

Potential Human and Environmental Impacts of the Freeborn Wind Transmission Line Project

Environmental Assessment

PUC Docket No. IP-6946 / TL-17-322

OAH Docket No. 5-2500-35036

May 14, 2018



Project Contacts

Responsible Government Unit

Minnesota Public Utilities Commission
121 Seventh Place East, Suite 350
Saint Paul, MN 55101-2147

Commission Representative

Mike Kaluzniak
(651) 201-2257
mike.kaluzniak@state.mn.us

Preparer

Minnesota Department of Commerce
85 Seventh Place East, Suite 200
Saint Paul, MN 55101-2198

Commerce Representative

Andrew Levi
(651) 539-1840
andrew.levi@state.mn.us

Project Proposer

Freeborn Wind Energy LLC
One South Wacker Drive, Suite 1800
Chicago, IL 60606-4630

Freeborn Wind Representative

Dan Litchfield
(312) 582-1057
dlitchfield@invenergyllc.com

How to Comment

Comment Period Closes June 12, 2018, at 4:30 p.m.

Comments received after the comment deadline may not be considered. All comments must include docket number: TL-17-322. If including an attachment use email or U.S. Mail.

Email Comments can be emailed to the publicadvisor.puc@state.mn.us

U.S. Mail Public Utilities Commission; 121 Seventh Place East, Suite 250; Saint Paul, MN 55101-2147

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Sources

Much of the information used to prepare this environmental assessment comes from the route permit application. Additional sources include new information provided by Freeborn Wind, as well as information from relevant environmental review documents for similar projects and spatial data. Limited information was gathered from multiple site visits to the project area.

Project Mailing List

To place your name on the project mailing list contact docketing.puc@state.mn.us or 651-201-2204 and provide the docket number (17-322), your name, email address, and mailing address. Please indicate how you would like to receive notices—by email or U.S. mail.

Alternative Formats

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

What is this document?

This document is an environmental assessment (EA). It studies potential human and environmental impacts from the Freeborn Wind Transmission Line Project and discusses ways to minimize, mitigate, or avoid these impacts. The Public Utilities Commission will use the information provided in this EA to inform their decision about issuing a route permit for the project.

Freeborn Wind Energy LLC (Freeborn Wind or company) an affiliate of Invenergy LLC (Invenergy) must obtain a route permit from the Public Utilities Commission (Commission) before constructing its proposed Freeborn Wind Transmission Line Project—an approximately seven mile 161 kilovolt (kV) overhead electric high voltage transmission line (HVTL) to be located in Freeborn County. The project would interconnect the proposed Freeborn Wind Farm to the electrical grid. Freeborn Wind indicates it will only construct the project if the wind farm is permitted.

Freeborn Wind submitted its route permit application on September 20, 2017. The application was filed pursuant to the alternative permitting process. The Commission accepted the application as complete on December 5, 2017. This means Freeborn Wind submitted all the required information needed to begin the environmental review process.

Energy Environmental Review and Analysis staff within the Commerce Department is responsible for conducting environmental review for HVTLs. Scoping was the first step. It provided opportunities to provide comments on the content of this EA and suggest alternative route or route segments that mitigate potential impacts. The EA studies potential human and environmental impacts from the project and identified route and route segment alternatives. The EA also discusses ways to minimize, mitigate, or avoid potential impacts.

An administrative law judge (ALJ) from the Office of Administrative Hearings will hold a public hearing after the EA is complete and available. At the hearing you may speak, ask questions, and submit comments about the project. After the public comment period is over, the ALJ will provide the Commission a written report and recommendation.

The Commission will then review the record and decide whether to issue a route permit. If the Commission issues a route permit for the project it will identify measures to mitigate potential impacts. The Commission is expected to make a decision in August 2018. If the Commission issues a permit ownership of Freeborn Wind will transfer from Invenergy to Xcel Energy. Xcel Energy will assume ownership and be responsible for constructing the project and fulfilling all permit conditions.

Where do I get more information?

For additional information, or if you have questions, contact Commerce or Commission staff

If you have questions or would like more information, please contact the EERA Environmental Review Manager Andrew Levi (651-539-1840 or andrew.levi@state.mn.us) or the Commission Public Advisor Charley Bruce (651-201-2251 or publicadvisor.puc@state.mn.us).

Additional documents and information, including the route permit application, can be found on eDockets by searching “17” for year and “322” for number: <https://www.edockets.state.mn.us/EFiling/search.jsp> or the EERA webpage: <https://mn.gov/commerce/energyfacilities/Docket.html?Id=34748>.

Acronyms, Abbreviations, and Definitions

AC alternating current

AFCL Association of Freeborn County Landowners

ALJ administrative law judge

Freeborn Wind Freeborn Wind Energy LLC

associated facilities As defined by Minnesota Rule 7850.1000, subpart 3, “associated facilities” means buildings, equipment, and other physical structures that are necessary to the operation of a large electric power generating plant or a high voltage transmission line.

BMPs best management practices

Commerce Commerce Department

Commission Public Utilities Commission

company Freeborn Wind Energy LLC

construction As defined by Minnesota Statute 216E.01, subdivision 3, “construction” means any clearing of land, excavation, or other action that would adversely affect the natural environment of the site or route but does not include changes needed for temporary use of sites or routes for nonutility purposes, or uses in securing survey or geological data, including necessary borings to ascertain foundation conditions.

Dairyland Line existing Dairyland 69 kV double-circuit transmission line

dB A-weighted sound level recorded in units of decibels

Department Commerce Department

distribution line A generic term not associated with Minnesota law referring to power lines that operate below 69 kilovolts.

DNR Department of Natural Resources

DWSMA Drinking Water Supply Management Area

EA environmental assessment

EERA Energy Environmental Review and Analysis

EIS environmental impact statement

ELF-EMF extremely low frequency electromagnetic fields

EMF electromagnetic fields

FEMA Federal Emergency Management Agency

Freeborn-Mower Freeborn-Mower Cooperative Services

Freeborn Wind Freeborn Wind Energy LLC

high voltage transmission line As defined by Minnesota Statute 216E.01, subdivision 4, “high voltage transmission line” means a conductor of electric energy and associated facilities designed for and capable of operation at a nominal voltage of 100 kilovolts or more and is greater than 1,500 feet in length.

HVTL high voltage transmission line

Invenergy Invenergy LLC

ITC ITC Midwest LLC

ITC Line existing ITC 69 kV single-circuit transmission line

KHz kilohertz

kV kilovolt or 1,000 volts

local vicinity An area 1,600 feet from the identified routing option.

MDA Department of Agriculture

MDH Department of Health

MW megawatt or 1,000,000 watts

Minn. R. Minnesota Rule

Minn. Stat. Minnesota Statute

MISO Midwest Independent System Operators

mG milligauss

mg/L milligrams per liter

MHz megahertz

MnDOT Department of Transportation

MPCA Pollution Control Agency

NAC Noise Area Classification

NHIS Natural Heritage Information System

NPDES/SDS National Pollutant Discharge Elimination System / State Disposal System

NERC North American Electric Reliability Corporation

NESC National Electric Safety Code

NEV neutral-to-earth voltage

NLCD National Land Cover Database

non-participating landowner A non-participating landowner is a person who has not signed a land agreement with Freeborn Wind that would allow the company to place a transmission line on their property. Non-participating landowners may have signed other agreements with the company that are unrelated to land rights.

NWI National Wetland Inventory

OAH Office of Administrative Hearings

participating landowner A participating landowner is a person who has signed a land agreement with Freeborn Wind that would allow the company to place a transmission line on their property.

PIMMA Pipeline Information Management Mapping Application

power line A distribution, transmission, or high voltage transmission line.

ppm parts per million

project or **proposed project** Freeborn Wind Transmission Line Project

project area The area one mile from any routing option.

right-of-way Defined by Minnesota Rule 7850.1000, subpart 15, "right-of-way" means the land interest required within a route for the construction, maintenance, and operation of a high voltage transmission line.

ROI region of influence

route Defined by Minnesota Statute 216E.01, subdivision 8, "route" means the location of a high voltage transmission line between two end points. The route may have a variable width of up to 1.25 miles.

route segment As defined by Minnesota Rule 7850.1000, subpart 17, "route segment" means a portion of a route.

SHPO Minnesota State Historic Preservation Office

SSURGO Soil Survey Geographic Database

transmission line A generic term not associated with Minnesota law referring to power lines that operate at 69 kilovolts or above.

UHF ultra high frequency

USACE United States Army Corps of Engineers

USFWS United States Fish and Wildlife Service

VHF very high frequency

WCA Wetland Conservation Act

wind farm proposed Freeborn Wind Farm

Wind Farm Substation proposed Freeborn Wind Farm Substation

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Introduction

Freeborn Wind Energy LLC (Freeborn Wind or company) an affiliate of Invenergy LLC (Invenergy) filed a route permit application¹ with the Public Utilities Commission (Commission) to construct the Freeborn Wind Transmission Line Project (proposed project or project), which consists of approximately seven miles of new 161 kilovolt (kV) overhead electric high voltage transmission line (HVTL) southeast of Glenville in Freeborn County. This project would connect the proposed Freeborn Wind Farm² to the electrical grid. Freeborn Wind will only construct the project if the Commission issues a site permit for the wind farm.³

Energy Environmental Review and Analysis (EERA) staff within the Commerce Department (Department or Commerce) is responsible for conducting environmental review on applications for a HVTL route permit before the Commission. The intent of the environmental review process is to inform interested persons, especially decision-makers, about potential human and environmental impacts from the project and identified route and route segment alternatives, as well as ways to mitigate potential impacts.

This document is an environmental assessment (EA). It addresses the issues required in Minnesota Rule 7850.3700, subpart 4, and those identified in the March 7, 2018, scoping decision issued by the deputy commissioner of Commerce (**Appendix A**). This EA facilitates the legislative goal to “minimize adverse human and environmental impacts while insuring continuing electric power system reliability and integrity and insuring that electric energy needs are met and fulfilled in an orderly and timely fashion,”⁴ and is organized as follows:

Section 1 provides a brief overview of the proposed project.

Section 2 explains the regulatory framework and required permits and approvals.

Section 3 describes the proposed project and alternative routes and route segments, including construction, restoration, and operation of the HVTL.

Section 4 details potential impacts to both human and natural resources; identifies measures to avoid, minimize, or mitigate adverse impacts; and describes unavoidable impacts and irreversible or irretrievable commitments of resources. It summarizes the cumulative potential effects of the proposed project and other projects.

Section 5 applies the information available in the route permit application and this EA to the routing factors listed in Minnesota Rule 7850.4100.

¹ Freeborn Wind Energy LLC (September 20, 2017) Application to the Minnesota Public Utilities Commission for a Route Permit for the Freeborn Wind Transmission Line Project, eDockets Nos. [20179-135684-01](#), [20179-135684-02](#), [20179-135684-03](#), [20179-135684-04](#), [20179-135685-01](#), [20179-135685-02](#), [20179-135685-03](#), [20179-135685-04](#), [20179-135685-05](#), [20179-135685-06](#), [20179-135685-07](#) (hereinafter “Application”).

² Commission Docket No. IP-6946 / 17-410, In the Matter of the Application of Freeborn Wind Energy LLC for a Site Permit for the Freeborn Wind Farm in Freeborn County, Minnesota. Information regarding the proposed wind farm is available at: <https://mn.gov/commerce/energyfacilities/Docket.html?id=34728>.

³ *Id.* at page 6.

⁴ Minnesota Statute [216E.02](#), subdivision 1.

What is the purpose of the project?

To interconnect the proposed Freeborn Wind Farm to the electrical grid

Freeborn Wind’s stated purpose for the project is to interconnect the proposed Freeborn Wind Farm to the electrical grid.

What does Freeborn Wind propose to construct?

The project consists of about seven miles of new 161 kV overhead transmission line

Freeborn Wind proposes to construct an approximately seven-mile 161 kV HVTL from the proposed Freeborn Wind Farm Substation (Wind Farm Substation) to the existing Glenworth Substation southeast of Glenville, Minnesota.⁵ An 80-foot right-of-way is necessary for the project, except that a 22-foot right-of-way will be used to cross 830th Avenue.⁶ Structures will generally be 80 feet tall,⁷ and will span between 550 and 900 feet.⁸

Where is the project located?

