes the land-based economies analysis.

Agricultural practices are an important component of the economy of southern Minnesota. Impacts to agriculture, such as poles placed in crop fields or interference with center pivot irrigation systems, may impede agricultural production. The percent of land area under active cultivation within a mile of each potential river crossing was assessed using Gap and International Coalition Land Use data downloaded from the DNR.

Agricultural uses occur in all river crossing study areas. The Franklin 69 kV, Cedar Mountain, South Franklin, Wabasha Creek, Brown County, South Le Sueur and South Henderson crossings have the greatest amount of land area under active cultivation, ranging from 50.7 percent to 56.6 percent within a one-mile radius. Although not assessed in this analysis, livestock production and hay are also likely to be components of land-based economies that typically occur with agricultural cultivation.

The areas also include lands participating in the Conservation Reserve Program (“CRP”). In 2007, \$110 million was paid out to Minnesota farmers with CRP and Conservation Reserve Enhancement Program (“CREP”) easements (Westcott and Williams 2007). Table 8, in the Vegetation and Wildlife section shows acreage of land under conservation easements at each crossing location.

Commercial forestry is not common in the portion of southern Minnesota crossed by the Project, and no documented commercial forestry facilities are located within a mile of the potential river crossings. Impacts to non-commercial forested lands have the potential to affect wildlife and habitat, environmental quality, recreation, and visual resources. These issues are addressed in the Wildlife and Vegetation section.

Industrial aggregate mines are found within two miles of most of the river crossing locations. Aggregate mines produce sand, gravel and crushed stone, which are important elements of many construction materials such as concrete. Kaolin clay is mined in the Minnesota River Valley and is used in making cement, bricks and tiles. Transmission lines near mines could interfere with mining equipment and may limit future expansion of mines. Mining activities near transmission structures could jeopardize the integrity of the structures. Mines were assessed by analyzing aerial photographs and MnDOT aggregate maps.

One or more aggregate mines occur within two miles at all river crossing locations except the Granite Falls, Wabasha Creek, Franklin 69 kV, Cedar Mountain, South Franklin, Wabasha Creek, Brown County, Le Sueur Treatment Pond, and Henderson crossings. Locating poles near mining operations may impede expansion of mining operations and could interfere with mining equipment. The integrity of transmission structures could be jeopardized if placed too close to mining activities. Public comments from work group meetings indicate that old gravel mines are good routing options, as they have low economic, recreational, and environmental value. Closed mine locations were not assessed in this analysis.

Table 5. Land-Based Economies

| Crossing | Agriculture (% land area) | Mining (two-mile study area) | Comments |
|------------------------------|------------------------------|--|--|
| Granite Falls | | | |
| Granite Falls | 12.6 | None | |
| Upper Minnesota River | | | |
| Redwood | 33.6 | One aggregate mine – 0.4 miles | |
| Morton | 31.3 | One aggregate mine – 0.7 miles | |
| Franklin 69 kV | 51.5 | None | |
| Cedar Mountain | 51.5 | None | |
| South Franklin | 56.6 | None | |
| Wabasha Creek | 50.7 | None | |
| Brown County | 50.7 | None | |
| Lower Minnesota River | | | |
| South Le Sueur | 51.9 | Three aggregate mines – 0.8, 1.0 and 1.2 miles | |
| Central Le Sueur | 26.6 | One aggregate mine - 1.0 miles | |
| Le Sueur 69 kV | 39.2 | One aggregate mine - 0.3 miles | |
| Highway 169 | 40.3 | One aggregate mine - 1.8 miles | |
| Le Sueur Treatment Pond | 44.1 | None | |
| Henderson | 42.9 | None | |
| North Henderson | 43.1 | Two aggregate mines - 0.7 and 1.0 miles | |
| South Henderson | 51.0 | One aggregate mine- 0.9 miles | |
| Blakeley | 39.7 | Three aggregate mines – 0.7, 0.9 and 1.4 miles | |
| Pipeline | 47.2 | Three aggregate mines – 0.8, 1.0 and 1.3 miles | Mine locations west of crossing could influence over-land approach to river crossing |
| West Belle Plaine | 42.9 | Three aggregate mines – 1.5, 1.7 and 2.0 miles | Mine locations west of crossing could influence over-land approach to river crossing |
| Belle Plaine | 24.8 | One aggregate mine – 1.8 miles | Mine locations west of crossing could influence over-land approach to river crossing |

4.3 ARCHAEOLOGICAL AND HISTORIC RESOURCES

Analysis of potential impacts to archaeological and historic resources included a GIS analysis of known archaeological and historical sites documented by the Minnesota SHPO. Two sets of data were analyzed. One data set contained all archaeological sites that are known to occur in the Project area, and the other set contained all historic structures that are known to occur in the Project area. From each data set, a subset of data was queried to show all sites that are currently listed or are considered eligible to be listed on the National Register of Historic Places (“NRHP”). Cemeteries and authenticated or suspected pre-European contact earthworks, which are protected by state law, were also included in the query. Study data include only known or recorded sites. This information is shown in Table 6. The Applicants recognize that the list of known resources is limited to those identified through surveys in specific locations, often tied to urban and rural development and infrastructure. Undocumented and undiscovered cultural resources often occur near rivers, on prominent elevations, or near population centers. It is also important to note that most of the recorded historic and archaeological properties have not been formally evaluated for listing on the NRHP.

Depending on the quality of preservation and cultural value of the site, archaeological and historic resources may be protected to varying degrees by federal and State law. Sites that are, or are eligible for, listing on the NRHP generally require a detailed analysis of the proposed impacts prior to construction. Cultural inventory surveys are likely to be required at any water source locations. This study should be used to identify locations with high concentrations of cultural resources to minimize or prevent issues with these resources.

Concentrations of archaeological resources are found along the Minnesota River bluffs and floodplain. Earthmoving activities in this area will require regulated cultural surveys in order to locate archaeological resources.

Historic resources are frequently buildings in cities. Because transmission routing prioritizes avoiding displacement of buildings and structures, direct impacts to these historic resources are unlikely. Indirect effects may occur. Routing options may be limited for the following crossings, due to proximity to cities (within one mile) that have high concentrations of historic sites: Morton, Central Le Sueur and Le Sueur 69 kV, Henderson, North Henderson, and Belle Plaine. Routing a transmission line through these areas will require coordination with SHPO. Other crossing locations may be preferred because of the presence of fewer historic resources.

Because comprehensive surveys have not been conducted throughout the region, it is possible that areas near water sources have not been surveyed for cultural resources. The Applicants anticipate that the USACE will likely request cultural resource surveys prior to issuing Section 404 and Section 10 permits. Cultural surveys prevent potential stop-work situations during the construction. If cultural resources are located before construction begins, and measures are taken to avoid impacts to these resources, then construction can proceed with minimal risk of inadvertently unearthing archaeological materials. Construction in some areas, namely those areas with a high probability of finding buried archaeological resources (such as blufftops and river floodplains), may require cultural monitors on site.

