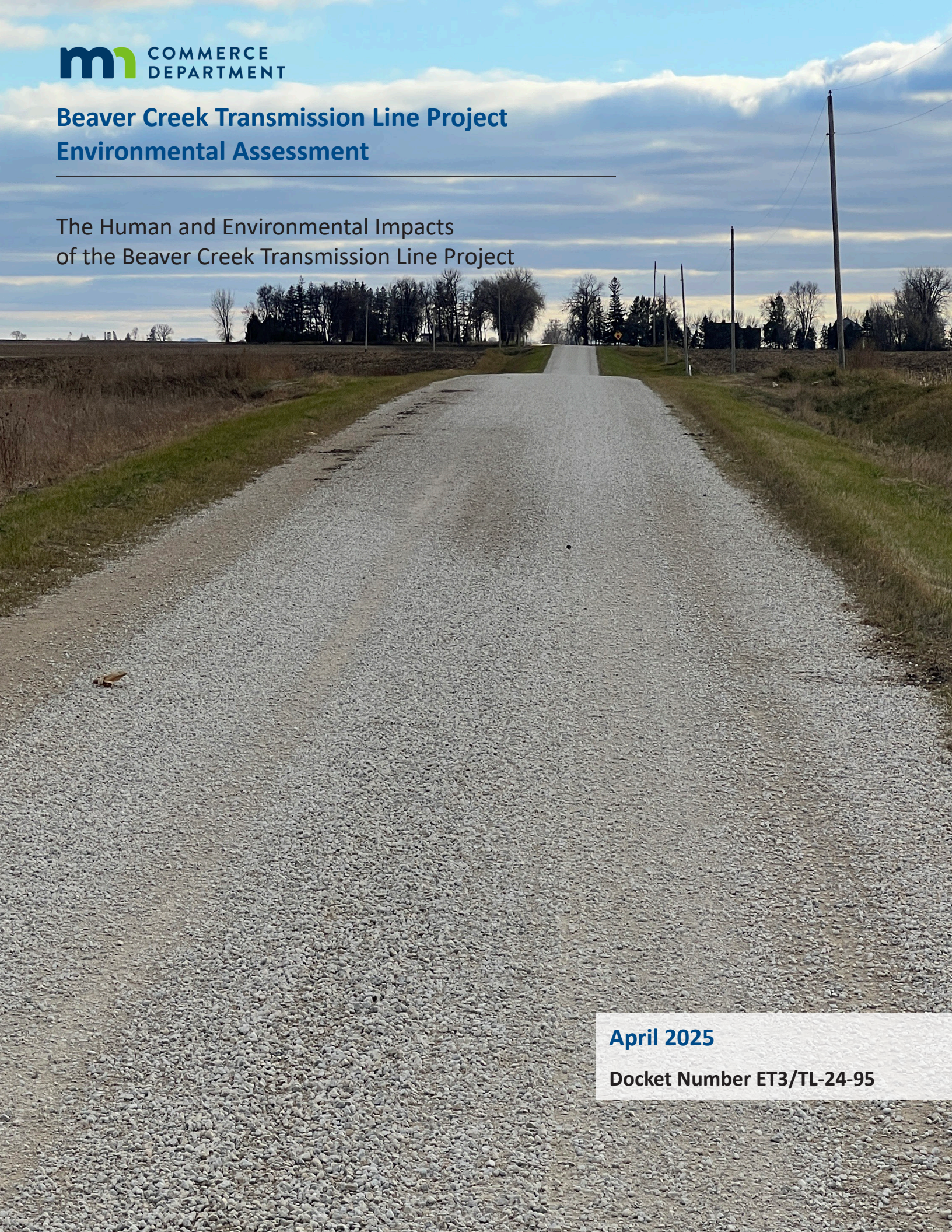

COMMERCE DEPARTMENT

Beaver Creek Transmission Line Project Environmental Assessment

The Human and Environmental Impacts of the Beaver Creek Transmission Line Project

April 2025

Docket Number ET3/TL-24-95

Abstract

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Dairyland Power Cooperative (applicant) proposes to construct a 161 kilovolt (kV) transmission line in York Township, Fillmore County, Minnesota (Beaver Creek Transmission Line Project or project). The project is approximately 9.5 miles long and extends into Iowa; however, only the 3.5-mile-long Minnesota portion of the project is considered in this document.

The Beaver Creek Transmission Line Project requires a route permit from the Minnesota Public Utilities Commission (Commission). The applicant submitted a route permit application to the Commission on August 26, 2024. The Commission requested Department of Commerce (Department) Energy Environmental Review and Analysis (EERA) staff to prepare an environmental assessment (EA) for the project.

This EA addresses the issues and mitigation measures identified in the Department's scoping decision of January 23, 2025. It evaluates the project's potential for human and environmental impacts and possible measures to mitigate these impacts.

Public hearings for the project will be held in the project area and are anticipated to occur the week of April 22, 2025. Notice of the hearings will be issued separately. An administrative law judge (ALJ) from the Minnesota Office of Administrative Hearings will preside over the hearings. Upon completion of the hearings, the ALJ will submit a report to the Commission including findings, conclusions, and recommendations to the Commission regarding the applicant's route permit application. A Commission decision on a route permit is expected in September 2025.

Additional materials related to this project and its permitting proceedings are available on the Department's website: http://mn.gov/commerce/energyfacilities and on the state of Minnesota's eDockets system: https://www.edockets.state.mn.us/documents (enter the year "24" and the number "95").

Persons interested in receiving future project notices and updates can place their names on the project mailing list by emailing docketing.puc@state.mn.us or calling 651-201-2246 and providing the docket number (24-95) their name, email address, and mailing address. Please indicate how you would like to receive notices—by email or U.S. mail.

To receive email notifications when new documents are filed for this project visit: https://www.edockets.state.mn.us/EFiling, and select Subscriptions.

This document can be made available in alternative formats (i.e., large print or audio) by calling 651-539-1530 (voice).

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Environmental Assessment
Beaver Creek Transmission Line Project

April 2025

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Acronyms

ALJ	administrative law judge
AQI	Air Quality Index
ATV	all-terrain vehicle
ATW	additional temporary workspace
BGEPA	Bald and Golden Eagle Protection Act
BMPs	best management practices
BWSR	Minnesota Board of Water and Soil Resources
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
Commission	Minnesota Public Utilities Commission
CSAH	County State Aid Highway
dBA	A-weighted decibel
Department	Minnesota Department of Commerce
DNR	Minnesota Department of Natural Resources
EA	environmental assessment
ECS	Ecological Classification System
EERA	Energy Environmental Review and Analysis
EJ	Environmental justice
EJC	Environmental Justice Communities
EJC	environmental justice concern
EMF(s)	electromagnetic field(s)
EMI	electromagnetic interference
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FPPA	Farmland Protection Policy Act
ft	feet
GHG(s)	greenhouse gases
GIS	geographic information system
GPS	global position systems
ICD(s)	implantable cardioverter defibrillators
in	inch
IPaC	Information for Planning and Consultation
IPCC	Intergovernmental Panel on Climate Change
kV	kilovolt
kV/m	kV per meter
LGU(s)	local units of government
mA	milliamps
MBTA	Migratory Bird Treaty Act
MDA	Minnesota Department of Agriculture
MEPA	Minnesota Environmental Policy Act
mG	milliGauss
MIAC	Minnesota Indian Affairs Council
MnDOT	Minnesota Department of Transportation
MWI	Minnesota Well Index
N_2O	nitrous oxide

NAAQS	National Ambient Air Quality Standards
NESC	National Electrical Safety Code
NEV	neutral-to-earth voltage
NLCD	National Land Cover Dataset
NO_2	nitrogen dioxide
NO_X	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRCS	USDA Natural Resource Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
O_3	ozone
OSA	Office of the State Archaeologist
Pb	lead
PM	particulate matter
PWI	public waters inventory
ROI	region of influence
ROW	right of way
RUS	Rural Utility Service
SBS	Sites of Biodiversity Significance
SDS	Sanitary Disposal System
SHPO	State Historic Preservation Office
SNR(s)	noise-sensitive receptor(s)
SO_2	sulfur dioxide
SSP	Shared Socioeconomic Pathway
SSURGO	Soil Survey Geographic
SWPPP	stormwater pollution prevention plan
UHF	ultra-high frequency
USACE	United States Army Corps of Engineers
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
W/m^2	watts per meter squared
WCA	Minnesota’s Wetland Conservation Act

Summary

This environmental assessment (EA) has been prepared for the Minnesota portion of the Beaver Creek Transmission Line Project (the project), a 161 kilovolt (kV) transmission line proposed by Dairyland Power Cooperative (applicant). This EA evaluates potential human and environmental impacts of the project and possible mitigation measures.

This EA is not a decision-making document but rather a guide for decision-makers. The EA is intended to facilitate informed decisions by state agencies, particularly with respect to the goals of the Minnesota Environmental Policy Act (MEPA) — "to create and maintain conditions under which human beings and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of the state's people" (Minn. Statute 116D.02).

Electrical Transmission System Reliability and the Shift to Renewable Energy

Over the past few decades, the generation of electricity in Minnesota has evolved away from fossil-fueled baseload generating plants to renewable generating resources (e.g., wind and solar power). In 2011, over half of the electricity generated in Minnesota came from coal-fired electric power plants. In 2023, these plants produced only 22 percent of the electricity in Minnesota, while renewable generating resources provided 33 percent (reference (1)). This change in electrical generation has implications for the current transmission system and whether the current system can handle the increased energy that these renewable energy projects generate.

The Beaver Creek Project

In 2017, the Midcontinent Independent System Operator (MISO) studied a series of renewable energy generation projects and examined the current interconnection system. As a result of these studies, MISO identified the need for the Beaver Creek project to allow future renewable energy generating projects to interconnect to the transmission system. The project would provide thermal and voltage support to the regional electric transmission system. It would also increase the ability of proposed renewable energy generation projects to be interconnect to the existing transmission system.

The project was studied, reviewed, and approved as part of the 2017 August West Area MISO Generation Interconnection Study (reference (2)). In August 2024, the applicant applied to the Minnesota Public Utilities Commission (Commission) for a route permit for the project (Map S–1). The Commission accepted the application as complete in October 2024.

The State of Minnesota's Role

Though MISO is charged with operating the electrical transmission grid in the Upper Midwest, it is ultimately the state of Minnesota that determines whether specific transmission lines are needed by the state and, if so, where they should be located. This authority is vested in the Commission. Thus, even though a project may be proposed and approved by MISO, the Commission determines whether and where the project is built.

For the Beaver Creek Transmission Line Project, the Commission must determine how best to mitigate the potential impacts of the project.

To help the Commission with its decision-making and to provide a fair and thorough airing of the issues, the state of Minnesota has set out a process for the Commission to follow in making its decisions. This process requires (1) the development of an EA and (2) public hearings before an administrative law judge (ALJ) (Minn. Statutes 216B and 216E). The goal of the EA is to describe the potential human and environmental impacts of the project ("the facts"); the goal of the hearings is to advocate, question, and debate what the Commission should decide about the project ("what the facts mean"). The entire record developed in this process, including all public input and testimony, is considered by the Commission when it makes its decision on the applicant's route permit application.

Commission Decision Criteria

The Commission makes its decision on the applicant's route permit application through criteria set out in Minnesota statutes and rules. For a route permit, the Commission is charged with selecting transmission line routes that minimize adverse human and environmental impacts while providing continuing electric power system reliability and integrity. Per Minn. Rule 7850.4100, the Commission must consider 14 factors when making a route permit decision:

A. Effects on human settlement include but are not limited to, displacement, noise, aesthetics, cultural values, recreation, and public services.

B. Effects on public health and safety.

C. Effects on land-based economies, including, but not limited to, agriculture, forestry, tourism, and mining.

D. Effects on archaeological and historic resources.

E. Effects on the natural environment, including effects on air and water quality resources and flora and fauna.

F. Effects on rare and unique natural resources.

G. Application of design options that maximize energy efficiencies, mitigate adverse environmental effects, and could accommodate expansion of transmission or generating capacity.

H. Use or paralleling of existing right-of-way (ROW), survey lines, natural division lines, and agricultural field boundaries.

I. Use of existing large electric power generating plant sites.

J. Use of existing transportation, pipeline, and electrical transmission systems or ROWs.

K. Electrical systems reliability.

L. Costs of constructing, operating, and maintaining the facility which are dependent on design and route.

M. Adverse human and natural environmental effects which cannot be avoided.

N. Irreversible and irretrievable commitments of resources.

Environmental Assessment

The Minnesota Environmental Policy Act requires that environmental review be conducted for major governmental actions with the potential to create significant environmental impacts (Minn. Statute 116D.04). To meet this requirement, the Commission has authorized the preparation of an EA. Department of Commerce (Department), Energy Environmental Review and Analysis (EERA) staff is responsible for preparing the EA on behalf of the Commission.

This EA is intended to facilitate informed decision-making by the Commission and other entities with regulatory authority over the project. It also assists citizens in providing guidance to decision-makers regarding the project. This EA analyzes the potential human and environmental impacts of the project and possible mitigation measures. The EA does not advocate or state a preference for a specific alternative. Instead, it analyzes and compares alternatives so that citizens, agencies, and governments can work from a common set of facts.

Public Participation

In preparing this EA, EERA staff solicited public comments on (1) the human and environmental impacts that should be evaluated in the EA and (2) possible mitigation measures to study. This process of soliciting comments on the contents of the EA is known as “scoping.” EERA staff solicited comments through public meetings in November 2024 and through a comment period that ended on December 3, 2024. Based on the public comments received and after review by the Commission, the Department issued the scoping decision for this EA on January 23, 2025.

Human and Environmental Impacts of the Project

Project construction and operation will impact human and environmental resources within the designated project area. There will be some short-term impacts, similar to those of any large construction project (e.g., noise, dust, soil disturbance). These impacts can be mitigated by measures common to most construction projects.

Other impacts will exist for the life of the project and may include aesthetic impacts, impacts on land-based economies such as agriculture, as well as impacts to the natural environment and on rare and unique natural resources. These long-term impacts are generally not well mitigated by construction measures. That is, these impacts do not flow from how the project is constructed but rather through its design and location. Long-term impacts can be somewhat mitigated by prudent design for the project.

Many impacts are anticipated to be minimal—in and of themselves or with common mitigation measures—for the project. These include:

- Impacts on human settlements (factor A) – displacement, environmental justice communities, noise, property values, electronic interference, cultural values, zoning and land-use compatibility, and public services
- Impacts on public health and safety (factor B) – EMF, implantable medical devices, stray voltage, induced voltage, and air quality

- Impacts on land-based economies (factor C) – forestry, mining, and recreation and tourism
- Impacts on archaeological and historic resources (factor D)
- Impacts on rare and unique natural resources (factor F) – sensitive ecological resources
- Impacts on electric system reliability (factor K)
- Costs that are dependent on design and route (factor L)

However, other aspects may have more moderate impacts:

- Impacts on human settlements (factor A) – aesthetics
- Impacts on land-based economies (factor C) – agriculture
- Impacts on the natural environment (factor E) – water resources, vegetation (flora), and wildlife (fauna)
- Impacts on rare and unique natural resources (factor F) – protected species
- Use or paralleling of existing rights-of-way (factors H and J)

Potential human and environmental impacts are summarized in Table S-1 and discussed further below.

Table S-1 Human and Environmental Impacts for the Applicant's Proposed Route

Resource	Element	Applicant's Proposed Route
Length (miles)		3.5
Human Settlement	Residences within 0-50 feet (count)	0
	Residences within 50-250 feet (count)	5
	Residences within 250-500 feet (count)	1
	Residences within 500-1,000 feet (count)	0
Environmental Justice Concerns (EJC)	communities with EJ concerns crossed by the 100-ft ROW (count)	0
Land-Based Economies	Agricultural land in 100-ft ROW (acres)	9.6
Archaeology and Historic Architecture	Archaeological sites in route width (count)	0
	Historic resources in route width (count)	3
Water Resources	Stream crossings (count)	3
	PWI crossings (count)	2
	NWI wetland crossings (count)	4
	Total NWI wetlands in 100-foot ROW (acres)	3.6
Vegetation	Forested landcover in 100-foot ROW (acres)	0
Wildlife	Wildlife Management Areas in 100-foot ROW (acres)	0

Resource	Element	Applicant's Proposed Route
	Scientific and Natural Areas in 100-foot ROW (acres)	0
Rare and Unique Natural Resources	Potential for protected species in 100-foot ROW (count)	1
ROW Sharing and Paralleling	Transmission line (miles, percent)	0 (0)
	Roadway (miles, percent)	3.5 (100)
	Field, parcel, or section lines (miles, percent)	3.5 (100)
	Total ROW sharing and paralleling (miles, percent)	3.5 (100)
Estimated Cost	Total estimated cost (2020 dollars)	$4,000,000

Human Settlements

Potential project impacts on human settlements are assessed through an evaluation of several elements, including noise, property values, electronic interference, cultural values, zoning and land-use compatibility, and public services. For most of the human settlement elements, project impacts are anticipated to be minimal. Analysis of impacts to human settlements focuses on those elements where impacts have the potential to occur, which for the project includes aesthetics.

Aesthetics

Aesthetic impacts are assessed, in part, through consideration of the existing viewshed, landscape, character, and setting of any given area, followed by an evaluation of how a proposed project would change these aesthetic attributes. Determining the relative scenic value or visual importance in any given area depends, in large part, on the values and expectations held by individuals and communities about the aesthetic resource in question.

Based on the project's proximity to residences, aesthetic impacts may occur as a result of the project. There are five residences located between 50 and 250 feet of the applicant's proposed route. Tree clearing along the ROW would also be necessary where the project crosses vegetated fence lines along 171st Avenue.

The project will result in the introduction of new infrastructure in a relatively rural area. However, aesthetic impacts would be minimized by sharing existing road ROW. In addition, there is an existing 12.47 kV distribution line along much of the proposed route, which has a similar visual appearance, albeit on a smaller scale than the project. The applicant has also committed to minimizing permanent impacts to the aesthetics and visual character of the area by avoiding and/or minimizing tree clearing and avoiding residential areas to the maximum extent practicable.

Land-Based Economies

Potential impacts to land-based economies are assessed through several elements including agriculture, forestry, mining, and recreation and tourism resources. The majority of elements considered under land-based economies would be minimally impacted by the project; only agricultural impacts are discussed further.

Agriculture

There are 9.6 acres of agricultural land within the ROW, comprised of hay/pastureland and cultivated cropland, which equates to approximately 23 percent of the total land cover within the ROW. Permanent impacts to agriculture as a result of the project may include loss of farmland due to structure placement in agricultural fields and restriction of equipment. Impacts to agricultural operations have been mitigated by proposing a project that primarily follows existing road ROW. Additionally, the applicant will work with landowners regarding compensation for any unintended impacts (e.g., repair of drain tile).

Archaeological and Historic Resources

Three historic architectural resources are located within the project's route width. One of these resources (a culvert) has been previously determined not eligible for the National Register of Historic Places (NRHP); therefore, no additional work related to this resource will be required for the project to proceed. The project has the potential to adversely affect the two remaining historic resources (bridges) that have not been evaluated for the NRHP. However, no direct effects to these resources are anticipated because project activities would occur adjacent to 171st Avenue and would not be located within the road ROW. Visual impacts may occur; however, the bridges and culvert represent infrastructure critical to the function of the rural agricultural community in the same way that the project will provide critical infrastructure for the community. Therefore, the project does not have the potential to alter these resources' setting, feeling, appearance, and/or association. The U.S. Department of Agriculture, Rural Development-Rural Utility Service (RUS), as the lead federal agency for the project, will be responsible for completing the requirements of Section 106 of the National Historic Preservation Act of 1966 (Section 106), including identifying, evaluating, minimizing, and/or mitigating any project-related impacts to historic properties.

The primary means of minimizing impacts to archaeological and historic resources is prudent routing or structure placement – (i.e., avoiding known archaeological and historic resources). If they cannot be avoided, impacts to these resources could be mitigated using measures developed in consultation with the State Historic Preservation Office (SHPO) prior to construction.

Natural Environment

Potential impacts to the natural environment are assessed by looking at several specific elements. For some of the elements of the natural environment, impacts from the project are anticipated to be minimal and are therefore not discussed here further. This section addresses those elements that do have the potential to be impacted by the project – water resources, vegetation, and wildlife.

Water Resources

The project crosses two unnamed streams that are identified as public waters and one that is not. In addition, there are four wetlands totaling approximately 3.6 acres located in the project ROW. However, it is anticipated that impacts to water courses and wetlands will be avoided by adjusting structure locations to avoid disturbing the streams and wetlands. No surface water or wetland crossing will be greater than 1,000 feet, meaning all surface waters can be spanned to avoid structure placement within these resources. In addition, the project will develop a stormwater pollution prevention plan (SWPPP) that identifies best management practices (BMPs) to be implemented during construction to minimize erosion and sedimentation impacts to surface waters. The applicant will also work with the Minnesota Department of Natural Resources (DNR) to obtain appropriate approvals for public water crossings.

Vegetation

Present-day vegetation consists of herbaceous agricultural vegetation, cultivated crops, hay and pastureland, and developed lands. Project construction will result in short-term impacts to existing vegetation, including localized physical disturbance and soil compaction. Development and use of access roads, staging, and stringing areas for the project will also have short-term impacts on vegetation by concentrating surface disturbance and equipment use. Permanent vegetation clearing will be required in the designated structure installation areas, resulting in an impact area measuring 8 feet in diameter for typical structures and 12 feet in diameter for dead-end and angle structures. Approximately one acre of trees will be removed from various locations within the ROW as a result of the project. Trees and understory brush will be cleared for the installation of structures and where canopy heights will interfere with the applicant's proposed route. Construction will also result in long-term impacts to vegetation by permanently removing taller-growing woody vegetation within the ROW.

Mitigation will include following existing road ROW, limiting new access roads for construction, constructing during fall and winter months to limit plant damage, leaving or replanting compatible plants at the edge of the transmission line ROW, replanting the transmission line ROW outside of active farmed areas with low-growing, native species, and limiting vehicle traffic to roads along the ROW and within previously disturbed areas.

Wildlife

Wildlife in the general vicinity of the project includes songbirds, raptors, and small mammals. In addition, Minnesota is in the Central Flyway of North America. Migratory birds use portions of the Central Flyway as resting grounds during spring and fall migration, as well as breeding and nesting grounds throughout the summer. Within and near the project, there is limited suitable habitat for migratory birds. Migratory birds are protected under the Migratory Bird Treaty Act (MBTA). In addition, bald eagles and golden eagles are protected under the MBTA and the federal Bald and Golden Eagle Protection Act (BGEPA).

For non-avian wildlife, construction activities that generate noise, dust, or disturbance may result in short-term, indirect impacts. During project construction, wildlife will generally be displaced within the ROW. Potential impacts to avian species (e.g., songbirds, raptors, and waterfowl) include displacement during construction, electrocution, and collision with transmission line conductors. Independent of the electrocution risk, birds may be injured by colliding with transmission line structures and conductors. The collision risk is influenced by several factors, including habitat, flyways, foraging areas, and bird size.

The primary mitigation strategy is to avoid disturbing and placing structures within riparian areas and wetlands. Bird collisions with transmission lines can be mitigated by configuring the conductors in a single horizontal plane or through the use of bird flight diverters.

Rare and Unique Natural Resources

There are six documented federal- or state-protected species within one mile of the applicant's proposed route. One federally endangered species, the northern long-eared bat, has the potential to be within the 100-foot ROW and, if present, could potentially be directly impacted by the project if trees are removed during the active nesting period. Impacts to northern long-eared bats could be minimized by conducting tree-clearing activities while the bats are hibernating in their inactive season and avoiding tree removal from June 1 through August 15.

Use of Existing Rights-of-Way

Sharing ROW with existing infrastructure minimizes fragmentation of the landscape and can minimize human and environmental impacts (e.g., aesthetic and agricultural impacts). The project shares ROW for its entire length in Minnesota; the ROW for the route would be shared with the existing road ROW along 171st Avenue.

Summary of Project-Specific Routing Factors

The discussion here uses text and a color graphic to summarize the relative merits of the applicant's proposed route (Table S-2). The color graphic and related notes for a specific routing factor or element are not meant to suggest that accommodations and/or changes need to be made to the route but are provided as a relative comparison to be evaluated together with all other routing factors. For example, if the applicant's proposed route is "red" for a particular factor or element, this is not meant to indicate a fatal flaw within the proposed route.

For routing factors that express the state of Minnesota's interest in the efficient use of resources (e.g., the use and paralleling of existing rights-of-way), the graphic represents the consistency of the route with these interests. For the remaining routing factors, the graphic represents the magnitude of the anticipated impacts.

Table S-2 Guide to Relative Merits of the Applicant's Proposed Route

Anticipated Impacts or Consistency with Routing Factor	Symbol
Minimal: Impacts are anticipated to be minimal with mitigation – OR – route option is very consistent with this routing factor.	
Moderate: Impacts are anticipated to be minimal to moderate with mitigation; special permit conditions may be required for mitigation – OR – the route may not be the least impactful with respect to the routing factor.	
Significant: Impacts are anticipated to be moderate to significant and likely unable to be mitigated – OR – route alternative is not consistent with the routing factor or consistent only in part. Indicates that the route is impactful with respect to the routing factor.	

A summary of the relative merits of the applicant's proposed route, broken down by each routing factor, is provided in Table S-3.

Table S-3 Summary of Routing Factors for the Applicant's Proposed Route

Routing Factor/Resource	Applicant's Proposed Route	Summary
A. Human Settlement – Displacement, Noise, Aesthetics, Cultural Values, Recreation, and Public Services		There are five residences located between 50 and 250 feet of the applicant's proposed route. Some tree clearing along the ROW may occur. The project will result in a viewshed change for the area.
B. Public Health and Safety		No impacts to public health and safety are anticipated as a result of the project.

Routing Factor/Resource	Applicant's Proposed Route	Summary
C. Land-based Economies – Agriculture, Forestry, Tourism, and Mining		Permanent impacts to agriculture as a result of the project may include loss of farmland due to structure placement in agricultural fields and restriction of farming equipment. Impacts to agricultural operations have been mitigated by proposing a project that primarily follows existing roadway ROW.
D. Archaeological and Historic Resources		No impacts to archaeological and historic resources are anticipated as a result of the project.
E. Natural Environment – Air and Water Quality Resources and Flora and Fauna		Impacts to water courses and wetlands will be avoided by adjusting structure locations to avoid impacting streams and wetlands. Project construction will result in short- and long-term impacts to existing vegetation. Short-term impacts to non-avian wildlife may occur. Avian electrocution and/or collision may occur as a result of the project.
F. Rare and Unique Natural Resources		The project may result in impacts to northern long eared bats if they are present in the ROW; however, this can be mitigated by conducting clearing activities while the bats are hibernating during their inactive season and avoiding tree removal from June 1 through August 15.
G. Application of Design Options that Maximize Energy Efficiencies, Mitigate Adverse Environmental Effects, and could Accommodate Expansion of Transmission or Generating Capacity		The project has been designed to maximize energy efficiencies and mitigate adverse environmental effects.
H. Use or Paralleling of Existing Rights-of-Way, Survey Lines, Natural Division Lines, and Agricultural Field Boundaries		The project shares road ROW for 100% of its length.
I. Use of Existing Large Electric Power Generating Plant Sites		This routing factor is not applicable to the project.
J. Use of Existing Transportation, Pipeline, and Electrical Transmission Systems or Rights-of-Way		The project shares road ROW for 100% of its length.
K. Electrical System Reliability		The project supports electrical system reliability.
L. Costs of Construction, Operating, and Maintaining the Facility, which are Dependent on Design and Route		The project has been designed to minimize construction and operating costs to the extent possible.
M. Adverse Human and Natural Environmental Effects which Cannot be Avoided		Unavoidable adverse human and environmental effects have been minimized to the extent possible.
N. Irreversible and Irretrievable Commitments of Resources		Irreversible and irretrievable commitments of resources have been minimized to the extent possible.

1 Introduction

This environmental assessment (EA) has been prepared for the Minnesota portion of the Beaver Creek Transmission Line Project (the project), a 161-kilovolt (kV) transmission line proposed by Dairyland Power Cooperative (applicant). This EA evaluates the potential human and environmental impacts of the project and possible mitigation measures.

This EA is not a decision-making document but rather a guide for decision-makers. The EA is intended to facilitate informed decisions by state agencies, particularly with respect to the goals of the Minnesota Environmental Policy Act "to create and maintain conditions under which human beings and nature can exist in productive harmony and fulfill the social, economic, and other requirements of present and future generations of the state's people" (Minn. Statute 116D.02).

1.1 Purpose and Need

The project is needed to address transmission system reliability concerns in southern Minnesota related to the region's increasing reliance on renewable energy generation. In 2017, the Midcontinent Independent System Operator (MISO) studied a series of renewable energy generation projects and examined whether the current interconnection system could handle the increased energy that these renewable energy projects will generate. As a result of these studies, MISO identified the need for the project to allow future renewable energy generator projects to interconnect to the transmission system. The project will provide thermal and voltage support to the regional electric transmission system. It will also increase the ability of proposed renewable energy generation projects to interconnect to the existing transmission system.

The project was studied, reviewed, and approved as part of the 2017 August West Area MISO Generation Interconnection Study (reference (2)).