The project is located entirely within Freeborn County

Freeborn Wind proposes to construct the project in Freeborn County, Minnesota, entirely within Shell Rock Township. **Table 1** summarizes the project location. **Figure 1** illustrates the proposed HVTL route as identified in the route permit application and project location.

Table 1 Project Location

| Township | Range | Section | Political Township | County |
|----------|-------|--|--------------------|----------|
| 101 | 20W | 7 - 9, 16, 17, 20, 21, 25 - 28, 25, 36 | Shell Rock | Freeborn |

Who owns the project?

Freeborn Wind is currently owned by Invenergy; should a permit be issued for the project the Freeborn Wind entity will be transferred to Xcel Energy

Freeborn Wind is a limited liability company currently owned by Invenergy. In 2016, the company entered into a Purchase and Sale Agreement with Xcel Energy. Xcel Energy subsequently filed a Supplemental Wind Petition seeking approval of 1,550 megawatts (MW) of wind energy, of which 750 MW was to be self-build (including the Freeborn Wind Farm). The Commission approved this petition, including the purchase and sale agreement, on September 1, 2017.⁹

Should the Commission issue a site permit for the wind farm and a route permit for the HVTL, the Freeborn Wind entity will be transferred from Invenergy to Xcel Energy. Xcel Energy will then be the owner of Freeborn Wind and be responsible for fulfilling all permit conditions. Freeborn Wind, owned by Xcel Energy, would construct, own, and operate both the Freeborn Wind Farm and the proposed HVTL.

⁵ Application.

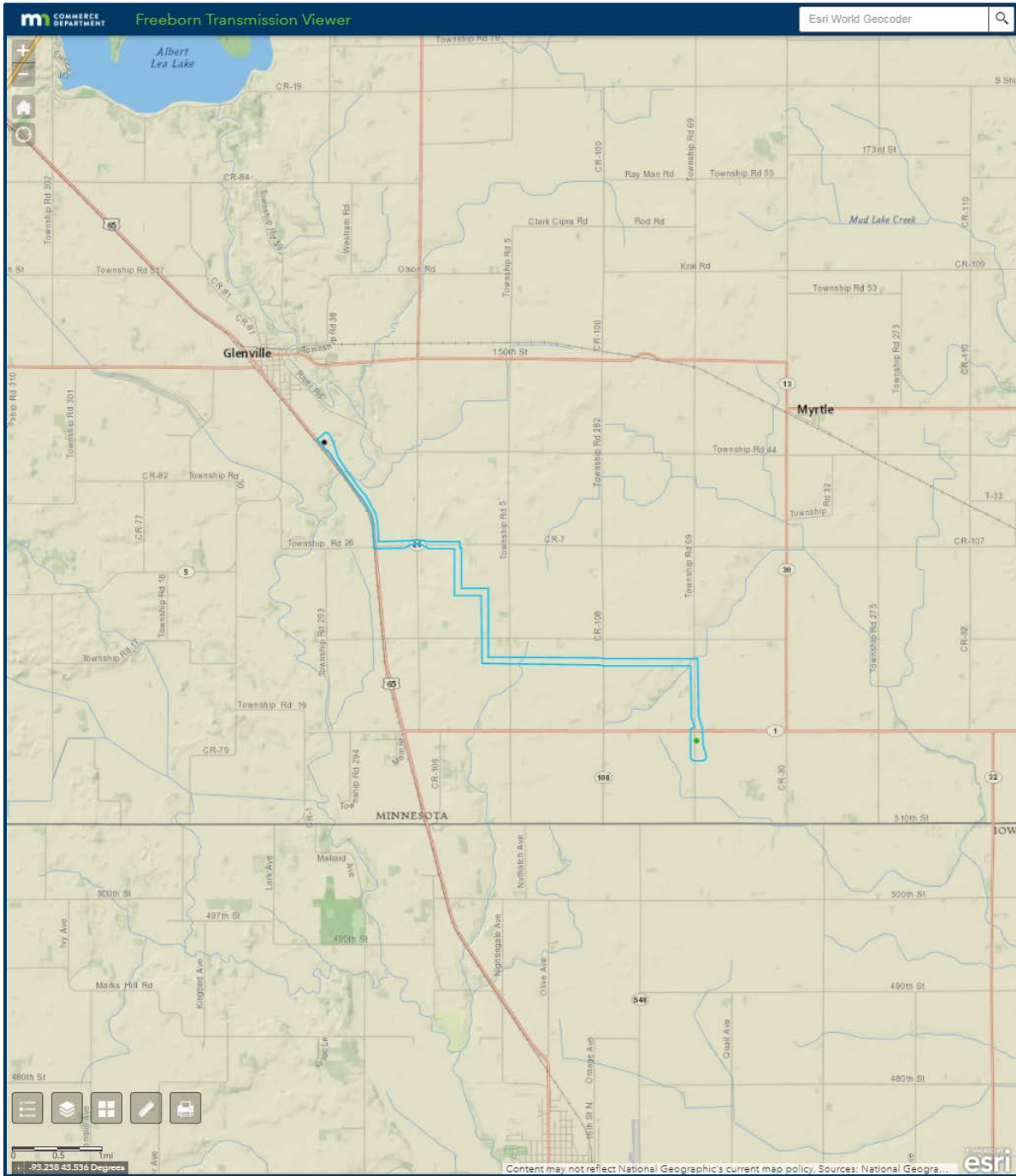
⁶ *Id.* at page 10.

⁷ *Id.* at page 19.

⁸ *Id.* at page 1.

⁹ Application at pages 5, 6.

Figure 1 Project Location



* Teal Route shown. Electronic readers may click on the map to reach an interactive web viewer. The viewer is available at: <https://mn.gov/commerce/energyfacilities/Docket.html?id=34748>.

Regulatory Background

REGULATORY BACKGROUND discusses the permitting process and needed authorizations from the Commission, as well as other federal, state, and local agencies. It describes the environmental review process, and identifies the factors the Commission must consider when making a route permit decision. Lastly, it identifies topics outside the scope of this EA.

Minnesota law provides the Commission with two processes to review route permit applications. These are the full permitting process and the alternative permitting process. The full process includes preparing an environmental impact statement (EIS) and holding a contested-case hearing. The alternative process, which applies to smaller sized projects, requires an EA instead of the more detailed EIS and a public hearing instead of the more formal contested-case hearing.

Applicants are free to elect the alternative process if their project qualifies for it. The project would operate at a voltage between 100 kV and 200 kV—qualifying for the alternative process. As a result, the Commission is reviewing the proposed project under Minnesota Statute 216E.04 and Minnesota Rules 7850.2800 to 7850.3900, which define the alternative process.

What Commission approvals are required?

A route permit is required; a certificate of need is not required

The project requires a route permit from the Commission because it meets the definition of “high voltage transmission line” under Minnesota Statute. A power line qualifies as an HVTL when it is longer than 1,500 feet and capable of operating at a voltage greater than 100 kV or 100,000 volts.¹⁰ The definition of HVTL also includes associated facilities, which might include substations, buildings, equipment, guy wires, and other physical structures necessary for operation of the HVTL.¹¹

A certificate of need is not required because the proposed project does not meet the definition of “large energy facility” under Minnesota Statute.¹² A HVTL capable of operation between 100 kV and 200 kV is considered a large energy facility only when it is more than ten miles long or crosses a state line.¹³

What permitting steps have occurred to date?

The Commission accepted the route permit application as complete; scoping occurred

Applicants must provide the Commission with a written notice of their intent to file a route permit application under the alternative permitting process. Freeborn Wind provided notice on June 15, 2017.¹⁴

¹⁰ Minn. Stat. [216E.01](#), subd. 4.

¹¹ *Ibid.*

¹² See Minn. Stat. [216B.243](#), subd. 2.

¹³ Minn. Stat. [216B.2421](#), subd. 2(3).

¹⁴ Freeborn Wind Energy LLC (June 15, 2017) *Notification of Pending Route Permit Application*, eDockets No. [20176-132807-01](#).

On September 20, 2017, Freeborn Wind filed a route permit application with the Commission.¹⁵ Under the alternative process an applicant is not required to propose alternative routes; however, if an applicant evaluated and rejected alternative routes, the application must describe these routes and reasons for rejecting them. Freeborn Wind considered but rejected three alternative route segments. These route segments are not discussed in this EA, but the route permit application describes them in detail.¹⁶

The Pollution Control Agency (MPCA), the Association of Freeborn County Landowners (AFCL), the Department, and members of the public submitted comments on the completeness of the route permit application. The Commission accepted the route permit application as complete on December 5, 2017.¹⁷ This means Freeborn Wind submitted the required information needed to begin environmental review.

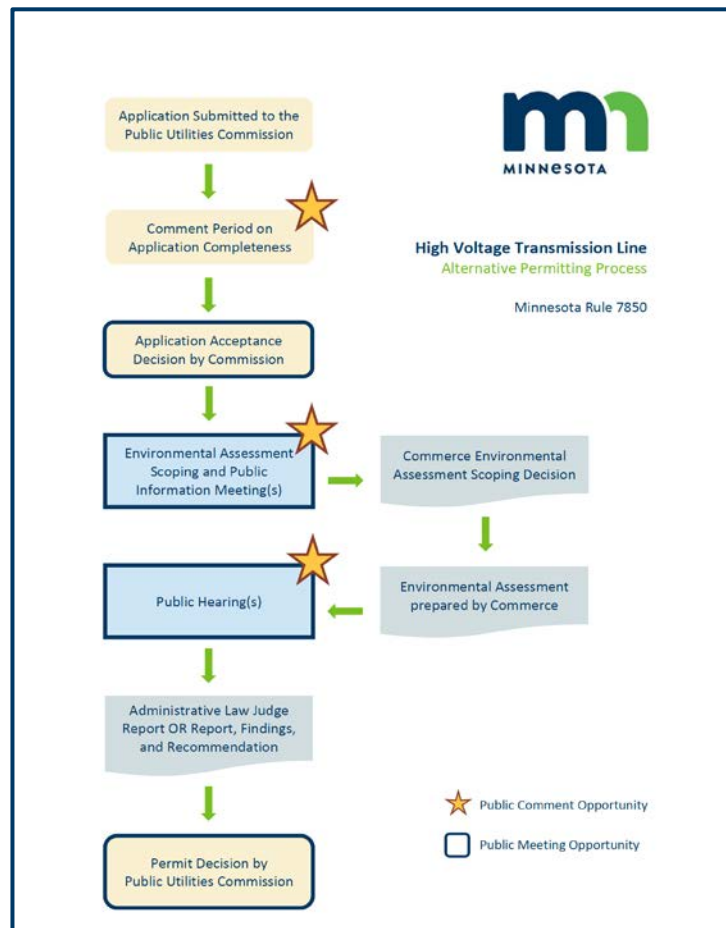
What is environmental review?

Environmental review informs interested persons about potential impacts and possible mitigation measures associated with the project; the Commission uses the environmental review process to inform their route permit decision

Commerce must complete environmental review prior to Commission consideration of a route permit. EERA staff conducts environmental review under Minnesota Statute 216E and Minnesota Rule 7850.

The alternative permitting process requires preparation of an EA,¹⁸ which studies potential environmental and human impacts from the proposed project and ways to minimize, mitigate, or avoid potential impacts.¹⁹ The EA also summarizes cumulative potential effects from the proposed project and other projects where these impacts coincide. This EA is the only state environmental review document required.²⁰ After the EA is publically available, a public hearing will occur in the project area.

Figure 2 Alternative Permitting Process



¹⁵ Application.

¹⁶ Application at Section 4.3.

¹⁷ Minnesota Public Utilities Commission (December 5, 2017) *Order Finding Application Complete*, eDockets No. [201712-137952-01](#).

¹⁸ Minn. Stat. [216E.04](#), subd. 5; Minn. R. [7850.3700](#), subp. 1.

¹⁹ Minn. Stat. [216E.04](#), subd. 5; Minn. R. [7850.3700](#), subp. 4.

²⁰ Minn. Stat. [216E.04](#), subd. 5; Minn. R. [7850.3700](#), subp. 8; Minn. Rule [4410.4300](#), subp. 6.

Scoping was the first step of the review process and included a public meeting and comment period.²¹ EERA staff used the information gathered during scoping to focus this EA on the most relevant information needed by the Commission to make an informed route permit decision.