Table 6. Archaeological and Historic Resources

| Crossing | All Archaeological Records w/in 1 mile | NRHP-Eligible Archaeological Records w/in 1 mile | All Historic Records w/in 1 mile | NRHP-Eligible Historic Records w/in 1 mile | Comments |
|------------------------------|--|--|----------------------------------|--|---|
| Granite Falls | | | | | |
| Granite Falls | 11 | 2 | 83 | 4 | Historic buildings in downtown Granite Falls |
| Upper Minnesota River | | | | | |
| Redwood | 5 | 2 | 6 | 1 | |
| Morton | 6 | 1 | 28 | 3 | Historic buildings in downtown Morton |
| Franklin 69 kV | 8 | 7 | 0 | 0 | Archaeological resources on western river bluff |
| Cedar Mountain | 1 | 0 | 8 | 0 | Historic buildings in downtown Franklin |
| South Franklin | 1 | 0 | 16 | 0 | Historic buildings in downtown Franklin |
| Wabasha Creek | 4 | 0 | 0 | 0 | |
| Brown County | 1 | 0 | 1 | 1 | |
| Lower Minnesota River | | | | | |
| South Le Sueur | 3 | 2 | 0 | 0 | |
| Central Le Sueur | 0 | 0 | 37 | 3 | Historic buildings in downtown Le Sueur |
| Le Sueur 69 kV | 0 | 0 | 25 | 3 | Historic buildings in downtown Le Sueur |
| Highway 169 | 4 | 4 | 1 | 0 | |
| Le Sueur Treatment Pond | 4 | 4 | 0 | 0 | |
| Henderson | 3 | 1 | 133 | 16 | Historic buildings in and around Henderson |

| Crossing | All Archaeological Records w/in 1 mile | NRHP-Eligible Archaeological Records w/in 1 mile | All Historic Records w/in 1 mile | NRHP-Eligible Historic Records w/in 1 mile | Comments |
|-------------------|--|--|----------------------------------|--|---|
| North Henderson | 0 | 0 | 86 | 0 | Historic buildings in and around Henderson |
| South Henderson | 0 | 0 | 2 | 0 | |
| Blakeley | 8 | 6 | 5 | 0 | Archaeological resources are dispersed |
| Pipeline | 6 | 2 | 0 | 0 | |
| West Belle Plaine | 1 | 1 | 0 | 0 | |
| Belle Plaine | 1 | 0 | 29 | 2 | Historic buildings in downtown Belle Plaine |

4.4 NATURAL ENVIRONMENT

Potential impacts to the natural environment include hydrology, wildlife, and vegetation resources.

4.4.1 HYDROLOGY

The hydrology analysis focused on the river width, floodplain width, and wetland resources near each crossing. River width was assessed using USGS 1:24,000 topographic maps and 2006 aerial photography. FEMA 100-year floodplain data were used to assess floodplain width. Wetlands were assessed using USFWS NWI maps. NWI data are based on USDA-Natural Resource Conservation Service (“NRCS”) soils data and aerial photo interpretation. Because NWI maps are not field-verified, omission of existing wetlands, misidentification of non-wetland areas as wetlands, and/or inaccurate wetland boundaries are not uncommon. Furthermore, hydrologic conditions may have changed since the maps were created in the 1970s and 1980s. Therefore, the wetlands data discussed in this section are used for comparative purposes only. Once routes and river crossings have been selected, wetland areas will need to be more thoroughly researched. Because the transmission line design proposed for this Project can typically span 1,000 feet, wetlands less than 1,000 feet across can be spanned, and are not discussed in this analysis. Table 7 summarizes results of the hydrology analysis at river crossings.

Wetlands are common throughout the Minnesota River Valley. Wetlands provide habitat for many plants and animals, mitigate flooding, and minimize the effects of runoff on water quality. If construction of the proposed transmission line is to take place within a wetland, a permit for the discharge of the dredging or filling material must be obtained from the USACE (33 U.S.C. § 1344). All wetlands are protected under the Minnesota Wetland Conservation Act (“WCA”), Minn. Stat. Ch. 103G, administered by BWSR and Local Government Units (“LGUs”). WCA requires mitigation for impacts, generally preferring replacing wetlands in-kind on location (Minn. Stat. § 103G.222). County governments, LGUs, and/or Soil and Water Conservation Districts (“SWCD”) apply WCA at the county and local level (Minn. Stat. § 103G.2422). Permits are required to impact wetlands and are independently approved by both the USACE and LGUs (33 U.S.C. § 1344; Minn. Stat. § 103G.127).

To satisfy State and federal requirements, delineations may be required to assess wetland size and type. Mitigation is usually necessary to compensate for permanent wetland impacts, such as purchasing reconstructed wetlands from a wetland bank, funding wetland replacement, restoring degraded wetlands, or purchase of natural wetlands for a wetland management agency such as the USFWS or the DNR. Mitigation must be independently approved by the USACE and by LGUs.

Wetlands that are too wide to span may occur at the following crossings: Morton, Franklin 69 kV, Cedar Mountain, South Le Sueur, Central Le Sueur, Le Sueur Treatment Pond, and North Henderson. Wetlands are found at all crossing locations, but they can often be avoided by locating poles in upland areas.

Drain tiles and ditches are common in agricultural areas and are important for keeping fields dry enough for successful cultivation. Structure placement can avoid impacts to ditches. However, minor impacts to tile systems may be unavoidable. The Applicants plan to repair or replace any damaged tile systems.

River width is important to assess because of spanning limitations and special structure designs that may be required for longer spans. River width from bank to bank ranges from less than 100 feet at Wabasha Creek to over 550 feet at Highway 169. Because maximum standard span distance is up to 1,000 feet, all river crossings can be spanned using standard structure designs, although detailed engineering including geotechnical borings will be needed to identify site-specific conditions. A large oxbow at North Henderson would require crossing the Minnesota River multiple times, or would force routing south into the Henderson area. Any of the potential river crossings will require a permit from the USACE under Section 10 of the Rivers and Harbors Act. The Minnesota River is listed on the DNR Public Waters Inventory (“PWI”) and crossing will require a state permit. Because the river will be spanned, no direct impacts are expected.

Permanent impacts to floodplains can reduce flood storage and may increase the flood elevation during a flood event. However, the small cross section of transmission line structures is not expected to affect flood elevations over a large river floodplain. Some counties and municipalities along the river have floodplain ordinances, which require that floodplain impacts be avoided when feasible, and permitted (usually through a floodplain permit) if unavoidable. Mitigation may be required as part of a floodplain permit. With the exception of the Granite Falls crossing, all floodplains are several times wider than the maximum standard span distance and structures will be required within the floodplain. The number of structures in floodplains can be minimized by using taller (greater than 150 feet) and/or stronger (reinforced H-frame) structures that can span longer-than-standard distances. Increased engineering and construction costs may be necessary in order to design and construct structures within the floodplain.