1.2 Project Description

The project includes constructing 3.5 miles of 161 kV transmission line in York Township, Fillmore County, Minnesota. The project will then cross the Minnesota-Iowa border and continue into Iowa for approximately six miles, ending at the new Beaver Creek Switchyard in Iowa. Only the portion of the project located in Minnesota is included in this EA.

The project will begin at the intersection of the applicant's existing 161kV LQ8A transmission line and 171st Avenue in York Township. One existing structure on the applicant's existing LQ8A line would be removed and replaced with a new starting structure for the project; the location that is proposed for this new structure is on the east side of 171st Avenue. Following completion of the project, an approximately four-mile portion of the existing 161 kV LQ8A transmission line would be retired between 131st Avenue and 171st Avenue at the northern end of the project.

From its tie-in at the existing 161kV LQ8A transmission line, the proposed alignment will travel south for 3.5 miles, parallel to 171st Avenue for its entire length (Map 1-1). The proposed alignment is sited along the east side of 171st Avenue for the majority of its length, although it will transition to the west side of the road approximately one mile south of its origin for a total length of approximately 0.25-mile, at which point it will transition back to the east side of the road.

The project will be co-located with road right-of-way (ROW) for its entire length in Minnesota. A portion of this length will also be co-located with the existing utility distribution line ROW. By locating the project next to existing rights-of-way, the project can leverage these rights-of-way rather than creating new ones. Locating the project along existing rights-of-way minimizes the potential impacts of the project.

1.3 State of Minnesota's Role

Though MISO is charged with ensuring reliable, low-cost electrical energy throughout the mid-continent of North America, it is ultimately the state of Minnesota that determines whether specific transmission lines are needed by the state and, if so, where they should be located. This authority is vested in the Minnesota Public Utilities Commission (Commission). Thus, even though a project may be approved by MISO, the Commission determines whether a project is built and where it will be constructed.

A route permit from the Commission is required for the project. The project also requires approvals (e.g., permits, licenses) from other state agencies and federal agencies with permitting authority for specific resources (e.g., the waters of Minnesota). A route permit supersedes and preempts zoning restrictions, building, and land-use regulations promulgated by local units of government (Minn. Statute 216E.10).

The applicants applied to the Commission for a project route permit on August 26, 2024. With this application, the Commission must determine how best to mitigate potential impacts of the project.

To help the Commission with its decision-making and to ensure a fair and robust airing of the issues, the state of Minnesota has set out a process for the Commission to follow in making its decisions. This process requires (1) the development of an EA and (2) public hearings before an administrative law judge (ALJ). The goal of the EA is to describe the potential human and environmental impacts of the project ("the facts"); the goal of the hearings is to advocate, question, and debate what the Commission should decide about the project ("what the facts mean"). The entire record developed in this process—the EA and the report from the ALJ, including all public input and testimony—is considered by the Commission when it makes its decisions on the applicant's route permit application.

1.4 Organization of Environmental Assessment

This EA is based on the applicant's route permit application, public comments received during the scoping comment period for this EA, and input from the Commission. This EA addresses the matters identified in the project scoping decision document (Appendix A) and is organized as outlined in Table 1-1.

Table 1-1 EA Organization

Chapter Heading		Description
Summary		Provides a summary of the project – its potential impacts and possible mitigation measures
Chapter 1	Introduction	Provides an overview of the stated project need, the project itself, the state of Minnesota's role, and discusses the organization of the document.
Chapter 2	Regulatory Framework	Describes the regulatory framework associated with the project, including the state of Minnesota's route permitting processes, the environmental review process, and the permits and approvals that are required for the project.
Chapter 3	Engineering, Design, and Construction	Describes the engineering, design, and construction of the project.
Chapter 4	Affected Environment, Impacts, and Mitigation Measures	Discusses the resources in the project area and the potential human and environmental impacts of the project. Identifies measures that could be implemented to avoid or mitigate impacts. Also included is a discussion of the potential cumulative effects of the project.
Chapter 5	Application of Routing Factors to the Project	Discusses the merits of the applicant's proposed route relative to the routing factors of Minnesota Rule 7850.4100.
Chapter 6	References	Provides references for resources used in the development of the EA.

1.5 Sources of Information

The primary EA information source is the route permit application submitted by the applicant and other publicly available data sources. Additional sources of information are identified in Chapter 6. Data provided by the applicant and from state agencies during the preparation of the EA is also included.

A number of spatial data sources, which describe the resources in the project area, were used in preparing this EA (Appendix B). Spatial data from these sources can be imported into geographic information system (GIS) software, where the data can be analyzed and potential impacts of the project and routing alternatives quantified (e.g., acres of forested wetlands within the anticipated project ROW).

2 Regulatory Framework

The project requires a route permit from the Commission. Energy Environmental Review and Analysis (EERA) staff are responsible for conducting an environmental review of the project. The project will also require approvals from other state and federal agencies with permitting authority over related actions.

2.1 Route Permit

Construction of a high-voltage transmission line in Minnesota requires a route permit from the Commission (Minn. Statute 216E.03). The project, a single-circuit 161 kV transmission line, meets the definition of a high-voltage transmission line and requires a route permit from the Commission. The applicant filed a route permit application on August 26, 2024. The Commission accepted the application as complete on October 15, 2024. The Commission referred the application to the Office of Administrative Hearings and authorized public hearings and environmental review for the project (Figure 2-1).

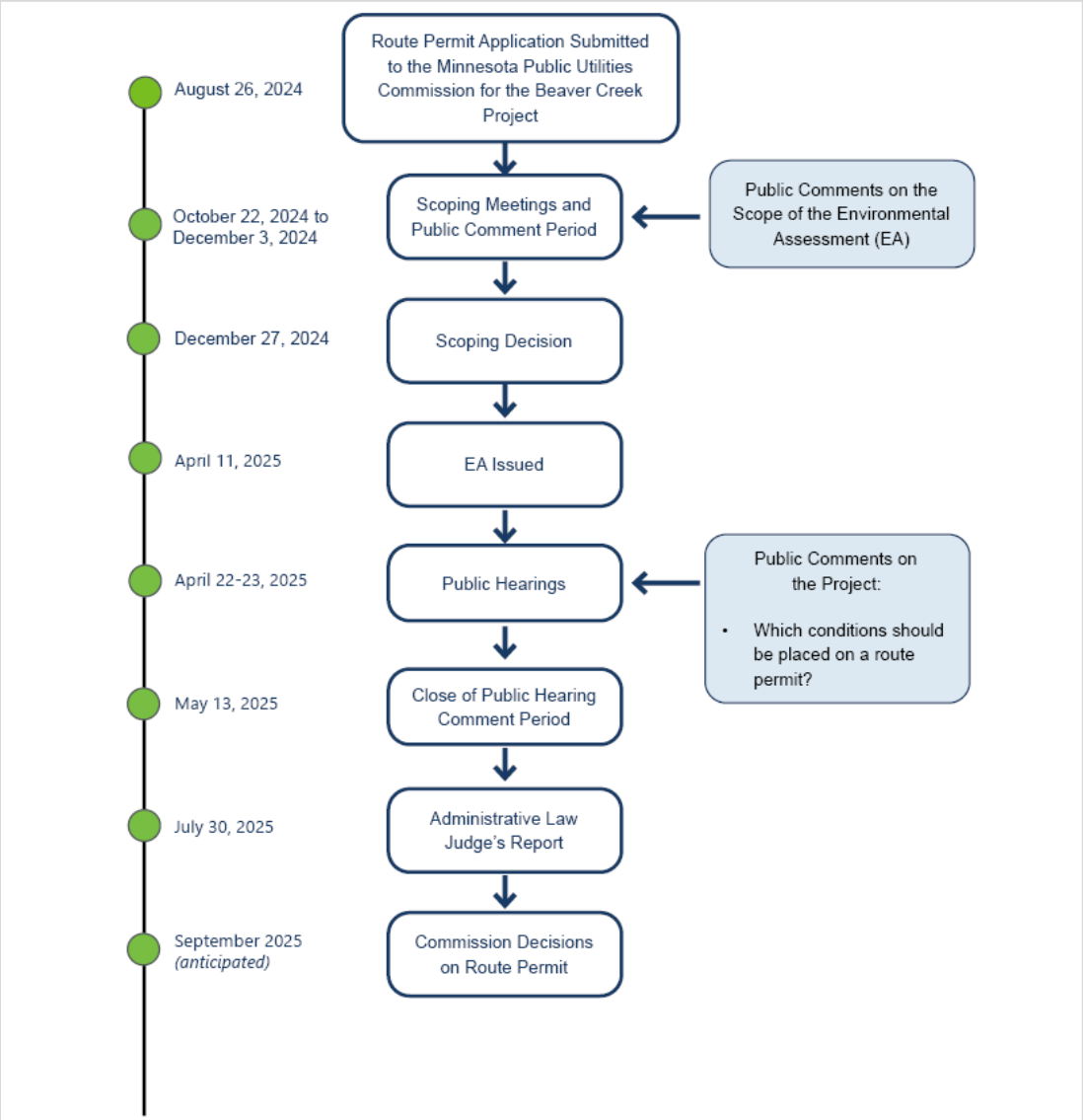


Figure 2-1 Commission's Environmental Review and Permitting Process for the Project

2.1.1 Route Permit Criteria

The Commission is charged with selecting transmission line routes that minimize adverse human and environmental impacts while ensuring electric power system reliability and integrity. Route permits issued by the Commission include a permitted route and anticipated alignment, as well as conditions specifying construction and operation standards.

Minn. Statute 216E.03 identifies considerations that the Commission must take into account when designating transmission line routes, including minimizing environmental impacts and minimizing human settlement and other land-use conflicts. Specifically, the Commission considers the following 14 factors when making a route permit decision (Minn. Rule 7850.4100):

- Effects on human settlement, including, but not limited to, displacement, noise, aesthetics, cultural values, recreation, and public services
- Effects on public health and safety
- Effects on land-based economies, including, but not limited to, agriculture, forestry, tourism, and mining
- Effects on archaeological and historic resources
- Effects on the natural environment, including effects on air and water quality resources and flora and fauna
- Effects on rare and unique natural resources
- Application of design options that maximize energy efficiencies, mitigate adverse environmental effects, and could accommodate expansion of transmission or generating capacity
- Use or paralleling of existing ROW, survey lines, natural division lines, and agricultural field boundaries
- Use of existing large electric power-generating plant sites
- Use of existing transportation, pipeline, and electrical transmission systems or rights-of-way
- Electrical systems reliability
- Costs of constructing, operating, and maintaining the facility, which are dependent on design and route
- Adverse human and natural environmental effects which cannot be avoided
- Irreversible and irretrievable commitments of resources

The Commission must make specific findings that it has considered designating a route for a new transmission line along an existing transmission line ROW or parallel to existing highway ROW and, to the extent these are not used for the route, the Commission must state the reasons why (Minn. Statute 216E.03). The Commission is charged with making a final decision on a route permit within six months after finding the route permit application complete. The Commission may extend this time limit for up to three months for just cause or upon agreement of the applicant. Once a route permit is issued by the

Commission, the applicant may, if necessary, exercise the power of eminent domain to acquire land for the project (see Chapter 3.3.1 for additional information regarding ROW acquisition).

2.2 Environmental Review

The Minnesota Environmental Policy Act requires environmental review to be conducted for major governmental actions with the potential to create significant environmental impacts (Minn. Statute 116D.04). For this project, the environmental review is an EA. EERA staff is responsible for preparing the EA on behalf of the Commission.

An EA describes and analyzes the potential human and environmental impacts of a project and possible mitigation measures. An EA is intended to facilitate informed decision-making by the Commission and other entities with regulatory authority over a project. It also assists citizens in providing guidance to decision-makers regarding the project. The EA will be completed and made available prior to the public hearing for the project.

2.3 Scoping

The first step in preparing an EA is scoping. The purpose of scoping is to provide citizens, local governments, tribal governments, and agencies an opportunity to focus the EA on those issues and mitigation measures that are relevant to the proposed project.

EERA and Commission staff jointly held two public information and scoping meetings to provide information about the permitting process and the project, answer questions, and gather input on topics to study in the EA. The first meeting was held in person on November 12, 2024, at the LeRoy Community Center in LeRoy, Minnesota. Four members of the public attended this in-person meeting. The second meeting was held virtually on November 13, 2024. No members of the public attended the virtual meeting.

A written comment period, ending on December 3, 2024, provided the public an opportunity to submit comments on potential impacts and mitigation measures for consideration in the scope of the EA. During the written comment period, the Minnesota Department of Natural Resources (DNR) and the applicant submitted comments. Comments included impacts and mitigation measures suggested for study in the EA; no routing alternatives were suggested.

EERA staff provided a summary of the scoping process and recommendations to the Commission on December 19, 2024. The Commission concurred with EERA's recommendations on January 7, 2025, and authorized EERA to include only the route proposed by the applicant in the scoping decision for the EA. The Department of Commerce (Department) issued the scoping decision for the EA on January 23, 2025 (Appendix A), identifying the potential impacts and route to be evaluated in this EA.

2.4 Public Hearing

Upon completion of the EA, a public hearing will be held in the project area. The hearing will be presided over by an ALJ from the OAH. At the public hearing, citizens will have the opportunity to submit comments, present evidence, and ask questions. Citizens can advocate for conditions to be included in the route permit. Members of the public can also comment on the EA regarding any information that might be inaccurate or missing in the document.

After the public hearing, the ALJ will submit a report to the Commission with findings of facts, conclusions of law, and recommendations regarding the route permit for the project. EERA staff will respond to

comments on the EA received during the hearing comment period, but staff is not required to revise or supplement the EA document. Upon completion of the environmental review and hearing process, the record will be presented to the Commission for final decisions.

2.5 Commission Decision

After considering the entire record, including the EA, input received during the public hearing, and the ALJ's findings and recommendations, the Commission will determine whether to grant the project a route permit. The route permit includes a permitted route and an anticipated alignment, as well as conditions specifying construction and operating standards. Route permits also typically include mitigation plans and project-specific mitigation measures. The Commission's decision on the route permit is anticipated in September 2025.

2.6 Other Permits and Approvals

A route permit from the Commission is the only state permit required for routing the project. A route permit supersedes local planning and zoning and binds state agencies (Minn. Statute 216E.10); therefore, state agencies are required to engage in the Commission's permitting process to aid in the Commission's decision-making and to indicate routes that are not permittable.

However, several federal, state, and local permits may be required for construction and operation of the project. All permits subsequent to the issuance of a route permit and necessary for the project must be obtained by the applicant. The information in this EA may be used by the subsequent permitting agencies as part of their environmental resource impact evaluation. Table 2-1 list permits and approvals that could be required for the project, depending on the final design.

Table 2-1 Summary of Possible Permits, Licenses, Approvals and Consultations

Permit	Jurisdiction
Federal	
Section 404 Clean Water Act Permit	United States Army Corps of Engineers
Section 7 Endangered Species Act / Migratory Bird Treaty Act Consultation/ Bald and Golden Eagle Protection Act	United States Fish and Wildlife Service
Section 106 of the National Historic Preservation Act Consultation	United States Department of Agriculture Rural Utilities Service
Farmland Protection Policy Act/Farmland Conversion Impact rating	Department of Agriculture/ Natural Resource Conservation Service
Part 7460 Airport Obstruction Evaluation	Federal Aviation Administration
State	
Route Permit	Minnesota Public Utilities Commission
Minnesota Statutes Chapter 138 (Minnesota Field Archaeology Act and Minnesota Historic Sites Act)	Office of the State Archaeologist State Historic Preservation Office Tribal Historic Preservation Offices
License to Cross Public Waters	Minnesota Department of Natural Resources – Lands and Minerals
Water Appropriation General Permit – Construction Dewatering	Minnesota Department of Natural Resources

Permit	Jurisdiction
State Endangered Species Consultation	Minnesota Department of Natural Resources – Ecological Services
National Pollutant Discharge Elimination System (NPDES)	Minnesota Pollution Control Agency
(NPDES) Construction Stormwater General Permit Coverage	
Minnesota Pollution Control Agency	
Section 401 Clean Water Act Water Quality Certification	
Wetland Conservation Act	Minnesota Board of Water and Soil Resources Fillmore County Soil and Water Conservation District
Oversize and/or Overweight Permits	Minnesota Department of Transportation
Local	
Road Crossing/Access/ROW/Utility Permits	York Township; Fillmore County
Moving Permits	
Other	
Crossing Permits/Agreements	Other utilities, such as railroads

2.6.1 Federal Approvals

The United States Army Corps of Engineers (USACE) regulates potential impacts to waters of the United States. Dredged or fill material, including material that moves from construction sites into these waters, could impact water quality. The USACE requires permits for projects that may cause such impacts.

The U.S. Fish and Wildlife Service (USFWS) requires permits for the taking of threatened or endangered species, bald and golden eagles, and native migratory birds. The USFWS encourages consultation with project proposers to ascertain a project's potential to impact these species and to identify general mitigation measures for the project.

The US Department of Agriculture Rural Utilities Service (RUS) is providing funding for the project and is also considered the lead federal agency pursuant to National Historic Preservation Act of 1966 (Section 106). RUS is therefore charged with coordinating with the State Historic Preservation Office (SHPO) and Native American tribes regarding potential impacts to significant cultural resources as a result of the project.

The US Department of Agriculture, Natural Resources Conservation Service (NRCS) coordinates with lead federal agencies to assess project impacts to farmlands under the Farmland Protection Policy Act (FPPA). The NRCS is responsible for determining if the FPPA is applicable to the project and provides a farmland conversion impacts rating to the lead federal agency to assess the relative impact of a project on FPPA protected farmlands.

The Federal Aviation Administration (FAA) regulates civil aviation, including the airspace used for aviation. The FAA requires permits for tall structures, including transmission line structures, that could adversely impact aviation.

2.6.2 State of Minnesota Approvals

The Minnesota SHPO is charged with preserving and protecting the state's cultural resources. SHPO consults with project proposers and state agencies to identify cultural resources (e.g., through surveys) and to avoid and minimize impacts to these resources.

The DNR regulates potential impacts to Minnesota's public lands and waters. The DNR requires a license to cross public lands and waters; licenses may require mitigation measures. Similar to the USFWS, the DNR also encourages consultation with project proposers to ascertain a project's potential to impact state-listed threatened and endangered species and possible mitigation measures.

A general National Pollutant Discharge Elimination System (NPDES)/Sanitary Disposal System (SDS) construction stormwater permit from the Minnesota Pollution Control Agency (MPCA) is required for stormwater discharges from construction sites. A permit is required if a project disturbs one acre or more of land. The general NPDES/SDS permit requires (1) the use of best management practices (BMPs), (2) a stormwater pollution prevention plan, and (3) adequate stormwater treatment capacity once the project is constructed. The NPDES/SDS permit intends for state water quality standards not to be compromised.

The Minnesota Board of Water and Soil Resources (BWSR) oversees the implementation of Minnesota's Wetland Conservation Act (WCA). The WCA is implemented by local units of government (LGUs). For linear projects that cross multiple LGUs, BWSR typically coordinates the review of potential wetland impacts among the affected LGUs. The WCA requires anyone proposing to impact a wetland to (1) try to avoid the impact, (2) try to minimize any unavoidable impacts, and (3) replace any lost wetland functions.

A permit from the Minnesota Department of Transportation (MnDOT) is required for transmission lines that are adjacent to or cross over Minnesota trunk highway ROW. MnDOT's utility accommodation policy generally allows utilities to occupy portions of highway ROW where such occupation does not put the safety of the traveling public or highway workers at risk or unduly impair the public's investment in the transportation system.

2.6.3 Local Approvals

The Commission's route permit supersedes local planning and zoning regulations and ordinances. However, the applicant must obtain all local approvals necessary for the project that are not preempted by the Commission's route permit, such as approvals for the safe use of local roads.

2.6.4 Other Approvals

Other approvals and/or crossing agreements may be required where project facilities cross an existing utility, such as a pipeline, solar facility, or railway. The need for such approvals would be determined after the final route is selected, and the applicant has indicated that these approvals would be obtained after a route permit has been issued by the Commission.

2.6.5 Electric Safety and Reliability Costs

The project must meet the requirements of the National Electrical Safety Code (NESC). Utilities must comply with the most recent edition of the NESC, as published by the Institute of Electrical and Electronics Engineers, Inc., and approved by the American National Standards Institute, when constructing new facilities or upgrading existing facilities (Minn. Statute 326B.35).

The NESC is designed to protect human health and the environment. It also ensures that the transmission lines and all associated structures are built from high-quality materials that will withstand the operational stresses placed upon them over the expected lifespan of the equipment, provided that routine maintenance is performed.

Utilities must also comply with North American Electric Reliability Corporation (NERC) standards. NERC standards define the reliability requirements for planning and operating the electrical transmission grid in North America.

3 Overview of Project

The applicant is proposing to construct an approximately 3.5-mile long, 161 kV transmission line in Fillmore County, Minnesota. The project will start in the vicinity of Structure LQ8A-111 on the applicant's existing 161 kV LQ8A transmission line in York Township, Minnesota, generally traveling south, crossing the Minnesota-Iowa border, and ending in the new Beaver Creek Switchyard in Iowa. The Minnesota portion of the proposed project is located in York Township, Fillmore County.

This chapter describes the transmission line structures and components that are proposed to be used for the project and the project's associated facilities. Additionally, this chapter discusses how the project will be constructed and its anticipated costs and schedule. Several terms used throughout this chapter and the remaining document have specific meanings and are defined here for clarity.

- **ROW** means the land interest required within a route for the construction, maintenance, and operation of a high-voltage transmission line (Minn. Rule 7850.1000). The applicant has indicated that the project requires a 100-foot-wide ROW (50 feet on either side of the transmission line's centerline).
- **ROW sharing** means that the new transmission line would be co-located with an existing transmission line or other existing infrastructure ROW (e.g., transportation, pipelines, etc.) to partially share that existing ROW and lessen the overall easement width required from landowners.

3.1 Engineering and Design

Design of transmission lines and associated facilities occurs through multiple stages, including identification of existing rights-of-way, transmission line design, ROW acquisition, and geotechnical investigations. The applicant has proposed a single circuit design, using aluminum conductor steel supported conductor line and incorporating two structure types for the project to allow for multiple configurations (Table 3-1). This chapter describes the transmission lines, structures, and configurations that may be used for the project.

Table 3-1 Types of 161 kV Structures Proposed for the Project

Structure Type	Material	Approximate Height Above Ground (feet)	Structure Base Diameter (inches)	Span Between Distances (feet)
Monopole with davit arms and suspension insulators	Steel	80 - 140	31 - 51	300 - 1,000
Monopole with strain insulator attachments directly to structure	Steel	75 - 110	35 - 55	300 – 1,000

3.1.1 Transmission Lines

Transmission line circuits consist of three phases, each phase at the end of a separate insulator and physically supported by a structure that holds it above ground. A phase consists of one or more conductors: single, double, or bundled. A typical conductor is a cable consisting of aluminum wires stranded around a core of steel wires. There may also be shield wires strung above the phases to prevent

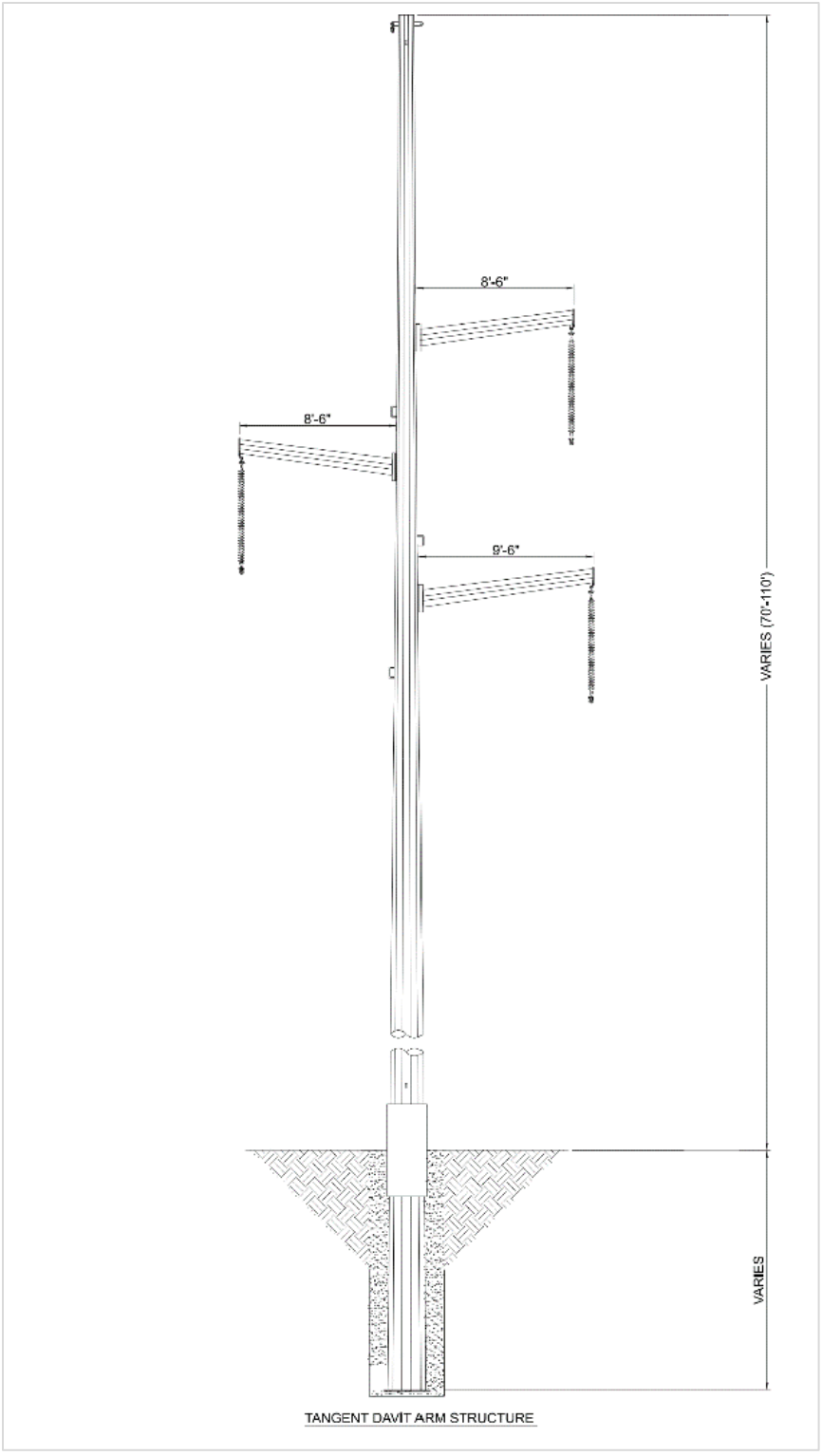
damage from lightning strikes. The majority of the project will consist of a single circuit, 161 kV line with steel monopole structures spaced approximately 300 to 1,000 feet apart.

3.1.2 Structures

The project will be constructed using single-circuit, self-supporting steel monopoles. The use of monopoles minimizes project footprint and ROW requirements. Proposed structure designs and photographs are provided in Figure 3-1 and Figure 3-2.

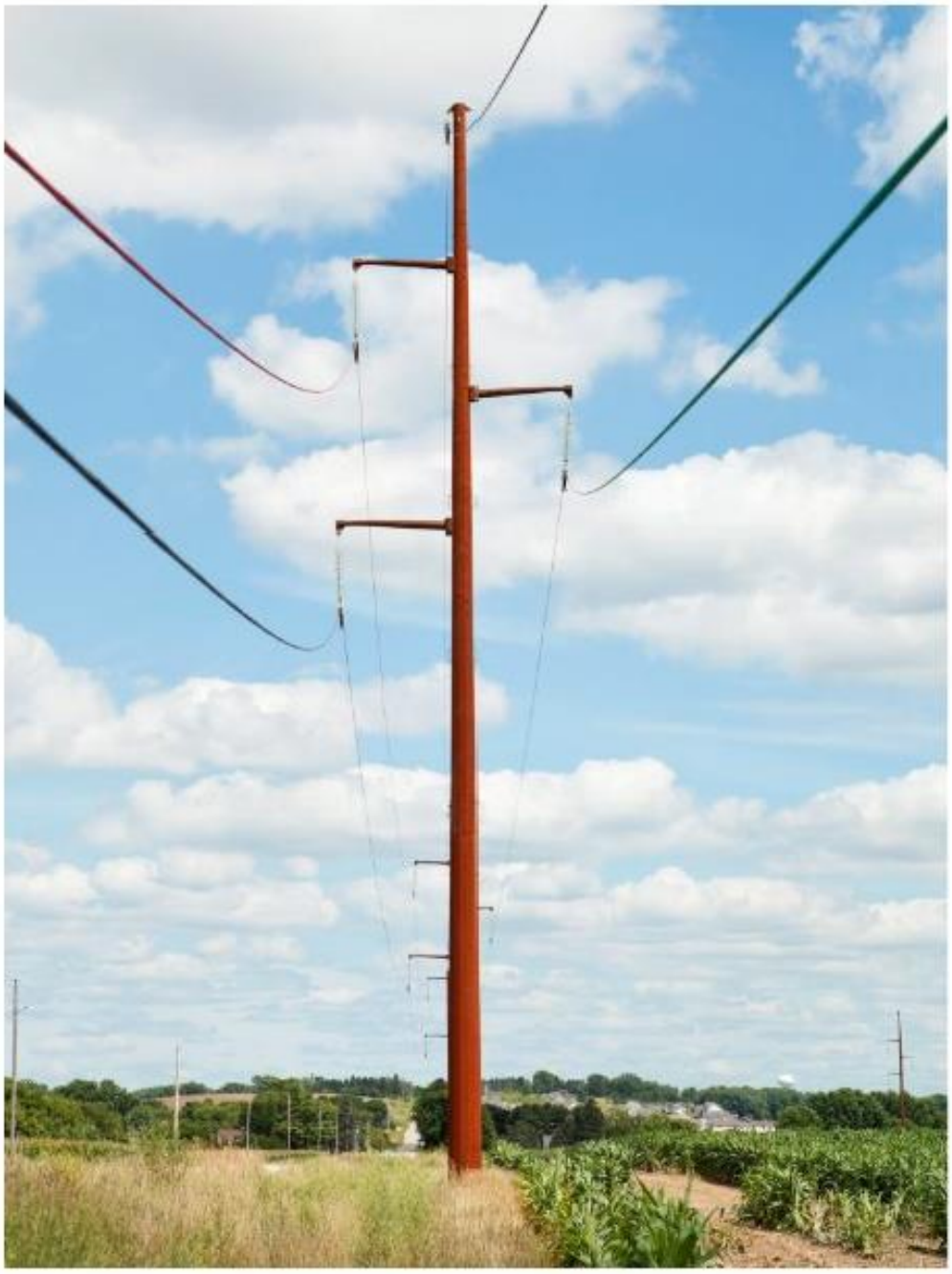
Transmission structures typically range in height from 75 to 140 feet above ground, depending upon the terrain and environmental constraints. The average diameter of the steel structures at ground level is 37 inches. Structures would be oriented in a delta configuration (one overhead ground wire at the top, two phases on one side, and a single phase on the other) supported by suspension insulators at tangent structures and strain insulators at tension structures (i.e., dead-end structures). All tangent poles with a line angle of two degrees or less would be directly embedded in the soil and are referred to as “tangent poles;” the typical depth of direct embedment is 10 percent of the pole height plus two feet. Any structure with a line angle greater than two degrees would be supported on a drilled shaft concrete foundation. Foundation depths are dependent upon geotechnical data and final design.