Scoping Process

Scoping focusses the EA on the most relevant impacts and issues

On December 6, 2017, EERA and Commission staff jointly issued a Notice of Environmental Assessment Scoping and Public Information Meeting and associated comment period.²² Notice was sent to those individuals on the project contact list and to potentially affected landowners.²³ Freeborn Wind published notice in the *Albert Lea Tribune* on December 8, 2017.²⁴ Additionally, notice was available on the EERA webpage.²⁵

EERA and Commission staff jointly held the scoping and public information meeting as noticed. The purpose of the meeting was to provide information about the permitting process and the proposed project, answer questions, and gather input regarding potential impacts and mitigative measures that should be studied in the EA. The meeting also provided an opportunity to solicit potential route or route segment alternatives that mitigate impacts. EERA staff provided multiple handouts, including a process summary and comment form.²⁶ A court reporter was present to document verbal statements.²⁷ Approximately 50 members of the public attended the meeting. Numerous people provided verbal comments.²⁸ One individual recommended a specific route segment alternative be included in the EA.²⁹

A public comment period, extending from December 6, 2017, to January 3, 2018, provided an opportunity for interested persons to identify issues, mitigation measures, and alternative routes or route segments for consideration in the scope of the EA. Written comments were received from nine individuals, one organization, and one state agency. One commenter included a route segment alternative.³⁰

Scoping Comments Received

Scoping comments are compiled and available to view or download³¹

EERA received a variety of comments about the project. Individuals discussed the economic benefits of the project, including increased tax revenues, local job creation, and landowner profits. Concerns included but were not limited to impacts resulting from the construction and operation of the project to aesthetics,

²¹ Minnesota Rule [7850.3700](#), subpart. 2.

²² Minnesota Department of Commerce (January 8, 2018) *Public Comments and Meeting Notes*, eDockets No. [20181-138726-01](#).

²³ Minnesota Public Utilities Commission (December 6, 2017) *Certificate of Service*, eDockets No. [201712-137985-02](#).

²⁴ Freeborn Wind Energy LLC (December 10, 2017) *Affidavit of Publication*, eDockets No. [201712-138188-01](#).

²⁵ Minnesota Department of Commerce (n.d.) *Project Docket: Freeborn Wind Transmission Line Project*, Retrieved December 28, 2017, from: <https://mn.gov/commerce/energyfacilities/Docket.html?Id=34748>.

²⁶ Minnesota Department of Commerce (n.d.) *Environmental Assessment Scoping Meeting Handouts*, Retrieved December 28, 2017, from: <https://mn.gov/commerce/energyfacilities//resource.html?Id=34761>.

²⁷ Minnesota Department of Commerce (January 8, 2018).

²⁸ *Ibid.*

²⁹ *Id.* at pages 153, 154 of 234.

³⁰ *Id.* at pages 19, 20 of 234.

³¹ *Id.*; see also Minnesota Department of Commerce (n.d.) *Public Comments and Meeting Notes*, Retrieved February 21, 2018, from: <https://mn.gov/commerce/energyfacilities/resource.html?Id=34765>.

agriculture (including aerial spraying, crop losses, and drain tile), electrical interference, human health (specifically electric and magnetic fields), induced voltage, karst features, property values, public safety (specifically from potential electrical interference with the Allied Radio Matrix for Emergency Response (ARMER) system), recreation (specifically fishing), the Shell Rock River, soils, stray voltage, transportation, tree clearing, water quality, wetlands, and wildlife and their habitats (with emphasis on bald eagles). Other issues included cumulative impacts and private versus public interests relative to eminent domain and the construction of infrastructure servicing a private entity.

The Department of Transportation (MnDOT) requested the EA assess the placement of the proposed utility poles in relation to U.S. Highway 65 right-of-way. MnDOT noted that should the Commission approve a route permit that would place the HVTL in an area that occupies a portion of MnDOT right-of-way, Freeborn Wind would need to submit a Utility Accommodation on Trunk Highway Right-of-Way (Form 2525). Additionally, MnDOT requested that the company coordinate any construction work or material delivery that might affect MnDOT right-of-way.

Scoping Decision

The scoping decision identified the topics studied in this EA

After considering public comments, input from the Commission, and recommendations by EERA staff, the Deputy Commissioner of Commerce issued a scoping decision on March 7, 2018 (**Appendix A**). The scoping decision identified the issues and routes to be evaluated in this EA. EERA staff provided notice of the scoping decision to those persons on the project mailing list and posted the notice to the EERA website.³² Staff also provided a letter to newly affected landowners, informing them that a route or route segment alternative identified in the scoping decision has the potential to impact their property.³³

Public Hearing

A public hearing will be held in the project area; you can provide comments at the hearing

Minnesota Rule 7850.3800, subpart 1, requires the Commission to hold a public hearing and open a public comment period once the EA is complete and made available. The hearing will be presided over by an administrative law judge (ALJ) from the Office of Administrative Hearings. Members of the public will have the opportunity to speak at the hearing, present evidence, ask questions, and submit comments. EERA staff will respond to your questions and comments about the EA at the public hearing, but staff is not required to revise or supplement the document.³⁴

Comments received during the hearing and the associated public comment period become part of the project record. The ALJ will provide a written report to the Commission summarizing the public hearing (and comment period) and any spoken or written comments received. The ALJ will also provide the Commission with a recommendation whether to issue a route permit.

³² Minnesota Department of Commerce (March 8, 2018) *Notice of Environmental Assessment Scoping Decision*, Retrieved May 9, 2018, from: <https://mn.gov/commerce/energyfacilities/documents/34748/2018-03-07-Invenergy-ScopingDecisionReduced-Signed.pdf>.

³³ Minnesota Department of Commerce (March 22, 2018) *Letter to Landowners*, eDockets No. [20185-142965-01](#).

³⁴ Minn. R. [7850.3800](#), subp. 4.

What criteria does the Commission use to make a route permit decision?

Minnesota Statute and Rule identifies the considerations and factors the Commission must take into account when determining to issue a route permit

The Minnesota Legislature directed the Commission to select HVTL routes that minimize adverse human and environmental impacts while insuring continuing electric power system reliability and integrity.³⁵ An HVTL route must be compatible with environmental preservation and the efficient use of resources while also insuring electric energy needs are met and fulfilled in an orderly and timely fashion.³⁶

Minnesota Statute 216E.03, subdivision 7(b) identifies 12 considerations that the Commission must consider when designating a HVTL route. These considerations are further clarified and expanded by Minnesota Rule 7850.4100, which identifies 14 factors the Commission must weigh when making a permit decision:

- 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; and
- N. irreversible and irretrievable commitments of resources.

The POTENTIAL IMPACTS AND MITIGATION SECTION addresses each of these factors by evaluating potential impacts to individual components or “elements” of each factor. For example, impacts to human settlement (Factor A) are assessed by evaluating 10 different elements including aesthetics, cultural values, displacement, electrical interference, land use and zoning, noise, property values, public services, recreation, and socioeconomics.

³⁵ Minn. Stat. [216E.02](#), subd. 1.

³⁶ Minn. Stat. [216E.02](#), subd. 1.

At the time the Commission makes a final decision about the route permit, it must determine if the EA and public hearing record address the issues identified in the scoping decision.³⁷ The Commission must also make specific findings that it has considered locating a route for a new HVTL along an existing HVTL route or parallel to existing highway right-of-way, and, to the extent these are not used, the Commission must state the reason(s).³⁸

The Commission must make a final decision on the route permit within 60 days of receiving the ALJ report.³⁹ A final decision must be made within six months after the Commission's determination the application is complete; however, this time limit may be extended for up to three months for just cause or upon agreement of the applicant.⁴⁰ A Commission permit decision is anticipated in late August 2018.

Are other permits or approvals required?

Yes, other permits and approvals might be required for the project

A route permit from the Commission is the only state permit required for routing the project; however, should the Commission issue a route permit, other permits might be required, for example, Freeborn Wind would need to obtain a license to cross the Shell Rock River from the Department of Natural Resources (DNR). These subsequent permits are commonly referred to as "downstream" permits and must be obtained by the company prior to construction of the project. **Table 2** identifies potential permits that might be required in addition to a route permit.

A route permit from the Commission supersedes local zoning, building, or land use rules.⁴¹ Though zoning and land use rules are superseded, the Commission's route permit decision must be guided, in part, by impacts to local zoning and land use in accordance with the legislative goal to "minimize human settlement and other land use conflicts."⁴²

A route permit also binds state agencies. Minnesota Statute 216E.10, subdivision 3, requires state agency participation in the permitting process to identify whether proposed projects—if constructed—would be "in compliance with state agency standards, rules, or policies." That is, the agency must indicate whether a route is or is not permissible.

Federal Permits

The United States Army Corps of Engineers (USACE) "regulates the discharge of dredged or fill material into waters of the United States, including wetlands."⁴³ Dredged or fill material could impact water quality. A permit is required from USACE if the potential for significant adverse impacts exists.

A permit is required from the United States Fish and Wildlife Service (USFWS) for the incidental "taking"⁴⁴ of any endangered species. As a result, USFWS encourages project proposers to consult with the agency

³⁷ Minn. R. 7850.3900, subp. 2.

³⁸ Minn. Stat. 216E.03, subd. 7(e).

³⁹ Minn. R. 7850.3900, subp. 1.

⁴⁰ *Ibid.*

⁴¹ Minn. Stat. 216E.10, subd. 1.

⁴² Minn. Stat. 216E.03, subd. 7.

⁴³ U.S. Environmental Protection Agency (October 27, 2015) *Section 404 Permit Program*, Retrieved May 9, 2018, from: <http://www.epa.gov/cwa-404/section-404-permit-program>.

⁴⁴ 16 U.S. § 1532(19) (defining "take" to mean to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in such conduct).

to determine if a project has the potential to impact federally-listed threatened and endangered species. Additionally, consultation can lead to the identification of mitigation measures for potential impacts associated with the project.

State Permits

Potential impacts to state lands and waters, as well as fish and wildlife resources are regulated by DNR. Utilities are required to obtain a License to Cross State Lands and Waters.⁴⁵ Projects affecting the course, current, or cross-section of lakes, wetlands, and streams that are public waters may require a Public Waters Work Permit.⁴⁶ Not unlike the USFWS, DNR encourages project proposers to consult with the agency to determine if a project has the potential to impact state-listed threatened or endangered species. Additionally, consultation can lead to the identification of mitigation measures for potential impacts associated with the project.

A permit from MnDOT is required for construction, placement, or maintenance of utility lines adjacent or across trunk highway rights-of-way.⁴⁷ Coordination would be required to construct access roads or driveways from trunk highways.⁴⁸ MnDOT requires these permits to ensure that use and occupancy of the right-of-way does not interfere with the free and safe flow of traffic, among other reasons.⁴⁹

Construction projects that disturb one or more acres of land require a general National Pollutant Discharge Elimination System (NPDES)/State Disposal System (SDS) Construction Stormwater Permit from MPCA. This permit is issued to “construction site owners and their operators to prevent stormwater pollution during and after construction.”⁵⁰ The NPDES/SDS permit requires (1) use of best management practices; (2) development of a Stormwater Pollution Prevention Plan or “SWPPP”; and (3) adequate stormwater treatment capacity once the project is complete. Additionally, MPCA regulates generation, handling, and storage of hazardous wastes.

A Clean Water Act Section 401 Water Quality Certification from MPCA might also be required. “Section 401 of the Clean Water Act requires any applicant for a federal license or permit to conduct an activity that may result in a discharge of a pollutant into waters of the United States to obtain a certification from the State in which the discharge originates that the discharge complies the applicable water quality standards.”⁵¹ The certification becomes a condition of the federal permit.

⁴⁵ Minn. Stat. [84.415](#).

⁴⁶ Minnesota Department of Natural Resources (n.d.) *Requirements for Projects Involving Public Waters Work Permits*, Retrieved March 15, 2018, from: http://www.dnr.state.mn.us/waters/watermgmt_section/pwpermits/requirements.html.

⁴⁷ Minn. R. [8810.3300](#), subp. 1.

⁴⁸ Minnesota Department of Transportation (n.d.) *Land Management*, Retrieved March 15, 2018, from: <https://www.dot.state.mn.us/utility/forms.html>.

⁴⁹ Minnesota Department of Transportation (n.d.) *MnDOT Policies*, Retrieved March 15, 2018, from: <http://www.dot.state.mn.us/policy/operations/op002.html>.