Table 7. Hydrology

| Crossing | River Width at Crossing | 100-year Floodplain Width at Crossing | Wetlands at Crossing – any wider than 1,000 ft | Comments |
|------------------------------|-------------------------|---------------------------------------|--|---|
| Granite Falls | | | | |
| Granite Falls | 270 feet | 320 feet | None | |
| Upper Minnesota River | | | | |
| Redwood | 230 feet | 5,100 feet | None | |
| Morton | 180 feet | 4,300 feet | Yes | If existing crossings are used, wetlands can be avoided |
| Franklin 69 kV | 250 feet | 4,300 feet | Yes | Existing transmission line corridor contains wetlands, but may be possible to avoid |
| Cedar Mountain | 160 feet | 4,800 feet | Yes | Existing transmission line corridor contains wetlands, roadway corridor less so |
| South Franklin | 100 feet | 5,000 feet | No | |
| Wabasha Creek | 90 feet | 5,800 feet | No | |
| Brown County | 110 feet | 4,900 feet | No | |
| Lower Minnesota River | | | | |
| South Le Sueur | 300 feet | 4,400 feet | Yes | Large wetlands likely can be avoided by following tree/field lines |
| Central Le Sueur | 300 feet | 1,200 feet | Yes | Large wetlands likely can be avoided by staying on road embankments |
| Le Sueur 69 kV | 280 feet | 1,400 feet | No | |
| Highway 169 | 570 feet | 1,000 feet | No | Floodplain is narrow by staying on TH 169 embankments |
| Le Sueur Treatment Pond | 330 feet | 3,900 feet | Yes | Wetland impacts can likely be avoided by spanning narrower sections |
| Henderson | 320 feet | 4,400 feet | No | |
| North Henderson | 350 feet | 6,500 feet | Yes | |
| South Henderson | 390 feet | 4,700 feet | No | |
| Blakeley | 390 feet | 3,700 feet | No | |

| Crossing | River Width at Crossing | 100-year Floodplain Width at Crossing | Wetlands at Crossing – any wider than 1,000 ft | Comments |
|-------------------|-------------------------|---------------------------------------|--|--|
| Pipeline | 260 feet | 4,000 feet | No | |
| West Belle Plaine | 420 feet | 4,600 feet | No | |
| Belle Plaine | 340 feet | 4,700 feet | Yes | Large wetlands may be avoided by staying on road embankments. Existing Belle Plaine crossing crosses two wetland complexes greater than 1,000 ft. across. Both roadway and crossing location cross oxbow lakes in addition to river. |

4.4.2 WILDLIFE AND VEGETATION

The wildlife and vegetation analysis consisted of examining areas and resources that contain and promote native plant and animal communities. Threatened and endangered species will be discussed further in the Rare and Unique Natural Features section of this document.

Several data sources were used to identify natural communities. Woodlands were assessed using USGS 1:24,000 topographic maps and 2006 aerial photography. DNR GIS data were used to analyze prairie remnants and areas of native prairie, state-listed trout streams, NHIS rare natural communities, MCBS habitat assessments, Metro Regionally Significant Natural Resource Areas (MSNRA), and private, state, and NRCS-FSA easements, for a field visit in October 2007 to a majority of river crossings. The general plant community type for each crossing was assessed and mapped. Table 8 summarizes the wildlife and vegetation analysis for the river crossings.

Many natural communities are found in park and recreation areas described in the Recreation section of this report. Local, State, and federal parks, SNAs, and WMAs are often created to protect important and rare natural communities, and typically are managed to promote native habitats and species. Routing concerns and river crossing viability for these areas are addressed in the Recreation section.

Woodlands offer important habitat to many species, and several important forest communities are found throughout the Minnesota River Valley. Woodlands are found on river bluffs near all crossings. Silver maple floodplain forest is found at the Morton, North Henderson, and Belle Plaine crossings; maple-basswood forest is found at the Franklin 69 kV and Le Sueur 69 kV crossings, and floodplain forest is found at the Central Le Sueur and Le Sueur 69 kV crossings. The Blakeley and Pipeline crossings include several native forest communities of significance. Rare native forest communities are not protected by law, but DNR officials would prefer that utilities avoid these resources.

Collocating transmission lines with existing corridors will minimize new forest impacts. Such collocation opportunities exist at the Redwood, South Franklin, Wabasha Creek, Central Le Sueur, Le Sueur 69 kV, Highway 169, Le Sueur Treatment Pond, Henderson, North Henderson, South Henderson, Blakeley, and Pipeline crossings. Crossings that do not collocate with existing facilities will have greater impacts. These crossings include South Le Sueur, Le Sueur Treatment Pond, North Henderson, and South Henderson crossings and have large areas of woodland greater than 500 feet wide and do not collocate with other corridors.

Native prairie occupies a small fraction of its original pre-settlement range. Considered a rare native community, prairies host a high diversity of plants and animals that may include threatened and endangered species. Native prairie locations are based on an October 2007 field visit, DNR GIS files of railroad prairie remnants, prairie bank records (protected prairie), and listed NHIS prairie communities. Native prairie remnants are known to occur at the Granite Falls, Redwood, Franklin 69 kV, Wabasha Creek and Brown County crossings. A large tract of restored prairie wider than 1,000 feet is found about one mile southwest of the Granite Falls crossing and should be avoided. Other areas of native prairie are avoidable or could be spanned. Prairie remnants can be found in any area that has not been recently disturbed by agriculture or intensive grazing. While prairies have no official protection, DNR officials would prefer that utilities avoid or minimize impacts to these areas.

MSNRAs are based on DNR analyses of regionally significant terrestrial and wetland ecological areas in the seven county Twin Cities metropolitan area. The data are intended to help make regional-scale land use decisions, especially as they relate to balancing development and natural resource protection. MSNRAs are found near the Henderson, North Henderson, South Henderson, Blakeley, Pipeline, West Belle Plaine, and Belle Plaine crossings. DNR officials stated a preference that the Project avoid or minimize impacts to these areas.

Thousands of acres of marginal farmland have been converted back to natural grassland and wetland habitats through State and federal land reserve programs. CRP, described with CREP in the Land-Based Economies section of this document, and Reinvest in Minnesota (“RIM”) easements are federal and State programs, respectively, that pay landowners to remove acres from active cultivation and allow the land to develop native communities. CREP is similar to CRP except that more funds are invested in habitat restoration. CREP and RIM generally target land that will promote high quality ecosystem improvement and water quality protection. These land reserve programs protect water quality and improve habitat for wildlife and waterfowl species. CRP is the most common land reserve program. Transmission line crossings of CRP and CREP have to be reviewed and approved by local FSA representatives. Crossings that do not affect vegetation, habitat or wildlife on the easement are likely to be allowed. Crossings that do affect vegetation or habitat may require that the Applicants work with landowners to purchase back the land taken out of CRP/CREP from the FSA, plus interest and fees.

CRP, CREP, and/or RIM are found within one mile of all potential crossings except Granite Falls. At the Cedar Mountain, South Franklin, Wabasha Creek, and Brown County crossings, more than 20 percent of land area within a one-mile radius of the crossing is under land reserve programs. Crossing these lands will likely require removal fees and will require coordination with the FSA or BWSR.