A dead-end structure is used to change direction and/or wire tension on a transmission line. Dead-end structures are also used as “storm structures” to limit the number of structures damaged by a cascading effect due to higher line tensions when a pole is knocked down by a storm. Dead-end structures would be steel on concrete foundations.



(monopole with davit arms)

Figure 3-1 Typical 161 kV Transmission Structure Design



(monopole with davit arms)

Figure 3-2 Photograph of Typical 161 kV Transmission Structure

3.1.3 Conductors

The structures would have three single conductor phase wires and one shield wire. It is anticipated that the phase wires would be 795 thousand circular mil aluminum conductor steel supported (795 Drake aluminum conductor steel supported) or a conductor with similar capacity. The shield wire would be a 0.607-inch diameter optical ground wire.

3.1.4 Associated Facilities

Associated facilities proposed for the project include the applicant's existing 161 kV LQ8A transmission line and a proposed new 161 kV switchyard facility to be constructed in Howard County, Iowa.

The beginning of the project (MP 0.0) would be at the intersection of the applicant's existing 161 kV LQ8A transmission line and 171st Avenue in York Township, Fillmore County, Minnesota. Existing structure LQ8A-111 would be removed and replaced with a new starting structure for the project; the location proposed for the new structure would be on the east side of 171st Avenue. The project would continue south along the east side of 171st Avenue for approximately one mile. Over the next 0.25 mile, the project will transition to the west side of 171st Avenue and then return to the east side of 171st Avenue. The project will then continue south along the east side of 171st Avenue for an additional 2.25 miles to the Minnesota and Iowa border.

The project will continue into Iowa and terminate at the new, applicant-proposed 161 kV switchyard facility in Howard County. The switchyard will serve as a new interconnection point for the applicant's existing 161 kV LQ8A, LQ8D, and LQ30 transmission lines and as the interconnection point for wind energy, effectively relocating the intersection of the 161 kV LQ8A and LQ30 transmission lines from present location in Minnesota to a new location in Iowa. This EA analyzes only the portion of the project in Minnesota.

3.2 Route Width, Right-of-Way, and Anticipated Alignment

When the Commission issues a route permit, it approves a route, a route width, and an anticipated alignment within that route width (Figure 3-3). The Commission may include conditions in a route permit. These conditions could address the route width or anticipated alignment in a specific area of the project, for example, requiring the alignment of a specific portion of the route to be north rather than south of a road or requiring that the route width be narrower in a certain area.

3.2.1 Route Width

The route width is typically larger than the actual ROW needed for the transmission line (Figure 3-3). This additional width provides flexibility in constructing the line, yet it is not to such an extent that the placement of the line is undetermined. The route width allows the applicant to work with landowners to address their concerns and to address engineering concerns that may arise after a permit is issued. The route width, in combination with the anticipated alignment, is intended to balance flexibility and predictability.

The transmission line must be constructed within the route designated by the Commission unless, after permit issuance, permission to proceed outside of the route is sought by the applicant and approved by the Commission (Minn. Rule 7850.4800).

In general, the applicant is requesting a route width of 250 feet on either side of the proposed transmission line centerline for a total of a 500-foot route width. The applicant is requesting a widened route width, up to 1,320 feet wide, for specific portions of the route to consider existing infrastructure, mitigate potential engineering challenges, and/or facilitate any necessary realignments/modifications to accommodate agency and/or landowner requests. Specifically, the applicant requested a variable width where the line will transition to the west side of 171st Avenue to allow flexibility in routing around existing homes, buildings, and other features along the township road.

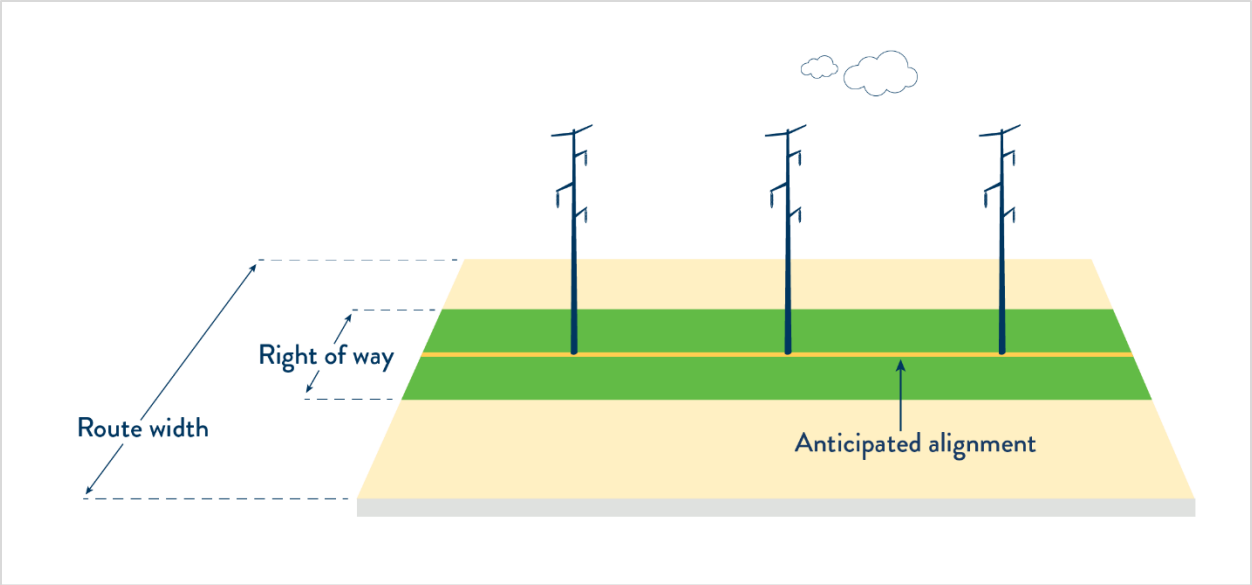


Figure 3-3 Route Width, Right-of-Way, and Anticipated Alignment Schematic

3.2.2 Right-of-Way

A ROW is the specific area required for the safe construction and operation of the transmission line, where such safety is defined by the NESC and the NERC reliability standards. The ROW must be within the designated route and is the area for which the applicant obtains rights from private landowners to construct and operate the line.

Once the Commission issues a route permit, the applicant will conduct a detailed survey and engineering work. Additionally, the applicant will contact landowners to gather information about their property and their concerns and discuss how the transmission line ROW might best proceed across the property. A transmission line ROW across private property is typically obtained by an easement agreement between the applicant and landowners.

The applicant has indicated that the project requires a 100-foot-wide ROW (50 feet on either side of the centerline). However, additional temporary workspace (ATW) beyond the 100-foot-wide ROW may be required for construction at certain locations, such as at road or railroad intersections, utility crossings, along steep slopes, and at stringing locations. In addition, there will be temporary staging of materials such as structures and hardware along the ROW prior to construction.

3.2.3 Anticipated Alignment

The anticipated alignment is the anticipated placement of the transmission line within the route width and ROW; in essence, where the transmission line is anticipated to be built.

After coordinating with landowners and completing detailed engineering plans, the applicant will establish the final project alignment and designate structure placements. These final plans, known as “plans and profiles,” must be provided to the Commission so that they can confirm that the applicant’s plans are consistent with the route permit and all permit conditions prior to construction of the project. This confirmation ensures that the built project alignment is consistent with the anticipated alignment in the Commission’s permit.

3.3 Construction and Maintenance

Construction of the project will not begin until all necessary federal, state, and local approvals have been obtained, easements have been acquired for ROW, and final plans and profiles have been approved by the Commission. The precise timing and order of ROW clearing and construction along the line will depend on the receipt of all necessary approvals, system loading issues, landowner agreements, and available workforce.

3.3.1 Right-of-Way Acquisition

The applicant has initiated landowner outreach, providing information on the project through letters, emails, telephone calls, and/or personal visits to potentially impacted landowners, interested parties, and federal, state, and local governmental officials. Applicant representatives appeared at regularly scheduled township board meetings in York and Beaver Townships to introduce the project.

In connection with the Iowa portion of the project, pursuant to the requirements of 478.2, Code of Iowa, the applicant was required to hold a landowner informational meeting in Howard County, Iowa, prior to any negotiations with landowners. Applicant representatives began personally contacting landowners in Minnesota following the landowner informational meeting in Iowa to introduce the project, solicit feedback, and secure permission to enter a property for preliminary land survey activities. The applicant will continue to engage with landowners throughout the permitting process to answer any questions they may have regarding the easement process or the project.

The majority of the project's land is privately owned. New easements will be needed for the 161 kV transmission line route. Applicant representatives will work directly with individual landowners to negotiate the necessary easements. At a minimum, the project may obtain a total ROW of 100 feet (typically 50 feet from each side of the transmission centerline) for the 161 kV transmission line system. Where the transmission line parallels roads, the transmission line structures are typically installed one to ten feet outside of the road ROW, resulting in approximately 55 feet of ROW needed outside of the road ROW. The final ROW width will vary depending on factors such as proximity to or overlap with public road ROWs, transmission line structure types, transmission line structure locations relative to existing or future improvements, etc. Modifications to the ROW width acquired and/or utilized are made on a case-by-case basis.

In addition to permanent easements needed for the construction of the line, agreements may be obtained from certain landowners for temporary construction or staging areas for the storage of structures, vehicles, or other related items.

3.3.2 Right-of-Way Access

The applicant will evaluate construction access opportunities by identifying existing easements, roads, and/or trails adjacent to the permitted route. Where feasible, the applicant indicated that they will limit access and construction activities to the ROW acquired for the project to minimize impacts to landowners and adjacent properties. In some situations, private field roads, trails, or farm fields may be used to gain access to construction areas. Where no current access is available, where existing access is inadequate, or when access requires incorporation of areas outside the ROW, permission from landowners will be obtained prior to using any of these areas to access the ROW for construction.

Improvements to existing access or construction of new access could be required to accommodate construction equipment. Where applicable, the applicant will obtain permits for new access from local

road authorities. The applicant will also work with appropriate road authorities to agree on proper maintenance of roadways traversed by construction equipment.

3.3.3 Equipment and Staging

Construction activities will require the use of many different types of equipment, including, but not limited to, cranes, backhoes, line trucks, drill rigs, dump trucks, front-end loaders, bulldozers, flatbed trucks, concrete trucks, cranes, and various trailers for hauling equipment. Excavation equipment is often set on wheel or track-driven vehicles. Where possible, construction crews will use equipment that minimizes impacts.

Construction staging areas will be required for the project and will be identified after a route is permitted. To the extent practicable, staging areas will be located on previously disturbed sites and will be used as receiving locations for delivery and storage of construction materials and equipment until they are needed for the project. Preferable staging areas would be large enough to lay down material and pre-assemble certain structural components or hardware. For staging areas outside the project ROW, rights to use these areas will be obtained individually from the landowners.

3.3.4 Construction Process

Construction for the project will begin once all required approvals are obtained, property and ROWs are acquired, and the final design is complete. Construction of an overhead transmission line requires several different activities at any given location. Major construction activities and the approximate construction sequence are illustrated in Figure 3-4 and described below. Construction will follow the applicant's standard construction and mitigation best practices. After land rights have been secured and prior to the start of any construction activities, landowners will be notified of the project schedule and other related construction activities. The applicant anticipates that construction will take approximately two months to complete.

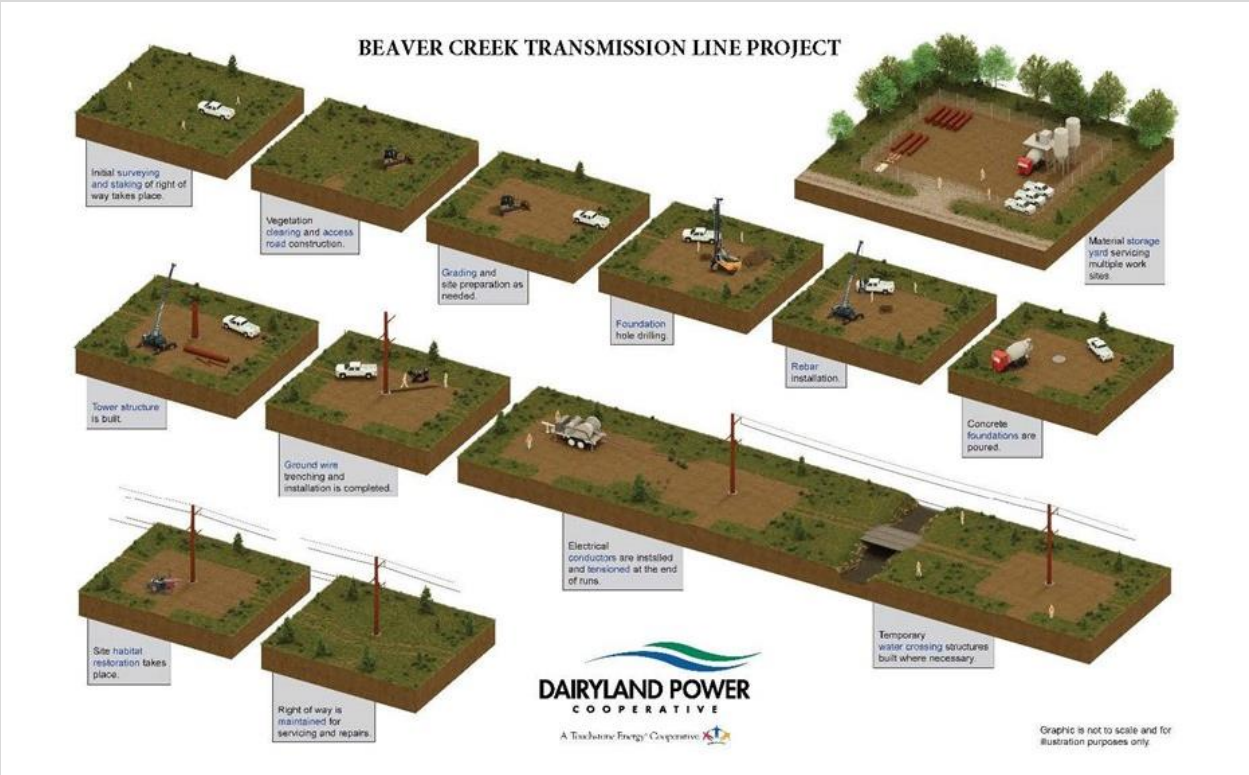


Figure 3-4 Applicant's Standard Construction Sequence

3.3.4.1 Geotechnical Evaluation

Geotechnical data collection is necessary for the final design of the transmission line and will be performed prior to construction activities. Soil borings are generally completed using rubber tired or tracked drill rigs, depending on site and access conditions. A pick-up truck or all-terrain vehicle (ATV) transports the crew and drilling supplies to the work area. Construction mats (composite fiberglass and/or wood) may be installed as needed based on site conditions and where access is required in wetland areas. Sites will be restored to pre-construction conditions upon completion of geotechnical investigations. The applicant will obtain the applicable permits and approvals prior to conducting this work.

3.3.4.2 Surveying and Staking

Surveying and staking will be conducted during multiple phases of the project and will include locating and marking the ROW and authorized off-ROW access roads, sensitive environmental resource boundaries, foundations or structure locations, property or section lines, underground and aboveground utilities, etc. Surveying and staking will be performed prior to and sometimes after construction activities, such as during constructability reviews, soil borings, staging/laydown yards, clearing, installation of foundations, and hole excavations. Surveying and staking generally have limited impact on the environment and are generally completed by a two-person crew traveling by foot, ATV, or pick-up truck.

3.3.4.3 Erosion and Sediment Control

Installation of erosion and sediment control BMPs would be implemented prior to anticipated ground disturbance and in accordance with the Minnesota Pollution Control Agency (MPCA) NPDES Construction Stormwater General Permit. Erosion and sediment control equipment include ATVs and

trucks for crew transportation, as well as skid loaders, tractors, backhoes, hydro-seeders, and other light-duty equipment. BMPs would be inspected, maintained, repaired, and replaced in accordance with the MPCA Construction Stormwater General Permit.

3.3.4.4 Mobilization and Preparation of Staging / Laydown Yards

Initially, labor and equipment will be mobilized to prepare laydown yards for temporary trailer(s) and security measures to receive materials, storage containers, portable toilets, dumpsters, construction mats, tools, and equipment, etc. Activities involved in preparing the staging/laydown yards may include installation of erosion and sediment control BMPs, any leveling of uneven surfaces, stripping and stockpiling of topsoil (if necessary), and installation of gravel, tracking pads near entry/exit (if needed), installation of culvert(s), power, and fencing. This work is generally completed using equipment such as a bulldozer and dump trucks. The disturbance from the laydown yard is dependent on soil type and topography. Depending on landowner preferences and applicable permitting conditions, laydown yards and portions thereof may be left in place or returned to prior conditions following construction activities.

3.3.4.5 Road Improvements and Development

In order to access the ROW, the applicant may need to improve existing access roads or develop new access roads. Road improvements may include tree trimming, tree clearing, road grading, widening, and fill placement. Only construction mats will be used in wetland features; construction mats will be removed after completion of construction activities. This work is generally completed using equipment such as a bulldozer, track-hoe, skid-loader, and dump trucks. The travel surface of the access road is generally 20 to 25 feet wide. The total amount of disturbance of the road (cut slope to the base of the spoils slope) is dependent on soil type and topography. Depending on landowner preferences and permit requirements, access roads may be left in place or returned to prior conditions following construction.

3.3.4.6 Clearing of ROW

To facilitate construction equipment access and ensure safe clearances between vegetation and the transmission line, all tall-growing vegetation will be removed from the ROW. Vegetation will be cut at or slightly above the ground surface using mechanized mowers, sky trims, processors, harvesters, or by hand. Rootstocks would generally be left in place, except in areas where stump removal is necessary to facilitate the movement of construction vehicles or when reasonably requested by the landowner. Side trimming the ROW would happen shortly after the clearing is completed. Following the side trimming, a final mowing of debris and stump cleanup would be completed. Where permission of the landowner has been obtained, stumps of tall-growing species will be treated with an herbicide to discourage re-growth.

3.3.4.7 Construction Matting

Matting will be used as a protective measure that minimizes ground impacts and will be installed to provide access through wetlands or other unstable soil areas prior to construction. Matting may be used to minimize compaction in agricultural areas if installed prior to construction. Mats are also used to support and stabilize large equipment required for construction. Construction mat travel lanes will generally be 16 to 20 feet wide. Construction matting may consist of composite, timber, or laminate mats and will be installed with rubber-tired grapple trucks, forwarders, forklifts, or skid loaders. The line will be constructed in segments, with mats being moved and used in other segments as construction progresses.

3.3.4.8 Additional Temporary Workspace

ATW beyond the 100-foot-wide ROW may be required at certain locations, such as road intersections, utility crossings, and along steep slopes. In addition, there will be temporary staging of materials such as structures and hardware along the ROW prior to construction installation. This work involves such equipment as semi-trucks, loaders, and cranes to unload structures and other materials near each work location. The applicant will avoid the placement of ATW in wetlands and near waterbodies as practicable.

3.3.4.9 Grading, Excavation, and Foundation Installation

Prior to foundation installation, the applicant will install a construction mat platform, generally 40 feet by 40 feet, around the structure location to provide a level and safe working area. In some cases, the applicant may grade an area approximately 40 feet by 40 feet around the structure location to develop the needed level surface. Excavation is required for all structures, whether they are direct-embedded or reinforced concrete foundations. In general, the excavated holes for each type of foundation range from 5 to 10 feet in diameter and 20 to 50 feet in depth or greater, depending on soil conditions.

The method of installation, diameter, and depth of the foundation will vary depending on the soil capability and structure loadings. For direct-embedded structures, a hole will be excavated to the appropriate depth. The base of the structure will be placed into the excavated hole or, if soils are unstable, into a culvert, and the area around the pole will be backfilled with clean granular fill or concrete. For structures requiring a reinforced concrete foundation, the required hole will be excavated, and a rebar cage and anchor bolts will be placed into the excavation. The excavation will then be filled with concrete to a point where the rebar cage and anchor bolts are covered, leaving a typical one to two-foot reveal of the foundation above grade with exposed threaded anchor bolts. The complete caisson will then be allowed to cure. Typical equipment for this phase of construction would include dump trucks, drill rigs, cranes, vacuum trucks, concrete mixers, and tanker trucks.

In areas with high water tables or where water is needed to stabilize the hole during drilling, it may be necessary to dewater the excavation. Depending on site conditions, the water may be filtered through a geotextile filter bag or similar method and discharged to an upland area where it can re-infiltrate or be removed from the site via a tank truck. Appropriation and discharging activities will follow applicable regulations and permit requirements to ensure compliance with Minnesota water quality standards.

3.3.4.10 Structure Setting

For base plate structures (mounted on concrete foundation), the above-grade structure is placed on the anchor bolt pattern, leveled, and tightened down. For direct-embedded structures, the base section is installed, leveled, and backfilled with granular or flow-able fill. After that, the top section or sections will be installed. At each section, hydraulic jacking systems are typically used to slide the joints together to the engineered and fabricated tolerances. Equipment used for this phase of construction includes cranes and bucket trucks at each structure location.

3.3.4.11 Wire Stringing and Clipping

Once there are a sufficient number of structures set consecutively in a row to support a wire pull, the equipment for the wire pull is mobilized to the pull area and is set up. The conductor and static wires are then pulled and clipped into place. This stringing and clipping activity requires access to each structure with a bucket truck or crane. Other handling equipment used for this phase of construction includes reel trailers, wire pullers, and related stringing equipment. Wire stringing areas or wire pulling areas are

approximately 40 feet by 300 feet. At a minimum, matting will be placed under wire equipment for construction grounding purposes at each wire-pulling area. Incidental matting will also be required at most road crossings. Matting will be removed using equipment similar to what is used for installation as each wire pull or construction segment is completed. During mat placement, use, and removal, standard procedures would be implemented to prevent or minimize the spread of invasive species.

3.3.4.12 Removal of Existing Facilities

Where replacing or overbuilding existing transmission circuits, the existing structures and wire will be removed. The removed materials will be evaluated to determine their appropriate disposal. Typical equipment used includes cranes, bucket trucks, reel trailers, wirepullers, and related stringing equipment. Where existing transmission structures are to be removed, it is common practice to remove the structure to a depth of at least four feet below grade; however, in some cases, the structure may be cut off at grade. The determination will be site-specific and will be based on the type of structure, land use at the site, and construction vehicle access constraints. The applicants anticipate that one existing structure on their existing LQ8A line would be removed and replaced with a new starting structure for the project (Figure 3-5). A portion of the existing 161 kV LQ8A line, from 171st to 131st Avenues, would then be retired and removed from service upon completion of the project. In addition, MiEnergy Cooperative (MiEnergy) has an existing 12.47 kV overhead distribution line within the route width along 171st Ave from County State Aid Highway (CSAH) 44 to the Iowa state line. The applicant intends to request that MiEnergy bury this line where it would coincide with the project, as opposed to attaching the distribution line to the new 161 kV structures. If MiEnergy agrees to bury their distribution line, this may occur as a separate undertaking, unrelated to the project. The applicant anticipates that MiEnergy may bury their distribution line prior to the beginning of construction for the project.

(looking northeast from 171st Avenue)

Figure 3-5 Project Tie-in Location: Existing LQ8A 161 kV Transmission Line

3.3.4.13 Cleanup and Restoration of ROW

Upon completion of construction, cleanup and site restoration occur. This includes removing construction mats, temporary clean span bridges, and other material or debris from the ROW. Any necessary seedbed preparation and seeding will be performed along with BMPs. Typical equipment used for these activities include mat trucks, bobcats, pickup trucks, and other light-duty vehicles.

3.3.4.14 Demobilization and Laydown Yard Cleanup

The last step in the construction process is final cleanup of the laydown yards by removing all items, such as trailers, security fencing, leftover materials, storage containers, portable toilets, dumpsters,

construction mats, tools, and equipment from the Project site. Once the final laydown restoration is complete per the contractual agreement with the applicable landowner, the construction phase is complete.

Although the workforce would ebb and flow over the course of the Project, the applicant anticipates that approximately 20-30 construction workers (applicant employees and contractors) would be employed during the construction phase of the Project. One or more construction supervisors would also be on site throughout the construction phase.

3.3.5 Restoration and Cleanup

Disturbed areas will be restored to their original condition to the maximum extent practicable or as negotiated with the landowner. Post-construction reclamation activities will include removing and disposing of debris, removing all temporary facilities (including staging and laydown areas), installing appropriate erosion and sediment control BMPs, reseeding areas disturbed by construction activities with vegetation similar to that which was removed with a seed mixture certified as free of noxious or invasive weeds, and restoring the areas to their original condition to the extent possible. In cases where soil compaction has occurred, the construction crew or a restoration contractor uses various methods to alleviate the compaction or as negotiated with landowners.

The applicant will contact landowners after construction is complete to determine if the clean-up measures have been to their satisfaction and if any other damage may have occurred. If damage has occurred to crops, fences, or the property, the applicant will compensate the landowner. In some cases, an outside contractor may be hired to restore the damaged property as near as possible to its original condition.

3.3.6 Maintenance Procedures

The project will be designed and maintained in accordance with the NESC and the applicant's standards. In general, transmission lines boast a high level of reliability and lengthy service life, often spanning decades, and seldom undergo complete retirement. Transmission lines have very few mechanical elements and are designed to function for decades and constructed to withstand weather extremes typical of the region.

The applicant will be responsible for the operation and maintenance of the project, which will include performing annual inspections and addressing and correcting any deficiencies identified during these examinations. Applicant inspections will be limited to the ROW and to areas where obstructions or terrain may require off-ROW access. The ROW will be managed by the applicant or its contractors to control encroachment that may interfere with transmission line operation, including vegetation management activities. Vegetation management activities within the ROW may include mechanical clearing, hand clearing, and herbicide application.

3.4 Project Costs

Total estimated costs for the project are approximately $4 million, based on 2020 dollars (Table 3-2). Costs include permitting, land acquisition and ROW, design/engineering, procurement of materials, construction costs, and contingency. The cost estimate assumes that the applicant would pay prevailing wages for applicable positions for the project's construction and no significant changes to the project, as described herein, are required. All capital costs for the project would be initially borne by the applicant;

however, these costs would be reimbursed to the applicant by the owner of the generator identified in MISO's Generation Interconnection Process.

Table 3-2 Estimated Project Cost

Project Component/Task	Estimated Cost
State Permitting	$0.1M
Land Acquisition	$0.5M
Design	$0.3M
Procurement	$1.7M
Construction	$1.1M
Contingency	$0.3M
Total	**$4.0M**

3.5 Project Schedule

It is anticipated that the Commission will make decisions on the applicant's route permit application in Q3 2025. The applicant anticipates that project construction would commence as early as Spring 2026. The start of construction is dependent on the receipt of all required permits and approvals. The applicant anticipates that the project would be energized in February 2027.

4 Affected Environment, Potential Impacts, and Mitigation Measures

This chapter provides an overview of the human and environmental resources that may be affected by the project. It discusses the potential project impacts on these resources and the measures that could be used to avoid, minimize, and mitigate these impacts.

Project construction and operation may impact certain human and environmental resources. There would be some short-term impacts and they would be similar to those of any large construction project (e.g., noise, dust, soil disturbance). Impacts may be mitigated by measures common to most construction projects; for example, the use of erosion-control blankets and silt fencing.

Other impacts will exist for the life of the project and may include aesthetic impacts, impacts to agriculture, and impacts to natural resources. Long-term impacts are generally not well mitigated by construction measures; these impacts do not flow from how the project is constructed but rather where it is located and its design. Long-term impacts can be mitigated through prudent project design. Detailed tables summarizing the data used for impact analyses are included in Appendix C.