⁵⁰ Minnesota Pollution Control Agency (November 19, 2015) *Stormwater Program for Construction Activity*, Retrieved May 9, 2018, from: <http://www.pca.state.mn.us/index.php/water/water-types-and-programs/stormwater/construction-stormwater/index.html>.

⁵¹ Minnesota Pollution Control Agency (n.d.) *Clean Water Act Section 401 Water Quality Certifications*, Retrieved April 2, 2018, from: <https://www.pca.state.mn.us/water/clean-water-act-section-401-water-quality-certifications>.

Local Permits

Freeborn County oversees local implementation of the Wetland Conservation Act (WCA) in the project area. The WCA requires that any person “proposing to impact a wetland to first, attempt to avoid the impact; second, attempt to minimize the impact; and finally, replace any impacted area with another wetland of at least equal function and value.”⁵²

Commission route permits preempt local zoning, building, and land use rules, regulations, or ordinances promulgated by regional, county, local, and special purpose government; however, coordination with local governments may be required for the issues listed below.

Access/Driveway — Coordination may be required to construct access roads or driveways from county or township roads.

Public Lands — Coordination would be required to occupy county or township lands such as forest lands, park lands, watershed districts, and other properties owned by these entities.

Overwidth Load — Coordination may be required to move over-width or heavy loads on county or township roads.

Road Crossing and Right-of-Way — Coordination may be required to cross or occupy county or township road rights-of-way.

Table 2 Potential Permits

| Federal | |
|---|--|
| U.S. Army Corps of Engineers | Section 404 of the Federal Clean Water Act |
| U.S. Fish and Wildlife Service | Threatened and Endangered Species Consultation |
| State | |
| Department of Natural Resources | Endangered Species Consultation |
| | License to Cross Public Lands and Waters |
| | Public Waters Work Permit |
| Department of Transportation | Utility Accommodation on Trunk Highway Right-of-Way |
| | Access/Driveway |
| Pollution Control Agency | National Pollutant Discharge Elimination System Permit |
| | Clean Water Act Section 401 Certification |
| Local | |
| Freeborn County | Wetland Conservation Act |
| Freeborn County; Shell Rock Township | Access/Driveway |
| | Public Lands |
| | Overwidth Load |
| | Road Crossing and Right-of-Way |
| Other | |
| Utilities | Crossing Permit |

⁵² Minn. R. 8420.0100, subp. 2.

Do electrical codes apply?

Yes, if constructed the HVTL must meet electrical safety code requirements

All power lines, regardless of route location, must meet requirements of the National Electrical Safety Code (NESC).⁵³ NESC standards are designed to safeguard human health “from hazards arising from the installation, operation, or maintenance of conductors and equipment in electric supply stations and overhead and underground electric supply ... lines.”⁵⁴ They also ensure that power lines and all associated structures are built from materials that will withstand the operational stresses placed upon them over the expected lifespan of the equipment, provided routine operational maintenance is performed.

Utilities must also comply with North American Electric Reliability Corporation (NERC) standards.⁵⁵ NERC standards define the reliability requirements for planning and operating the electrical transmission grid in North America.⁵⁶

Are any issues outside the scope of this EA?

Yes, the scoping decision identified issues that will not be studied in this EA

Consistent with the scoping decision this EA does not address:

- A no-build alternative.
- Any alternative not specifically identified in the scoping decision.
- Issues related to project need, size, type, or timing.
- Impacts of specific energy sources.
- The manner in which landowners are compensated for right-of-way easements.
- The ability of Freeborn Wind to use eminent domain to acquire easement(s) for the project.

⁵³ See Minn. Stat. [326B.35](#); Minn. R. [7826.0300](#), subp. 1 (requiring utilities to comply with the most recent edition of the NESC when constructing new facilities or reinvesting capital in existing facilities); see also Appendix C Generic Route Permit Template, Section 4.4.1 (requiring compliance with NESC standards).

⁵⁴ IEEE Standards Association (n.d.) *2017 – National Electrical Safety Code Brochure*, Retrieved May 9, 2018, from: http://standards.ieee.org/about/nesc/nesc_2017_brochure.pdf.

⁵⁵ Generic Route Permit Template at Section 5.5.1.

⁵⁶ North American Electric Reliability Corporation (2017) *Standards*, Retrieved May 8, 2018, from: <http://www.nerc.com/pa/stand/Pages/default.aspx>.

Proposed Project and Alternative Routes

This section describes the project and alternative route and route segments. Unless otherwise noted, the source of information for this section is the route permit application and supplemental information provided by Freeborn Wind.

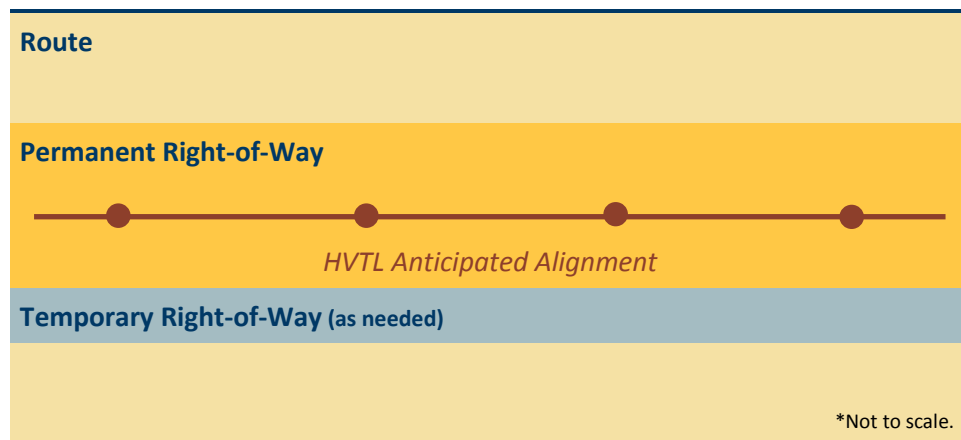
What does the Commission approve in a route permit?

The Commission approves a route, route width, and anticipated alignment

When the Commission issues a route permit it approves a route, route width, and an anticipated alignment (**Figure 3**). The route permit also outlines conditions specifying construction and operation standards.⁵⁷ A generic route permit template is included in **Appendix B**.

The HVTL must be constructed within the Commission’s designated route and along the anticipated alignment unless subsequent permissions are requested and approved by the Commission. “Any right-of-way modifications within the designated route [must be] located so as to have comparable overall impacts relative to the factors in Minnesota Rule 7850.4100, and shall be specifically identified and documented in and approved as part of the plan and profile.”⁵⁸ Modifications to the anticipated alignment generally result from landowner requests or unforeseen conditions.

Figure 3 Route and Right-of-Way Illustration



⁵⁷ See, for example, Generic Route Permit Template at Section 5.4.2 (stating “the transmission line shall be designed, constructed, and **operated** in such a manner that the electric field measured one meter above ground level immediately below the transmission line shall not exceed 8.0 kV/m rms.” (emphasis added)).

⁵⁸ Generic Route Permit Template at Section 4

What is a route?

A route is a temporary designation; the HVTL must be constructed within the route

Minnesota Statute 216E.01, subdivision 8, defines “route” as “the location of a [HVTL] between two end points. The route may have a variable width of up to one and one-quarter miles.” The route width is typically wider than the actual right-of-way needed for the HVTL. This extra width provides flexibility in constructing the HVTL, but is not so wide that it is impossible to determine where the HVTL would be constructed. This makes potential on-the-ground effects predictable.

What route and route segment alternatives does this EA study?

Two routes and two route segments are studied; the EA does not study those routes considered but rejected in the route permit application

This EA studies the Teal Route, Orange Route, Purple Route Segment, and Gold Route Segment (**Figure 4**). Should the Commission issue a route permit, it could select any combination of these alternative route or route segments to permit. Freeborn Wind is required to construct the HVTL within the route or route segment(s) selected.

Teal Route

The Teal Route was proposed by Freeborn Wind in the route permit application

Traveling south to north, the Teal Route begins at the proposed Wind Farm Substation. It travels along 840th Avenue, then turns west and follows field lines past 820th Avenue. The line then turns north and west crossing an existing 69 kV transmission line (ITC Line) owned by ITC Midwest LLC (ITC). Freeborn Wind proposes to follow the west side of the ITC Line north to 130th Street. The proposed HVTL then turns west and parallels 130th Street to the south for a distance then crosses to the north and follows the road until it reaches U.S. Highway 65. From there, it follows the east side of the highway north to the interconnection point at the existing Glenworth Substation owned by ITC. Freeborn Wind requested a 400-foot route width with wider route widths near substations and narrower route widths near three residences, U.S. Highway 65, and a communications tower (**Map 1**).

Orange Route

The Orange Route was proposed during scoping; it is now Freeborn Wind’s preferred route

The Orange Route follows the same alignment as the Teal Route except that route widths are restricted to the greatest extent possible to avoid non-participating landowners. Route widths vary from 225, 250, and 400 feet with wider route widths near substations (**Map 2**).

Purple Route Segment

The Purple Route Segment was proposed during scoping; it follows an existing transmission line corridor

Traveling south to north, the Purple Route Segment breaks from the proposed route in the NE 1/4 of S28, T101, R20W where it continues west approximately 1,000 feet along field lines to the existing ITC Line. The route segment turns north and travels along the ITC Line for approximately one and one-quarter miles until it reaches 130th Street where it rejoins the Teal and Orange routes. Route widths vary from 250, 400, and 600 feet (**Map 3**).

This EA studies two possibilities for this route segment: running the proposed HVTL parallel to the existing ITC Line (paralleling) or overbuilding the proposed HVTL above the ITC Line on new structures within the existing ITC right-of-way (overbuilding).

Gold Route Segment

The Gold Route Segment was proposed during scoping; it follows existing transmission line corridors

Traveling south to north, the Gold Route Segment breaks from the proposed route at 130th Street. It follows the ITC Line north until it reaches the existing Dairyland Power Cooperative double circuit 69 kV transmission line (Dairyland Line) at the boundary of S21 and S16, T101, R20W. At this point it turns west and follows the Dairyland Line along 140th Street and River Road. The route segment crosses the Shell Rock River and rejoins the proposed route in the NW 1/4 of S17, T101, R20W south of the Glenworth Substation. Route widths vary from 400 to 600 feet (**Map 4**).

This EA studies two possibilities for this route segment: running the proposed HVTL parallel to the existing ITC and Dairyland Lines (paralleling) or overbuilding the proposed HVTL above the ITC and Dairyland Lines on new structures within existing rights-of-way (overbuilding).

What is a right-of-way?

Right-of-way is a permanent easement where the HVTL is located

Minnesota Rule 7850.1000, subpart 15, defines “right-of-way” as the “land interest required within a route for the construction, maintenance, and operation” of a HVTL. The applicant indicates the proposed project will require an 80-foot right-of-way, except that a 22-foot right-of-way will be necessary to cross 830th Avenue.

Right-of-way will be centered over the anticipated alignment when conductors are on both sides of a structure (40 feet on either side). The right-of-way will be staggered over the anticipated alignment when conductors are on one side of the structure only (30 feet on the non-conductor side and 50 feet on the conductor side). Freeborn Wind anticipates the right-of-way would abut existing ITC Line or Dairyland Line rights-of-way but not overlap.

How would Freeborn Wind acquire rights-of-way?