MCBS is a systematic survey of rare biological features in Minnesota. The goal of the MCBS is to identify significant natural areas and to collect and interpret data on the distribution and ecology of rare plants, rare animals, and native plant communities. Surveys take place on public and private lands targeted as likely to be significant natural areas. Data from the MCBS show natural areas designated as having moderate, high, or outstanding biodiversity at all river crossings. The Redwood, Morton, Cedar Mountain, South Franklin, Wabasha Creek, Blakeley and Pipeline crossings have concentrations of high and outstanding areas of biodiversity. Some of these may not be avoidable. High and outstanding areas of biodiversity should be avoided if possible. These surveys are not exhaustive and many areas known to have high-quality natural areas were not included in the surveys, such as much of the Minnesota Valley NWR. DNR officials stated a preference that utilities avoid or minimize impacts to these areas.

The NHIS, managed in Minnesota by the DNR, includes an inventory of known rare natural communities. These sites include animal assemblages such as mussel sampling sites, prairie habitats such as dry prairie, and geologic features. Forest habitats are described above. These communities can offer high biodiversity and may harbor rare, threatened, and endangered species.

NHIS natural communities are found near all river crossings except for the West Belle Plaine crossing. The Granite Falls and Redwood crossings have high concentrations of rare prairie communities and geologic features. The Morton crossing has many important geologic features. Transmission lines should avoid rare natural communities as much as possible. All crossings offer potential routes that would avoid these communities.

Table 8. Wildlife and Vegetation

| Crossing | Woodlands in Vicinity | CRP/RIM Combined Acres w/in One Mile | Known Prairie Remnants w/in One Mile | MCBS Areas of Significant Biodiversity w/in One Mile | NHIS Rare Native Communities w/in One Mile | October 2007 Field Visit Data | Metro Regionally Significant Natural Resource Areas |
|------------------------------|---|--------------------------------------|--|--|---|-------------------------------|---|
| Granite Falls | | | | | | | |
| Granite Falls | Woodlands on southern side of river, from 500 – 1,200 feet wide | 0 | -Dry prairie and rock outcrop prairie remnants -An area of protected prairie occurs about one mile southwest. | 4 Moderate 2 High | Mussel Sampling Site Metamorphic Composition (archean) Mixed Sequence (archean) Sedimentary Sequence (quaternary) Dry Hill Prairie Mesic Prairie Bedrock Outcrop Dry Prairie | Rock outcrop/dry prairie | N/A |
| Upper Minnesota River | | | | | | | |
| Redwood | Woodlands on either side, from 50 – 200 feet wide | 436.9 | Mesic Prairie Dry Prairie | 2 Below 7 Moderate 6 High | Mussel Sampling Site Weathering (Jurassic, Cretaceous) Mesic Prairie Wet Meadow Bedrock Outcrop Dry Prairie | N/A | N/A |
| Morton | Woodlands on either side, from 500 – 1,100 feet wide | 115.3 | No | 13 Moderate 1 Outstanding | Metamorphic Structure (archean) Metamorphic Sequence (archean) Silver Maple Floodplain Forest Bedrock Outcrop | N/A | N/A |

| Crossing | Woodlands in Vicinity | CRP/RIM Combined Acres w/in One Mile | Known Prairie Remnants w/in One Mile | MCBS Areas of Significant Biodiversity w/in One Mile | NHIS Rare Native Communities w/in One Mile | October 2007 Field Visit Data | Metro Regionally Significant Natural Resource Areas |
|-----------------------|--|--------------------------------------|--------------------------------------|--|---|--|---|
| Franklin 69 kV | Woodlands on either side, from 50 – 500 feet wide | 243.6 | Wet Prairie | 2 Below 4 Moderate 1 Outstanding | Maple-Basswood Forest Wet Prairie | N/A | N/A |
| Cedar Mountain | Woodlands on either side, from 150 – 500 feet wide | 460.9 | No | 1 Below 8 Moderate 5 Outstanding | Mussel Sampling Site | Relatively narrow floodplain forest | N/A |
| South Franklin | Woodlands on either side, from 100 – 350 feet wide | 425.0 | No | 8 Moderate 3 Outstanding | Mussel Sampling Site | Relatively narrow floodplain forest | N/A |
| Wabasha Creek | Woodlands on either side, from 80 – 400 feet wide | 426.9 | Mesic Prairie | 1 Below 14 Moderate 1 High 3 Outstanding | Mussel Sampling Site Mesic Prairie Oak Woodland-Brushland | Floodplain forest wider than 1,000 ft. | N/A |
| Brown County | Woodlands on either side, from 50 – 600 feet wide | 494.7 | Dry Prairie | 2 Below 11 Moderate | Dry Prairie Wet Meadow | Floodplain forest wider than 1,000 ft. | N/A |
| Lower Minnesota River | | | | | | | |
| South Le Sueur | Woodlands on either side, from 50 – 800 feet wide | 38.5 | No | 1 Below 4 Moderate | Calcareous Seepage Fen Wet Meadow Shrub | N/A | N/A |
| Central Le Sueur | Wooded road embankments would likely need clearing | 321.2 | No | 3 Below 2 Moderate | Mussel Sampling Site Floodplain Forest | Floodplain forest wider than 1,000 ft. | N/A |

| Crossing | Woodlands in Vicinity | CRP/RIM Combined Acres w/in One Mile | Known Prairie Remnants w/in One Mile | MCBS Areas of Significant Biodiversity w/in One Mile | NHIS Rare Native Communities w/in One Mile | October 2007 Field Visit Data | Metro Regionally Significant Natural Resource Areas |
|-------------------------|--|--------------------------------------|--------------------------------------|--|---|--|---|
| Le Sueur 69 kV | Existing Transmission line corridor is cleared for 175 feet and would likely require additional clearing | 338.7 | No | 1 Below 1 Moderate | Floodplain Forest | Floodplain forest wider than 1,000 ft. | N/A |
| Highway 169 | Wooded road embankments would likely need clearing | 318.1 | No | 2 Below 1 Moderate | Colonial Waterbird Nesting Site | Floodplain forest wider than 1,000 ft. south of US 169 | N/A |
| Le Sueur Treatment Pond | Woodlands on either side, from 500 – 1,200 feet wide | 270.8 | No | 1 Below 2 Moderate | Colonial Waterbird Nesting Site Oak Forest Silver Maple Floodplain Forest | N/A | N/A |
| Henderson | Woodlands on western side – 500 feet wide | 295.1 | No | 2 Below 7 Moderate | Mussel Sampling Site Sedimentary Unit (quaternary) Dry Hill Oak Savanna | Floodplain forest wider than 1,000 ft. | Metro Regionally Significant NRA – 1 mile |
| North Henderson | Woodlands on either side, from 340 – 875 feet wide | 250.1 | No | 3 Moderate | Silver Maple Floodplain Forest | N/A | Metro Regionally Significant NRA – 0.0 mile |
| South Henderson | Woodlands on either side, from 100 – 1,375 feet wide | 172.3 | No | 6 Moderate | Mussel Sampling Site Dry Hill Oak Savanna | N/A | N/A |