4.1 Describing Potential Impacts and Mitigation

This chapter analyzes the potential human and environmental impacts of the project on various resources. Understanding these impacts involves contextualizing their duration, size, intensity, and location. This form of contextual information serves as the basis for assessing the project's impacts on resources.

- **Duration**—Impacts vary in length of time. Short-term impacts are temporary and generally associated with construction. Long-term impacts are associated with operation and usually end with decommissioning and reclamation. Permanent impacts extend beyond the decommissioning stage.
- **Size**—Impacts vary in size. To the extent possible, potential impacts are described quantitatively, for example, the number of impacted acres or the percentage of affected individuals in a population.
- **Intensity**—Impacts vary in the severity to which a resource is affected, in whatever context that impact occurs.
- **Location**—Impacts are location dependent. For example, common resources in one location might be uncommon in another.

Instead of assigning values based on resource significance, qualitative descriptors are employed. These descriptors provide a standardized language for understanding the impact levels and characteristics of the applicant's proposed route. For this work, the qualitative descriptors are as follows:

- **Minimal**—Minimal impacts do not considerably alter an existing resource condition or function. Minimal impacts may, for some resources and at some locations, be noticeable to an average observer. These impacts generally affect common resources in the short term.

- **Moderate**—Moderate impacts alter an existing resource condition or function and are generally noticeable or predictable for the average observer. Effects may be spread out over a large area, making them difficult to observe, but can be estimated by modeling or other means. There may be moderate or permanent long-term impacts to common resources, but they are generally short- to long-term impacts to rare and unique resources.

- **Significant**—Significant impacts alter an existing resource condition or function to the extent that the resource is severely impaired or cannot function. Significant impacts are likely noticeable or predictable for the average observer. Effects may be spread out over a large area making them difficult to observe but can be estimated by modeling. Significant impacts can be of any duration and may affect common and rare and unique resources.

This EA also discusses ways to avoid, minimize, or mitigate specific impacts. These actions are collectively referred to as mitigation.

- **Avoid**—Avoiding an impact means that the impact is eliminated altogether by moving or not undertaking parts or all of a project.

- **Minimize**—Minimizing an impact means to limit its intensity by reducing the project size or moving a portion of the project from a given location.

- **Mitigate**—Impacts that cannot be avoided or minimized could be mitigated. Impacts can be mitigated by repairing, rehabilitating, or restoring the affected environment, or compensating for it by replacing or providing a substitute resource elsewhere.

4.1.1 Region of Influence

The region of influence (ROI) is the geographic area within which the project may exert some influence. The ROI varies with the resource being analyzed and the potential impact (Table 4-1). Potential impacts to human and environmental resources are analyzed in this EA within each ROI. It is used in the EA as the basis for assessing the potential impacts to each resource as a result of the project. In this EA, the following ROI are used:

- **Fifty feet (ROW)**. A distance of 50 feet on each side of the anticipated alignment (100 feet total) is equivalent to the ROW for the project. ROW is used as the ROI for analyzing electronic interference, potential displacement impacts and impacts to land-based economies, the natural environment, and rare and unique natural resources.

- **Route Width**. The route width for the project corresponds generally to a distance of 250 feet on each side of the anticipated alignment (500 feet total) but also extends up to 1,320 feet total in certain areas along the applicant's proposed route. The route width is used as the ROI for analyzing potential impacts to aesthetics, archaeological and historic resources, public health and safety, and noise.

- **One thousand feet**. A distance of 1,000 feet (2,000 feet total) from the anticipated alignment for the project is used as the ROI for analyzing potential aesthetic and property value impacts, understanding the number of residences in proximity to the project, as well as impacts to transportation and public services, noise, and zoning and land use compatibility. Impacts may extend outside of the 1,000-foot distance but are anticipated to diminish relatively quickly such that potential impacts outside of this distance would be minimal.

- **One mile**. A distance of one mile (two miles total) from the project is used to provide context for archaeological and historic resources and rare and unique natural resources, and as the ROI for airports and airstrips.
- **Project Area**. The project area, defined generally as the civil township through which the project passes, is used as the ROI for analyzing potential impacts to climate change, cultural values, land use, emergency services, air quality, recreation and tourism, and socioeconomics and communities of environmental justice concern (EJC). These are resources for which impacts may extend throughout communities near the project.

Table 4-1 Regions of Influence

Type of Resource	Specific Resource/Potential Impact to Resource	Region of Influence (ROI)
Human Settlement	Displacement	ROW
Human Settlement	Aesthetics, Property Values, Noise, Zoning and Land Use Compatibility, Electronic Interference	1,000 feet
Human Settlement	Cultural Values, Socioeconomics/EJC	Project Area
Transportation and Public Services	Roadways/Railways, Public Utilities	1,000 feet
Transportation and Public Services	Emergency Services	Project Area
Transportation and Public Services	Airports	1 Mile
Public Health and Safety	Electric and Magnetic Fields, Implantable Medical Devices, Stray Voltage, Induced Voltage	Route Width
Climate Change	Greenhouse Gases, Climate Resilience	Project Area
Air Quality	Air Quality	Project Area
Land-Based Economies	Agriculture, Forestry, Mining	ROW
Land-Based Economies	Recreation and Tourism	Project Area
Archaeological and Historic Resources	Archaeological Resources; Historic Architectural Resources	Route Width, 1 Mile
Natural Environment	Water Resources	ROW
Natural Environment	Soils	ROW
Natural Environment	Vegetation and Wildlife	ROW
Natural Environment	Geology	Route Width
Rare and Unique Natural Resources	Protected Species	1 Mile
Rare and Unique Natural Resources	Sensitive Ecological Resources	ROW, 1 Mile

4.2 Environmental Setting

The project is located in south central Minnesota within Fillmore County and crosses into Iowa, where it would terminate at the new Beaver Creek Switchyard. Generally, the project is located in a low-density, rural agricultural landscape. The nearest town to the project is Chester, Iowa.

The Minnesota DNR and the U.S. Forest Service (USFS) have developed an Ecological Classification System (ECS) for ecological mapping and landscape classification in Minnesota that is used to identify, describe, and map progressively smaller areas of land with increasingly uniform ecological features (reference (3)). Map 4-1 shows the ecological sections and subsections near the project. The ECS splits Minnesota into ecological provinces, sections, and subsections. The project is within the Eastern Broadleaf Forest province, which is characterized by an ecotone between western prairie land and eastern semi-humid mixed conifer-deciduous forest in northeast Minnesota (reference (4)). The southeast portion of the Eastern Broadleaf Forest province transitions from areas impacted by glaciation during the last glacial maximum to the driftless area.

The project is within the Minnesota and Northeast Iowa Morainal ecological section. This zone includes glacial depositional landforms such as drumlins, outwash plains, and hummocky moraines. The project is further within the Oak Savanna subsection of the Minnesota and Northeast Iowa Morainal section. The Oak Savanna subsection is characterized by a rolling plain of loess-mantled ridges over sandstone and carbonate bedrock and till (reference (5)). Vegetation consisted primarily of bur oak savanna, interspersed with areas of tallgrass prairie and maple-basswood forest.

The project is approximately one and a half miles west of the Rochester Plateau in the Paleozoic Plateau section. The Rochester Plateau is characterized by a transition of the Des Moines lobe end moraines to a rolling plateau with dissected landscape features (reference (6)). Vegetation primarily consisted of tallgrass prairie and bur oak savanna.

4.3 Human Settlement

Transmission lines have the potential to negatively impact human settlements through a variety of means. Transmission line structures and conductors could change the aesthetics of an area, displace homes or businesses, introduce new noise sources, lower property values, be incompatible with local zoning, and/or interfere with electronic communications. Impacts to human settlements resulting from the project are anticipated range from minimal to moderate.

4.3.1 Aesthetics

The aesthetic and visual resources of a landscape are defined as the existing natural and built features that affect the visual quality and character of an area. Determining the relative scenic value or visual importance in any given area depends, in large part, on the individual viewer or community of viewers, whose perceptions are shaped by their values and experiential connection to the viewing area, as well as their physical relationship to the view, including distance to structures, perspective, and duration of the view.

For this EA, it is assumed that landscapes that are, for the average person, harmonious in form and use are generally perceived as having greater aesthetic value. Infrastructure that is not harmonious with a landscape or affects existing landscape features reflects a change in the aesthetic view that, for some or many, could negatively affect a viewer's perception and expectation of the area. Assessing visual quality reflects the difference between the landscape change and the individual or communal reaction to that change. As noted above, individual or communal perspectives are complex and affected by individual or shared values and experiences with the land. As such, some viewers may perceive the project setting as having high visual quality, while others may perceive the area to have less visual quality.

The project is also shaped by a built environment, where existing transmission line rights-of-way, highways, and county roads, referred to as "horizontal elements," are consistent throughout the project length. The project is located within a rural landscape that is generally flat to gently rolling and mainly agricultural along the route. MiEnergy has an existing 12.47 kV overhead distribution line within the route width; the distribution line structures range between 25 and 30 feet in height (Figure 4-1). The applicant plans to request that MiEnergy bury this distribution line prior to initiating construction on the project; this will be a separate undertaking by MiEnergy (see Chapter 3.3.4.12 for additional information).

The new structures that will be installed for the project range between 75 to 140 feet in height, around 50 to 110 feet taller than the existing MiEnergy structures.

Figure 4-1 Existing MiEnergy Distribution Line (Looking South from 171st Avenue)

The applicant's proposed route was developed to avoid proximity to residences, with no residences located within the ROW. There are six residences within 1,000 feet of the project, with the closest residences located between 50 and 250 feet of the alignment (Table 4-2). With respect to ROW sharing, the entire project parallels road ROW and field, parcel, or section lines for the entire route (Table 4-3).

Table 4-2 Proximity to Residences

Residences, Distance from Anticipated Alignment	Applicant's Proposed Route
Residences within 0-50 feet	0
Residences within 50-250 feet	5
Residences within 250-500 feet	1
Residences within 500-1,000 feet	0
Total Residences within 1,000 feet	6

Table 4-3 ROW Sharing and Paralleling

Infrastructure	Applicant's Proposed Route[1] Miles (percent)
Follows Existing Railroad	0 (0)
Follows Existing Roads	3.5 (100)
Follows Existing Transmission Line	0 (0)
Total – Follows Transmission Line, Road, or Railroad	3.5 (100)
Follows Field, Parcel, or Section Lines	3.5 (100)

[1] Portions may share or parallel more than one type of infrastructure ROW or division/boundary line, and therefore, the sum may be greater than 100 percent.

4.3.1.1 Impacts

The project's transmission line structures and conductors would create aesthetic impacts. These impacts are anticipated to be minimal to moderate. The degree of these impacts depends on:

- Proximity to homes, schools, churches, etc., where relatively more observers are present to experience aesthetic impacts. Map 4-2 provides an overview of residences and other buildings near the route proposed for the project.
- The presence of terrain and vegetation that could shield views of the transmission line and the preservation of such vegetation.
- The types of structures and structure designs used for the project.
- Use of existing ROW where the project would have an incremental impact relative to existing human modifications to the landscape (i.e., putting like with like).

4.3.1.2 Mitigation Measures

The primary strategy for minimizing aesthetic impacts is prudent routing—that is, choosing routes where a transmission line is most harmonious with the landscape. Tree clearing along the ROW will be necessary where the project crosses vegetated fence lines and trees located along 171st Avenue. The applicant has committed to minimizing permanent impacts to the aesthetics and visual character of the area by avoiding and/or minimizing tree clearing and avoiding residential areas to the maximum extent practicable. Other minimization and mitigation measures include:

- Maximizing ROW sharing with existing linear rights-of-way (e.g., roadways) to minimize incremental aesthetic impacts.
- Avoiding routing through areas with high-quality, distinctive viewsheds.
- Using structures and structure designs that minimize impacts (e.g., use of uniform structure types to the extent practical).
- Using construction methods that minimize damage to vegetation near the transmission line.
- Placing structures to take advantage of existing natural screening to reduce the view of the line from nearby residences and roadways.
- Avoiding placing structures directly in front of residences.
- Including specific conditions in individual easement agreements with landowners along the route (e.g., requiring new plantings or landscaping).
- Considering input from landowners when siting structure locations and other project components.

4.3.2 Property Values

Property values have the potential to be affected by the location of nearby transmission lines. Prior research has found that potential impacts to property values due to transmission lines are generally connected to three main factors. First, how the transmission line affects the viewshed and aesthetics of a property. Second, the real or perceived risks that buyers have of electromagnetic fields (EMF). Third, the effects to agricultural production on properties that are used for farming operations.

4.3.2.1 Impacts

The aforementioned factors play a role in the many interconnecting factors that affect property values. Because of this, it is difficult to measure how much and in all the different ways transmission lines and property values are correlated. A variety of methodologies have been used to research the relationship between transmission lines and property values. Some general conclusions can be drawn from this body of literature. This chapter highlights relevant outcomes of property value research with additional detail provided in Appendix I.

Research does not support a clear cause-and-effect relationship between property values and proximity to transmission lines but has revealed trends that are generally applicable to properties near transmission lines:

- When negative impacts on property values occur, the potential reduction in value is in the range of one to 10 percent.
- Property value impacts decrease with distance from the line; thus, impacts are usually greater on smaller properties than on larger ones (e.g., transmission lines can be set back farther from residences on larger parcels, transmission line easements take up a larger percentage of smaller parcels).
- Negative impacts diminish over time.
- Other amenities, such as proximity to schools or jobs, lot size, square footage of the home, and neighborhood characteristics, tend to have a greater effect on sale price than the presence of a transmission line.
- The value of agricultural property decreases when transmission line structures interfere with farming operations.

4.3.2.2 Mitigation Measures

Property value impacts may be mitigated by minimizing aesthetic impacts, perceived EMF health risks, and agricultural impacts. This can be achieved by maximizing the use of existing ROW and placing the transmission line away from residences and out of agricultural fields. There is potential for impacts to be mitigated by including specific conditions in individual landowner easement agreements along the transmission line.

4.3.3 Zoning and Land-Use

Minnesota authorizes counties and cities to create their own zoning ordinances to implement and work in conjunction with their comprehensive plans. Zoning is a method to regulate the way land is used and create patterns in the way they are used. Zoning is a regulatory device used by local governments to geographically restrict or promote certain types of land uses. Minnesota statutes provide local governments with zoning authority to promote public health and general welfare.

This project is subject to Minnesota's Power Plant Siting Act (Minn. Statute 216E). Under this statute, the route permit issued for a transmission line (Minn. Statute 216E.10):

> *…shall be the sole site or route approval required to be obtained by the utility. Such permit shall supersede and preempt zoning restrictions, building or land use rules, regulations or ordinances promulgated by regional, county, local and special purpose government.*

Therefore, the applicants are not required to seek permits or variances from local governments to comply with applicable zoning codes. Nonetheless, impacts to local zoning are clearly impacts to human settlements, and the Commission considers impacts to human settlements as a factor in selecting transmission line routes.

Land cover throughout the project consists primarily of developed and agricultural land. There are no parcels of land under federal, state, county, or municipal ownership along the project; all the parcels are under private ownership.

The project would go through York Township in Fillmore County, Minnesota. The closest city to the project is Chester, Iowa. York Township falls under Fillmore County's authority for zoning and ordinances.

The Fillmore County Comprehensive Plan, established in 2006, contains the County's vision and future goals (reference (7)). The project crosses through exclusively agricultural zoning areas (Map 4-3). According to the Fillmore County Zoning Ordinance adopted in September 1989 (reference (8)), the purpose of the agricultural district is to maintain, conserve, and enhance agricultural land that has historically been tilled on a continuous basis and to provide for the orderly development of dwellings and rural home-based businesses. Electrical distribution lines and other essential services are a permitted use in the agricultural district.

4.3.3.1 Impacts

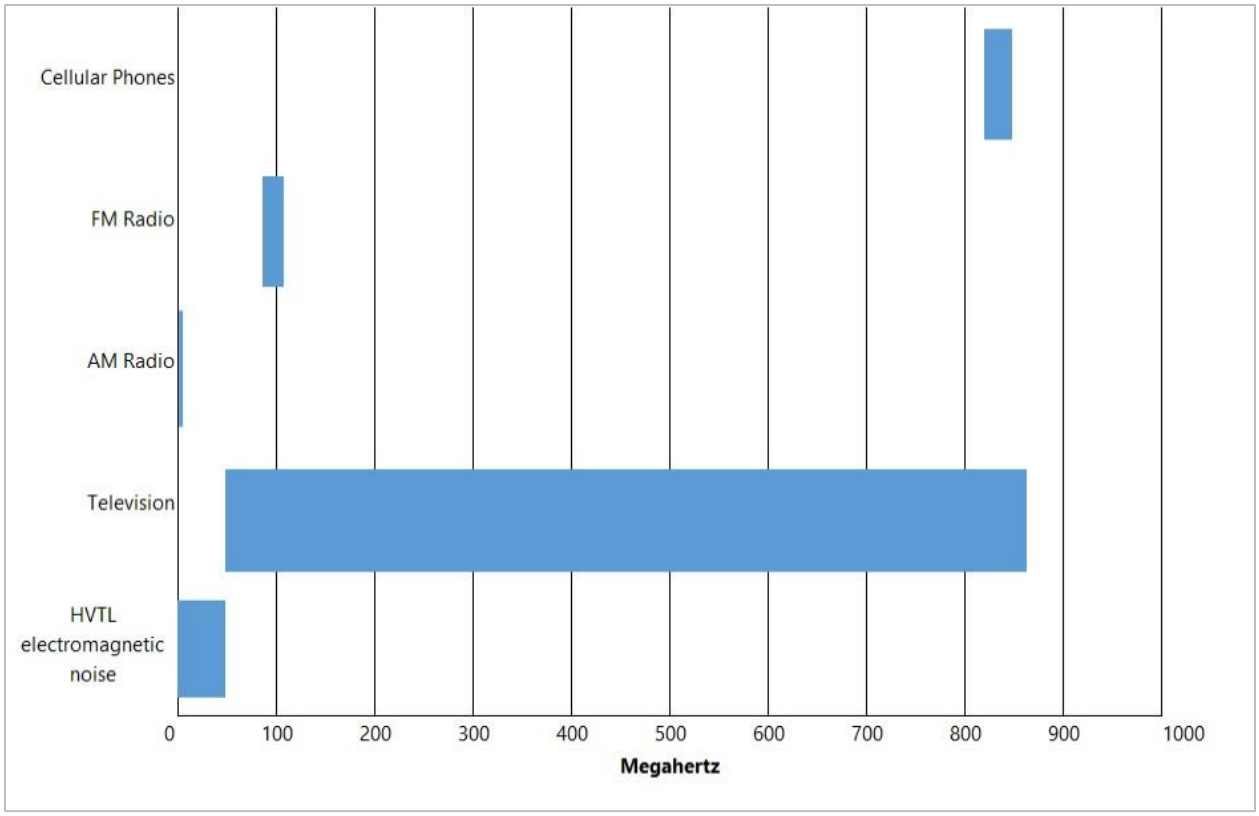
Potential project impacts to local zoning are anticipated to be minimal, as the project is compatible with agricultural zoning.

4.3.3.2 Mitigation Measures

Land-use impacts can be mitigated by minimizing the project's aesthetic impacts to the extent that zoning and land-use plans address aesthetics (e.g., landscaping). The project will be co-located with road ROW for its entire length, which would limit change in land use. Although short-term agricultural impacts may occur, these will be mitigated to the maximum extent possible through restoration and/or compensatory payments to landowners. No other mitigation is proposed.

4.3.4 Electronic Interference

Electronic interference refers to a disturbance in an electronic signal that can impair the proper functioning of an electronic device. Transmission lines do not generally cause interference with radio, television, cellular phone, global position systems (GPS), or other communication signals and reception. Information on medical electronic devices is discussed in Chapter 4.5.2. Figure 4-2 compares the spectrum of transmission frequencies for several communication and media signals to the peak intensity disturbance associated with electromagnetic noise from transmission lines. Additional discussion is provided below for each major type of media or communication signal.



Sources: references (9); (10); (11)

Figure 4-2 Frequencies of Electronic Communications and Electromagnetic Noise Created by Transmission Lines

4.3.4.1 Radio and Television

Generally, transmission lines do not cause interference with radio (including amateur radio, commercial broadcasting, and two-way radio services) and television (references (12); (13)). There are three potential sources for interference that are rare but do exist. These include gap discharges, corona discharges, and shadowing and reflection effects.

Gap discharge interference is the most noticed form of power line interference with radio and television signals and is typically the most easily fixed. Gap discharges are usually caused by hardware defects or abnormalities on a transmission or distribution line, causing small gaps to develop between mechanically connected metal parts. As sparks discharge across a gap, they create the potential for electrical noise, which can cause interference with radio and television signals. The degree of interference depends on the quality and strength of the transmitted communication signal, the quality of the receiving antenna system, and the distance between the receiver and the power line. Gap discharges are usually a maintenance issue because they tend to occur in areas where gaps have formed due to broken or ill-fitted hardware (clamps, insulators, brackets). Because gap discharges are a hardware issue, they can be repaired relatively quickly once the issue has been identified.

Corona from transmission line conductors can also generate electromagnetic noise at the same frequencies that radio and television signals are transmitted, as shown in Figure 4-2. The air ionization caused by the corona generates audible noise, radio noise, light, heat, and small amounts of ozone (O_3). The potential for radio and television signal interference due to corona discharge relates to the magnitude

of the transmission line-induced radio frequency noise compared to the strength of the broadcast signals. Very few practical interference problems related to corona-induced radio noise occur with transmission lines because radio frequency noise, like EMF, becomes significantly weaker with distance from the transmission line conductors. In most cases, the strength of the radio or television broadcast signal within a broadcaster's primary coverage area is great enough to prevent interference.

If interference occurs for an AM radio station within a station's primary coverage area where good reception existed before the project was built, reception can be regained by adjusting or moving the receiving antenna system. Interference is unlikely to occur for AM radio frequencies, except for immediately under a transmission line, and interference would dissipate rapidly with increasing distance from the line.

FM radio receivers usually do not pick up interference from transmission lines because corona-generated radio frequency noise currents decrease in magnitude with increasing frequency and are quite small in the FM broadcast band (88-108 Megahertz) (Figure 4-2). Also, the interference rejection properties inherent in FM radio systems make them fairly immune to amplitude-type disturbances.

The potential for television interference from radio frequency noise is unlikely because the United States has transitioned from analog to digital broadcasting. Digital reception is considerably more tolerant of noise than analog broadcasts. Due to the higher frequencies of television broadcast signals (54 megahertz and above), a transmission line seldom causes reception problems within a station's primary coverage area. In rare situations where the project may cause interference within a station's primary coverage area, the problem can usually be corrected with the addition of an outside antenna.

The shadowing effect comes from physically blocking communication signals and can impact two-way mobile radio communications and television signals. Television interference due to shadowing and reflection effects is rare but may occur when a large transmission structure is aligned between the receiver and a weak distant signal, creating a shadow effect. In rare situations where the project may cause interference within a station's primary coverage area, the problem can usually be corrected with the addition of an outside antenna. If television or radio interference is caused by or from the operation of the proposed facilities in those areas where good reception was available prior to construction of the project, the applicants would evaluate the circumstances contributing to the impacts and determine the necessary actions to restore reception to the present level, including the appropriate modification of receiving antenna systems if necessary.

4.3.4.2 Internet and Cellular Phones

Wireless internet and cellular phones use frequencies in the 900 MHz ultra-high frequency (UHF) range—a range for which impacts from corona-generated noise are anticipated to be negligible. If internet service at a residence or business is provided by a satellite antenna, this service could be impacted by a line-of-sight obstruction. As with other satellite reception, any interference due to an obstruction could be resolved by moving the satellite antenna to a slightly different location.

4.3.4.3 Global Positioning Systems

GPS works by sending radio-frequency signals from a network of satellites to the receiver. Because of this, buildings, trees, and other physical structures have the potential to interfere with a GPS signal. Research has evaluated the potential for interference in the use of GPS satellite-based microwave signals under or near power line conductors. Results of this research indicate it is unlikely that there

would be electronic interference while using GPS (reference (14)). Interference would be more likely near a transmission line structure and unlikely under a transmission line (reference (14)).

4.3.4.4 Impacts

No impacts to electronic devices are anticipated.

4.3.4.5 Mitigation Measures

Interference due to line-of-sight obstruction could be mitigated by prudent placement of transmission line structures and/or repositioning of electronic antennas as needed. Both cellular phone signals and GPS operate at frequencies outside the range of electromagnetic noise from transmission lines. If gap discharge interference occurs due to a hardware issue, the issue would be repaired and identified. In situations where interference with electronic devices does occur and is caused by the presence or operation of the transmission line, route permits issued by the Commission require permittees to restore electronic reception to pre-project quality (Appendix E).

4.3.5 Displacement

Displacement is the removal of a residence or building to facilitate the operation of a transmission line. For electrical safety code and maintenance reasons, utilities generally do not allow residences or other buildings within the ROW of a transmission line. Any residences or other buildings located within a proposed ROW are generally removed or displaced. Displacements are relatively rare and are more likely to occur in more populated areas where avoiding all residences and businesses is not always feasible.

Displacements can be avoided through several means, including structure placement, the use of specialty structures, and modifications of the ROW width. The applicant indicated in its route permit application that it is committed to working with landowners to design adequate clearances from buildings and to address landowner concerns. Though the general rule is that buildings are not allowed within the ROW of the transmission line, there are instances where the activities taking place in these buildings may be compatible with the safe operation of the line.

4.3.5.1 Impacts

There are no churches, schools, daycares, or nursing homes within the project ROW. There are no residences or non-residential buildings (e.g., agricultural outbuildings or animal production structures) within the project ROW.

4.3.5.2 Mitigation Measures

No impacts to residential or non-residential buildings are anticipated; therefore, no mitigation measures are proposed.

4.3.6 Noise

Noise is generally defined as unwanted sound. Noise levels are measured in units of decibel on a logarithmic scale and can be used to compare a wide range of sound intensities. Certain sound frequencies are given more weight because human hearing is not equally sensitive to all frequencies. The A-weighted decibel (dBA) scale accounts for the sensitivity of the human ear. (Table 4-4). Due to the logarithmic dBA, a noise level of 70 dBA is approximately twice as loud as a 60 dBA sound to the average human hearing.

Table 4-4 Common Noise Sources and Levels

Sounds Pressure Levels (dBA)	Common Indoor and Outdoor Noises
110	Rock band at 5 meters
100	Jet flyover at 300 meters
90	Chainsaw or gas lawnmower at 1 meter
85	Typical construction activities
80	Food blender at 1 meter
70	Vacuum cleaner at 3 meters
60	Normal speech at 1 meter
50	Dishwasher in the next room
40	Library
30	Bedroom
20	Quiet rural nighttime

Note: Minn. Rules 7030

The MPCA has developed protective standards for daytime and nighttime noise levels that vary based on land use at the location where the sound is heard (noise area classification, NAC). All project noises must be within the MPCA noise standards (Table 4-5). The noise standards are expressed as a range of permissible dBA over the course of a 1-hour period; L50 is the dBA that may be exceeded 50 percent of the time within one hour, while L10 is the dBA that may be exceeded 10 percent of the time within one hour (Minn. Rule 7030).

Table 4-5 State Noise Standards by Noise Area Classification

Noise Area Classification (NAC)	Daytime (dBA)L10	Daytime (dBA)L50	Nighttime (dBA)L10	Nighttime (dBA)L50
NAC 1: Residential and Other Sensitive Uses	65	60	55	50
NAC 2: Non-Residential Uses (retail, business and government services, recreational activities, transit passenger terminals)	70	65	70	65
NAC 3: Non-Residential Uses (manufacturing, fairgrounds and amusement parks, agricultural and forestry activities)	80	75	80	75

The project is primarily within agricultural zones (NAC-3), where maximum noise levels are currently caused by the movement and operation of farm equipment. Some portions of the project are near residences (NAC-1). Because of this, noise-sensitive receptors (NSRs) throughout the project are residences and agricultural businesses. Noise receptors could also include individuals working outside or using recreational facilities along the project. For most of the project, ambient noise levels are in the range of 30 to 50 dBA, with temporary, higher noise levels associated with wind, vehicular traffic, and the use of gas-powered equipment (e.g., tractors and chain saws).

Community noise levels are usually closely related to the intensity of human activity. Noise levels are generally considered low when below 45 dBA, moderate in the 45 to 60 dBA range, and high above 60 dBA (Table 4-4). In rural areas, noise levels can be below 35 dBA. In small towns or wooded and lightly used residential areas, noise levels are more likely to be around 50 or 60 dBA. Levels around 75 dBA are

more common in busy urban areas, and levels up to 85 dBA tend to occur near major freeways and airports.

4.3.6.1 Impacts

Potential noise impacts from the project can be grouped into two categories: construction noise and transmission line noise.

Construction Noise

During project construction, temporary, localized noise from heavy equipment and increased vehicle traffic is expected to occur along the ROW during daytime hours. Construction activities are anticipated to include use of typical heavy equipment such as backhoes, cranes, boom trucks, and assorted small vehicles. Construction noise could temporarily affect residences that are close to the ROW. Any exceedances of the MPCA daytime noise limits would be temporary in nature, and no exceedances of the MPCA nighttime noise limits are expected.