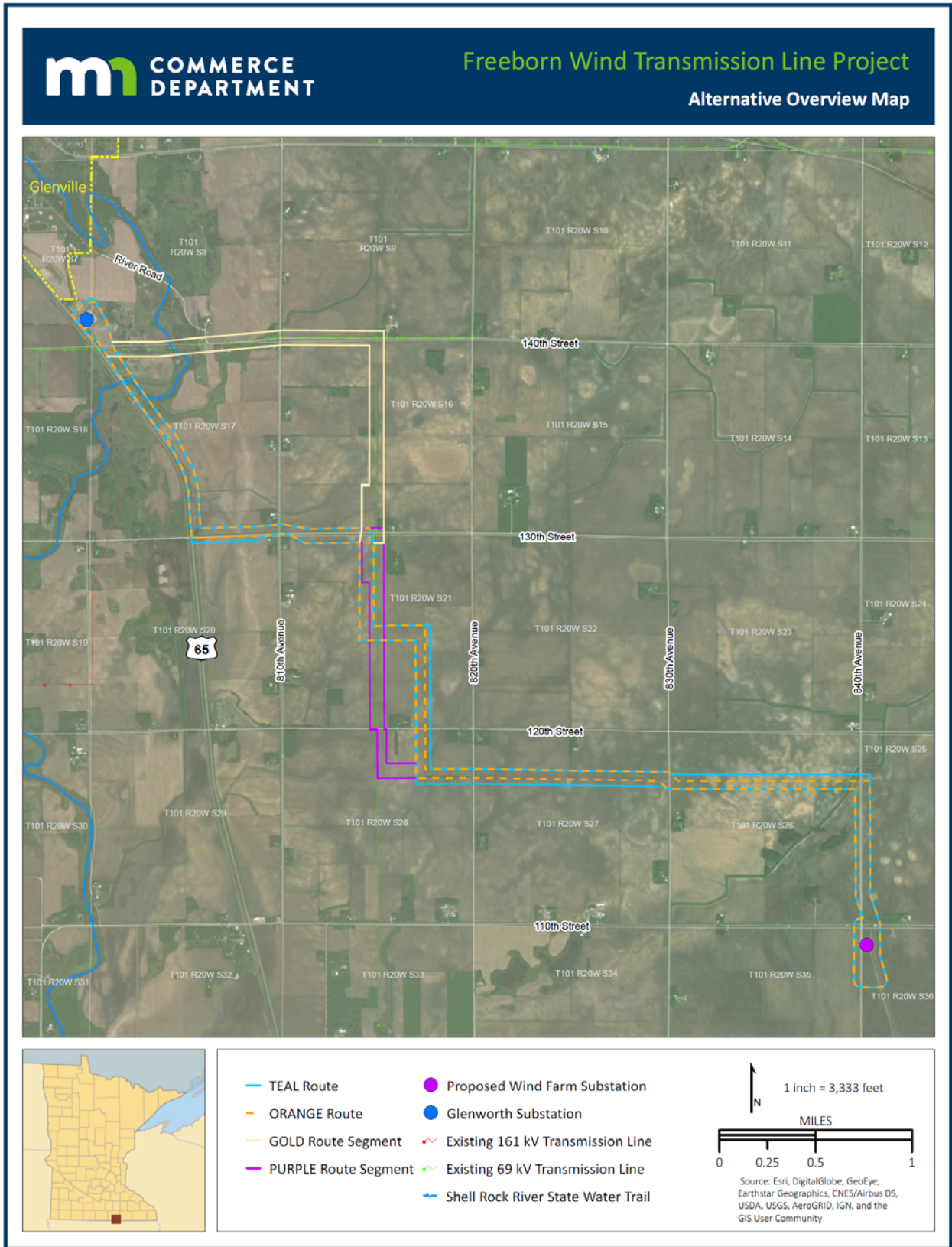
Freeborn Wind will negotiate with landowners for easement rights

Should the Commission issue a route permit, Freeborn Wind will conduct a design survey to finalize an alignment and right-of-way for the HVTL that is consistent with the permit. The company must acquire permanent easements for the right-of-way. The project will require approximately seven miles of new right-of-way, which is about 65 total acres. The project crosses private and state land.

Private During easement acquisition landowners will be provided a number of documents, including a copy of the route permit, draft easement and offer of compensation, information about construction practices, and the project schedule. Typically easement terms are negotiated that reduce negative impacts to a landowner’s property and provides just compensation for use of the easement.⁵⁹

⁵⁹ Minnesota Department of Commerce (August 5, 2014) *Rights-of-Way and Easements for Energy Facility Construction and Operation*, Retrieved May 4, 2018, from: https://mn.gov/commerce/energyfacilities/documents/Easements%20Fact%20Sheet_08.05.14.pdf.

Figure 4 Alternative Overview Map



In addition to long-term easements for the operation and maintenance of the HVTL, agreements for the use of temporary work space might be obtained from some landowners. Temporary workspace generally includes a marshalling yard(s) used to stage or store structures, vehicles, equipment, and supplies. Marshalling yards are generally sited on previously disturbed or developed areas. Freeborn Wind indicates it will establish a marshalling yard for the project in Worth County, Iowa.

Public Companies must follow the procedure outlined in Minnesota Statute 84.415 and Minnesota Rules 6135 to cross state-owned land. The Division of Lands and Minerals within DNR grants permission to cross state lands and waters in the form of a crossing license. The license is usually granted for 25 to 50 years and may be renewed when it expires.⁶⁰ To apply for an easement Freeborn Wind must file an Application for License to Cross Public Lands and Waters.⁶¹

Can Freeborn Wind exercise the power of eminent domain?

Freeborn Wind states it may exercise the power of eminent domain

In some instances negotiated easement agreements cannot be reached. Should this occur Freeborn Wind states it may exercise the power of eminent domain to acquire land for the project. This process is called condemnation. Freeborn Wind indicates condemnation is not their preference, and prefers the project be routed on participating landowner's property.

In the eminent domain process an independent panel of three court-appointed commissioners determines the value of the easement, and both the landowner and the applicant are bound by this determination. If the eminent domain process is used, Freeborn Wind must obtain at least one appraisal for the property proposed to be acquired.⁶²

How would Freeborn Wind construct the project?

Construction practices are similar for all routing options except for the Purple and Gold Route Segment overbuild options

Construction will not begin until Freeborn Wind obtains necessary approvals and land rights. All activities must comply with easement agreements. The company will notify landowners of the anticipated construction schedule, which might ultimately vary due to permit conditions, weather, and available workforce and materials.

Freeborn Wind will follow standard Xcel Energy construction and mitigation practices, including best management practices (BMPs) designed to mitigate impacts. BMPs are based on industry-specific standards and experience with previous projects.

Typical construction equipment includes: tree removal equipment, mowers, cranes, backhoes, digger-derrick line trucks, track-mounted drill rigs, dump trucks, front-end loaders, bucket trucks, bulldozers, pullers, tensioners, flatbed tractor-trailers, flatbed trucks, pickup trucks, concrete trucks, and various trailers. Excavation equipment can be wheel or track-driven. A temporary marshalling yard will be located

⁶⁰ Minnesota Department of Natural Resources (n.d.) *Utility Crossing Licenses*, Retrieved May 4, 2018, from: https://www.dnr.state.mn.us/permits/utility_crossing/index.html.

⁶¹ Minnesota Department of Natural Resources (June 13, 2015) *Application for License to Cross Public Lands and Waters*, Retrieved May 4, 2018, from: http://files.dnr.state.mn.us/lands_minerals/utility/utility_crossing_application.pdf.

⁶² Minn. Stat. 117.036, subd. 2.

in Worth County, Iowa. Freeborn Wind estimates there will be 40 to 60 vehicle trips per day on local roads during construction.

Safety Practices

Freeborn Wind will design the HVTL in compliance with all applicable standards regarding clearance to ground, clearance to existing utilities, clearance to buildings, strength of materials, and right-of-way widths. Crews will follow standard construction practices and Xcel Energy and industry safety procedures. This includes clear signage during all construction activities. The HVTL will be equipped with protective devices to safeguard the public should an accident occur, for example, a structure falling to the ground. These devices include breakers and relays at substations that will de-energize the line should such an event occur. Substations will be fenced and locked.⁶³

Right-of-Way Preparation

Before ground disturbance occurs surveyors will mark the anticipated alignment and right-of-way boundary. Construction begins by removing trees and other vegetation from the right-of-way that will interfere with safe construction and operation of the HVTL. The Commission requires that applicants minimize tree removal to the maximum extent practicable and leave undisturbed low growing species that will not interfere with operation or construction.⁶⁴

Structures are generally installed at existing grade; locations with more than 10 percent slope will be graded and leveled. Crews will install erosion control where needed. Access will be from existing roads or farm field access roads. The company will upgrade or construct new roads as necessary on private parcels. These activities will be coordinated with the landowner and appropriate road authority. Freeborn Wind committed to geotechnical testing HVTL structure locations prior to construction. Structure design and location will be determined based upon the results of this testing, and will avoid karst features. Prior to structure installation, the HVTL alignment might again be surveyed and marked to guarantee proper placement of structures.

Structure Installation

This phase of construction begins by marking underground utilities using Gopher State One Call. Structures will be delivered to the installation location either directly from the manufacturer or from the marshaling yard. Crews will install hardware while the structure is on the ground. The structure is then lifted, placed, and secured.

The process of securing a structure depends on its type. Medium angle, heavy angle, or dead-end structures will require concrete foundations, also referred to as drill pier foundations. These foundations will be approximately eight feet in diameter and up to 30 feet deep. Once crews have augured the foundation hole, steel reinforcing bars and anchor bolts are installed. Concrete is poured—usually to one foot above grade. After the foundation is set structures are bolted to it. Crews will spread and level excess soil from excavation near the structure or remove it from the site, as requested by the landowner or required by permit conditions.

Tangent (straight) and light angle structures are generally direct imbedded—although they might be placed on drill pier foundations based on soil conditions—into augured holes three feet in diameter and 10 to 13 feet deep. Once the hole is augured it is partially filled with crushed rock. The structure then set

⁶³ Application at page 32.

⁶⁴ Generic Route Permit Template at 5.3.6.

on the rock base. The hole is backfilled with crushed rock and soil. Excess soil is treated similarly to drill pier foundations.

Once structures are installed conductors are strung along the line. Setup areas will be approximately three times the height of the structure and as wide as the right-of-way width. Puller-tensioner sites are locations where the contractor will set up equipment to pull in and tension the conductor. Exact locations are unknown at this time. These locations are most often located at major obstacles such as turning points in the alignment. Conductors and a shield wire will be strung, tightened, and, once appropriate tension is obtained, secured to each structure. Crews will use temporary guard or clearance structures to provide adequate clearance over roads, existing power lines, waterways, or other potential obstructions, as well as to protect the conductor. Lastly, crews will install bird diverters on the shield wire in select locations; their placement is coordinated with DNR.

Restoration

Crews will repair or restore disturbed areas to pre-construction contours to the greatest extent practicable so that all surfaces drain naturally, blend with natural terrain, and facilitate revegetation. Restoration includes removal of debris and all temporary facilities, implementing erosion control measures, and reseeding with appropriate seed mixes, that is, similar types of vegetation that are certified free of noxious weeds and invasive species. Soil compaction is alleviated as negotiated by landowners. Wildlife-friendly mesh will be considered where netting is necessary for erosion control on DNR-administered lands. Restoration will begin on a parcel by parcel basis as crews finish construction.

After construction is complete a right-of-way agent will contact landowners to determine if restoration has been completed to their satisfaction and to identify damages that might have occurred during construction. Freeborn Wind will compensate landowners for any damages or hire a contractor to restore damaged property per the terms of individual easement agreements.

Special Construction Techniques

The following “special” construction techniques will be utilized for the project depending upon the routing option ultimately selected by the Commission. These techniques, while termed special, are common construction practices used industry-wide.

Paralleling and Overbuilding Both the Purple and Gold route segments would co-locate the project with existing transmission lines. Two options exist to accomplish co-location: paralleling or overbuilding. Paralleling means the HVTL right-of-way would follow immediately adjacent to existing transmission line right-of-way, but the structures would be at a distance from the existing transmission line. Overbuilding means the HVTL would be located with the existing transmission line on the same structure and rights-of-way would be shared.

Freeborn Wind anticipates that should paralleling be used the transmission line centerlines would be 80 feet apart. The company indicates that paralleling closer than 80 feet would require more detailed engineering to ensure the transmission lines do not interact electrically. Construction techniques would be similar to those described above.

Two potential construction scenarios exist for the overbuild option. The first is that the existing transmission lines could be taken out of service for the entire construction period. If this were the case the existing structures would be demolished and the HVTL constructed with new structures in identical or similar locations. The second—more likely—scenario involves temporarily moving the existing

transmission lines off their structures to temporary “shoo-fly” structures at the edge of the right-of-way. The shoo-fly line then supports the conductors while the old structures are removed and the new structures built.

The shoo-fly line would be constructed in such a way to control conductor movement within the existing right-of-way—likely offset from the existing centerline by 20 to 30 feet. Final offset would be determined based on survey work, and kept to a minimum to avoid disturbances to landowners to the greatest extent practicable. The shoo-fly structures would be approximately 40 feet tall for the ITC Line and 45 feet tall for the Dairyland Line. Spans would be approximately 300 feet for both lines. Shoo-fly lines would be built without static protection. Because the shoo-fly line is temporary, it does not need to be built to meet permanent clearances.