| Crossing | Woodlands in Vicinity | CRP/RIM Combined Acres w/in One Mile | Known Prairie Remnants w/in One Mile | MCBS Areas of Significant Biodiversity w/in One Mile | NHIS Rare Native Communities w/in One Mile | October 2007 Field Visit Data | Metro Regionally Significant Natural Resource Areas |
|-------------------|--|--------------------------------------|--------------------------------------|--|--|--|---|
| Blakeley | Woodlands on either side, from 300 – 1,000 feet wide | 37.5 | No | 10 Moderate 4 High | Mussel Sampling Site Maple-Basswood Forest 2x Silver Maple Floodplain Forest 2x Sugar Maple-Basswood Forest | Floodplain forest wider than 1,000 ft. | Metro Regionally Significant NRA – 0.2 miles |
| Pipeline | Woodlands on either side, from 80 – 150 feet wide | 167.7 | No | 2 Below 3 Moderate 6 High | Dry Sand – Gravel Prairie Maple-Basswood Forest 2x Silver Maple Floodplain Forest Sugar Maple-Basswood Forest | N/A | Metro Regionally Significant NRA – 0.4 miles |
| West Belle Plaine | Woodlands on either side, from 500 – 1,200 feet wide | 183.4 | No | 1 Below 1 Moderate 1 High | No | Floodplain forest wider than 1,000 ft. | Metro Regionally Significant NRA – 0.8 miles |
| Belle Plaine | Woodlands on either side, from 900 to over 2,000 feet wide | 19.8 | No | 3 Below 6 Moderate | Silver Maple Floodplain Forest | Floodplain forest wider than 1,000 ft. | Metro Regionally Significant NRA – 0.5 miles |

4.5 RARE AND UNIQUE FEATURES

The rare and unique features analysis consisted of examining NHIS data on protected rare and unique features, including federally threatened and endangered (“T&E”) species, state T&E and species of special concern (“SPC”), and State-protected fens. Federal T&E species are protected under the ESA. 16 U.S.C. §§ 1531, et. al. State T&E species and fens are protected under the Minnesota Endangered Species Statute (Minn. Stat. § 84.0895). Table 9 summarizes the rare and unique features analysis for the river crossings.

Section 7 of the ESA imposes an affirmative duty on federal agencies to coordinate their actions to ensure that their actions (including permitting) are not likely to jeopardize the continued existence of a listed species (plant or animal) or result in the destruction or modification of critical habitat (16 U.S.C. § 1536). Section 9 of the ESA prohibits unauthorized taking, possession, sale, and transport of endangered animals, and applies to private parties and private land (16 U.S.C. § 1538). The term “take” means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or to attempt to engage in such conduct with respect to a species protected by the ESA (16 U.S.C. §1532(19)). Authorization to take is very limited and includes scientific or incidental activities by permit only. Under Minnesota Statutes, Section 84.0895, a person may not take, import, transport, or sell any portion of an endangered or threatened species without authorization. Minnesota statutes protect only State-listed T&E species, not SPC. Generally, federally listed T&E species have the same or higher listing in Minnesota. Federally listed T&E species are found at the Redwood and Morton (Prairie Bush Clover, threatened), and Blakeley (Winged Mapleleaf [mussel], endangered) crossings. State-listed species with “threatened,” “endangered,” or “specie of concern” statuses are found at all river crossings except for the South Franklin and Brown County crossings. Concentrations of State-listed plants occur at the Granite Falls, Redwood, Morton, Cedar Mountain, and Wabasha Creek crossings. Avian species, which are at the risk of collision with transmission lines, are found at the Franklin 69 kV, Le Sueur 69 kV, Highway 169, Le Sueur Treatment Pond, South Henderson, Pipeline, West Belle Plaine, and Belle Plaine crossings.

The Le Sueur Calcareous Fen is found about 0.8 miles west of the South Le Sueur crossing. No other state-protected fens are found within a mile of the crossing locations. The fen hydrologic regime is sensitive and changes in drainage patterns or water table dynamics in the general vicinity can affect a fen. The Le Sueur Calcareous Fen can be avoided.

Avoidance of federal and State T&E species is the appropriate approach to potential impacts. Because transmission lines will span rivers and sediment control practices will be used to avoid and minimize erosion and sedimentation, no impacts to T&E fish and mussel species are expected. Direct impacts to protected plants can be avoided by conducting a botanical survey to document locations, and then aligning structure placements to span these features. Direct impacts to most listed terrestrial animals are not expected to occur, although there is the risk of listed avian species to collide with the line. Indirect impacts caused by the presence of transmission lines or construction activities, such as habitat loss, degradation or fragmentation should be considered.

The Migratory Bird Treaty Act (“MBTA”), administered by the USFWS, protects migratory birds and active nests from destruction or other negative impacts (16 U.S.C. § 703, et. al). Transmission lines are known to affect birds through fatal collisions with conductors. Typical requirements of the USFWS include using markers on conductors in major flyways such as the Minnesota River Valley and performing pre-construction surveys for bird nests. Impacts to migratory birds are likely at any

Minnesota River crossing because of the valley's use by many bird species. Nearby habitat favorable for birds such as large wetlands, parks, grasslands and foraging areas (crop fields) could increase the potential for collisions. Avoiding crossings where these resources occur would minimize impacts, although completely avoiding likely bird habitat would not be possible. Coordination with the USFWS is important to ensure compliance with the MBTA.

On August 9, 2007, the bald eagle was removed from the federal threatened species list. Primary protection of these birds is now provided by the Bald Eagle Protection Act, originally passed in 1940 and amended most recently in 1978 (16 U.S.C. § 668, et. al). This Act provides similar basic protections as the ESA. Therefore, bald eagle protection is still of high priority but will not require an ESA review by the USFWS. Bald eagles are listed as special concern in Minnesota. No known nesting sites are documented within a mile of potential river crossings; however, the Minnesota River Valley harbors a large bald eagle population. Documented sightings occur at the Franklin 69 kV, Le Sueur 69 kV, Highway 169, Le Sueur Treatment Pond, South Henderson, Pipeline, West Belle Plaine, and Belle Plaine crossings. Bald eagle surveys may be required at the river crossings ultimately selected by the Commission depending on nesting and roost tree availability.