Transmission Line Noise

Noise from transmission lines (electrical conductors) is due to small electrical discharges which ionize surrounding air molecules. The level of noise from these discharges depends on conductor conditions, voltage levels, and the weather conditions. Noise emissions are greatest during heavy rain events (defined as more than one inch of rain per hour) when the conductors are consistently wet. However, during heavy rains, the background noise level is usually greater than the noise from the transmission line, and few people are in close proximity to the transmission line in these conditions.

The anticipated noise levels for a typical 161 kV line, calculated using the Bonneville Power Administration Corona and Field Effects Program (version 3), are listed in Table 4-6 (reference (15))

Table 4-6 Anticipated 161 kV Transmission Line Noise Levels with Heavy Rain

Load Condition	Line Current (Amp)	Audible Noise (dBA) (Rain) Cross-Section Distance to 161 kV Transmission Line (feet)										
		-300	-200	-100	-50	-25	0	25	50	100	200	300
Peak Historic Load	1,115	15.5	17.4	20.6	23.3	25.2	26.8	26.2	24.2	21.1	17.7	15.7

In foggy, damp, or light rain conditions, transmission lines may produce audible noise higher than background levels. During dry weather, noise from transmission lines is a perceptible hum and sporadic crackling sound. Noise levels are anticipated to be within Minnesota noise standards (i.e., < 50 dBA) and are only perceptible when ambient noise levels in the project area fall below 40 dBA.

4.3.6.2 Mitigation Measures

Project noise impacts are anticipated to be minimal and within Minnesota's noise standards. Operational noise levels for the project are anticipated to be within state standards; however, the project would introduce a new noise source that, in certain situations (e.g., a calm evening), may be heard by nearby residents. Route permits issued by the Commission require compliance with Minnesota's noise standards.

4.3.7 Cultural Values

Cultural values are community beliefs and attitudes that provide a framework for community unity and animate community actions. Cultural values are informed, in part, by history and heritage. The project traverses land that has been home to a variety of people and cultures. Major infrastructure projects can be inconsistent with an area's cultural values, resulting in a deterioration of a community's shared sense of self.

In the early to mid-1800s, the area was populated primarily by Dakota Sioux peoples. By the mid-1800s, Canadian, French, and British fur traders began settling in this area. A large wave of European immigrants arrived around 1850; these settlers were primarily of German, Norwegian, Swedish, Dutch, and British heritage (reference (16)).

Cultural values are also informed by the work and recreation of residents and by geographical features. The project setting is primarily rural and agricultural. Farming and the ability to continue to farm and support livelihoods through farming are strong values in the project area. Various recreational opportunities, including camping, hiking, Native American heritage sites, and snowmobiling, are also available near the project. These opportunities are supported by a variety of natural resources, including lakes, rivers, parks, and wildlife management areas (reference (17)).

4.3.7.1 Impacts

Impacts to cultural values are anticipated to be minimal as a result of the project. The project will not adversely impact the work of residents that underlie the area's cultural values, nor is it anticipated to adversely impact geographical features that inform these values.

4.3.7.2 Mitigation Measures

Impacts to cultural values are anticipated to be minimal, and no mitigation is proposed.

4.3.8 Socioeconomics

Socioeconomic factors provide an indication of how economic activity affects and is shaped by social processes. Socioeconomic measures indicate how societies progress, stagnate, or regress because of their actions and interactions within and between the local, regional, or global economic scales. Transmission line projects contribute to growth and progress at the local level over time; therefore, the socioeconomic impacts of the project are anticipated to be positive.

Table 4-7 shows the population and socioeconomic information for York Township, Fillmore County, and the state of Minnesota. It shows that York Township's population density is well below Fillmore County and the state, reflecting the project's rural setting. Table 4-7 also shows the township's median household income is slightly lower than the county and state.

Table 4-7 Socioeconomic Census Data

Area	Minnesota	Fillmore County	York Township
Population	5,737,915	21,346	344
Population Density (population/sq. miles)	72	24.8	9.5
Labor Force	3,146,576	11,168	160
Labor Force Unemployment Rate (%)	2.1	1.9	0.0
Per Capita Income	$46,530	$37,134	$27,132
Median Household Income	$85,086	$75,225	$66,750

Approximately 20 to 30 workers would be required for project construction. Transmission line construction is anticipated to begin in the fall/winter of 2025, with the full project (both the Minnesota portions and the Iowa portions) in service by February 2027. The applicant plans to use union labor and to have a construction supervisor on site throughout the construction phase. A mix of Dairyland employees and contract workers would be deployed for all construction activities. Local businesses have the potential to experience short-term positive economic impacts through the use of the hotels, restaurants, and other services used by contractors during construction.

4.3.8.1 Impacts

The project would generate minor, short-term positive economic impacts, driven by increased construction activity and a small influx of contractor employees. The project would have some positive impacts on the socioeconomics of the region through the creation of temporary jobs, generation of tax revenue, and providing more reliable electrical service to the surrounding communities.

4.3.8.2 Mitigation Measures

No socioeconomic impacts are anticipated; therefore, no mitigation measures are proposed.

4.3.9 Environmental Justice

Utility infrastructure can adversely impact low-income, minority, and/or tribal populations. Environmental justice (EJ) is the “just treatment and meaningful involvement of all people, regardless of income, race, color, national origin, Tribal affiliation, or disability, in agency decision-making and other federal activities that affect human health and the environment” (reference (18)). The goal of this fair treatment is to identify potential disproportionately high and adverse effects from project implementation and identify alternatives that may mitigate these impacts.

MPCA’s Understanding Environmental Justice in Minnesota Mapping Tool (reference (19)) is an online mapping tool that uses census data to identify areas for meaningful community engagement and additional evaluation for disproportionate effects from pollution. The tool identifies Environmental Justice Communities (EJC) using the following four criteria, which align with the definition of an EJ area in Minn. Statute 216B.1691, subdivision 1(e):

- 40 percent or more of the area’s total population is nonwhite
- 35 percent or more households in the area have an income that is at or below 200 percent of the federal poverty level

- 40 percent or more of the area's residents over the age of five have limited English proficiency
- The area is located within Indian country, as defined in U.S. Code, title 18, section 1151

The project is located exclusively within Census Tract 9605 (Map 4-4). Using the MPCA mapping tool and the EJC definition, there are no EJCs within the project area (Table 4-8).

Table 4-8 Population, Income, and Minority Data

Area	Minnesota	Fillmore County	Census Tract 9605
Population	5,737,915	21,346	3,159
Percent Minority (2022)	23.3	0.1	<0.0
Percent people at or below 200 percent of the Federal Poverty Level (2022)	9.3	8.9	14.6
Limited English Proficiency	2.2	1.2	3.6

4.3.9.1 Impacts

The project would not cause disproportionately adverse impacts to EJ communities because there are none in the project area.

4.3.9.2 Mitigation Measures

No EJ impacts are anticipated; therefore, no mitigation is proposed.

4.4 Transportation and Public Services

Transmission line projects have the potential to negatively impact public services (e.g., roads, utilities, and emergency services). These impacts are typically temporary in nature (e.g., the inability to fully use a road or utility while construction is in process). However, there could be more long-term impacts if they change the area so that public service options are foreclosed or limited.

This chapter summarizes the project's potential impacts on local roadways/railways, public utilities, emergency services, and airports and provides methods for mitigating these impacts. Temporary and long-term impacts to public services resulting from the project are anticipated to be minimal.

4.4.1 Roadways/Railways

The project is located in a primarily rural area. The project runs adjacent to 171st Avenue for approximately 3.5 miles. The project also intersects multiple roadways, including May Avenue, 110th Street, 128th Street, County Highway 44, and 171st Avenue twice. There are no major highways located adjacent to the project; the nearest major highways are US Highway 63 and MN Highway 56, which are both located approximately 2.7 miles to the west (Map 4-5).

There are no passenger rail service or rail freight lines near the project.

4.4.1.1 Impacts

Construction could occasionally cause lanes or roadways to be closed, although these closures would only last for the duration of the construction activity in a given area. Construction equipment and delivery vehicles will increase traffic along roadways throughout project construction, with effects lasting from a few minutes to a few hours, depending upon the complexity and duration of the construction activities. Drivers could experience increased travel times as a result. Construction vehicles could temporarily block public access to streets and businesses in cities.

The project could impact roadways and roadway users in several ways, including:

- Causing temporary traffic delays, detours, and congestion during construction.
- Impairing the safe operation and maintenance of roadways.

Vehicles and equipment that will be used for the construction of the transmission line (e.g., overhead line cranes, concrete trucks, construction equipment, and material delivery trucks) are generally heavier than passenger vehicles and may cause more damage to road surfaces. Oversized/overweight load permits must be obtained from the Minnesota Department of Transportation (MnDOT) when size and/or weight limits will be exceeded.

Construction workers and construction-related vehicles using public roadways to access the transmission line ROW are likely to have localized adverse impacts on traffic volumes. Approximately 20 to 30 workers will be employed during construction. During the course of construction, workers would be dispersed throughout the project. Accordingly, the increase in vehicle traffic will represent a small increase over existing traffic volumes at any given time and location.

Transmission lines that parallel roads could affect future road expansions or realignments because structures placed along the road ROW might need to be moved to preserve a safe distance between structures and the edge of the expanded roadway. The project will be co-located with road ROW for its entire length. The applicants will coordinate with Fillmore County and York Township on road access permits and procedures, as well as utility permits and other road-related approvals, as needed. When wire stringing across a road, the applicant will install appropriate traffic control and safety devices, such as H braces, signs, or flaggers. The applicants will work with York Township and Fillmore County on the appropriate safety measures during stringing and haul routes.

Severe weather, including high winds, ice, snow storms, and tornadoes, could create safety hazards on any roadways located within the designed fall distance of an overhead transmission line. Snow and ice accumulation and high winds could increase a structure’s weight, making it more susceptible to failure or collapse.

The applicant indicated that the project’s design standards meet the NESC requirements for safe design and operation of transmission lines. These standards include designing transmission lines to withstand severe winds from summer storms and the combination of ice and strong winds from winter weather.

No impacts to railways are anticipated.

4.4.1.2 Mitigation Measures

The increased traffic during construction is anticipated to be minor and temporary; therefore, no mitigation measures are proposed. Long-term impacts to transportation are not anticipated and mitigation would not be required.

4.4.2 Public Utilities

Electric utility service near the project is provided by MiEnergy. Natural gas services near the project are provided by Minnesota Energy and Tri-County Electric Cooperative (reference (20)). An AMOCO bulk petroleum transportation pipeline, running northwest-southeast, is located approximately 0.6 miles east of the project. Potable water is supplied to the project primarily by local wells.

4.4.2.1 Impacts

Project impacts to public utilities are anticipated to be minimal. The project would not cross any existing electric transmission lines. The project will be co-located with a MiEnergy 12.47 kV distribution line for approximately two miles, from CSAH 44 south until 110th Street. This distribution line is currently above ground; however, the applicant intends to request that MiEnergy bury the line as a separate undertaking from the project. No notable disruptions to electrical service are anticipated as a result of the project. An overarching project objective is to enhance electrical service in the area. The project does not cross over any known pipeline rights-of-way.

4.4.2.2 Mitigation Measures

The applicant indicates that it will use the Gopher State One-Call system to locate and mark all underground utilities to avoid potential impacts. No impacts to other public utilities are anticipated, so no mitigation measures are proposed.

4.4.3 Emergency Services

Emergency services in the region are provided by law enforcement and emergency response agencies of the local counties and communities. Sheriffs' offices and municipal police departments located in the surrounding area provide regional law enforcement. The Fillmore County Sheriff's Department provides services to the project area. Additionally, the cities of Spring Valley, Wykoff, Grand Meadow, and Harmony all have local police departments.

The project is located within Fire Region 15 – Southeast, and fire services for the area are provided by the Wykoff Fire Station and the Spring Valley Fire Station. Ambulance districts provide emergency medical response services throughout the region. The project is located within the Leroy Area Ambulance Service region. Emergency medical response is also available from local hospitals, such as the Olmsted Medical Center in Spring Valley, MN, Regional Health Services of Howard County in Cresco, IA, the Olmsted Medical Center in Rochester, MN, and the Mayo Clinic Hospital in Rochester, MN. The closest of these facilities is the Olmsted Medical Center in Spring Valley, MN, located approximately 11 miles from the project (reference (21)).

4.4.3.1 Impacts

The project is not anticipated to impact emergency services. Any temporary road closures required during construction will be coordinated with local jurisdictions to provide safe access for police, fire, and other emergency service vehicles. Any accidents that might occur during the project's construction will be

handled through local emergency services. Given the limited number of construction workers involved in the project and the low probability of a construction-related accident, the current emergency services are expected to have ample capacity to address any potential emergencies that may occur during project construction.

4.4.3.2 Mitigation Measures

No impacts to emergency services are anticipated; therefore, no mitigation measures are proposed.

4.4.4 Airports

Transmission line structures and conductors can conflict with the safe operation of an airport if they are too tall and/or too close for the applicable safety zones. Different classes of airports have different safety zones depending on several characteristics, including runway dimensions, classes of aircraft they can accommodate, and navigation and communication systems (reference (22)). These factors determine the necessary take-off and landing glide slopes, which in turn determine the setback distance of transmission line structures.

The Federal Aviation Administration (FAA) and MnDOT each have established development guidelines on the proximity of tall structures to public-use airports. The FAA has also developed guidelines for the proximity of structures to very high-frequency omnidirectional range navigation systems. Transmission lines near public airports are limited by FAA height restrictions, which prohibit transmission line structures above a certain height, depending on the distance from the specific airport. Regulatory obstruction standards only apply to those airports that are available for public use and are listed in the FAA airport directory. Private airstrips and personal use airstrips cannot be used in commercial transportation or by the general public and are, therefore, not subject to FAA regulatory obstruction standards (Minn. Rules 8800.2400).

In addition, MnDOT has established separate zoning areas around airports. The most restrictive safety zones are safety zone A, which does not allow any buildings, temporary structures, places of public assembly, or transmission lines, and safety zone B, which does not allow places of public or semi-public assembly such as churches, hospitals, or schools. Permitted land uses in both zones include agricultural uses, cemeteries, and parking lots. Safety zone C, the horizontal airspace obstruction zone, encompasses all land enclosed within the perimeter of the imaginary horizontal plane 150 feet above the established airport elevation, the perimeter of which is constructed by swinging arcs of specified radii (5,000 to 10,000 feet) from the center of each end of the primary surface of each runway, and which is not included in zone A or zone B. As with FAA regulations, MnDOT zoning requirements only apply to public airports (Minn. Rules 8800.2400).

There are no FAA-listed airports, public airports, or private airports located within one mile of the project.

4.4.4.1 Impacts

There are no FAA airports, public airports, or private airports located within one mile of the project. As such, impacts to airports are not anticipated.

4.4.4.2 Mitigation Measures

No impacts to airports are anticipated, and no mitigation measures are proposed.

4.5 Public Health and Safety

Transmission line projects have the potential to negatively impact public health and safety during project construction and operation. As with any project involving heavy equipment and transmission lines, there are safety issues to consider during construction. Potential health and safety impacts include injuries due to falls, equipment use, and electrocution. Potential health impacts related to the operation of the project include health impacts from EMF, stray voltage, induced voltage, and electrocution.

4.5.1 Electric and Magnetic Fields

Electric and magnetic fields (EMFs) are invisible lines of force that surround electrical devices (e.g., power lines, electrical wiring, and electrical equipment), which are produced through the generation, transmission, and use of electric power. The term “EMF” is typically used to refer to EMFs that are coupled together. However, for lower frequencies associated with power lines, EMFs are relatively decoupled.

Electric fields are the result of electric charge, or voltage, on a conductor. The intensity of an electric field is related to the magnitude of the voltage on the conductor and is typically described in terms of kV per meter (kV/m). Magnetic fields are created and increase from the strength of the flow of current through wires or electrical devices. The intensity of a magnetic field is related to the magnitude of the current flow through the conductor and is typically described in units of magnetic flux density expressed as Gauss (G) or milliGauss (mG). Magnetic fields, unlike electric fields, are not shielded or weakened by materials that do not conduct electricity (e.g., trees and buildings). Rather, they pass through most materials.

Both magnetic and electric fields decrease rapidly with increased distance from the source. EMFs are invisible, just like radio, television, and cellular phone signals, all of which are part of the electromagnetic spectrum (reference). EMFs are found anywhere there are energized, current-carrying conductors, such as near transmission lines, local distribution lines, substation transformers, household electrical wiring, and common household appliances (reference (23)).

4.5.1.1 Magnetic Field Background Levels

The wiring and appliances located in a typical home produce an average background magnetic field of between 0.5 mG and 4 mG (references (24); (25)). A U.S. government study conducted by the EMF Research and Public Information Dissemination Program determined that most people in the United States are, on average, exposed daily to magnetic fields of 2 mG or less (reference (23)). Typical magnetic field strengths near common appliances are shown in Table 4-9.

Table 4-9 Typical Magnetic Field Strengths

Source	Distance from Source			
	0.5 foot	1 foot	2 feet	4 feet
	Typical Magnetic Fields (mG)			
Air Cleaners	180	20	3	0
Copy Machines	90	20	7	1
Fluorescent Lights	40	6	2	0
Computer Displays	14	5	2	0
Hair Dryers	300	1	0	0
Baby Monitor	6	1	0	0
Microwave Ovens	200	4	10	2

Source: reference (23)

4.5.1.2 Research on EMF and Health Impacts

Research on whether exposure to low frequency EMF causes biological responses and health effects has been performed since the 1970s. The U.S. National Institute of Environmental Health Sciences and the World Health Organization have been a part of this research. Their research does not support a relationship or association between exposure to electric power EMF and adverse health effects.

The U.S. National Institute of Environmental Health Science evaluated numerous epidemiologic studies and comprehensive reviews of the scientific literature that examined associations of cancers with living near power lines, with magnetic fields in the home, and with exposure of parents to high levels of magnetic fields in the workplace. They concluded that “no consistent evidence for an association between any source of non-ionizing EMF and cancer has been found” (reference (24)).

Minnesota, Wisconsin, and California have also all performed literature reviews or research to examine this issue. In 2002, Minnesota formed an Interagency Working Group to evaluate EMF research and to develop public health policy recommendations regarding EMF associated with high-voltage transmission lines. The Working Group included staff from a number of state agencies and published its findings in a White Paper on EMF Policy and Mitigation Options. They found that some epidemiological studies have shown no statistically significant association between exposure to EMF and health effects, and some have shown a weak association. The Working Group noted that studies have not been able to establish a biological mechanism for how EMF may cause health impacts.

Worldwide, the majority of scientific panels that have reviewed the research conducted to date conclude that there is insufficient evidence to establish a direct association between EMF and adverse health effects. Based on this work, the Commission has repeatedly found that “there is insufficient evidence to demonstrate a causal relationship between EMF exposure and any adverse human health effects” (reference (26)). Appendix F provides detailed background on EMF health impact research.

4.5.1.3 Regulatory Standards

There are currently no federal regulations regarding allowable electric or magnetic fields produced by transmission lines in the United States; however, a number of states have developed state-specific regulations (Table 4-10).

The Commission has established a standard that limits the maximum electric field under transmission lines to 8 kV/m. All transmission lines in Minnesota must meet this standard. The Commission has not adopted a magnetic field standard for transmission lines. However, the Commission has adopted a prudent avoidance approach in routing transmission lines and, on a case-by-case basis, considers mitigation strategies for minimizing EMF exposure levels associated with transmission lines.

Table 4-10 State Electric and Magnetic Field Standards

State	Area where Limits Apply	Field	Limit
Florida	Edge of ROW	Electric	2 kV/m (lines ≤ 500 kV
		Magnetic	150 mG (lines ≤ 230 kV) 200 mG (> 230 kV- ≤ 500 kV) 250 mG (> 500 kV)
	On ROW	Electric	8 kV/m (≤ 230 kV) 10 kV/m (> 230 kV- ≤ 500 kV) 15 kV/m (> 500 kV)
Minnesota	On ROW	Electric	8 kV/m
Montana	Edge of ROW [1]	Electric	1 kV/m
	Road crossings	Electric	7 kV/m
New Jersey	Edge of ROW	Electric	3 kV/m
New York	Edge of ROW	Electric	1.6 kV/m
		Magnetic	200 mG
	Public road crossings	Electric	7 kV/m
	Private road crossings	Electric	11 kV/m
	On ROW	Electric	11.8 kV/m
Oregon	On ROW	Electric	9 kV/m

Source: reference (23)
kV/m – kilovolts per meter, kV – kilovolts mG – milligauss
[1] May be waived by landowner

4.5.1.4 Impacts

The predicted electric field level associated with the project is shown in Table 4-11 for the edge of ROW and at the location where the maximum electric field will be experienced (typically, under the transmission line). Because electric fields are dependent on the transmission line voltage, the values in Table 4-11 show the applicant's calculated approximate electric fields for the project's transmission configuration. Values were calculated assuming minimum conductor-to-ground clearance at mid-span and a height of 1 meter above ground. The maximum calculated electric field for the project's configuration is 0.39 kV/m, which is within the Commission's 8 kV/m limit.

Table 4-11 Calculated Electric Fields (kV/M) for Proposed Alignment (3.28 feet above ground)

Operating Voltage (kV)	Max Operating Voltage (kV)	Electric Field Strength (kV/m) Lateral Distance to Proposed Alignment (feet)										
		-300	-200	-100	-50	-25	0	25	50	100	200	300
161	169	0.01	0.03	0.13	0.28	0.32	0.35	0.39	0.28	0.10	0.02	0.01

Magnetic fields are dependent on the current flowing on the transmission line and, therefore, could vary throughout the day. The values in Table 4-12 are provided for the peak historic load scenario for the project. Values were calculated assuming minimum conductor-to-ground clearance at mid-span and a height of 1 meter above ground. The maximum calculated magnetic field under peak conditions is 40 mG. The maximum possible magnetic field at the edge of the ROW (50 ft) was calculated to be 26.8 mG.

Table 4-12 Calculated Magnetic Fields (mG) for Proposed Alignment Design

Load Condition	Line Current (Amps)	Magnetic Field Strength (mG) Lateral Distance to Proposed Alignment (feet)										
		-300	-200	-100	-50	-25	0	25	50	100	200	300
Peak Historic Load	1,281	1.9	3.9	12.0	24.9	34.4	40.0	36.0	26.8	12.9	4.1	1.9

There is no federal standard for transmission line electric or magnetic fields. The Commission has historically imposed a maximum electric field limit of 8 kV/m measured at 1 meter above ground for new transmission projects. All transmission lines in Minnesota must meet this standard. The Commission has not adopted a magnetic field standard for transmission lines. However, the Commission has adopted a prudent avoidance approach in routing transmission lines and, on a case-by-case basis, considers mitigation strategies for minimizing EMF exposure levels associated with transmission lines.

4.5.1.5 Mitigation Measures

No EMF impacts are anticipated for the project; therefore, no mitigative measures are proposed.

4.5.2 Implantable Medical Devices

Electromechanical implantable medical devices, such as cardiac pacemakers, implantable cardioverter defibrillators (ICDs), neurostimulators, and insulin pumps, may be subject to interference from electromagnetic interference (EMI), which could mistakenly trigger a device or inhibit it from responding appropriately (reference (12)). While EMI can result in either inappropriate triggering or inhibition of a device from responding properly, only a small percentage of these occurrences are caused by external EMI. The American Conference of Governmental Industrial Hygienists and ICD Manufacturer's recommended magnetic and electric field exposure limits are 1 g and 1 kV/m, respectively, for people with pacemakers (references (27); (12)). One gauss is five to 10 times greater than the magnetic field likely to be produced by a high-voltage transmission line (reference (12)).

4.5.2.1 Impacts

EMF exposure produced by transmission lines generally does not affect implantable devices, but in the event that they are affected, it typically results in temporary asynchronous pacing. Electric and magnetic field levels decrease with distance; however, maximum levels in all instances, including the edge of the ROW, are anticipated to be less than 1 kV/m (Table 4-11). Maximum levels of magnetic fields at the edge of the ROW are anticipated to be 26.8 mG (Table 4-12). Accordingly, impacts to implantable medical devices and their users are anticipated to be minimal. If a medical device is affected, the device will return to normal operation when the person moves away from the source of the EMF (reference (12)). Therefore, no adverse health impacts or permanent impacts on implantable medical devices are anticipated.

4.5.2.2 Mitigation Measures

No mitigative measures are proposed because no adverse health impacts or permanent impacts on implantable medical devices are anticipated as a result of the project.

4.5.3 Stray Voltage

Electrical systems that deliver power to end-users and electrical systems within the end-user's business, home, farm, or other buildings are grounded to the earth for safety and reliability reasons. The grounding of these electrical systems results in a small amount of current flow through the earth. Stray voltage could arise from neutral currents flowing through the earth via ground rods, pipes, or other conducting objects or from faulty wiring or faulty grounding of conducting objects in a facility. Thus, stray voltage could exist at any business, house, or farm that uses electricity—independent of whether there is a transmission line nearby.

Where utility distribution systems are grounded, a small amount of current will flow through the earth at those points. This is called neutral-to-earth voltage (NEV), which is voltage that is associated with distribution lines and electrical wiring within buildings and other structures (reference (28)). Stray voltage is not created by transmission lines, as they do not directly connect to businesses or residences. Stray voltage is, generally, an issue associated with electrical distribution lines and electrical service at a residence or on a farm. Site-specific mitigation measures are required to address potential stray voltage impacts (reference (29)).

The USDA defines stray voltage as "a small voltage (less than 10 volts) measured between two points that can be simultaneously contacted by an animal" (reference (28)). Stray voltage and its effects on farms have been studied for nearly 30 years. Numerous studies have found that although stray voltage is likely to exist on farms, it is rarely strong enough to affect the behavior or production of dairy cattle (reference (30)). Advisors for the Commission issued a report in 1998 supporting the conclusion that no credible scientific evidence has been found to show that currents in the earth or associated electrical parameters such as voltages, magnetic fields, and electric currents, are causes of poor health and milk production in dairy herds (reference (31)).

4.5.3.1 Impacts

Minimal impacts due to stray voltage are anticipated from the project. Transmission lines do not create stray voltage as they do not directly connect to businesses, residences, or farms. The project will not directly connect to businesses or residences in the area and would not change local electrical service.

4.5.3.2 Mitigation Measures

If there are stray voltage concerns on a landowner's property or a landowner would like an on-site investigation, the applicant suggests they contact their electric service provider directly. The applicant has committed to coordinate with local companies to perform pre- and post-construction testing of potentially impacted facilities and to address property owner concerns if requested.

4.5.4 Induced Voltage

It is possible for electric fields from a transmission line to extend to a conductive object that is near a line. This may induce a voltage on the object; the magnitude of the voltage depends on several factors, such as the size, shape, and orientation of the object along the ROW. Smaller conductive objects near the line

could cause a nuisance shock to a person, but this nuisance shock is not a potential safety hazard. If there were insulated pipelines, electric fences, telecommunication lines, or other conductive objects with greater lengths and sizes, induced voltage from a transmission line could become unsafe to people who touch them; however, this still has not been found to be a health safety hazard (reference (32)).

4.5.4.1 Impacts

Minimal impacts due to induced voltage are anticipated from the project. Shocks from induced voltage from transmission lines are considered more of a nuisance than a danger. The transmission line would follow the NESC, which requires the steady-state (continuous) current between the earth and an insulated object located near a transmission line to be below 5 milliamps (mA) (reference (32)). In addition, the Commission limits electric fields to 8 kV/m to prevent serious hazard from shocks due to induced voltage under transmission lines (reference (33)). Any route permits that are issued have to meet the NESC standards and the Commission's electric field limit.

4.5.4.2 Mitigation Measures

Potential impacts from induction would be mitigated through the applicant's appropriate design and construction measures. All non-energized conductors or conductive objects would be grounded.

4.6 Climate Change

This chapter describes potential impacts of the project on climate change and the project's climate resilience.

4.6.1 Greenhouse Gases

Greenhouse gases (GHGs) are gases that trap heat in the atmosphere. Some of the solar radiation that reaches Earth's surface radiates back toward space as infrared radiation. GHGs trap heat in the atmosphere from the absorption of this infrared radiation, which causes a rise in the temperature of Earth's atmosphere (Figure 4-3). This warming process is known as the greenhouse effect (reference (34)).