Once the shoo-fly line is strung, it will be connected at each end to energized portions of the existing transmission lines. This will require a one day outage. Once the new structures are set and conductors strung, another one day outage will be necessary to energize the line. Freeborn Wind will remove the shoo-fly line after the permanent line is energized.

Overbuild structures along the ITC Line would be about 85 to 90 feet tall and be round or laminated wood poles (**Figure 6**). Structures along the Dairyland Line would be about 90 to 95 feet tall over ground and 120 to 125 feet tall at the Shell Rock river crossing (**Figure 7**). These structures would be made of wood, except that steel structures would likely be used at the river crossing.

Spanning the Shell Rock River along the Gold Route Segment will require additional clearances. Displacement will not occur. Clearances can be achieved by increasing the right-of-way width or decreasing the span length. Eighty-foot right-of-way can be maintained by increasing the number of structures thereby reducing conductor movement. Right-of-way width calculations are as follows:

Figure 5 Gold Route Segment Right-of-Way Width Calculations

| Span Length in Feet | Right-of-Way Width in Feet |
|---------------------|----------------------------|
| 600 | 70 |
| 700 | 80 |
| 800 | 90 |
| 900 | 100 |
| 1,000 | 110 |
| 1,100 | 110 |

The Gold Route Segment would require crossing the Shell Rock River. Paralleling would use structures previously described. Freeborn Wind indicates the span length precludes use of a shoo-fly line when overbuilding. As a result, the existing structures will be kept in service while a new line is constructed adjacent to the existing line. Overbuild structures would need to be approximately 15 feet from the existing transmission line to comply with Occupational Safety and Health Administration requirements. Span lengths would be approximately 1,100 feet, and necessitate a right-of-way width of 110 feet. (The span length along the existing Dairyland Line is approximately 1,075 feet.)

Distribution Line Burial Existing distribution lines will be buried along 830th Avenue to accommodate the proposed HVTL. Freeborn-Mower Cooperative Services (Freeborn-Mower), the local electric provider,

would be responsible for burying the distribution line. Freeborn-Mower indicates this process is straightforward. A vibratory plow is used to bury the distribution line within the road right-of-way after necessary permits are acquired. A single, short (minutes to hours) outage might occur. In case they do occur affected consumers would be notified prior to the outage.

Wetlands and Waterways The HVTL will cross wetlands and waterways. Freeborn Wind indicates that crews will maintain sound water and soil conservation practices during construction and operation of the project. Crews will protect soils to minimize erosion into adjacent water resources. This includes containing excavated material, protecting exposed soil, and stabilizing restored soil. Structures will be placed in upland areas to the greatest extent possible. Should access roads be required they would be located outside of wetlands and other sensitive areas to the greatest extent practicable. Should equipment need to be driven across these features it will be done only as necessary and after consultation with appropriate resource agencies.

Figure 6 Purple Route Segment Under/Overbuild Structure

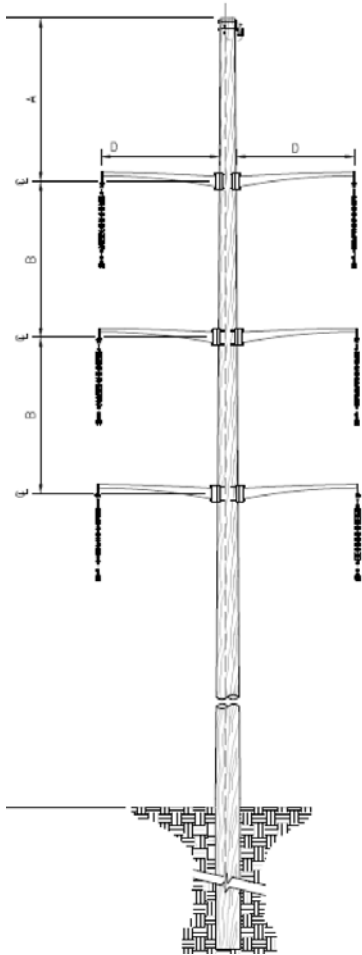
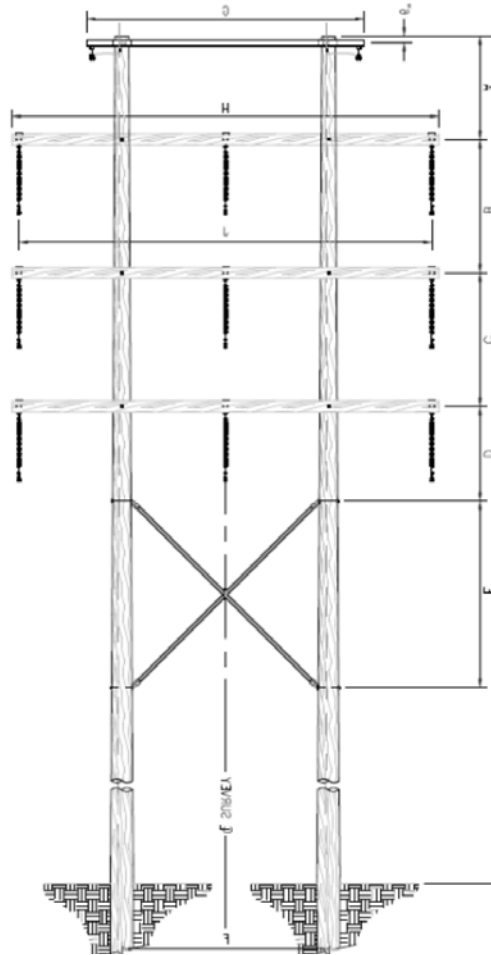


Figure 7 Gold Route Segment Under/Overbuild Structure



How would Freeborn Wind operate and maintain the project?

Regular inspections will identify needed maintenance and repairs

Freeborn Wind will perform regular (yearly) inspections to identify needed maintenance and repairs. Crews will perform these activities as needed to ensure the continued integrity of the HVTL. Vegetation

that interferes with safe operation will be removed by hand-clearing or mechanical means. Herbicides will be used if consistent with permit conditions and landowner agreements. Native vegetation that will not interfere with the safe operation of the HVTL will be allowed to reestablish.

Protective relay equipment will automatically take the HVTL out of service when a fault occurs on the system. These outages are usually very short—a matter of seconds. Considering power lines have very few mechanical elements scheduled maintenance outages are infrequent.

Freeborn Wind indicates the useful life of the project to be 60 years, and, at this time, there are no plans for decommissioning the project. The HVTL will support a proposed wind farm located in both Minnesota and Iowa. Consequently, even if the Minnesota portion of the wind farm were decommissioned, the line might still be necessary to connect the Iowa portion of the project to the electrical grid. The company indicates the line could support other wind projects in the future.

How much would the project cost?

Costs vary by routing option and range from \$3.8 to \$8.05 million

Costs are highly dependent upon routing option. **Table 3** provides cost estimates. These estimates are engineering estimates, and are anticipated to reflect actual costs within 20 percent. Annual operation and maintenance costs, including right-of-way maintenance, are anticipated to be \$1,500 per mile for all alternatives. Maintenance costs could increase with the overbuild option if agreements with existing utilities require Freeborn Wind to take on some of the responsibility for the existing circuits.

Table 3 Estimated Costs

| Item(s) | Teal | Orange | Purple Overbuild Option* | Purple Parallel Option* | Gold Overbuild Option* | Gold Parallel Option* |
|---|--------------------|--------------------|--------------------------|-------------------------|------------------------|-----------------------|
| Land acquisition and permitting | \$400,000 | \$400,000 | \$450,000 | \$450,000 | \$550,000 | \$550,000 |
| Design, procurement, and construction | \$3,000,000 | \$3,000,000 | \$3,500,000 | \$3,000,000 | \$7,100,000 | \$3,200,000 |
| Post-construction close-out and permit compliance | \$400,000 | \$400,000 | \$400,000 | \$400,000 | \$400,000 | \$400,000 |
| Total | \$3,800,000 | \$3,800,000 | \$4,350,000 | \$3,850,000 | \$8,050,000 | \$4,150,000 |

* Totals include the cost to construct the entire HVTL; not simply the route segment.

If a permit is issued when will the project be built?

Freeborn Wind anticipates the transmission line would be energized in December 2020

Assuming all permits are acquired construction will begin in May of 2020. The HVTL is anticipated to be energized in December 2020. This schedule is based on information available to date.

Potential Impacts and Mitigation

POTENTIAL IMPACTS AND MITIGATION MEASURES describes the environmental setting, affected resources, and potential impacts and mitigation measures associated with the project. Because the Teal and Orange routes share an identical anticipated alignment and the Orange route width is entirely within the Teal route width these routes are studied together, unless otherwise noted.

How are potential impacts measured?

Potential impacts are measured on a qualitative scale based on an expected impact intensity level; the impact intensity level takes mitigation into account

A potential impact is the anticipated change to an existing condition caused either directly or indirectly by the construction and operation of a proposed project. Potential impacts can be positive or negative, short- or long-term, and, in certain circumstances, can accumulate incrementally. Impacts vary in duration and size, by resource, and across locations.

Direct impacts are caused by the proposed action and occur at the same time and place. An indirect impact is caused by the proposed action, but is further removed in distance or occurs later in time. This EA considers direct and indirect impacts that are reasonably foreseeable, which means a reasonable person would anticipate or predict the impact. Cumulative potential effects are the result of the incremental impacts of the proposed action in addition to other projects in the environmentally relevant area.

Potential Impacts and Mitigation

The following terms and concepts are used to describe and analyze potential impacts:

Duration Impacts vary in length. Short-term impacts are generally associated with construction. Long-term impacts are associated with the 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.

Uniqueness Resources are different. Common resources occur frequently, while uncommon resources are not ordinarily encountered.

Location Impacts are location dependent. For example, common resources in one location might be uncommon in another.

The context of an impact—in combination with its anticipated on-the-ground effect—is used to determine an impact intensity level, which can range from highly beneficial to highly harmful. Impact intensity levels are described using a qualitative scale, which is explained below. These terms are not intended as value judgments, but rather a means to ensure common understanding among readers and to compare potential impacts between alternatives.

Negligible impacts do not alter an existing resource condition or function, and are generally not noticeable to an average observer. These short-term impacts affect common resources.

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

Moderate impacts alter an existing resource condition or function, and are generally noticeable to the average observer. Impacts might be spread out over a large area making them difficult to observe, but can be estimated by modeling. Moderate impacts might be long-term or permanent to common resources, but generally short- to long-term to uncommon resources.

Significant impacts alter an existing resource condition or function to the extent that the resource is impaired or cannot function. Significant impacts are likely noticeable or predictable to the average observer. Impacts might 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 affect common or uncommon resources.

Also discussed are opportunities to avoid, minimize, or mitigate potential impacts. Collectively, these actions are referred to as *mitigation*.

To avoid an impact means to eliminate it altogether, for example, by not undertaking parts or all of a project, or relocating the project.

To minimize an impact means to limit its intensity, for example, by reducing a project's size or moving a portion of the project.

To mitigate an impact means fixing it by repairing, rehabilitating, or restoring the affected resource, or compensating for it by replacing it or providing a substitute resource elsewhere. Mitigating an impact can be used when an impact cannot be avoided or further minimized.

Some impacts can be avoided or minimized; some might be unavoidable but can be minimized; others might be unavoidable and unable to be minimized, but can be mitigated. The level at which an impact can be mitigated might change the overall impact intensity level.

Region of Influence

Potential impacts to human and environmental resources are analyzed within specific geographic areas called regions of influence (ROI). This EA uses the following ROIs: right-of-way, route width, local vicinity (1,600 feet), project area (one-mile from all routing options), and Freeborn County. Impacts to resources may extend beyond this distance, but are expected to diminish quickly. ROIs vary between resources, and can change across projects. As necessary, potential impacts and mitigation measures beyond the identified ROI are discussed to provide appropriate context. **Table 4** summarizes the ROIs used in this EA.