Table 9. Rare and Unique Features

| Crossing | Endangered, Threatened, and Protected Species | | | | | | Fens w/in one Mile | Comments |
|------------------------------|---|----------------------------------|-----------------------|-----------------|--------------|-----------|-----------------------------|----------|
| | Qty | Scientific Name | Common Name | State Status | US Status | Type | | |
| Granite Falls | | | | | | | | |
| Granite Falls | 1 | <i>Astragalus lotiflorus</i> | Low Milk-vetch | NON | No | Botanical | No | |
| | 1 | <i>Hordeum pusillum</i> | Little Barley | NON | No | Botanical | | |
| | 1 | <i>Opuntia macrorhiza</i> | Plains Prickly Pear | SPC | No | Botanical | | |
| | 2 | <i>Orobanche fasciculata</i> | Clustered Broomrape | SPC | No | Botanical | | |
| | 3 | <i>Elaphe vulpina</i> | Eastern Fox Snake | NON | No | Reptile | | |
| | 5 | <i>Eumeces fasciatus</i> | Five-lined Skink | SPC | No | Reptile | | |
| | 1 | <i>Actinonaias ligamentina</i> | Mucket | THR | No | Mussel | | |
| | 1 | <i>Elliptio dilatata</i> | Spike | SPC | No | Mussel | | |
| | 1 | <i>Ligumia recta</i> | Black Sandshell | SPC | No | Mussel | | |
| | 1 | <i>Pleurobema coccineum</i> | Round Pigtoe | THR | No | Mussel | | |
| 1 | <i>Venustaconcha ellipsiformis</i> | Ellipse | THR | No | Mussel | | | |
| Upper Minnesota River | | | | | | | | |
| Redwood | 2 | <i>Alopecurus carolinianus</i> | Carolina Foxtail | NON | No | Botanical | No | |
| | 1 | <i>Cerastium brachypodum</i> | Mouse-ear Chickweed | NON | No | Botanical | | |
| | 1 | <i>Eleocharis wolfii</i> | Wolf's Spike-rush | END | No | Botanical | | |
| | 1 | <i>Lespedeza leptostachya</i> | Prairie Bush Clover | THR | LT | Botanical | | |
| | 1 | <i>Myosotis verna</i> | Forget-me-not | NON | No | Botanical | | |
| | 1 | <i>Reithrodontomys megalotis</i> | Western Harvest Mouse | NON | No | Mammal | | |
| | 1 | <i>Actinonaias ligamentina</i> | Mucket | THR | No | Mussel | | |
| | 1 | <i>Elliptio dilatata</i> | Spike | SPC | No | Mussel | | |
| | 1 | <i>Lasmigona costata</i> | Fluted-shell | SPC | No | Mussel | | |
| | 1 | <i>Ligumia recta</i> | Black Sandshell | SPC | No | Mussel | | |
| | 1 | <i>Pleurobema coccineum</i> | Round Pigtoe | THR | No | Mussel | | |
| | 1 | <i>Cyprinus elongatus</i> | Blue Sucker | SPC | No | Fish | | |
| | 1 | <i>Polyodon spathula</i> | Paddlefish | THR | No | Fish | | |
| 1 | <i>Scaphirhynchus platyrhynchus</i> | Shovelnose Sturgeon | NON | No | Fish | | | |
| Morton | 1 | <i>Alopecurus carolinianus</i> | Carolina Foxtail | NON | No | Botanical | No | |
| | 1 | <i>Buellia nigra</i> | A Species of Lichen | END | No | Botanical | | |

| Crossing | Endangered, Threatened, and Protected Species | | | | | | Fens w/in one Mile | Comments |
|------------------------------|---|-------------------------------------|----------------------------|--------------|-----------|-----------|--------------------|--|
| | Qty | Scientific Name | Common Name | State Status | US Status | Type | | |
| | 1 | <i>Cerastium brachypodum</i> | Mouse-ear Chickweed | NON | No | Botanical | | |
| | 1 | <i>Hordeum pusillum</i> | Little Barley | NON | No | Botanical | | |
| | 1 | <i>Lespedeza leptostachya</i> | Prairie Bush Clover | THR | LT | Botanical | | |
| | 1 | <i>Myosotis verna</i> | Forget-me-not | NON | No | Botanical | | |
| | 1 | <i>Cycleptus elongatus</i> | Blue Sucker | SPC | No | Fish | | |
| | 1 | <i>Scaphirhynchus platyrhynchus</i> | Shovelnose Sturgeon | NON | No | Fish | | |
| | 1 | <i>Atrytone arogos</i> | Arogos Skipper | SPC | No | Insect | | |
| | 1 | <i>Speyeria idalia</i> | Regal Fritillary | SPC | No | Insect | | |
| Franklin 69 kV | 1 | <i>Haliaeetus leucocephalus</i> | Bald Eagle | SPC | No | Avian | No | |
| Cedar Mountain | 1 | <i>Bacopa rotundifolia</i> | Water-hyssop | SPC | No | Botanical | No | |
| | 1 | <i>Elatine triandra</i> | Three Stamened Waterwort | NON | No | Botanical | | |
| | 1 | <i>Opuntia macrorhiza</i> | Plains Prickly Pear | SPC | No | Botanical | | |
| | 1 | <i>Scaphirhynchus platyrhynchus</i> | Shovelnose Sturgeon | NON | No | Fish | | |
| South Franklin | 1 | <i>Scaphirhynchus platyrhynchus</i> | Shovelnose Sturgeon | NON | No | Fish | No | |
| Wabasha Creek | 2 | <i>Bacopa rotundifolia</i> | Water-hyssop | SPC | No | Botanical | No | |
| | 1 | <i>Elatine triandra</i> | Three Stamened Waterwort | NON | No | Botanical | | |
| | 1 | <i>Opuntia macrorhiza</i> | Plains Prickly Pear | SPC | No | Botanical | | |
| | 1 | <i>Scaphirhynchus platyrhynchus</i> | Shovelnose Sturgeon | NON | No | Fish | | |
| Brown County | 1 | <i>Astragalus lotiflorus</i> | Low Milk-vetch | NON | No | Botanical | No | |
| Lower Minnesota River | | | | | | | | |
| South Le Sueur | 1 | <i>Cypripedium candidum</i> | Small White Lady's-slipper | SPC | No | Botanical | Le Sueur Fen #1227 | Fen is located in T111N R26W NENE16, ~0,8 mi west of crossing. |
| Central Le Sueur | 1 | <i>Apalone mutica</i> | Smooth Softshell | SPC | No | Mussel | No | |
| Le Sueur 69 kV | 1 | <i>Apalone mutica</i> | Smooth Softshell | SPC | No | Mussel | No | |
| | 1 | <i>Elaphe vulpina</i> | Eastern Fox Snake | NON | No | Reptile | | |