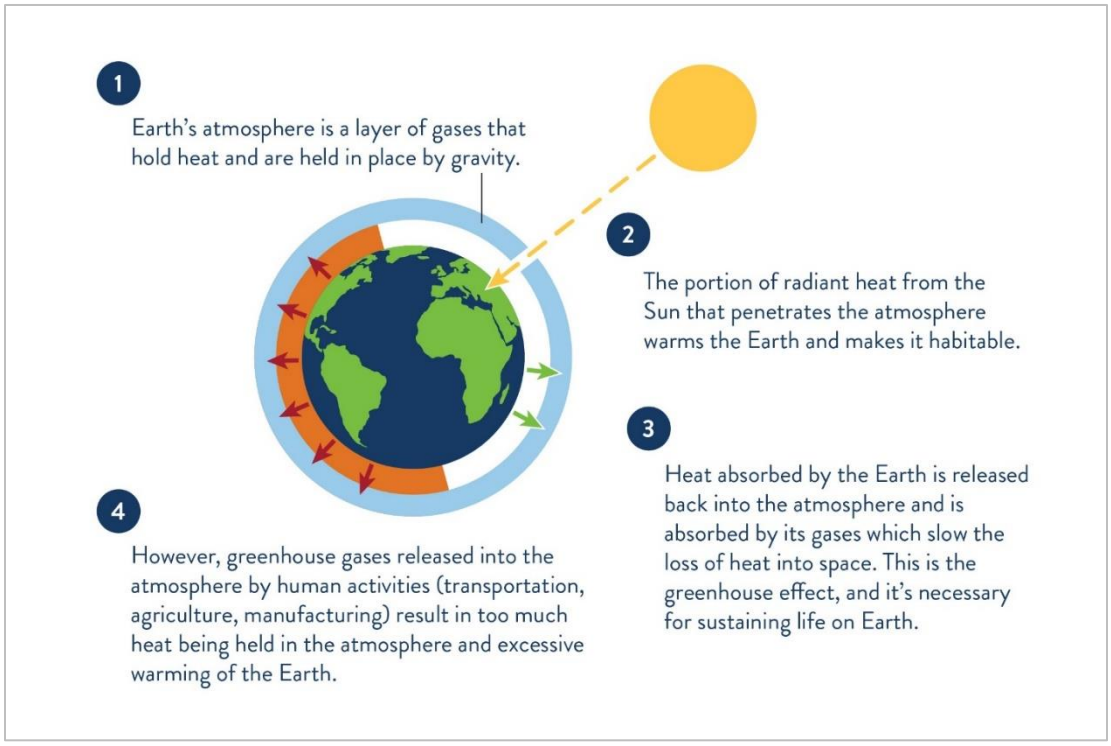


Figure 4-3 Greenhouse Effect

The most common GHGs include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated gases. Anthropogenic GHG emissions are responsible for about two-thirds of the energy imbalance that is causing Earth's temperature to rise, which has direct and cascading effects on weather and climate patterns, vegetation, agriculture, disease, availability of water, and ecosystems (reference (35)).

The state of Minnesota has established a goal to reduce statewide greenhouse gas emissions across all sectors producing those emissions by at least the following amounts, compared with the level of emissions in 2005: (1) 15 percent by 2015; (2) 30 percent by 2025; (3) 50 percent by 2030; and (4) to net zero by 2050.

Minn. Statute 216B.1691 Renewable Energy Objectives, which became effective in 2023, requires all electric utilities to generate or procure 100 percent of electricity sold to Minnesota customers from carbon-free sources by 2040, with an interim goal of 80 percent (for public utilities) and 60 percent (for other electric utilities) carbon-free electricity by 2030. Carbon-free sources are those that generate electricity without emitting CO_2. Electric utilities are also required to generate or procure 55 percent of electricity sold to Minnesota customers from an eligible energy technology by 2035. Eligible energy technology includes technology that generates electricity from solar, wind, and certain hydroelectric, hydrogen, and biomass sources (Minn. Statutes, 216B.1691).

4.6.1.1 Impacts

Identified GHG emissions associated with the construction and operation of the project consist of direct emissions generated from combustion sources (mobile off-road sources) and land use change.

Construction emissions from mobile combustion were calculated for construction equipment (dump trucks, cranes, bulldozers, etc.). Construction emissions from temporary land use changes were calculated with an assumed construction duration of 60 days. Project construction is expected to produce 169.9 metric tons of carbon dioxide equivalent (CO_2e) and the temporary land use change is expected to produce 11.3 metric tons of CO_2e. Compared to the approximately 25.6 million metric tons of CO_2e emitted statewide by electricity generation in 2022, the expected GHG emissions from the project's construction are expected to be minimal (reference (36)). GHG calculations are summarized in Appendix D.

Identified GHG emissions associated with the operation of the project include direct emissions generated from mobile combustion sources. Operational emissions from mobile combustion sources were calculated for inspection maintenance equipment assumed to be used every two years (UTVs and pickup trucks) and vegetation management equipment assumed to be used every six years (UTVs, pickup trucks, chainsaws, etc.). Project operation and maintenance are expected to produce 0.8 metric tons of CO_2e. The ROW would be restored to its existing land use, and permanent land use changes from the structure foundations are expected to be negligible. Small amounts of ozone are produced from the operation of transmission lines through the ionization of air molecules during corona discharge. These emissions are anticipated to be minimal. Operational emissions from electrical consumption are not expected for the project.

Although project construction and operations will result in GHG emissions, the project is needed to optimize regional transfer capability as coal-fired generation ceases in southern Minnesota and significant renewable generation comes online in the upper Midwest. Thus, on whole, the project will assist in achieving the state's GHG reduction goals.

4.6.1.2 Mitigation Measures

Minimization efforts to reduce project GHG emissions may include efficient planning of vehicle and equipment mobilization and travel, vehicle idle time reduction, proper equipment upkeep, efficient planning of material delivery, proper use of power tools, use of battery powered tools when feasible, and alternative fuel vehicle usage when feasible.

4.6.2 Climate Resilience

Climate change is observed as changes in temperature and precipitation patterns, increases in ocean temperatures and sea levels, changes in extreme weather events, and ecosystem changes. These changes are largely attributed to the greenhouse effect. As the amount of GHGs in Earth's atmosphere increases, the greenhouse effect causes Earth to become warmer (reference (37)).

There are also naturally occurring climate variations. These are cyclical patterns caused by variations in ocean circulation and atmospheric pressure patterns that occur on timescales of weeks to decades. Increased global surface temperatures may change these natural climate patterns and the resulting impact on regional precipitation and temperature anomalies (reference (38)).

Warmer and wetter conditions have been observed in Minnesota since 1895, especially in the past several decades. An increase in precipitation and precipitation intensity has also been observed, including devastating, large-area extreme rainstorms. A rise in temperatures, particularly during the winter season, has been occurring as well. These trends are expected to continue (reference (39)).

To understand how climate change is anticipated to affect the project location, historical and projected climate data is considered, as well as climate hazard projections. The DNR's Minnesota Climate Explorer tool provides a summary of historical climate data for various regions across Minnesota.

Figure 4-4 summarizes the mean, maximum, and minimum average daily temperature from 1895 to 2024 for Fillmore County, where the project is located. It also shows the temperature trends per decade from 1895 to 2024 and from 1994 to 2024 to represent the full record of data and the most recent 30-year climate normal period, respectively. In each temperature statistic, the county exhibited an increase in daily temperature from 1895 to 2024. The annual average minimum daily temperature has increased at the largest rate of the three temperature statistics.

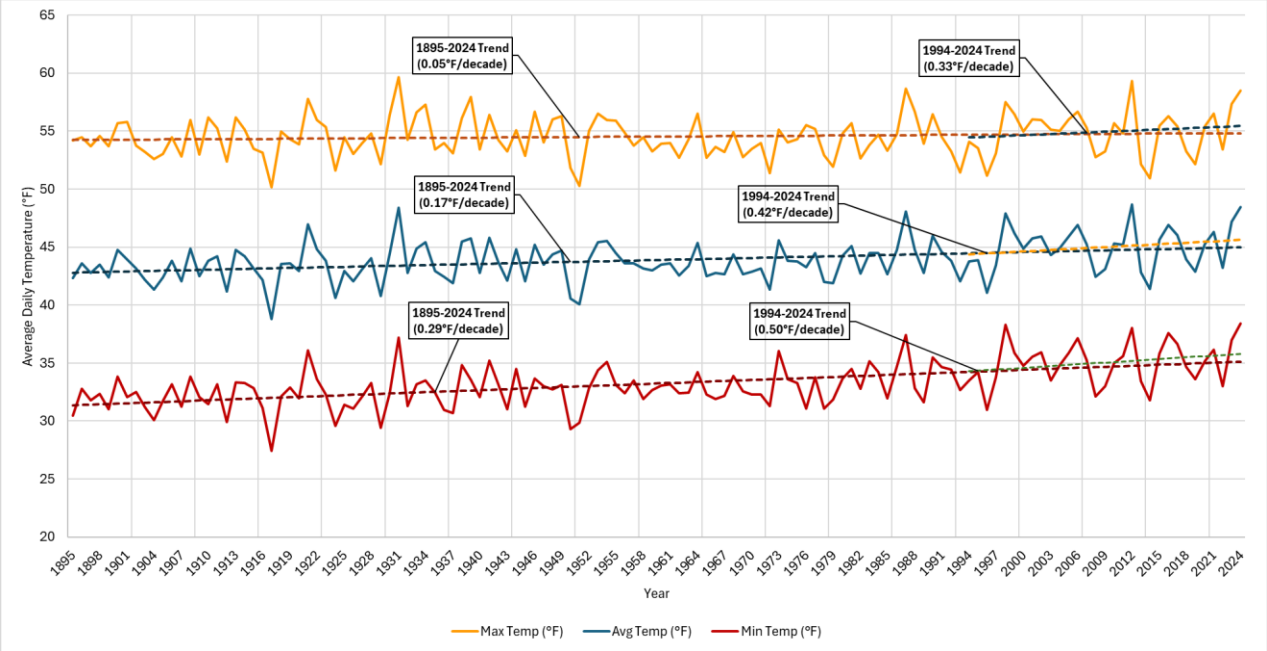


Figure 4-4 Historical Annual Mean, Maximum, and Minimum Daily Air Temperature (°F) for Fillmore County from 1895 to 2024

Figure 4-5 shows the total annual precipitation for Fillmore County from 1895 to 2024. Total annual precipitation has increased from 1895 to 2024 by a rate of 0.49 in/decade and increased from 1994 to 2024 by a rate of 1.63 in/decade.

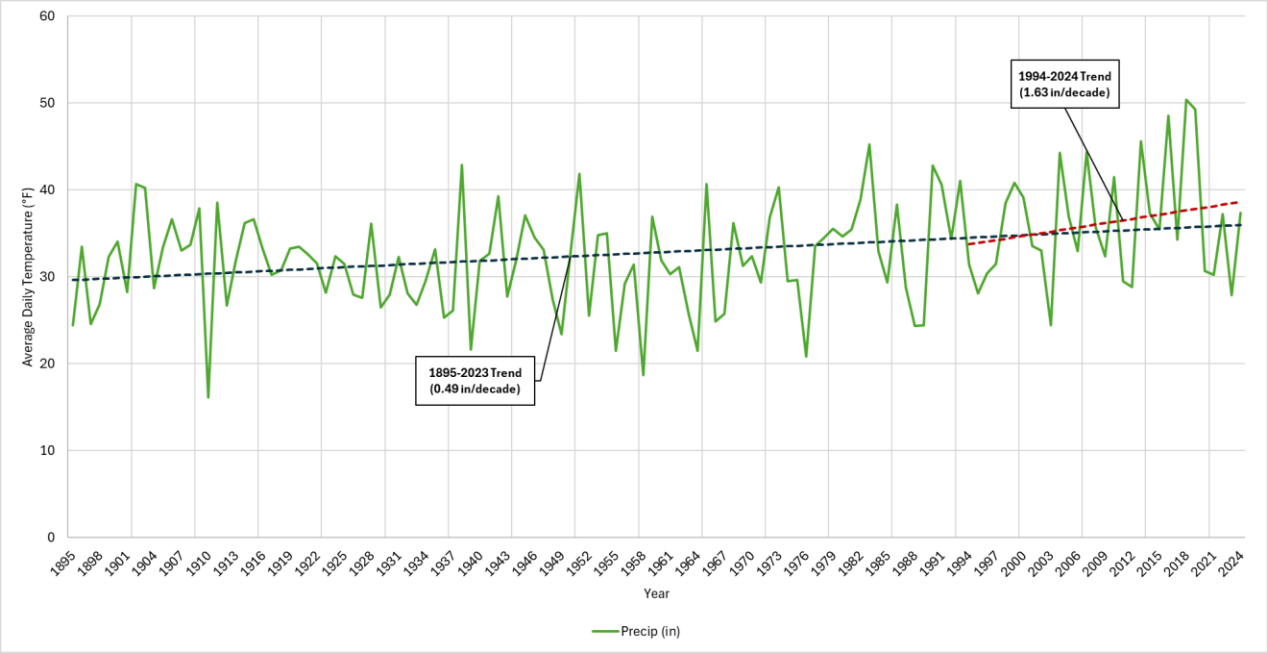


Figure 4-5 Historical Total Annual Precipitation (inches) for Fillmore County from 1895 to 2024

Future projections are based on the Minnesota dynamically downscaled climate model data that was developed by the University of Minnesota (reference (40)) and are summarized in three scenarios: Shared Socioeconomic Pathway (SSP) 245, SSP370, and SSP585. SSP is a measure adopted by the Intergovernmental Panel on Climate Change (IPCC) to represent various greenhouse gas (GHG) concentration pathways as well as social and economic decisions (reference (40)).

SSP245 represents an intermediate emission scenario where a net radiative forcing of 4.5 watts per meter squared (W/m2) is received by the earth due to the GHG effect, and emissions begin to decrease around 2040 (reference (41)). SSP370 represents a high emissions scenario, where a net radiative forcing of 7.0 W/m2 is received by the earth (reference (41)). SSP585 represents a very high emissions scenario, where a net radiative forcing of 8.5 W/m2 is received by the earth, and no emissions are reduced through 2100 (reference (41)).

Table 4-13 shows the model historical and projected temperature values for the project. Under all scenarios for each statistic, temperature values are projected to increase through the end of the 21st century. The largest increases occur in the minimum daily temperature under all scenarios except SSP370 2040-2059 and SSP370 2060-2079 which saw the largest increases in the maximum daily temperature.

Table 4-13 Projected Average, Minimum, and Maximum Daily Temperatures for Fillmore County, MN

Scenario	Time Period	Average Daily Temperature (°F) - Ensemble Mean	Minimum Daily Temperature (°F) - Ensemble Mean	Maximum Daily Temperature (°F) - Ensemble Mean
Historical	1995-2014	44.89	35.44	57.20
ssp245	2040-2059	48.61 (3.72)	39.28 (3.84)	60.73 (3.54)
ssp245	2060-2079	49.88 (4.99)	40.62 (5.18)	61.92 (4.73)
ssp245	2080-2099	51.50 (6.61)	42.16 (6.72)	63.66 (6.46)
ssp370	2040-2059	49.95 (5.06)	40.21 (4.77)	62.60 (5.41)
ssp370	2060-2079	51.98 (7.09)	42.34 (6.9)	64.50 (7.30)
ssp370	2080-2099	53.77 (8.88)	44.41 (8.97)	65.96 (8.76)
ssp585	2040-2059	49.15 (4.26)	39.78 (4.34)	61.31 (4.11)
ssp585	2060-2079	51.83 (6.94)	42.60 (7.16)	63.83 (6.64)
ssp585	2080-2099	56.12 (11.23)	47.17 (11.73)	67.80 (10.60)

Table 4-14 shows the model's historical and projected precipitation values for the project. Under the SSP245, a slight increase in precipitation followed by a decrease in precipitation is projected. Under SSP370, a decrease in precipitation from modeled historical values is projected to occur under all time periods (largest occurring before 2060). For SSP585, a slight decrease in precipitation from modeled historical values is projected, followed by a sharp increase in precipitation by the end of the century.

Table 4-14 Projected Annual Precipitation for Fillmore County, MN

Scenario	Time Period	Total Annual Precipitation (in) - Ensemble Mean
Historical	1995-2014	36.47
ssp245	2040-2059	37.37 (0.90)
ssp245	2060-2079	36.30 (-0.17)
ssp245	2080-2099	35.59 (-0.88)
ssp370	2040-2059	30.07 (-6.4)
ssp370	2060-2079	32.30 (-4.17)
ssp370	2080-2099	35.00 (-1.47)
ssp585	2040-2059	36.2 (-0.27)
ssp585	2060-2079	38.27 (1.80)
ssp585	2080-2099	40.98 (4.51)

The EPA Climate Resilience Evaluation and Awareness Tool (CREAT) provides general climate projections to help planning in water, wastewater, and stormwater utilities (reference (42)). For the project area, CREAT anticipates the 100-year storm intensity increasing from a value between 3.3 and 13.6 percent in 2035 to between 6.4 and 26.6 percent in 2060. The EPA Streamflow Projections Map summarizes general projections related to streamflow under climate change (reference (43)). The EPA

Streamflow Projections Map anticipates a general change in the average streamflow of streams within the project area by a ratio of 1.19 to 1.20 (90th percentile) under wetter projections and a ratio of 0.85 to 1.00 (10th percentile) under drier projections in 2071 to 2100 (RCP 8.5) compared to baseline historical flow (1976 to 2005).

4.6.2.1 Impacts

Changes in temperature, precipitation, and extreme weather events are expected to occur over the lifetime of the project. Temperatures and precipitation are generally expected to increase, with extreme weather events becoming more frequent. High temperatures can affect the sagging of a transmission line and its thermal tolerance. Changes in storm timing and intensity can lead to compromised structure foundations. Increased storm intensity and high winds can lead to compromised conductors and damaged structures.

4.6.2.2 Mitigation Measures

The project would be designed for resiliency under changing climatic factors such as increased temperatures and changes in intensity and timing of storm events and associated precipitation, as well as in accordance with NERC reliability standards. Additional mitigation measures are not proposed.

4.7 Air Quality

The CAA is a federal law that regulates air emissions from stationary and mobile sources. The CAA requires the U.S. Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS) for six common air pollutants, referred to as “criteria pollutants”. The six criteria pollutants are ground-level ozone (O_3), particulate matter ($PM_{2.5}$), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), and lead (reference (44)). NAAQS are set to address the public health and welfare risks posed by certain widespread air pollutants (references (45); (46)). Compliance with the national and state air quality standards in the state of Minnesota is assessed at the county level. The EPA designates Fillmore County to be in attainment for all NAAQS.

In Minnesota, air quality is monitored using stations located throughout the state. The MPCA uses data from these monitoring stations to calculate the Air Quality Index (AQI) on an hourly basis for O_3, $PM_{2.5}$, SO_2, NO_2, and CO. Each day is categorized based on the pollutant with the highest AQI value for a particular hour (reference (47)).

The project area is located nearest to the Ben Franklin School air quality monitor in Rochester, MN, located approximately 30 miles northwest of the project area. The station monitors for O_3 and $PM_{2.5}$. A summary of days in each AQI category at the Ben Franklin School monitor for the most recent five-year period available, covering 2024-2020, is provided in Table 4-15.

Table 4-15 Days in Each Air Quality Index Category – Ben Franklin School Monitor

Year	Good	Moderate	Unhealthy for Sensitive Groups	Unhealthy	Very Unhealthy
2024	149	32	0	1	0
2023	189	161	14	1	0
2022	280	78	1	0	0
2021	275	84	2	0	0
2020	292	73	1	0	0

Air quality at this monitoring station has generally been considered good for the majority of the past five reported years. Since 2020, 2023 had the largest number of days classified as moderate or worse. In 2023, 161 days were classified as moderate, 14 days were classified as unhealthy for sensitive groups, and one day was classified as unhealthy.

4.7.1 Impacts

Air emissions during construction would primarily consist of emissions from construction equipment and would include pollutants such as CO_2, nitrogen oxides (NO_X), and PM. Dust generated from earth-disturbing activities also gives rise to particulate matter. Emissions from construction vehicles could be minimized by using modern equipment with lower emissions ratings. Adverse effects on the surrounding environment are expected to be negligible due to the temporary disturbance during construction and the intermittent nature of the emission- and dust-producing construction phases. Small amounts of NO_X will be produced from the operation of the transmission line through ionization of air molecules during corona discharge. These emissions are expected to be minimal. A small amount of ozone will be created due to corona from the operation of transmission lines. The emission of ozone during operations is not anticipated to have a significant impact on the environment (reference (48)).

4.7.2 Mitigation Measures

If construction activities generate problematic dust levels, the applicant may employ construction-related practices such as wetting of unpaved roads and exposed or barren ground to control fugitive dust. Additionally, cleared rights-of way, storage areas, and access roads would be restored and revegetated once construction is complete, limiting further dust production during operation.

During operations, air emissions would be minimal. Small amounts of emissions would be associated with the intermittent project operation and maintenance activities via mobile combustion and roadway dust generation. If dust levels become problematic during operation and maintenance activities, the applicant may employ fugitive dust control practices such as wetting of unpaved roads.

4.8 Land-Based Economies

The project's construction and operation have the potential to impact land-based economies. Transmission lines are a physical, long-term presence on the landscape that could prevent or otherwise limit the use of land for other purposes. When placed in an agricultural field, transmission line structures have a relatively small footprint, yet they can interfere with farming operations.

Elements of land-based economies include agriculture, forestry, mining, and recreation and tourism (discussed in Chapters 4.8.1, 4.8.2, 4.8.3, and 4.8.4, respectively).

4.8.1 Agriculture

Agriculture land use is prevalent throughout the project area (Map 4-6). There are a total of 9.6 acres of agriculture land within the ROW, which equates to 22.8 percent of the total land cover within the ROW (Figure 4-6).

Figure 4-6 View of agricultural land in the ROW

Present-day vegetation in the ROW, as derived from the National Land Cover Dataset (NLCD), consists of herbaceous vegetation, cultivated crops, hay and pastureland, and developed lands. The NLCD is derived from Landsat imagery along with various other data sources (reference (49)). As such, it provides only an approximation of existing land cover types. Table 4-16 provides a summary of the various landcovers observed within the ROW.

Table 4-16 NLCD Landcover within the Project ROW

Landcover Type	Area within ROW (acres)	Percentage of ROW
Developed, Open Space	12.4	29.5
Developed, Low Intensity	18.3	43.4
Developed, Medium Intensity	1.4	3.3
Developed, High Intensity	0.1	0.1
Herbaceous	0.4	0.9
Hay/Pasture	0.2	0.5
Cultivated Crop	9.4	22.3

The USDA Natural Resource Conservation Service (NRCS) Soil Survey Geographic (SSURGO) database (reference (50)) identifies farmland soils based on three categories, which are subject to protection under the Farmland Protection Policy Act (FPPA). These categories include prime farmland, prime farmland when drained, and farmland of statewide importance. Nearly all the agricultural land within the ROW is classified as prime farmland or prime farmland if drained. There is no farmland of statewide importance in the ROW.

According to the Minnesota Natural Resource Atlas (reference (51)), Minnesota Department of Agriculture (MDA) organic farm directory (reference (52)), and the MDA apiary registry (reference (53)), there are no Conservation Reserve Enhancement Program enrolled lands, registered organic producers, or apiaries within the ROW.

4.8.1.1 Impacts

The project has the potential to impact agriculture both temporarily and permanently. Temporary impacts include impacts from transmission line construction. Localized construction impacts would cease once the transmission line construction phase is complete.

Permanent transmission line impacts result from the placement of transmission line structures within agricultural fields. Permanent structures can have varying-sized footprints due to the structure design and distance from each other (Table 3-1). Examples of permanent impacts resulting from transmission line structures include restriction of farming equipment, loss of farmable land, interference with aerial spraying, and obstruction of irrigation systems. These impacts have the ability to result in financial impacts through loss of income and decreases in property values.

4.8.1.2 Mitigation Measures

Impacts to agricultural operations have been mitigated by proposing a project that primarily follows existing roadway ROW. Impacts to agricultural operations would also be mitigated by limiting temporary construction impacts to only the necessary footprint and the applicant's commitment to work with landowners for any unintended impacts (e.g., repair of drain tile).

4.8.2 Forestry

Minnesota's forests primarily consist of aspen/birch, spruce/fir, and oak/hickory forest types, which are managed by private/tribal industry (44 percent), state government (24 percent), federal government

(17 percent), and counties/municipalities (15 percent) (reference (54)). As of 2020, Minnesota's forest products industry was the state's fifth-largest manufacturing sector by employment and provided 64,500 jobs (reference (54)). In 2017, Minnesota's forest products industry produced $17.8 billion of shipment value (gross sales) and provided 8.5 percent of all manufacturing payroll employment.

Timber harvested in Minnesota is used for construction materials, paper products, and heating for homes, among other commercial goods. Additionally, timber harvested from private commercial forest lands is primarily used in the manufacturing of paper products.

4.8.2.1 Impacts

For safe operation of the project, trees and other tall-growing vegetation must be removed from the transmission line ROW. Vegetation clearing typically consists of initial tree and vegetation clearing before construction and on-going maintenance within the ROW following construction.

No known forested lands or forestry operations exist within the ROW; therefore, impacts to forestry operations are not anticipated.

4.8.2.2 Mitigation Measures

Mitigation is not proposed because no impacts to forestry resources are anticipated.

4.8.3 Mining

Mining is a significant industry in Minnesota, with mining operations classified into two categories: metallic minerals and non-metallic minerals (reference(55)). Metallic minerals consist of materials such as iron ore, copper, and nickel, while non-metallic minerals consist of materials such as aggregate, peat, and kaolin clay. Aggregate materials are used in construction activities and usually consist of raw materials such as sand, gravel, and crushed stone.

4.8.3.1 Impacts

There are no known mining operations within the ROW; therefore, no impacts to mining operations are anticipated.

4.8.3.2 Mitigation Measures

Mitigation is not proposed because no impacts to mining are anticipated.

4.8.4 Recreation and Tourism

Tourism and recreational activities commonly overlap; the difference between the two is the distance traveled to access these opportunities. Recreational activities are generally located within the vicinity of one's home and easily accessible, while tourism involves activities that require substantial travel and may incur additional expenses as a result. Recreation and tourism opportunities in the project vicinity are minimal, consisting of the Cherry Grove Wildlife Management Area, the Cherry Grove Blind Valley Scientific and Natural Area, and one golf course (Map 4-7).

There are no Aquatic Management Areas, county parks or trails, local parks or trails, scenic byways, snowmobile trails, state forests, state parks, or State Game Refuges located within the project area.

4.8.4.1 Impacts

Project impacts on recreation and tourism are anticipated to be minimal and temporary in nature, lasting only for the duration of construction. Short-term disturbances, such as increased noise and dust, could detract from nearby recreational activities and could, depending on the timing, affect hunting by temporarily displacing wildlife. However, wildlife is expected to return to the area once construction has been completed.

The Cherry Grove Wildlife Management Area, Cherry Grove Blind Valley Scientific and Natural Area, and golf course are all located more than one mile from the ROW; therefore, no notable impacts to recreation and tourism are anticipated.

4.8.4.2 Mitigation Measures

Mitigation is not proposed because no impacts to recreation and tourism are anticipated.

4.9 Archaeological and Historic Resources

Archaeological resources are defined as the material remains of past human life or activities (reference (56)). Pursuant to the Minnesota Historic and Architectural Survey Manual (reference (57)), historic resources are defined as sites, buildings, structures, or objects that are over 45 years in age and "create tangible links to the American past, whether in relation to historical events and people, traditional ways of life, architectural design, or methods of construction" (reference (58)).

Federal laws and regulations, including Section 106 and the Archaeological Resources Protection Act of 1979, provide the standards for cultural resources identification, evaluation, and mitigation of impacts. Pursuant to Section 106, significant archaeological and/or historic resources (i.e., historic properties) are those resources that are included or eligible for inclusion in the National Register of Historic Places (NRHP).

The project is also subject to the Minnesota Historic Sites Act (Minn. Statutes 138.661 to 138.669), the Field Archaeology Act (Minn. Statutes 138.31 to 138.42), and the Minnesota Private Cemeteries Act (Minn. Statute section307.08). The Minnesota Historic Sites Act (Minn. Statutes 138.661 to 138.669) requires that state agencies consult with the SHPO before undertaking or licensing projects that may affect properties on the State or National Registers of Historic Places. The Minnesota Field Archaeology Act (Minn. Statutes 138.31 to 138.42) establishes the position of state Archaeologist and requires State Archaeologist approval and licensing for any archaeological work that takes place on non-federal public property.

Under the Minnesota Private Cemeteries Act (Minn. Statutes 307.08), when human burials are known or suspected to exist in a project area, the landowner or developer must submit construction and development plans to the Office of the State Archaeologist (OSA) for their review before the plans are finalized and prior to any disturbance within the burial area. If the known or suspected burials are thought to be Native American or of Native American ancestry, the landowner or developer must submit construction and development plans to the OSA and the Minnesota Indian Affairs Council (MIAC) for their review before the plans are finalized and prior to any disturbance within the burial area. The OSA and MIAC have 45 days to make recommendations for the preservation in place or the removal of the human burials or remains that may be endangered by construction or development activities.

To determine potential cultural resource impacts, known archaeological and historic resources in or adjacent to the project were identified through a review of the OSA online portal and MnSHIP, the Minnesota SHPO online portal. MnSHIP is a comprehensive database of all documented historic architectural resources for the entire state, while the OSA portal is a database of all previously recorded archaeological sites in the state.

4.9.1 Archaeological Resources

The OSA online portal indicates that there are no previously recorded archaeological resources located within one mile of the project. Dairyland, in consultation with RUS and SHPO, is planning to conduct an archaeological survey for the project as needed ahead of construction.

4.9.1.1 Impacts

Archaeological resource impacts could result from construction activities—ROW clearing, placement of structures, construction of access roads, temporary construction areas, and vehicle and equipment operation.

However, no known archaeological resources have been documented within one mile of the project; therefore, no impacts to archaeological resources are anticipated.

4.9.1.2 Mitigation Measures

The preferred impact mitigation for archaeological resources is prudent structure placement (i.e., avoiding known archaeological resources). If archaeological resources are anticipated or known to exist within a specific part of the route, potential impacts could be mitigated by measures developed in consultation with the SHPO prior to construction. Additionally, Dairyland has developed an Unanticipated Discoveries Plan (UDP) that outlines the procedures to follow, in accordance with state and federal laws, should archaeological materials or human remains be discovered during project construction. The RUS, as the lead federal agency for the project, will be responsible for completing Section 106, including identifying, evaluating, and mitigating any project-related impacts to historic properties.