Environmental Setting

Agricultural row crop fields and wooded farmsteads dominate the gently rolling topography; the Shell Rock River in the northwest is a contrasting riparian landscape

DNR and the U.S. Forest Service developed the Ecological Classification System for ecological mapping and landscape classification in Minnesota. These classifications “identify, describe, and map progressively

smaller areas of land with increasingly uniform ecological features.”⁶⁵ The majority of Freeborn County is located in the Oak Savanna subsection. Prior to European settlement, “bur oak savanna was the primary vegetation, but areas of tallgrass prairie and maple-basswood forest were common.”⁶⁶ Historically, fire maintained oak openings rather than forest, and wetlands were once plentiful throughout this subsection.⁶⁷

Table 4 Regions of Influence for Human and Environmental Resources

| Resource Type | Element | Region of Influence |
|---------------------------------------|--|---------------------|
| Human Settlement | Displacement, Land Use and Zoning | Right-of-Way |
| | Electrical Interference | Route Width |
| | Aesthetics, Noise, Property Values, Recreation | Local Vicinity |
| | Cultural Values | Project Area |
| | Socioeconomics | Freeborn County |
| Public Services | Airports, Roads, Emergency Services, Public Utilities | Project Area |
| Public Health and Safety | Electric and Magnetic Fields, Implantable Medical Devices, Stray Voltage | Route Width |
| Land-based Economies | Agriculture, Forestry, Mining | Route Width |
| | Tourism | Project Area |
| Archaeological and Historic Resources | — | Project Area |
| Natural Environment | Geology, Soils, Vegetation | Right-of-Way |
| | Water Resources, Wetlands, Wildlife (excepts birds), Wildlife Habitat | Route Width |
| | Wildlife (birds) | Local Vicinity |
| | Rare and Unique Resources | Project Area |
| | Air Quality | Freeborn County |

Today, the subsection is primarily farmland, with urban expansion accelerating to the north outside Freeborn County. “Increasing intensity of agricultural production has led to further wetland deterioration and loss, water-quality concerns, and sediment loading in streams.”⁶⁸

⁶⁵ Minnesota Department of Natural Resources (n.d.) *Ecological Classification System: Ecological Land Classification Hierarchy*, Retrieved April 3, 2018, from: <https://www.dnr.state.mn.us/ecs/index.html>.

⁶⁶ Minnesota Department of Natural Resources (n.d.) *Oak Savanna Subsection*, Retrieved April 3, 2018, from: <https://www.dnr.state.mn.us/ecs/222Me/index.html>.

⁶⁷ Minnesota Department of Natural Resources (January 2006) *Tomorrow’s Habitat for the Wild and Rare: An Action Plan for Minnesota Wildlife*, St. Paul: State of Minnesota, at page 94.

⁶⁸ Minnesota Department of Natural Resources (January 2006) at page 94.

Project Setting

The topography within the project area is gently rolling. Elevations range from about 1,200 to 1,300 feet above sea level, with lower elevations associated with the Shell Rock River in the northwest ascending to the south and east.⁶⁹ The National Land Cover Database (NLCD) provides “spatial reference and descriptive data for characteristics of the land surface” nation-wide.⁷⁰ Land cover types—in Minnesota—within one mile of any routing option are approximately 84 percent cultivated crops and eight percent developed space, for example, homesteads and roads. Four percent of the project area is grassland and emergent herbaceous wetlands account for three percent of land cover types. See **Map 5**.

The NLCD is based on a 30 meter resolution meaning cover types are grouped into 30 x 30 meter blocks. This provides an accurate depiction of land cover types at a landscape scale. However, smaller cover types may be classified the same as larger, surrounding cover types. Therefore, when reviewing projects at a localized scale, the NLCD may not accurately depict all parcels.

The existing environment is rural open space. Agricultural row crop fields and wooded farmsteads dominate the project area. The Shell Rock River in the northwest provides a contrasting riparian landscape. AFCL describes the project area as a “quiet, sparsely populated rural area.”⁷¹ Built features include numerous residences and outbuildings, agricultural buildings, an auto salvage yard, a drainage ditch, U.S. Highway 65, other paved and gravel roads, electric transmission and distribution lines, the Glenworth Substation, and a communications tower (according to aeronautical charts the tower is 234 feet tall). The ITC Line runs north and south through the project area. It spans approximately 300 feet with wooden structures approximately 60 feet tall. The Dairyland Line is a double circuit 69 kV line with spans approximately 350 feet and steel structures approximately 70 feet tall.

Resource Topics Dismissed from Standard Analysis

Select resource topics received abbreviated study because they were deemed insignificant to the Commission’s decision regarding a route permit; impact intensity levels are negligible

The following resource topics are commonly considered as part of environmental review, but were determined insignificant to the Commission’s decision in this docket. This determination was based on information from the route permit application, field visits, scoping comments received, environmental analysis, and staff experience with similar projects. Additional information regarding these topics is provided in the route permit application.

Airports

According to navigational charts and desktop satellite imagery review the closest airports to the project are the Albert Lea Municipal Airport (AEL) and the Austin Municipal Airport (AUM) in Minnesota, and the Northwood Municipal Airport (5D2) in Iowa.⁷² These airports are approximately nine, 15.5, and four miles from the project, respectively. Impacts to airports or airport operations would not occur.

⁶⁹ Application at page 30; *see also* Minnesota Department of Natural Resources (n.d.) *MnTOPO*, Retrieved April 3, 2018, from: <http://arcgis.dnr.state.mn.us/maps/mntopo/>.

⁷⁰ U.S. Geological Survey (February 2012) *The National Land Cover Database*, Retrieved May 8, 2018, from: <http://pubs.usgs.gov/fs/2012/3020/fs2012-3020.pdf>.

⁷¹ Association of Freeborn County Landowners (October 24, 2017) *Comments on Completeness*, eDockets No. [201710-136755-01](#) at page 4.

⁷² Federal Aviation Administration (February 1, 2018) *VFR Raster Chart – Omaha*, Retrieved April 13, 2018, from: https://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/vfr/.

Displacement

Displacement is the forced removal of a residence or building to facilitate the construction and operation of a power line.⁷³ The project can be constructed so that the removal of homes or buildings along all routing options would not occur. No residences are within the right-of-way of any routing option.

Floodplain

Portions of the Teal, Orange, and Gold routing options are within areas mapped as “Zone AE” by the Federal Emergency Management Agency (FEMA). Areas within this designation are “subject to inundation by the 1-percent-annual-chance flood event.”⁷⁴ Structures, should they be placed in the floodplain, are not anticipated to affect flooding. Impacts to the 100-year floodplain are not anticipated.

Forestry

Field visits and indicates no active forestry operations, including commercial timber harvest or woodlots, occur within the route width of any routing option. Impacts to known forestry operations and resources would not occur.

Mining

According to the MnDOT Aggregate Source Information System⁷⁵ there are no aggregate resources within the route width of any routing option. Field visits and desktop satellite imagery review indicates no active mining operations occur within the route width of any routing option. Impacts to known mining operations and resources would not occur.

Impacts to Human Settlement

HVTs can impact human settlement. Impacts might be short-term, for example, increased expenditures during construction, or long-term, for example, changes to viewshed.

Aesthetics

The overall impact intensity level along the Teal, Orange, and Gold overbuild option is anticipated to be moderate. Impacts along the Purple routing options and the Gold parallel option are anticipated to be minimal. Potential impacts will be short- and long-term, localized, and affect both common and unique resources. Impacts are unavoidable.

Aesthetics refers to the visual quality of an area as perceived by the viewer, and forms the overall impression an observer has of an area. Aesthetics are subjective, meaning their relative value depends upon the perception and philosophical or psychological responses unique to individuals. Impacts to aesthetics are equally subjective, and depend upon the sensitivity and exposure of an individual. How an individual values aesthetics, as well as perceived impacts to a viewshed, can vary greatly.

⁷³ American Heritage Dictionary of the English Language, Fifth Edition (2011) *displacing*, Retrieved May 4, 2018, from: <http://www.thefreedictionary.com/displacing> (defining “displace” as “to move, shift, or force from the usual place or position” and “to force to leave a place of residence”).

⁷⁴ Federal Emergency Management Agency (March 27, 2018) *Zone AE and A1-30*, Retrieved May 8, 2018, from: <https://www.fema.gov/zone-ae-and-a1-30>.

⁷⁵ Minnesota Department of Transportation (January 24, 2018) *Aggregate Sources: Viewing with Google Earth™*, Retrieved April 26, 2018, from: https://www.dot.state.mn.us/materials/asis_GE.html.

A viewshed includes the natural landscape and built features visible from a specific location. Natural landscapes can include wetlands, surface waters, distinctive landforms, and vegetation patterns. Buildings, roads, bridges, and power lines are examples of built features. Generally, a harmonious viewshed is considered by many to be more aesthetically pleasing.

Viewer sensitivity is an individual's interest or concern for the quality of a viewshed and varies depending upon the activities viewers are engaged in, their values and expectations related to the viewshed, and their level of concern for potential changes to the viewshed. High viewer sensitivity is generally associated with individuals engaged in recreational activities; traveling to scenic sites for pleasure and to or from recreational, protected, natural, cultural, or historic areas; or experiencing viewsheds from resorts, road-side pull-outs, or residences. Residents have a higher sensitivity to potential aesthetic impacts than temporary observers. Low viewer sensitivity is generally associated with individuals working or passing through an area.

Viewer exposure refers to variables associated with observing a viewshed, and can include the number of viewers, frequency and duration of views, and view location. For example, a high exposure viewshed would be observed frequently by large numbers of people for long periods. These variables, as well as other factors such as viewing angle or time of day, affect the overall aesthetic impact.

Potential Impacts

Aesthetic impacts are anticipated to vary across routing options. Potential impacts will be long-term, of a small size, localized, and affect common resources. Impacts generally cannot be mitigated. The overall impact intensity level along the Teal, Orange, and Gold overbuild option is anticipated to be moderate. Impacts along the Purple routing options and the Gold parallel option are anticipated to be minimal.

The project will introduce new built features—structures and conductors—on the landscape. Given the open nature of the project area, tall growing woody vegetation will likely not screen visual impacts within the local vicinity. All routing options follow existing infrastructure for a significant portion of their length. A 234-foot communications tower dominates the viewshed.

Viewer exposure is anticipated to be high along U.S. Highway 65 and the Shell Rock River. Low viewer exposure is expected elsewhere in the local vicinity. Viewer sensitivity is expected to be low along the highway, where motorists commute and travel through the project area, but high elsewhere. High sensitivity is also associated with residents viewing the HVTL from their homes. **Table 5** shows the number of residences within the local vicinity of the various routing options at different distances. No residence is within the anticipated right-of-way of any routing option. The Gold route segment would reduce the number of residences within the local vicinity of both the Teal and Orange routes by three, but would not decrease the number of residences in the right-of-way or the route width. The Purple route segment, due to its close proximity to the Teal and Orange routes, would not change the number of residences within the right-of-way, route width, or local vicinity of those routes.

Should a permit be issued for the project, crossing the Shell Rock River is unavoidable. The Teal and Orange routes cross the river adjacent to U.S. Highway 65. The Gold parallel option crosses adjacent to the existing Dairyland Line, which extends the existing transmission line crossing horizontally. The Gold under/overbuild option would not introduce a new feature once constructed. The new structure would be larger and taller vertically than the existing Dairyland Line. Constructing the Gold overbuild option would require the new line be built while the existing line remain in service resulting in similar construction related impacts.

Table 5 Proximity of Residences from Anticipated Alignment

| Route or Route Segment | Route Width | 400 feet | 800 feet | Local Vicinity |
|------------------------|-------------|----------|----------|----------------|
| Teal | 0 | 2 | 6 | 13 |
| Orange | 0 | 2 | 6 | 13 |
| Gold Under/Overbuild | 3 | 5 | 7 | 10 |
| Gold Parallel | 3 | 4 | 7 | 10 |
| Purple All | 0 | 0 | 3 | 4 |

* No residences are within the right-of-way of any routing option.

The Teal and Orange anticipated rights-of-way follow 130th Street on the south for three-tenths of a mile between the communications tower and 810th Avenue, at which point it makes a long (one-tenth mile) crossing to the north. This will result in power lines on both sides of the road for a portion of 130th Street, and a conductor extending across the roadway for a prolonged distance (**Figure 8**).

Paralleling field lines reduces impacts to agriculture, but does not necessarily reduce aesthetic impacts. Generally when a power line follows road right-of-way the conductors are out of view (looking perpendicular to the roadway). This is not the case when paralleling field lines at a distance from road right-of-way. Additionally, unless paralleling is immediately adjacent to existing power lines its benefits are reduced. “Paralleling” that is not immediately adjacent can appear as a landscape cluttered with power lines. The Teal and Orange routes follow the existing ITC Line for a portion of their length at a distance. This would create an approximately 257-foot gap between transmission lines.