| Crossing | Endangered, Threatened, and Protected Species | | | | | | Fens w/in one Mile | Comments |
|-------------------------|---|------------------------------------|---------------------|--------------|-----------|-----------|--------------------|----------|
| | Qty | Scientific Name | Common Name | State Status | US Status | Type | | |
| Highway 169 | 1 | <i>Haliaeetus leucocephalus</i> | Bald Eagle | SPC | No | Avian | No | |
| | 1 | <i>Cycleptus elongatus</i> | Blue Sucker | SPC | No | Fish | | |
| | 1 | <i>Haliaeetus leucocephalus</i> | Bald Eagle | SPC | No | Avian | | |
| Le Sueur Treatment Pond | 1 | <i>Buteo lineatus</i> | Red-shouldered Hawk | SPC | No | Avian | No | |
| | 1 | <i>Haliaeetus leucocephalus</i> | Bald Eagle | SPC | No | Avian | | |
| | 1 | <i>Cycleptus elongatus</i> | Blue Sucker | SPC | No | Fish | | |
| | 1 | <i>Elapbe vulpina</i> | Eastern Fox Snake | NON | No | Reptile | | |
| Henderson | 1 | <i>Alasmidonta marginata</i> | Elktoe | THR | No | Mussel | No | |
| | 1 | <i>Apalone mutica</i> | Smooth Softshell | SPC | No | Mussel | | |
| | 1 | <i>Arcidens confragosus</i> | Rock Pocketbook | END | No | Mussel | | |
| | 1 | <i>Lampsilis teres</i> | Yellow Sandshell | END | No | Mussel | | |
| | 3 | <i>Cycleptus elongatus</i> | Blue Sucker | SPC | No | Fish | | |
| | 1 | <i>Scaphirhynchus platorynchus</i> | Shovelnose Sturgeon | NON | No | Fish | | |
| North Henderson | 2 | <i>Cycleptus elongatus</i> | Blue Sucker | SPC | No | Fish | No | |
| | 1 | <i>Scaphirhynchus platorynchus</i> | Shovelnose Sturgeon | NON | No | Fish | | |
| South Henderson | 2 | <i>Haliaeetus leucocephalus</i> | Bald Eagle | SPC | No | Avian | No | |
| | 1 | <i>Lampsilis teres</i> | Yellow Sandshell | END | No | Mussel | | |
| | 1 | <i>Arcidens confragosus</i> | Rock Pocketbook | END | No | Mussel | | |
| | 1 | <i>Cycleptus elongatus</i> | Blue Sucker | SPC | No | Fish | | |
| | 1 | <i>Alasmidonta marginata</i> | Elktoe | THR | No | Mussel | | |
| Blakeley | 1 | <i>Panax quinquefolius</i> | American Ginseng | SPC | No | Botanical | No | |
| | 1 | <i>Elapbe vulpina</i> | Eastern Fox Snake | NON | No | Reptile | | |
| | 1 | <i>Scaphirhynchus platorynchus</i> | Shovelnose Sturgeon | NON | No | Fish | | |
| | 1 | <i>Fusconaia ebena</i> | Ebonyshell | END | No | Mussel | | |
| | 1 | <i>Ligumia recta</i> | Black Sandshell | SPC | No | Mussel | | |
| | 1 | <i>Quadrula fragosa</i> | Winged Mapleleaf | END | LE | Mussel | | |
| | 1 | <i>Quadrula metanavra</i> | Monkeyface | THR | No | Mussel | | |
| | 2 | <i>Actinonaias ligamentina</i> | Mucket | THR | No | Mussel | | |
| 1 | <i>Tritogonia verrucosa</i> | Pistolgrip | THR | No | Mussel | | | |
| Pipeline | 1 | <i>Besseyia bullii</i> | Kitten-tails | THR | No | Botanical | No | |

| Crossing | Endangered, Threatened, and Protected Species | | | | | | Fens w/in one Mile | Comments |
|-------------------|---|---------------------------------|--------------|--------------|-----------|-----------|--------------------|----------|
| | Qty | Scientific Name | Common Name | State Status | US Status | Type | | |
| | 1 | <i>Haliaeetus leucocephalus</i> | Bald Eagle | SPC | No | Avian | | |
| West Belle Plaine | 1 | <i>Besseyia bullii</i> | Kitten-tails | THR | No | Botanical | No | |
| | 1 | <i>Haliaeetus leucocephalus</i> | Bald Eagle | SPC | No | Avian | | |
| Belle Plaine | 1 | <i>Haliaeetus leucocephalus</i> | Bald Eagle | SPC | No | Avian | No | |

Federal Listing: LE = Listed Endangered; LT = Listed Threatened; C = Candidate for listing; No = No protection under the Endangered Species Act
 MN State Listing: END = Endangered; THR = Threatened; SPC = Species of Concern; NON = No status, but species is being monitored

5.0 CONSTRUCTABILITY AND ENGINEERING

River crossings offer a unique set of challenges from a transmission design and construction perspective. Certain engineering considerations are inherent at any river crossing, and certain crossings may offer specific issues pertinent only to those locations. The constructability and engineering analysis considered a broad overview of the following:

- Bluff to bluff width based on USGS 1:24,000 topographic maps and aerial photography
- Channel width (including meander channels)
- Floodplain width based on FEMA 100-year flood zones
- Wetland width based on NWI maps, and
- Other concerns such as concentration of existing transmission lines and ability to locate the new facilities at least 75 feet from existing homes.

The Applicants concluded that all of the potential river crossings are feasible from an engineering standpoint. Some crossings would require more costly non-standard structures and ROW procurement in high-density residential areas. Crossings that are not likely to require non-standard structures and avoid residential areas include Franklin 69 kV, Wabasha Creek, and Highway 169. Table 10 summarizes the constructability and engineering analysis for the river crossings. Table 7 in the Hydrology section shows river width and floodplain area at the crossing sites.

Table 10. Constructability and Engineering

| Crossing | Width Bluff to Bluff | Engineering Concerns | Comments |
|------------------------------|-----------------------------|--|--|
| Granite Falls | | | |
| Granite Falls | 350 feet | Several transmission crossings may require taller structures to maintain transmission line clearances; additionally there will be multiple crossings over scenic highways and railroad | Existing 115 kV transmission line will be removed. |
| Upper Minnesota River | | | |
| Redwood | 1.5 miles | Some transmission crossings may require taller structures, especially if near railroad west of river and bluff east of river | |
| Morton | 1.6 miles | US highway and railroad in vicinity of crossing; Morton located north of the river and Lower Sioux Reservation located south of the river | Crossing would likely have to go west-east to avoid direct impacts with Morton and/or Lower Sioux Reservation |
| Franklin 69 kV | 1.1 miles | Likely follow existing 69 kV transmission line; Crossings over TH and railroad is located east of the river | Appears to have most direct approach for the existing Franklin Substation, as compared to other Franklin crossings |
| Cedar Mountain | 1.8 miles | See Franklin 69 kV | |
| South Franklin | 1.8 miles | No existing infrastructure; therefore, new access through area would need to be developed | |
| Wabasha Creek | 1.7 miles | No existing infrastructure, therefore, new access through area would need to be developed | If coming from south or southwest, this crossing would be closest to the proposed Cedar Mountain Substation South area |
| Brown County | 1.3 miles | Transmission line crossing may require taller structures north and east of the river because an existing transmission line is parallel to the river bluff and scenic highway | North-south access looks to be established with existing road; however bridge may have load limits |
| Lower Minnesota River | | | |
| South Le Sueur | 0.9 miles | A scenic highway and railroad crossing is located east of the river. It may be beneficial to align crossing with existing road on the east river bank No existing infrastructure, therefore, new access through area would need to be developed | Marker balls on shield wires may be necessary for airport glide paths. |