If unanticipated archaeological or historic resources are discovered during construction, Commission route permits require that construction activities cease at that location and that SHPO be contacted to assist in the development of appropriate resource protection measures (Appendix E). In addition, if human remains or suspected burial sites are discovered during construction, the state archaeologist would be contacted, and construction would cease at the location until the applicants and the state archaeologist have developed adequate mitigation measures as per Minn. Statute 307.08.

4.9.2 Historic Resources

A review of the MnSHIP portal indicates that there are eight previously inventoried historic resources located within one mile of the project (Map 4-8). Of the eight documented resources, three are located within the route width for the project (Table 4-17). The previously documented historic resources include three bridges and five culverts. Each of the culverts have been previously determined not eligible for the NRHP, while the three historic bridges are unevaluated for NRHP eligibility.

Table 4-17 Documented Historic Resources within One Mile of the Project

Resource Number	Resource Type	NRHP Eligibility	Location
FL-YRK-00013	Bridge, ca. 1940	Unevaluated	Route Width
FL-YRK-00014	Bridge, ca. 1906	Unevaluated	Route Width
FL-YRK-00015	Bridge, ca. 1905	Unevaluated	1 Mile
FL-YRK-00019	Culvert	Not Eligible	Route Width
FL-YRK-00020	Culvert	Not Eligible	1 Mile
FL-YRK-00021	Culvert	Not Eligible	1 Mile
FL-YRK-00022	Culvert	Not Eligible	1 Mile
FL-YRK-00023	Culvert	Not Eligible	1 Mile

4.9.2.1 Impacts

Historic resource impacts could result from construction activities—ROW clearing, placement of structures, construction of access roads, temporary construction areas, and vehicle and equipment operation. Impacts could also result from the removal of historic resources.

Additional impacts can result from transmission line location and operation. Impacts can occur if the project is located near or within view of a historic resource, and the resulting change in viewshed negatively affects the setting, feeling, and/or association of the resource. This issue is especially pertinent for cultural resources where the surrounding environment plays a crucial role in defining their character and significance.

The project may impact up to three previously documented historic resources: two bridges (FL-YRK-00013 and FL-YRK-00014) and one culvert (FL-YRK-00019) located on 171st Avenue (Map 4-8). However, because project activities would occur adjacent to 171st Avenue and would not be located within the road ROW, the project will not directly affect these resources. The bridges and culvert represent infrastructure critical to the function of the rural agricultural community in the same way that the project would provide critical infrastructure for the community. Therefore, the project does not have the potential to alter these resources' setting, feeling, appearance, and/or association.

4.9.2.2 Mitigation Measures

The preferred mitigation for impacts to historic resources is prudent structure placement (i.e., avoiding known historic resources). If significant historic resources are anticipated or known to exist within a specific part of the project, potential impacts could be mitigated by measures developed in consultation with the SHPO prior to construction. The RUS, as the lead federal agency for the project, will be responsible for completing Section 106, including identifying, evaluating, and mitigating any project-related impacts to historic properties.

If unanticipated historic resources are discovered during construction, Commission route permits require that construction activities cease at that location and that SHPO be contacted to assist in the development of appropriate resource protection measures (Appendix E).

4.10 Natural Environment

Transmission lines have the potential to impact the natural environment through temporary, construction-related impacts and long-term impacts to water resources, vegetation, and wildlife.

4.10.1 Water Resources

Hydrologic features located within the project include streams, wetlands, and groundwater resources. Both surface water and groundwater resources are addressed in this chapter.

4.10.1.1 Surface Water

The project is located in two watersheds, the Root River (watershed HUC ID: 07040008) and the Upper Iowa River (watershed HUC 8 ID: 07060002). The northern one-third of the project flows to Canfield Creek, a tributary to the Root River; the southern two-thirds of the project area flows to the Upper Iowa River. The project will cross three unnamed streams; none of these streams are designated as impaired by the MPCA. Map 4-9 shows the watersheds and surface water resources located in the vicinity of the project.

Surface waters in Minnesota are regulated by different entities at the federal and state levels. The U.S. Army Corps of Engineers regulates the placement of dredged or fill materials in wetlands and other waters under its jurisdiction. The DNR regulates watercourses, water basins, and wetlands that are designated as significant recreational or natural resource value in Minnesota and are referred to as public waters. These waters are delineated in the state's public waters inventory (PWI). The DNR requires a permit for crossing or working within the boundaries of designated public waters. Two of the unnamed streams crossed by the project are identified as public waters (Table 4-18; Map 4-9).

Wetlands are defined in both the 1977 EO 11990-Protection of Wetlands and in Section 404 of the CWA as those areas that are inundated by surface or groundwater with a frequency to support, and under normal circumstances does or would support, a prevalence of vegetation or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands are protected at the federal level under Section 404 of the CWA and at the state level under the Minnesota Wetland Conservation Act (WCA) and the DNR PWI program. According to the U.S. Fish and Wildlife Service's (USFWS) National Wetland Inventory (NWI), four wetlands totaling approximately 3.6 acres are located in the project ROW (Table 4-18).

Table 4-18 Surface Water Resources

Dataset	Crossing Count	Centerline Crossing Length (feet)	Length within the ROW (feet)	Area within the ROW (acres)
Stream Crossings	3	-	1,017	-
Public Waters Inventory (PWI)	2	-	905	-
National Wetlands Inventory	4	650	-	3.6

Impacts

It is anticipated that impacts to water courses and wetlands would be avoided with construction of this project. Structure locations would be adjusted to avoid disturbing the streams and wetlands. No surface water or wetland crossing would be greater than 1,000 feet, meaning all surface waters can be spanned to avoid placing a structure within these resources.

Removal of vegetation and soil cover could result in short-term water quality impacts due to increased turbidity. Construction impacts could also include the removal of riparian vegetation within the ROW. Vegetation clearing could also increase light penetration to watercourses, potentially resulting in localized increases in water temperatures and changes to aquatic communities.

Wetlands can be impacted by soil erosion and sediment deposition during construction. Sedimentation and ground disturbance in wetlands can make them more susceptible to the establishment of invasive plant species, such as reed canary grass, which would adversely impact wetland function by reducing vegetative biodiversity and altering wildlife habitat.

Mitigation Measures

Mitigation measures would be implemented to prevent or minimize surface water impacts that could affect water quality. The MPCA, through the National Pollutant Discharge Elimination System (NPDES), regulates construction activities that may impact stormwater runoff. The project will require authorization to discharge stormwater associated with construction activity under the MPCA NPDES/SDS Construction Stormwater General Permit (MNR100001). The project will develop a stormwater pollution prevention plan (SWPPP) that identifies BMPs to be implemented during construction to minimize erosion and sedimentation impacts to surface waters.

Anticipated BMPs for the project include no vehicle fueling, maintenance, or herbicide application within 100 feet of streams or wetlands to protect against contamination of surface or groundwater systems. Materials such as fuels, lubricants, paints, and solvents required for construction will be stored away from surface water resources. Any spills or leaks will be cleaned up immediately, and leaking equipment will be removed from the area for proper maintenance.

In addition, public waters crossed by the project will require a DNR utility crossing license. The applicant has indicated that it will work with the DNR to obtain appropriate approvals for public water crossings.

4.10.1.2 Groundwater

The DNR divides Minnesota into six groundwater provinces. The project is located within Minnesota's karst province. This province is characterized as thin with less than 50 feet of glacial sediments overlying

carbonate and sandstone bedrock (reference (59)). This area is also prone to karst features such as sinkholes and caves. There are no springs located within the ROW.

The Minnesota Department of Health maintains the Minnesota Well Index (MWI), which provides information about wells and borings, such as location, depth, geology, construction, and static water level. According to the MWI, there are no wells within the ROW.

Impacts

Project groundwater impacts are anticipated to be minimal. Potential impacts to groundwater could occur through: (1) surface water impacts infiltrating to groundwater, and (2) impacts directly related to constructing structure foundations. Groundwater in the area may be encountered in the shallow quaternary aquifer and upper carbonate aquifer. Surface water impacts can lead to groundwater impacts; thus, concerns are similar (i.e., construction activities that lead directly to sedimentation or through disturbed soils and vegetation). Mitigation of these impacts can be affected by measures to control soil erosion and sedimentation.

Direct groundwater impacts could occur as a result of the construction and placement of transmission line structures. Structure foundations will generally range from 25 to 60 feet in depth. Because there are no wells within the ROW, other wells in the vicinity are generally installed to depths deeper than the foundation depths, and no direct impacts to groundwater are anticipated because concrete components of the foundations have relatively low solubility.

Mitigation Measures

Mitigation measures proposed for surface water impacts are also anticipated to provide mitigation for groundwater impacts during construction. The applicant notes that if shallow depths to groundwater resources are identified during geotechnical design of the project, specialty structures with wider, shallower foundations may be used.

4.10.2 Geology

The project's surface geology is dominated by pre-Wisconsinan aged glacial till deposits and fine-grained Quaternary sediment, including till, loess (silty loam to loam), and residuum (clay to sand). Interspersed deposits of the Browerville Formation are also present. The Browerville Formation deposits originate from ice from the Superior glacial provenance; material is a pebbly loam and may also contain cretaceous limestone and grey shale. Karst topography is found within the Browerville Formation. Depth to bedrock can range from 10 feet to over 20 feet (reference (60)).

The project's bedrock consists of Paleozoic-aged sedimentary deposits. Deposits include limestone, shaley limestone, and dolostone of the Maquoketa, Stewartville Prosser, and Cummingsville Formations (reference. (61)).

Sand and gravel-rich glacial till can often be mined for aggregate resources. There are no aggregate mines or mining operations present within the ROW (Chapter 4.8.3).

The project's seismic risk is very low; it is located within an area rated as having less than a two-percent chance of damage from natural or human-induced earthquakes in 10,000 years (reference (62)). The most intense earthquake recorded in the area occurred in 1860 and was documented as a seven on the

Modified Mercalli Intensity Scale. The majority of the remaining recorded earthquakes were documented as less than five on the Modified Mercalli Intensity Scale (reference (63)).

Landslides are common throughout Minnesota due to the unconsolidated glacial till deposits located at the surface. Landslide susceptibility can vary based on several factors, including the slope angle, water content, and sediment properties. Landslides most commonly occur in Minnesota due to slope failure during heavy rain events (reference (64)).

The bedrock beneath the project is dominantly limestone which tends to form karst topography. In southeastern Minnesota, erosion has worn away a majority of the overlying glacial till and exposed the limestone, increasing the likelihood of encountering karst topography (reference (65)). Over time, the carbonate materials present in limestone are dissolved by rain and groundwater, creating karst topography. Karst topography is a terrain with distinctive landforms, including sinkholes, caves, springs, and sinking streams, with hydrology dominated by rapid conduit flow (reference (66)). There are currently no mapped sinkholes within the ROW, but there are two mapped sinkholes within the route width. The absence of karst on the land surface does not verify the absence of karst below the ground surface. Karst topography is present within the route width, and portions of the project are classified as having a “moderate to high probability” for sinkholes; therefore, unmapped sinkholes may be present.

4.10.2.1 Impacts

Earthquakes are unlikely to occur in or near the project. Changes in slope are not anticipated during the project, and as a result, there would be limited risk of landslides. There are no mapped sinkholes within the project ROW, but karst topography is present with conditions conducive to sinkhole development (Map 4-10). There is potential for encountering unmapped sinkholes when working within karst topography. If a sinkhole is encountered during project construction, remedial actions have the potential to impact these features.

4.10.2.2 Mitigation Measures

There is a potential for unmapped sinkholes to be encountered during the project's construction while working within the mapped karst topography. Unmapped sinkholes pose a safety hazard during the project's construction and operation. Before the start of construction, the applicant will perform a geotechnical investigation and survey the ROW for sinkholes or evidence of sinkhole development. If a sinkhole is discovered during the geotechnical investigation, the applicant will work with the Minnesota DNR to develop a Karst Contingency Plan prior to starting construction. The Karst Contingency Plan will discuss remedial actions for mitigation. Potential remedial actions include working with the Minnesota DNR to analyze the sinkhole and excavating/replacing, filling, or grounding the sinkhole, if feasible. If a sinkhole is encountered, construction may need to be temporarily halted, and the location of a proposed structure may need to be shifted to avoid the uncovered sinkhole.

4.10.3 Soils

Soil information for the project was obtained from the USDA NRCS SSURGO database (reference (67)). Soils mapped in and around the project include five soil textural classes: clay loam, loam, silt loam, silty clay loam, and not characterized.

According to the SSURGO database, exposed soils in the area have a slight to moderate erosion hazard. The ratings in this interpretation indicate the hazard of soil loss from off-road and off-trail areas after disturbance activities that expose the soil surface.

Soil compaction susceptibility within the area ranges from low to high; however, some soil areas have not been rated. Soil compaction is primarily caused by wheel traffic and occurs when moist or wet soil particles are pressed together, reducing pore space between them.

Hydric soils are present throughout the area. A hydric soil is a soil formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part of the soil profile. Hydric soils are typically associated with lowlands and wetlands and are rated by their proportion of hydric soil in the map unit.

4.10.3.1 Impacts

Project soil impacts are anticipated to be minimal and temporary. Soil impacts are dependent, to some extent, on the soil surface conditions at the time of construction. Construction activities that occur on wet soils tend to have longer-lasting impacts regardless of the soil type. During dry conditions, soil disturbances will be temporary, minimal, and generally less invasive than typical agricultural practices such as plowing and tilling.

Surface soils would be disturbed by site clearing, grading, and excavation activities at structure locations, pulling and tensioning sites, and setup areas. Soil disturbance will occur during the transport of crews, machinery, materials, and equipment over access routes (primarily along rights-of-way). Soil erosion may occur if surface vegetation is removed, especially on fine-textured soils that occur on sloping topography, exposing soils to wind and water erosion. Topsoil could be lost to improper handling or erosion, and loss of soils could adversely impact water resources in the area. Soil compaction and rutting could occur from the movement of construction vehicles on access paths and at other locations because of heavy equipment activity.

4.10.3.2 Mitigation Measures

Identifying specific staging areas and associated impacts will be completed during the final design. Potential impacts to soils will be minimized by using BMPs for the project's construction as required by the route permit and other state and federal permits. Common measures employed to minimize soil erosion include:

- Using low-ground pressure construction equipment, which is designed to minimize impacts to soils in damp areas.
- Implementing measures to minimize erosion and sedimentation during construction and employing perimeter sediment controls, protecting exposed soil by promptly planting, seeding, using erosion control blankets and turf reinforcement mats, stabilizing slopes, protecting storm drain inlets, protecting soil stockpiles, and controlling vehicle tracking.
- Grading contours so that all surfaces provide for proper drainage, blend with the natural terrain, and are left in a condition that will facilitate re-vegetation and prevent erosion. Returning all areas disturbed during construction to pre-construction conditions.
- Obtaining an NPDES construction stormwater permit from the MPCA and preparing a SWPPP if more than one acre of soil will be disturbed during construction.
- Erecting or using sediment control fences that are intended to retard flow, filter runoff, and promote the settling of sediment out of runoff via ponding behind the sediment fence.
- Using erosion control blankets and turf reinforcement mats that are typically single or multiple-layer sheets made of natural and/or synthetic materials that provide structural stability to bare surfaces and slopes.
- Separating topsoil and subsoil and covering stockpiled soils.
- Returning locations, where grading or temporary access is required, to their original land contour and elevation to the greatest extent possible.
- Seeding to establish temporary and permanent vegetative cover on exposed soil. Soils will be revegetated as soon as practicable to minimize erosion.
- Revegetating disturbed areas using weed-free seed mixes and using weed-free straw and hay for erosion control.
- Using mulch to form a temporary and protective cover on exposed soils. Mulch can help retain moisture in the soil to promote vegetative growth, reduce evaporation, insulate the soil, and reduce erosion. A common mulch material used is hay or straw.

4.10.4 Vegetation

The project is within the Oak Savanna ecological subsection, as described in Chapter 4.2. This subsection is characterized as a series of end moraines from the previous glacial maximum that consist of bur oak, hardwood forests, and tallgrass prairies. Prior to European settlement, the majority of the area consisted of bur oaks that grew in a variety of conditions, including dry uplands, sandy plains, and moist bottomlands (reference (68)). Historically, fire was important in maintaining oak savanna by preventing

bur oak forests from establishing. Tallgrass prairie was also present in oak savanna landscapes. Sensitive vegetation resources, such as native plant communities, are scattered across the project; these resources are discussed in Chapter 4.11.

4.10.4.1 Impacts

Project construction will result in short-term impacts to existing vegetation, including localized physical disturbance and soil compaction. Construction activities involving the development and use of access roads, staging, and stringing areas would also have short-term impacts on vegetation by concentrating surface disturbance and equipment use. Permanent vegetation clearing will be required in the designated structure installation areas, resulting in an impact area measuring 8 feet in diameter for typical structures and 12 feet in diameter for dead-end and angle structures. Approximately one acre of trees will be removed from various locations within the ROW. The trees and understory brush will be cleared for the installation of structures and where canopy heights would interfere with the applicant's proposed route. Construction will also result in long-term impacts to vegetation by permanently removing taller-growing woody vegetation within the ROW (Figure 4-7).

Figure 4-7 Example of Trees in the ROW that may be Cleared (Facing North)

Construction and maintenance activities have the potential to result in the introduction or spread of noxious weeds and other non-native species. Noxious weeds could be introduced to new areas through propagating material like roots or seeds transported by contaminated construction equipment. Activities that could potentially lead to the introduction of noxious weeds and other non-native species include

ground disturbance that leaves soils exposed for extended periods, introduction of topsoil contaminated with weed seeds, vehicles importing weed seed, and conversion of landscape type.

4.10.4.2 Mitigation Measures

The primary means of mitigating vegetation impacts is to avoid particular vegetation, such as trees, through prudent routing. Mitigation can be achieved, in part, by using existing infrastructure rights-of way (e.g., roadway) such that tree removal is minimized. Mitigation can also be accomplished by spanning areas of sensitive vegetation, native plant communities, and other sensitive ecological resources.

Vegetation impacts can also be mitigated by a number of other strategies, including:

- Following existing road ROW.
- Limiting new access roads for construction.
- Constructing during fall and winter months to limit plant damage.
- Leaving or replanting compatible plants at the edge of the transmission line ROW.
- Replanting the transmission line ROW with low-growing, native species.
- Limiting vehicle traffic to roads along the ROW and within previously disturbed areas.

Potential noxious weed impacts can be mitigated by:

- Revegetating disturbed areas using weed-free seed mixes and using weed-free straw and hay for erosion control.
- Removal of invasive species/noxious weeds via herbicide and manual means consistent with easement conditions and landowner restrictions.
- Cleaning and inspecting construction vehicles to remove dirt, mud, plant, and debris from vehicles prior to arriving at and leaving construction sites.

Vegetation impacts can also be mitigated by providing compensation to individual landowners through negotiated easement agreements.

4.10.5 Wildlife

The project provides limited habitat for wildlife species, as much of the landscape has been converted to cultivated crops. The project is near the transition between the southern and central wildlife regions (references (69); (70)). The south wildlife region consists of species adapted to prairie landscapes that extend from the border with the Dakotas and as far north as the Minnesota River. The central wildlife region extends from the Anoka sand plains in Central Minnesota to the southeast driftless area. Wildlife in the general vicinity consists of songbirds, raptors, and small mammals. The project does not offer areas of cover such as forests or prairies. Perennial vegetation coverage is sparse and limited to roadside ditches, stream corridors, and residential properties. Oak stands located outside of the project ROW offer additional coverage throughout the year.

The state of Minnesota is in the Central Flyway of North America. The Central Flyway is a bird migration route that encompasses the Great Plains of the U.S. and Canada. Migratory birds use portions of the Central Flyway as resting grounds during spring and fall migration, as well as breeding and nesting grounds throughout the summer. Within and near the project, there is limited suitable habitat for migratory birds.

Migratory birds are protected under the Migratory Bird Treaty Act (MBTA) of 1918 (16 USC 703-712), which prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests. Bald eagles (*Haliaeetus leucocephalaus*) and golden eagles (*Aquila chrysaetos)* are protected under the MBTA and the federal Bald and Golden Eagle Protection Act (BGEPA) (16 USC 668-668d), which specifically prohibits the taking or possession of and commerce in, either alive or dead, of any part, nest, or egg of these eagles.

4.10.5.1 Impacts

For non-avian wildlife, construction activities that generate noise, dust, or disturbance may result in short-term, indirect impacts on wildlife. During project construction, wildlife would generally be displaced within the ROW. Clearing and grading activities could also affect small mammals that may be unable to avoid equipment. Many wildlife species will likely avoid the immediate area during construction; the distance that animals would be displaced depends on the species and the tolerance level of each animal. However, comparable habitat is available adjacent to the project.

Potential impacts to avian species (e.g., songbirds, raptors, and waterfowl) include displacement during construction, electrocution, and collision with transmission line conductors. Electrocution occurs more frequently with larger bird species, such as hawks, because they have wider wingspans that are more likely to create contact with the conductors. To avoid and minimize potential electrocution of avian species, the project will be constructed in accordance with the Avian Power Line Interaction Committee's safety recommendations (reference (71)). These recommendations minimize electrocution risk by providing adequate clearance from energized conductors to grounded surfaces and to other conductors.

Independent of the electrocution risk, birds may be injured by colliding with transmission line structures and conductors. The collision risk is influenced by several factors, including habitat, flyways, foraging areas, and bird size. Waterfowl, especially larger waterfowl such as swans and geese, are more likely to collide with transmission lines. The collision frequency increases when a transmission line is placed between agricultural fields that serve as feeding areas and wetlands or open water, which serve as resting areas. In these areas, it is likely that waterfowl and other birds would be traveling between different habitats, increasing the likelihood of a collision.

The potential long-term project impacts to wildlife are anticipated to be minimal. Potential wildlife impacts can be mitigated.

4.10.5.2 Mitigation

Bird collisions with transmission lines can be mitigated by configuring the conductors in a single horizontal plane and through the use of bird flight diverters. Diverters enable birds to better see conductors during flight and avoid collisions with them. A typical diverter is shown in Figure 4-8.

The primary mitigation strategy is to avoid disturbing and placing structures within riparian areas.

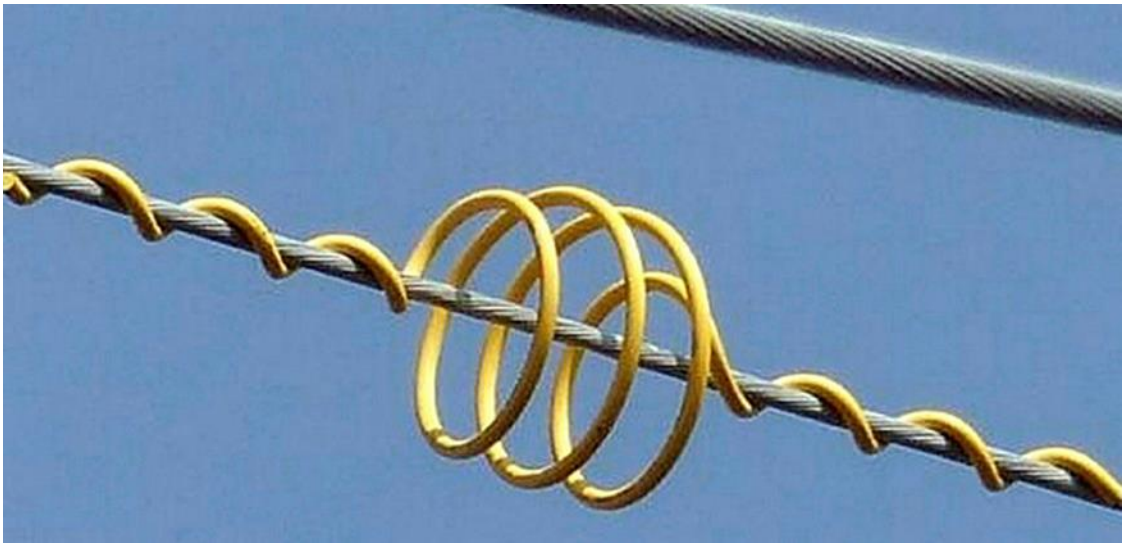


Figure 4-8 Bird Flight Diverter

4.11 Rare and Unique Natural Resources

This chapter describes the rare and unique natural resources, including federally and state-protected species and sensitive ecological resources, which are present throughout the project's geographic area.

Federally endangered or threatened species are protected under Section 7 of the Endangered Species Act (ESA) of 1973. Data on federally protected species were reviewed using the USFWS Information for Planning and Consultation (IPaC) online tool.

State-endangered or threatened species are protected under the Minnesota Endangered Species Statute (Minn. Statute 84.0895). The DNR Conservation Explorer online tool (License Agreement #2022-008) was used to assess the presence of sensitive ecological resources in the area. Sensitive ecological resources may provide habitat suitable for federal and/or state-protected species.

4.11.1 Protected Species

4.11.1.1 Federally Protected Species

The USFWS IPaC online tool was queried on February 28, 2025, for a list of federally threatened and endangered species, proposed species, candidate species, and designated critical habitat that may be present within the vicinity of the project (Appendix G). The IPaC query identified five federal species that could potentially be in the vicinity of the project, including one endangered species, two threatened species, one proposed threatened species, and one experimental population, non-essential species. These species and their typical habitats are summarized in Table 4-19.

The IPaC query identified the presence of bald eagles (*Haliaeetus leucocephalus*) and/or golden eagles (*Aquila chrysaetos*) in the project vicinity; these species are protected under the BGEPA and the MBTA. The BGEPA and the MBTA provide protection for bald eagles. The BGEPA protects and conserves bald eagles and golden eagles from intentional take of an individual bird, chick, egg, or nest, including alternate and inactive nests. Unlike the MBTA, BGEPA prohibits disturbance that may lead to biologically significant impacts, such as interference with feeding, sheltering, roosting, and breeding or abandonment of a nest.

The project does not traverse any federally designated critical habitat.

Table 4-19 Federal Species Potentially Present in the Vicinity of the Project

Scientific Name	Common Name	Federal Status	State Status	Habitat
Myotis septentrionalis	Northern Long-eared Bat	Endangered	Special concern	Forested habitat in active season; caves and mines during inactive season [1]
Grus americana	Whooping Crane	Experimental Population, Non-Essential	Not listed	Wetlands, lakes, ponds, rivers, and agricultural fields [2]
Danaus plexippus	Monarch Butterfly	Proposed Threatened	Not listed	Areas with a high number of flowering plants. Presence of milkweed (Asclepias spp.) to complete the caterpillar life stage [3]
Lespedeza leptostachya	Prairie Bush-clover	Threatened	Threatened	Disturbed tallgrass prairie habitats and undisturbed remnant prairies [4]
Platanthera praeclara	Western Prairie Fringed Orchid	Threatened	Endangered	Moist tallgrass prairies and sedge meadows [5]

[1] reference (72)
[2] reference (73)
[3] reference (74)
[4] reference (75)
[5] reference (76)

Impacts

Potential short-term impacts on federally protected wildlife species that could occur during project construction would be similar to those described for non-listed species in Chapter 4.10.5, and may include displacement of protected species during construction activities that generate noise, dust, or disturbance of habitat.

Impacts to northern long-eared bats could occur if clearing or construction take place during the bat's active season, when the species are breeding, foraging, or raising pups in forested habitat. Bats may be injured or killed if occupied trees are cleared during the active season, and the species may be disturbed during clearing or construction activities due to noise or human presence.

Whooping cranes are designated as a non-essential experimental population in the state. This designation refers to a population that has been established within its historical range under Section 10(j) of the ESA to aid in species recovery. Consultation under Section 7(a)(2) of the ESA is only required if project activities would occur within a National Wildlife Refuge or a National Park. The project does not intersect any National Wildlife Refuges or National Parks; therefore, consultation is not required. The project is expected to have no effect on whooping cranes due to a lack of suitable habitat within one mile.

The monarch butterfly is a federal candidate species, which means that it is a species for which the USFWS has sufficient information to propose listing them as endangered or threatened under the ESA, but their listing is not finalized yet. Candidate species have no federal protection under the ESA.

The prairie bush-clover is a federally and state-threatened species that inhabits isolated prairie habitat and remnant prairies on steep slopes. Potential impacts to the prairie bush-clover could occur due to disturbance of habitat during and after construction through physical clearing and herbicide application.

However, the project contains primarily agricultural land and regularly maintained ROW, so the project is expected to have no effect on the prairie bush-clover due to the lack of suitable habitat.

The Western Prairie Fringed Orchid is a federally threatened species and state-endangered species that inhabits remnant native plant communities. Potential impacts to the Western prairie fringed orchid could occur due to disturbance of habitat during and after construction through physical clearing and herbicide application. However, because the project contains primarily agricultural land and regularly maintained ROW, the project is expected to have no effect on the western prairie fringed orchid due to the lack of suitable habitat.

Bald and golden eagles typically nest in mature trees near large lakes or streams (reference (77)). There is potentially suitable nesting habitat present for these species within one mile of the project. The project is expected to have no effect on bald and golden eagles because tree clearing for this project would occur in the ROW, and nesting habitat is unlikely to be present within the ROW due to the lack of potential food sources in the vicinity.