| Crossing | Width Bluff to Bluff | Engineering Concerns | Comments |
|-------------------------|----------------------|---|---|
| Central Le Sueur | 1.6 miles | The City of Le Sueur is located east of the river; also a US highway located to the west and railroad located east of the river | Following railroad north immediately after crossing river may be feasible; railroad may require additional grounding due to induction |
| Le Sueur 69 kV | 1.0 miles | Following existing 69 kV transmission line may be feasible but would route through the City of Le Sueur east of the river | See Central Le Sueur |
| Highway 169 | 1.0 miles | New transmission line may parallel US Highway 169 south of the road; avoid placement directly adjacent to treatment ponds north of the road; railroad crossing west of river | After crossing river, following secondary road east of river may allow for easier construction access |
| Le Sueur Treatment Pond | 1.0 miles | Avoid placement of transmission line near treatment ponds and oxbow lakes. There are some residential developments north of these areas; railroad crossing west of river | In this vicinity, ~2500 ft. north of Le Sueur Treatment Pond or south of highway at Highway 169 appear to be most feasible crossings |
| Henderson | 1.3 miles | Scenic and state highways east and west of river, railroad west of river | Henderson west of the river in this vicinity |
| North Henderson | 1.2 miles | Scenic and state highways east and west of the river, railroad west of the river | No existing access; therefore new access through area would need to be developed |
| South Henderson | 0.9 miles | Scenic and state highways east and west of river, railroad west of river | No existing infrastructure; therefore, new access through area would need to be developed |
| Blakeley | 0.8 miles | Following existing road may be feasible; scenic highway west and railroad east of river | |
| Pipeline | 0.8 miles | Following proposed pipeline may result in improved access thru area; gravel pits, and scenic highway north of the river and railroad south of the river | Grounding pipeline to mitigate induction may be required |
| West Belle Plaine | 1.0 miles | Following existing 69 kV transmission line and railroad may result in improved access through area; scenic highway north of the river, oxbow lake and railroad south of the river | For extensive lengths where paralleled, railroad may need to be grounded due to induction |
| Belle Plaine | 1.0 miles | Crossing by following north-south road and then cross the railroad to east is possible | For extensive lengths where paralleled, railroad may need to be grounded due to induction |

5.1 UNDERGROUND CROSSINGS OF THE MINNESOTA RIVER

As part of its analysis of Minnesota River crossings, the Applicants also considered the possibility of undergrounding facilities at river crossings. Underground transmission lines at the Minnesota River crossings would avoid new overhead lines, although the river viewscape will still be impacted by large transition structures that would need to be located on either side of the river crossings where the transmission line transitions from overhead to underground and vice versa. In addition, the construction, repair, and presence of an underground transmission line across the Minnesota River may result in potentially greater impacts to the habitat, wildlife, and recreational value of the river and nearby area.

Because undergrounding the transmission line does not greatly minimize visual and environmental impacts to the Minnesota River and nearby area and because of the significant engineering, construction, and repair challenges and costs associated with undergrounding a transmission line under a water feature, the Applicants determined that undergrounding the transmission line at the Minnesota River crossings is not appropriate. The following sections discuss in more detail the challenges and impacts associated with undergrounding a transmission line under the Minnesota River.

5.1.1 ENGINEERING CHALLENGES

Despite the use of special design methods, underground conductors generally operate at higher temperatures than overhead transmission lines which results in reduced efficiency, an increased risk of outages, and a shorter life span for the conductor. An underground transmission line is expected to require more frequent repairs and earlier replacement than an overhead transmission line.

5.1.2 CONSTRUCTION CHALLENGES

The construction of the transmission line under or along the bottom of the Minnesota River, although likely possible from a technical perspective, poses construction challenges and be significantly more costly than overhead construction. Two different construction methods are available for undergrounding a transmission line under the Minnesota River. The transmission line can be laid along the bottom of the river using a hydro-plowing procedure that partially imbeds the line, referred to as a submarine cable, on the bottom of the river. Alternatively, a casing could be directionally bored beneath the Minnesota River at each river crossing and the conductor could be installed in the casing.

If a submarine cable is used, such a cable can be susceptible to damage from floods, river debris, and boat anchors. Boater contact with the submarine cable also creates a potential safety hazard for members of the public. Safety warnings, access limits, or other protective measures are needed near the crossings along the Minnesota River.

If the transmission line is directionally bored, unknown bedrock or boulders may be encountered during the drilling phase, resulting in damage to expensive drilling equipment and sometimes requiring new boring paths to be started, either of which would increase the cost and time required to place the line underneath the river.

In addition, because of available technology and materials and shipping weight and size restrictions, underground conductors of the size appropriate for this Project are generally limited to approximately 1,000-foot-long segments. With respect to the Minnesota River, no crossing

locations have river widths greater than 570 feet at ordinary high water mark (“OHWM”). The average crossing width is 282 feet.

Both of the above-described underground construction methods require a transition structure at each location where the transmission line transitions from overhead to underground and from underground to overhead. Because of the high voltage of the Project (*i.e.*, 345 kV), such transition structures would likely be lower to the ground and enclosed by a fence.

Accessing construction and excavation sites for the installation of the underground transmission line and the associated belowground vaults and transition structures may be complicated by the existing topography of the Minnesota River area, which includes steep forested bluffs, rock outcrops, floodplain wetlands and sensitive natural resources.

5.1.3 REPAIR CHALLENGES

An underground transmission line beneath or along the bottom of the Minnesota River would also be more difficult and costly to repair in the event of a line failure. Because conductors located underground cannot be as easily visually inspected as overhead conductors, locating and repairing outages can be difficult and time consuming. Typical underground transmission line outages are repaired and returned to service two to three weeks after an outage event, compared to two to 24 hours for overhead transmission lines. Repairs may take even longer if the failed cable becomes frayed and wedged in the underground duct or casing. Such a cable would typically be abandoned and new cable would be threaded through an empty redundant duct made in the initial underground installation or a new duct or casing would need to be installed. It is unlikely that a redundant duct or casing would be installed across the Minnesota River at each of the crossings. Therefore, if a failed line had to be abandoned, then a new path would need to be directionally bored across that river crossing or a new submarine cable would need to be installed along the river bottom, repeating the various environmental impacts associated with undergrounding a transmission line across the Minnesota River.

5.1.4 ENVIRONMENTAL IMPACTS

The construction of an underground transmission line near and under the Minnesota River could result in more environmental impacts than an overhead transmission line. The submarine cable underground construction method would disturb the riverbed and aquatic vegetation and could impact water quality and aquatic organisms. The directional boring underground construction method would require significant excavation and relatively large work areas at each end of the bore. Also, with directional drilling there is a risk that drilling mud (a lubricating Bentonite mud) could escape into the river environment as the result of a spill, tunnel collapse or rupture of the mud surface (commonly known as “frac-out”). In addition, depending on the location needed for construction, vehicles and equipment and materials for directional drilling may impact the surrounding environment, which ranges from flat agricultural land to steep river bluffs and floodplain. And although an underground transmission line would have less of a visual impact where the line is underground, there would still be some visual impacts associated with the transition structures described above.

6.0 CONCLUSION

Based on the foregoing data, the Applicants concluded that the crossings of the Minnesota River should be above-ground facilities and that the following five crossings should be carried forward into the development of the Preferred Route and the Alternate Route: Granite Falls, Redwood, Brown County, Le Sueur Treatment Pond, and West Belle Plaine. The selected crossings best minimize human and environmental impacts while achieving Project needs. The Applicants then undertook additional analysis in developing the Preferred Route and the Alternate Route. Details of this further analysis are described in the Application, Chapter 6 and Chapter 8.

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