Mitigation Measures

The primary means to mitigate potential impacts to federally protected species is to avoid routing through habitat utilized by these species. Additionally, impacts can be mitigated by incorporating species (or species type) specific BMPs in coordination with the USFWS. The applicant may be required to conduct field surveys for protected species in coordination with USFWS to determine the presence of particular species along the permitted route. If a protected species is unavoidable, a takings permit may be required, and other permit conditions may be set.

Impacts to northern long-eared bats could be minimized by conducting clearing activities while the bats are hibernating in their inactive season and avoiding tree removal from June 1 through August 15 habitats.

4.11.1.2 State-Protected Species

The applicant requested a DNR Natural Heritage Review in May 2024 to determine if any state-endangered, threatened, or special concern species have been documented within one mile of the project (Appendix H). The NHIS database identified one record of a threatened species within one mile of the project. The state-threatened species documented in the NHIS database, along with their typical habitat, are summarized in Table 4-20.

Table 4-20 Natural Heritage Information System Database Records of State-Threatened and Endangered Species Documented Within One Mile of the Project

Scientific Name	Common Name	Type	State Status	Habitat
Valeriana edulis var. ciliata	Edible Valerian	Vascular plant	Threatened	Moist, sunny, calcareous areas, including calcareous fens, wet meadows, and moist prairies [1]

[1] reference (78)

Impacts

The state-threatened edible valerian occupies prairie and fen habitat. Due to a lack of suitable habitat in the project ROW, project-related impacts to edible valerian are not anticipated.

Mitigation Measures

No mitigation is proposed because project-related impacts to state-protected species are not anticipated for the project.

4.11.2 Sensitive Ecological Resources

The DNR has established several classifications for sensitive ecological resources across the state, with only one being present within the project area (Map 4-7). The sensitive ecological resource, the Cherry Grove Blind Valley Scientific and Natural Area, is located over three miles from the project. This area is shown in Map 4-7 but is not discussed further in this EA due to distance mitigating any potential for project-related impacts.

There are no state-mapped Sites of Biodiversity Significance (SBS), native plant communities, high conservation value forests, or Lakes of Biological Significance within one mile of the project.

4.11.2.1 Impacts

No known sensitive ecological resources have been documented within one mile of the project; therefore, no impacts to sensitive ecological resources are anticipated as a result of the project.

4.11.2.2 Mitigation Measures

Mitigation measures for sensitive ecological resources are not proposed because there are no sensitive ecological resources within one mile of the project.

4.12 Use of Existing Right-of-Way

Sharing ROW with existing infrastructure minimizes fragmentation of the landscape and can minimize human and environmental impacts (e.g., aesthetic and agricultural impacts). The use and paralleling of existing transportation, pipeline, and electrical transmission systems or rights-of-way is one of the 14 factors the Commission considers when making a route permit decision (Minn. Rule 7850.4100). As discussed at the beginning of Chapter 3, ROW sharing is defined as co-locating the transmission line with other existing infrastructure ROW to partially share that existing ROW and lessen the overall easement width required for the project.

The route parallels existing road ROW along 171st Avenue for its entire length in Minnesota (Table 4-3). The project would also share this road ROW for its entire length (Map 4-11).

4.13 Electric System Reliability

The NERC has established mandatory reliability standards for American utilities. For new transmission lines, these standards require the utility to evaluate whether the grid would continue to operate adequately under various contingencies. The effects of these transmission contingencies on the system and the transmission system's ability to serve load must be monitored and managed by utilities. Route permits issued by the Commission require permittees to comply with NERC standards (Appendix E).

In developing possible project routes, the applicant analyzed whether these routes created reliability concerns. The applicant indicated that there are no reliability concerns with its proposed route and that this route supports and enhances the reliability of the regional electrical system. Thus, no adverse impacts to electric system reliability are anticipated.

4.14 Cost

As outlined in the RPA, the estimated project construction cost is approximately $4 million (estimated in year-2020 dollars). Construction cost estimates rely on the best available information at the filing time of the RPA and include permitting, land acquisition and ROW, design/engineering, materials (e.g., steel, conductor, insulators, etc.), construction costs, and contingency. The cost estimate assumes the applicant will pay prevailing wages for applicable positions during project construction.

In rural areas, monopole construction and easement costs are approximately $1,142,000 per mile (2020 dollars). However, the project's costs are anticipated to be higher than this per-mile average because the proposed route would avoid existing homes and other existing structures. To avoid the existing homes and structures, the applicants anticipate crossing the road back and forth, which adds angle structures to the project. To engineer these added angles, the project may require specialty structures and foundations. The use of specialty structures and foundations adds additional cost, and an additional contingency was also included due to the uncertainty around material costs and lead times.

Once constructed, operation and maintenance costs associated with the new transmission line would be initially driven by controlling regrowth vegetation within the ROW. The estimated annual cost of ROW vegetation maintenance is estimated at $7,000 to $15,000 every five years. Transmission line maintenance for the project is estimated at $30,000 to $35,000 annually. Storm restoration, annual inspections, and ordinary replacement costs are included in these annual operating and maintenance costs.

4.15 Cumulative Potential Effects

In Minnesota, cumulative potential effects are impacts on the environment that result from:

> *The incremental effects of a project in addition to other projects in the environmentally relevant area that might reasonably be expected to affect the same environmental resources, including future projects actually planned or for which a basis of expectation has been laid, regardless of what person undertakes the other projects or what jurisdictions have authority over the projects (Minn. Rule 4410.0200).*

Considering cumulative potential effects serves to assist decision-makers in avoiding decisions about a specific project in isolation. Effects that might seem minimal when viewed in the context of a single project can accumulate and become significant when the broader landscape of all projects is taken into account.

Cumulative effects are reviewed here for projects that have been planned or are otherwise foreseeable in the project area. The websites of several agencies/local governments were reviewed, and in some cases, agencies/local governments were directly contacted to identify current and reasonably foreseeable future projects that are located within the project vicinity; these agencies included the Minnesota Environmental Quality Board, the Commission, the Department, BWSR, MPCA, and DNR. In addition, the websites for the Iowa Department of Transportation, Fillmore County (Minnesota), and Howard County (Iowa) were reviewed.

Two projects were identified in the project area – these include retiring a portion of the existing Dairyland 161 kV LQ8A transmission line and reconfiguring the aboveground MiEnergy distribution line to a buried distribution line. The 161 kV LQ8A project would consist of retiring an approximately four-mile portion of the existing 161 kV LQ8A single circuit monopole line between 131st Avenue and 171st Avenue at the northern end of the project.

The distribution line project would consist of burying an existing aboveground distribution line for approximately 2.4 miles along its current route, where it would be co-located with the project. The buried line would follow 171st Ave from CSAH 44 to 110th Street. This project would be completed by MiEnergy.

4.15.1 Human Settlements

Cumulative potential effects on human settlements are anticipated to be minimal. Future projects will result in aesthetic impacts. The 161 kV LQ8A retirement project would remove four miles of existing overhead electrical lines in the vicinity of the project. Burying the existing MiEnergy distribution line would remove an existing overhead electrical line for approximately two miles along 171st Avenue, although the existing distribution line structures would be replaced by new transmission line structures that are approximately 50 feet taller. Burying the existing distribution line would further require minor excavations and temporary visual impacts. The projects are not anticipated to impact local zoning, land use, property values, noise, or cultural values.

4.15.2 Transportation and Public Services

Cumulative potential effects on transportation and public services are anticipated to be minimal. County and township roads may experience localized congestion as construction occurs, particularly if any of the three projects overlap in schedule. However, traffic would return to normal following the completion of each project.

4.15.3 Public Health and Safety

This project, in combination with retiring the 161 kV transmission line and burying the distribution line, is not expected to create impacts to public health and safety. Retiring an existing 161 kV transmission line and burying a distribution line both have the potential to reduce EMF in the vicinity of the project. In addition, the Commission imposes a maximum electric field limit of 8 kV/m for new transmission projects; therefore, cumulative public health impacts related to induced voltages are not anticipated.

4.15.4 Climate and Air Quality

The project, in combination with retiring the 161 kV transmission line and burying the MiEnergy distribution line, would minimally impact the climate and air quality. When considered singularly, small amounts of emissions would be associated with each project while construction is occurring via mobile combustion and particulate roadway dust generation. However, adverse effects on the surrounding

environment are expected to be negligible due to the temporary nature of the disturbances during construction. In addition, retiring the existing 161 kV line and constructing the project would, on the whole, assist in achieving the state's GHG reduction goals.

4.15.5 Land-Based Economies

Cumulative potential effects on land-based economies may occur but are anticipated to be minimal. Small areas of agricultural land and adjacent road ROW would be disturbed for the project as well as retiring the 161 kV transmission line and burying the distribution line. Following construction, the land is expected to be returned to pre-project conditions.

4.15.6 Archaeological and Historic Resources

This project, in combination with retiring the 161 kV transmission line and burying the MiEnergy distribution line, could result in cumulative potential effects to archaeological and historic resources. Any time new ground disturbance would occur as the result of a project, there is the potential to impact significant archaeological and historic resources. However, surveying and identifying these resources during the project planning stages would determine their presence. Once identified, prudent routing and/or efforts to avoid or minimize impacts to these resources would reduce the potential for cumulative effects.

4.15.7 Natural Environment

This project, in combination with retiring the 161 kV transmission line and burying the MiEnergy distribution line, could interact to result in cumulative potential effects to the natural environment, including water, soil, vegetation, and wildlife resources. However, it is anticipated that the cumulative potential effects to these resources would be minimal given the use of existing ROW for this project and removal of existing 161 kV transmission line. Construction of the project will result in localized impacts to soil and water resources that will be mitigated by implementing BMPs to minimize impacts. Similarly, erosion control practices will be implemented during the retirement of the 161 kV transmission line and while burying the distribution line. Wildlife may be temporarily displaced during these construction activities, although quality wildlife habitat is minimal in the project area. Vegetation impacts are expected to be minimal because retiring this project's 161 kV transmission line and burying the distribution line would occur parallel to road ROW and/or within agriculture fields. BMPs, such as bird flight diverters, could be used where necessary to reduce the potential for avian impacts.

4.15.8 Rare and Unique Natural Resources

Cumulative potential effects on rare and unique natural resources are expected to be minimal. The project, in combination with the reasonably foreseeable future projects, is not within federally protected areas and not within critical habitat for threatened or endangered species.

5 Application of Routing Factors to the Project

The Commission is charged with locating transmission lines in a manner that is "compatible with environmental preservation and the efficient use of resources" and that minimizes "adverse human and environmental impact(s)" while ensuring electric power reliability (Minn. Statute 216E.02). Minn. Statute 216E.03, subdivision 7(b) identifies considerations that the Commission must consider when designating transmission lines routes.

Minn. Rule 7850.4100 lists 14 factors for the Commission to consider in its route permitting decisions, including impacts on human settlements, land-based economies, and the natural environment (see Factors Considered by the Commission for Transmission Line Route Permits sidebar). Through an analysis of the routing factors, this chapter summarizes and discusses the potential impacts of the applicant's proposed route.

Many of the project impacts relative to the applicable routing factors are anticipated to be avoided or minimized by the (1) route selection, (2) general and special conditions in the Commission's route permit, (3) prudent transmission structure placement and placement of the alignment within the permitted route, and (4) the requirements of "downstream" permits such as a construction stormwater permit.

The discussion here focuses on the first 12 routing factors (See Minn. Rule 7850.4100, factors A through L). Routing factors M and N— the unavoidable and irreversible impacts of the project—are discussed at the end of this chapter.

Routing factor G speaks to mitigating adverse environmental impacts. With respect to environmental impacts, the examination of such impacts suggested by routing factor G is included in the discussion of other routing factors and elements that more specifically address an environmental impact (e.g., effects on vegetation and wildlife, routing factor E).

Routing factor I, the use of existing large electric power generating plant sites, is not relevant to this project and is not discussed further.

Finally, routing factors H and J address similar issues, the use or paralleling of existing rights-of-way. Routing factor H relates to the use or paralleling of existing rights-of-way but

Factors Considered by the Commission for Transmission Line Route Permits

To determine whether to issue a route permit for a high-voltage transmission line, the Commission shall consider the following factors of Minnesota Rules, part 7850.4100:

A. Effects on human settlement, including, but not limited to, displacement, noise, aesthetics, cultural values, recreation, and public services.

B. Effects on public health and safety.

C. Effects on land-based economies, including, but not limited to, agriculture, forestry, tourism, and mining.

D. Effects on archaeological and historic resources.

E. Effects on the natural environment, including effects on air and water quality resources and flora and fauna.

F. Effects on rare and unique natural resources.

G. Application of design options that maximize energy efficiencies, mitigate adverse environmental effects, and could accommodate expansion of transmission or generating capacity.

H. Use or paralleling of existing rights-of-way, survey lines, natural division lines, and agricultural field boundaries.

I. Use of existing large electric power generating plant sites.

J. Use of existing transportation, pipeline, and electrical transmission systems or rights-of-way.

K. Electrical system reliability.

L. Costs of constructing, operating, and maintaining the facility which are dependent on design and route.

M. Adverse human and natural environmental effects which cannot be avoided.

N. Irreversible and irretrievable commitments of resources.

also includes items that do not have a ROW, such as survey lines, natural division lines, and agricultural field boundaries. Routing factor J relates to the use of existing transportation, pipeline, and electrical transmission rights-of-way. Within this chapter, these factors are considered similarly—the use or paralleling of existing rights-of-way, where there is infrastructure that has a ROW.

5.1 Applicant's Proposed Route

The potential impacts of the applicant's proposed route are summarized in Table 5-1, depicted on Map 5-1 and described further in Chapters 5.1.1 through 5.1.6. Those elements with minimal or no potential to be impacted by the project are not discussed in this Chapter.

Table 5-1 Human and Environmental Impacts of the Applicant's Proposed Route

Resource	Element	Applicant's Proposed Route
Length (miles)		3.5
Human Settlement	Residences within 0-50 feet (count)	0
	Residences within 50-250 feet (count)	5
	Residences within 250-500 feet (count)	1
	Residences within 500-1,000 feet (count)	0
Environmental Justice	Communities of EJ concern crossed by the 100-ft ROW (count)	0
Land-Based Economies	Agricultural land in 100-ft ROW (acres)	9.6
Archaeological and Historic Resources	Archaeological sites in route width (count)	0
	Historic resources in route width (count)	3
Water Resources	Stream crossings (count)	3
	PWI crossings (count)	2
	NWI wetland crossings (count)	4
	Total wetlands in 100-foot ROW (acres)	3.6
Vegetation	Forested landcover in 100-foot ROW (acres)	0
Wildlife	Wildlife Management Areas in 100-foot ROW (acres)	0
	Scientific and Natural Areas in 100-foot ROW (acres)	0
	Potential for Federal- or state-protected species in 100-foot ROW (count)	1
ROW Sharing and Paralleling	Transmission line (miles, percent)	0 0)
	Roadway (miles, percent)	3.5 (100)
	Field, parcel, or section lines (miles, percent)	3.5 (100)
	Total ROW sharing and paralleling (miles, percent)	3.5 (100)
Estimated Cost	Total estimated cost (2020 dollars)	$4,000,000

5.1.1 Human Settlement

Potential impacts on human settlements are assessed through an evaluation of several elements, as discussed in Chapter 4.3. For most of the human settlement elements, project impacts are anticipated to be minimal. Analysis of impacts to human settlements focuses on those elements where impacts have the potential to occur, which for the project includes aesthetics.

5.1.1.1 Aesthetics

Aesthetic impacts are assessed, in part, through a consideration of the existing viewshed, landscape, character, and setting of any given area, followed by an evaluation of how a proposed project would change these aesthetic attributes. Determining the relative scenic value or visual importance in any given area depends, in large part, on the values and expectations held by individuals and communities about the aesthetic resource in question.

Based on the project's proximity to residences, aesthetic impacts may occur as a result of the project. There are five residences located between 50 and 250 feet of the applicant's proposed route. Tree clearing along the ROW will be necessary where the project crosses vegetated fence lines along 171st Avenue.

The project will result in the introduction of new infrastructure in a relatively rural area. However, aesthetic impacts would be minimized by sharing existing road ROW. In addition, there is an existing 12.47 kV distribution line along much of the proposed route, which has a similar visual appearance, albeit on a smaller scale than the project. The applicant has also committed to minimizing permanent impacts to the aesthetics and visual character of the area by avoiding and/or minimizing tree clearing and avoiding residential areas to the maximum extent practicable.

5.1.2 Land-Based Economies

Potential impacts to land-based economies are assessed through an evaluation of the elements discussed in Chapter 4.8. The majority of elements considered under land-based economies would be minimally impacted by the project. Potential agricultural impacts that may occur as a result of the project are discussed further.

5.1.2.1 Agriculture

There are 9.6 acres of agriculture land within the ROW, comprised of hay/pastureland and cultivated cropland, which equates to 22.8 percent of the total land cover within the ROW. Permanent impacts to agriculture as a result of the project may include loss of farmland due to structure placement in agricultural fields and restriction of farming equipment. Impacts to agricultural operations have been mitigated by proposing a project that primarily follows existing roadway ROW. Additionally, the applicant will work with landowners regarding compensation for any unintended impacts (e.g., repair of drain tile).

5.1.3 Archaeological and Historic Resources

Three historic architectural resources are located within the route width for the project. One of these resources (a culvert) has been previously determined not eligible for the NRHP; therefore, no additional work related to this resource would be required for the project to proceed. However, the project has the potential to adversely affect the two remaining historic resources (bridges) that have not been evaluated for the NRHP. However, project activities will occur adjacent to 171st Avenue and would not be located

within the road ROW, so the project will not directly affect these resources. The bridges and culvert represent infrastructure critical to the function of the rural agricultural community in the same way that the project will provide critical infrastructure for the community. Therefore, the project does not have the potential to alter these resources' setting, feeling, appearance, and/or association. The RUS, as the lead federal agency for the project, will be responsible for completing Section 106, including identifying, evaluating, and mitigating any project-related impacts to historic properties.

The primary means of minimizing impacts to archaeological and historic resources is prudent routing or structure placement – (i.e., avoiding known archaeological and historic resources). If they cannot be avoided, impacts to these resources could be mitigated using measures developed in consultation with the SHPO prior to construction.

5.1.4 Natural Environment

Potential impacts to the natural environment are assessed by looking at several specific elements. For some of the elements of the natural environment, impacts from the project are anticipated to be minimal and are therefore not discussed in this Chapter. This Chapter addresses those elements that do have the potential to be impacted by the project – water resources, vegetation, and wildlife.

5.1.4.1 Water Resources

The project crosses two unnamed streams that are identified as public waters and one that is not. In addition, four wetlands totaling approximately 3.6 acres are located in the project ROW. However, it is anticipated that impacts to water courses and wetlands will be avoided by adjusting structure locations to avoid disturbing the streams and wetlands. No surface water or wetland crossing will be greater than 1,000 feet, meaning all surface waters can be spanned to avoid placing a structure within these resources. In addition, the project will develop a SWPPP that identifies BMPs to be implemented during construction to minimize erosion and sedimentation impacts to surface waters. The applicant will also work with the DNR to obtain appropriate approvals for public water crossings.

5.1.4.2 Vegetation

Present-day vegetation consists of herbaceous agricultural vegetation, cultivated crops, hay and pasture land, and developed lands. Project construction will result in short-term impacts to existing vegetation, including localized physical disturbance and soil compaction. Development and use of access roads, staging, and stringing areas for the project will also have short-term impacts on vegetation by concentrating surface disturbance and equipment use. Permanent vegetation clearing will be required in the designated structure installation areas, resulting in an impact area measuring 8 feet in diameter for typical structures and 12 feet in diameter for dead-end and angle structures. Approximately one acre of trees would be removed from various locations within the ROW. The trees and understory brush will be cleared for the installation of structures and where canopy heights would interfere with the applicant's proposed route. Construction will also result in long-term impacts to vegetation by permanently removing taller-growing woody vegetation within the ROW.

Mitigation will include following existing road ROW, limiting new access roads for construction, constructing during fall and winter months to limit plant damage, leaving or replanting compatible plants at the edge of the transmission line ROW, replanting the transmission line ROW outside of active farmed areas with low-growing, native species, and limiting vehicle traffic to roads along the ROW and within previously disturbed areas.

5.1.4.3 Wildlife

Wildlife in the general vicinity consists of songbirds, raptors, and small mammals. In addition, Minnesota is in the Central Flyway of North America. Migratory birds use portions of the Central Flyway as resting grounds during spring and fall migration, as well as breeding and nesting grounds throughout the summer. Within and near the project, there is limited suitable habitat for migratory birds. Migratory birds are protected under the MBTA. In addition, bald eagles and golden eagles are protected under the MBTA and the federal BGEPA.

For non-avian wildlife, construction activities that generate noise, dust, or disturbance may result in short-term, indirect impacts. During project construction, wildlife would generally be displaced within the ROW. Potential impacts to avian species (e.g., songbirds, raptors, and waterfowl) include displacement during construction, electrocution, and collision with transmission line conductors. Independent of the electrocution risk, birds may be injured by colliding with transmission line structures and conductors. The collision risk is influenced by several factors, including habitat, flyways, foraging areas, and bird size.

The primary mitigation strategy is to avoid disturbing and placing structures within riparian areas and wetlands. Bird collisions with transmission lines can be mitigated by configuring the conductors in a single horizontal plane or through the use of bird flight diverters.

5.1.5 Rare and Unique Natural Resources

There are six documented federal- or state-protected species within one mile of the applicant's proposed route. One federally endangered species, the northern long-eared bat, has the potential to be within the 100-foot ROW and, if present, could potentially be directly impacted by the project if trees are removed during the active nesting period. Impacts to northern long-eared bats could be minimized by conducting clearing tree activities while the bats are hibernating in their inactive season and avoiding tree removal from June 1 through August 15.

5.1.6 Use of Existing Rights-of-Way

Sharing ROW with existing infrastructure minimizes fragmentation of the landscape and can minimize human and environmental impacts (e.g., aesthetic and agricultural impacts). The project shares ROW for the entire length of the project in Minnesota; the ROW for the route will be shared with the existing road ROW along 171st Avenue.

5.2 Summary of Project-Specific Routing Factors

The discussion here uses text and a color graphic to summarize the relative merits of the applicant's proposed route (Table 5-2). The color graphic and related notes for a specific routing factor or element are not meant to suggest that accommodations and/or changes need to be made to the route but are provided as a relative comparison to be evaluated together with all other routing factors. For example, if the applicant's proposed route is "red" for a particular factor or element, this is not meant to indicate a fatal flaw within the proposed route.

For routing factors that express the state of Minnesota's interest in the efficient use of resources (e.g., the use and paralleling of existing rights-of-way), the graphic represents the consistency of the route with these interests. For the remaining routing factors, the graphic represents the magnitude of the anticipated impacts.

Table 5-2 Guide to Relative Merits of the Applicant's Proposed Route

Anticipated Impacts or Consistency with Routing Factor	Symbol
Minimal: Impacts are anticipated to be minimal with mitigation – OR – route option is very consistent with this routing factor.	
Moderate: Impacts are anticipated to be minimal to moderate with mitigation; special permit conditions may be required for mitigation – OR – the route may not be the least impactful with respect to the routing factor.	
Significant: Impacts are anticipated to be moderate to significant and likely unable to be mitigated – OR – route alternative is not consistent with the routing factor or consistent only in part. Indicates that the route is impactful with respect to the routing factor.	

5.2.1 Routing Factors for Which Impacts are Anticipated to be Minimal

Potential impacts are anticipated to be minimal for the following routing factors and elements:

- Impacts on human settlements (factor A) – displacement, environmental justice communities, noise, property values, electronic interference, cultural values, zoning and land-use compatibility, and public services.
- Impacts on public health and safety (factor B) – EMF, implantable medical devices, stray voltage, induced voltage, and air quality.
- Impacts on land-based economies (factor C) – forestry, mining, and recreation and tourism.
- Impacts on archaeological and historic resources (factor D).
- Impacts on rare and unique natural resources (factor F) – sensitive ecological resources.
- Impacts on electric system reliability (factor K).
- Costs that are dependent on design and route (factor L).

5.2.2 Routing Factors for which Impacts may be Minimal to Moderate

Potential impacts are anticipated to be minimal to moderate for the following routing factors and elements:

- Impacts on human settlements (factor A) – aesthetics.
- Impacts on land-based economies (factor C) – agriculture
- Impacts on the natural environment (factor E) – water resources, vegetation (flora), and wildlife (fauna).
- Impacts on rare and unique natural resources (factor F) – protected species.
- Use or paralleling of existing rights-of-way (factors H and J).

The relative merits of the applicant's proposed route against each of the routing factors is included in Table 5-3.

Table 5-3 Summary of Routing Factors for the Applicant's Proposed Route

Routing Factor/Resource	Applicant's Proposed Route	Summary
A. Human Settlement – Displacement, Noise, Aesthetics, Cultural Values, Recreation, and Public Services		There are five residences located between 50 and 250 feet of the applicant's proposed route. Some tree clearing along the ROW will occur. The project will result in a viewshed change for the area.
B. Public Health and Safety		No impacts to public health and safety are anticipated as a result of the project.
C. Land-based Economies – Agriculture, Forestry, Tourism, and Mining		Permanent impacts to agriculture as a result of the project may include loss of farmland due to structure placement in agricultural fields and restriction of farming equipment. Impacts to agricultural operations have been mitigated by proposing a project that primarily follows existing roadway ROW.
D. Archaeological and Historic Resources		No impacts to archaeological and historic resources are anticipated as a result of the project.
E. Natural Environment – Air and Water Quality Resources and Flora and Fauna		Impacts to water courses and wetlands will be avoided by adjusting structure locations to avoid impacting streams and wetlands. Project construction will result in short- and long-term impacts to existing vegetation. Short-term impacts to non-avian wildlife may occur. Avian electrocution and/or collision may occur as a result of the project.
F. Rare and Unique Natural Resources		The project may result in impacts to northern long eared bats if they are present in the ROW; however, this can be mitigated by conducting clearing activities while the bats are hibernating during their inactive season and avoiding tree removal from June 1 through August 15.
G. Application of Design Options that Maximize Energy Efficiencies, Mitigate Adverse Environmental Effects, and could Accommodate Expansion of Transmission or Generating Capacity		The project has been designed to maximize energy efficiencies and mitigate adverse environmental effects.
H. Use or Paralleling of Existing Rights-of-Way, Survey Lines, Natural Division Lines, and Agricultural Field Boundaries		The project shares road ROW for 100% of its length.
I. Use of Existing Large Electric Power Generating Plant Sites		This routing factor is not applicable to the project.
J. Use of Existing Transportation, Pipeline, and Electrical Transmission Systems or Rights-of-Way		The project shares road ROW for 100% of its length.
K. Electrical System Reliability		The project supports electrical system reliability.

Routing Factor/Resource	Applicant's Proposed Route	Summary
L. Costs of Construction, Operating, and Maintaining the Facility, which are Dependent on Design and Route		The project has been designed to minimize construction and operating costs to the extent possible.
M. Adverse Human and Natural Environmental Effects which Cannot be Avoided		Unavoidable adverse human and environmental effects have been minimized to the extent possible.
N. Irreversible and Irretrievable Commitments of Resources		Irreversible and irretrievable commitments of resources have been minimized to the extent possible.

5.3 Unavoidable Impacts

Transmission lines are large infrastructure projects that can have adverse human and environmental impacts. Even with mitigation strategies, there are adverse project impacts that cannot be avoided. These impacts are anticipated to occur for all routing alternatives and to vary, if at all, as discussed above.

Aesthetic impacts cannot be avoided. The project would introduce new transmission line structures and conductors into project area viewsheds. These structures and conductors will be visible; therefore, they would have an adverse aesthetic impact, though it will be minimized by paralleling existing infrastructure. Temporary construction-related impacts also cannot be avoided. These include construction-related noise and dust generation and disruption of traffic near construction sites.

While the project will parallel existing infrastructure to the extent practicable, impacts to agriculture cannot be completely avoided. The project requires the placement of concrete footings and the construction of transmission line structures in a project area that has 22.8 percent agricultural land cover. Potential impacts include loss of tillable acreage and constraints on the layout and management of field operations.

Finally, impacts to the natural environment cannot be avoided. Even if impacts can be limited to the transmission line's ROW, construction and operation of the transmission line will require tree removal and brush trimming, as well as clearing at structure sites. These are unavoidable impacts to vegetation. Transmission line conductors can adversely affect avian species by creating opportunities for collisions with the conductors. These collisions could occur despite mitigation strategies such as the use of bird flight diverters.

5.4 Irreversible and Irretrievable Impacts

The commitment of a resource is irreversible when it is impossible or very difficult to redirect that resource for a different future use. An irretrievable commitment refers to the use or consumption of a resource such that it is not recoverable for later use by future generations. These types of commitments are anticipated to occur for all routing alternatives and not to vary significantly among alternatives.

The commitment of land for a transmission line ROW is likely an irreversible commitment. In general, lands in the rights-of-way of large infrastructure projects such as railroads, highways, and transmission lines remain committed to these projects for a relatively long period of time.

Even in instances where a ROW is abandoned, the land within the ROW is typically repurposed for a different infrastructure use, such as a rails-to-trails program, and is not returned to a previous land use. This said, transmission line rights-of-way can be returned to a previous use (e.g., row crop, pasture) by the removal of structures and structure foundations to a depth that supports this use.

There are few commitments of resources associated with the project that are irretrievable. These commitments include the steel, concrete, and hydrocarbon resources committed to the project, though it is possible that the steel could be recycled at some point in the future. Labor and fiscal resources required for the project are also irretrievable commitments.

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