Overbuilding the HVTL with existing transmission lines in the project area will reduce the number of structures on the landscape; however, once constructed the structures will be taller and more obtrusive visually. Construction necessitates use of a shoo-fly line if overbuilding, which would create similar visual impacts to the other routing options during construction.

Potential impacts along the Teal and Orange routes are anticipated to be short- and long-term and localized. These routes cross the Shell Rock River at a location previously impacted by highway and railway bridges. Impacts at the crossing will be incremental. Without mitigation these routes will result in power lines on both sides of a portion of 130th Street. Structures will be slightly taller than the existing ITC Line. The overall impact intensity level is anticipated to be moderate.

Impacts along the Gold parallel option are also anticipated to be short- and long-term, of a small size, and localized affecting a unique resource. This route crosses the Shell Rock River at a location previously impacted by a transmission line crossing. Impacts at the crossing will be incremental. A parallel crossing might draw more attention to it. Structures will be slightly taller than the existing ITC Line and Dairyland Line. The overall impact intensity level is anticipated to be moderate.

The Gold overbuild option is anticipated to cause short- and long-term impacts that are of a small size and localized. It will affect a unique resource. An existing river crossing occurs at this location; therefore, a new river crossing is not necessary. Construction of this route segment would result in larger structures with a taller vertical conductor arrangement. Potential impacts would be incremental. This larger crossing might draw more attention. Because the new line would be constructed next to the existing line, construction related impacts would be similar. Structures will be significantly taller than the existing ITC Line and Dairyland Line. The overall impact intensity level is anticipated to be moderate.

Figure 8 East on 130th Street



Impacts along the Purple routing options are anticipated to be minimal. The parallel option will have shorter structures but more on the landscape; whereas the overbuild option will have fewer structures on the landscape but they will be larger.

Mitigation

Aesthetic impacts can be minimized by prudent routing, that is, by choosing routes and alignments that are, to the extent practicable, consistent with the existing viewshed or reduce viewer exposure. Impacts can also be mitigated by limiting vegetation clearing to only what is necessary for the safe construction and operation of the HVTL. Commission route permits require permittees to minimize vegetation removal when constructing an HVTL.⁷⁶

Adverse impacts can be further mitigated by ensuring that damage to natural landscapes during construction is minimized, and, to the extent that it does not interfere with safe operation of the transmission line, planting lower growing woody vegetation in a transition area near the edge of the right-of-way in wooded areas. Aesthetic impacts can also be mitigated by plantings or painting that minimizes the visual exposure of structures.

Routing power lines on both sides of 130th Street along the Teal and Orange routes is avoidable with prudent routing. Crossing 130th Avenue near the communications tower and following the north side of 130th Street would require burying or underbuilding the existing distribution line, but would eliminate power lines on both sides of the road and the long, extended crossing currently proposed.

⁷⁶ Generic Route Permit Template at Section 5.3.9.

Cultural Values

The overall impact intensity level is anticipated to be negligible for all routing options. The project is not anticipated to impact or alter the work and leisure pursuits of residents in the project area or land use in such a way as to impact the underlying culture of the area.

Cultural values are learned community beliefs and attitudes, which provide a framework for individual and community thought and action. Southeastern Minnesota counties are not marked by significant cultural differences, and are part of a larger area within the United States that Colin Woodard has termed “Yankeedom”. Woodard believes cultural lines do not follow state or county boundary lines, but rather, historical settlement patterns.⁷⁷ Yankeedom is described as sharing general values with communities in the New England states.⁷⁸ According to Woodard, this culture “put great emphasis on education, local political control, and the pursuit of the ‘greater good’ of the community, even if it required individual self-denial.”

Patchworknation.org draws on U.S. Census estimates of common categories at the county level, such as “population, demographic, economic, consumer expenditure, and religious adherence indicators”⁷⁹ to group all counties in the United States into 12 categories. Freeborn County is categorized as an “Emptying Nest” county, which is characterized by being a “home to many retirees and aging baby boomer populations [and] less diverse than the nation at large.... Located throughout the Midwest ... they are home to large numbers of 55-and-over citizens. And their connection to an older vision of America often extends beyond their population.”⁸⁰ Though not categorized this way, Freeborn County also scored high in the “Tractor Country” category, which are counties made up of “mostly rural and remote smaller towns with older populations and large agricultural sectors.”⁸¹

Cultural values can be informed, in part, by ethnic heritage. Residents of Freeborn County self-reported having primarily European ancestry, with German and Norwegian being most common (about two-thirds of the total population).⁸² Less than one-half percent of county residents self-reported as being American Indian.⁸³ Cultural values are also informed by work and leisure pursuits, for example, farming and fishing, as well as land use, such as cropland. Large county-wide events include the Freeborn County Fair located on the Freeborn County Fairgrounds in Albert Lea.

⁷⁷ Woodard, C. (2013) *Up in Arms*, Retrieved April 16, 2018, from: <http://emerald.tufts.edu/alumni/magazine/fall2013/features/up-in-arms.html>

⁷⁸ Woodard, C. (2011) *American Nations: A History of the Elven Rival Regional Cultures of North America*, PENGUIN GROUP (USA) INC., New York, New York.

⁷⁹ Patchwork Nation (n.d.) *Community Types*, Retrieved May 9, 2018, from: <http://www.patchworknation.org/regions-page>.

⁸⁰ Patchwork Nation (n.d.) *Emptying Nests*, Retrieved May 9, 2018, from: <http://www.patchworknation.org/Emptying-Nests>

⁸¹ See The Jefferson Institute for the Study of World Politics (n.d.) Patchwork Nation All Counties Distribution, Including Source Data, Retrieved May 9, 2018 from: http://www.patchworknation.org/sites/default/files/allcounties06_distribution.xls; see also Patchwork Nation (n.d.) *Tractor Country*, Retrieved May 9, 2018, from: <http://www.patchworknation.org/Tractor-Country>

⁸² Application at page 39

⁸³ U.S. Census Bureau (n.d.) *American FactFinder*, Available at: <https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml>.

Potential Impacts

While negative impacts will occur to specific resource elements, for example, aesthetics, the construction of the HVTL is not anticipated to impact or alter the work and leisure pursuits of residents in the project area or land use in such a way as to impact the underlying culture of the area.

Mitigation

Impacts to cultural resources are anticipated to be negligible; therefore, mitigation is not proposed.

Electronic Interference

The overall impact intensity level is anticipated to be minimal for all routing options. Potential impacts, if they occur, will be short-term, of a small size, localized, and affect common resources. Impacts can be mitigated.

Power lines have potential to interfere with the normal operation of electronic devices such as radio and television. Interference can result from a phenomenon known as corona, which is common to all power lines. Additionally, structures might block line-of-sight communication signals.

Corona is the result of small electrical discharges at discrete locations along the surface of the conductor that ionize surrounding air molecules. These discharges generate audible noise and radio frequency noise. If the radio frequency noise is excessive it can interfere with signal reception. Interference, however, is largely dependent on the magnitude of the corona-induced radio frequency noise relative to the strength of the broadcast signals.⁸⁴

Corona noise is dependent upon many variables, such as the size of the conductor coupled with its surface condition, power line geometry, weather, and, most importantly, operating voltage.⁸⁵ “Corona noise levels are generally quite low until the transmission line operating voltage exceeds 345 to 500 kV.”⁸⁶ Radio frequency noise related to corona is “typically not a concern for power lines with operating voltages below 161 kV, because the electric field intensity is too low to produce significant corona.”⁸⁷ Radio frequency noise from corona diminishes in magnitude as it increases in frequency.

Radio Signals

The frequency generated by corona noise predominantly ranges from 500 to 1,500 kilohertz (KHz).⁸⁸ AM radio broadcasts are in frequencies from 535 to 1705 KHz.⁸⁹ Interference to AM radio broadcasts typically occur directly underneath power lines and result in a crackling sound—interference dissipates rapidly on either side of the line. FM radio broadcasts are in very high frequencies (VHF) and vary from 88 to 108 megahertz (MHz) or 88,000 to 108,000 KHz, which is higher than corona generated noise. Interference rejection properties inherent in FM radio systems help reduce electromagnetic noise.

⁸⁴ Great River Energy (August 7, 2015) Application to the Minnesota Public Utilities Commission for a Route Permit for the Bull Moose 115 kV Project, eDockets Nos. [20158-113086-01](#), [20158-113086-02](#) at page 6-11.

⁸⁵ Application at page 34.

⁸⁶ *Ibid.*

⁸⁷ Great River Energy (August 7, 2015) at page 6-11.

⁸⁸ Minnesota Environmental Quality Board (April 1982) *Electric Power Transmission Line: An Assessment of Right-of-Way Compatibility*, St. Paul: State of Minnesota.

⁸⁹ National Telecommunications and Information Administration (August 2011) *United States Frequency Allocations: The Radio Spectrum*, Retrieved March 8, 2018, from: https://www.ntia.doc.gov/files/ntia/publications/spectrum_wall_chart_aug2011.pdf.

Emergency Services

Emergency services also broadcast in VHF. Rural Minnesota will move to an 800 MHz system already in place in the metropolitan area.⁹⁰ Freeborn County emergency service broadcasts are in frequencies ranging from 154.19000 MHz (County Fire Departments) to 156.18000 MHz (Road Department).⁹¹ The Allied Radio Matrix for Emergency Response (ARMER) is used across Minnesota. In Freeborn County frequencies range from 851 MHz to 859 MHz.⁹² These signals are higher than corona generated noise.

Television Signals

It is possible to receive television broadcasts through a digital antenna, satellite dish, or from a local cable provider. How an individual receives their television broadcast dictates the potential interference that might occur from a power line.

Broadcast television stations in the United States use digital transmission and to receive these transmissions an antenna must be able to receive VHF or ultra-high frequency (UHF) signals.⁹³ These frequencies are higher than frequencies generated by corona noise. Additionally, digital broadcasts use packets of binary information as opposed to waveforms to transfer content. These binary signals are less susceptible to corruption and can be corrected for errors. Digital broadcasts are susceptible to freezing and pixilation due to multipath reflections or low signal strength.

Satellite television broadcasts at frequencies ranging from 12 to 18 gigahertz.⁹⁴ These signals are also higher than corona generated noise. Satellite television is susceptible to line-of-sight interference, for example, falling snow can result in signal loss. Cable broadcasts are redistributed satellite broadcasts and are generally not susceptible to interference due to the use of shielded coaxial cable.

Wireless Internet and Cellular Phones

Wireless internet and cellular phones use frequencies in the UHF range, and vary based on phone service provider. UHF signals begin at 900 MHz, which are higher than frequencies generated by corona noise.

Potential Impacts

The overall impact intensity level is anticipated to be minimal for all routing options. Potential impacts, if they occur, will be short-term, of a small size, localized, and affect common resources. Impacts can be mitigated.

Radio Signals

Radio interference would likely occur in the AM frequency range directly underneath the conductors or in close proximity to them within the right-of-way. Potential impacts might occur when vehicles or equipment pass underneath the HVTL. Interference is not expected in the FM frequency range.

⁹⁰ Emergency Medical Services Board (n.d.) *EMS Radio Project*, Retrieved April 24, 2018, from:

<https://mn.gov/boards/emsrp/grantprojects/projects/ems-radio-project.jsp>.

⁹¹ Radio Reference.com (December 14, 2017) *Freeborn County Minnesota*, Retrieved April 24, 2018, from:

<https://www.radioreference.com/apps/db/?ctid=1333>.

⁹² Radio Reference.com (April 17, 2018) *Allied Radio Matrix for Emergency Response (ARMER)*, Retrieved

April 24, 2018, from: <https://www.radioreference.com/apps/db/?sid=3508>

⁹³ U.S. Federal Communications Commission (n.d.) *Antennas and Digital Television*, Retrieved April 24, 2018,

from: <https://www.fcc.gov/consumers/guides/antennas-and-digital-television> .

⁹⁴ National Telecommunications and Information Administration (August 2011).

Emergency Services

Impacts to the ARMER System are not anticipated. The Statewide Maintenance and Operations Manager with MnDOT’s Office of Statewide Radio Communications reviewed the Scoping Summary and concluded that “MnDOT has no concerns with the new transmission line affecting the ARMER system.”⁹⁵

Television Signals

No residences are within the route width of the Teal, Orange, or Purple routing options; therefore, impacts to television signals along these routes and route segment are not anticipated. Three residences are within the route width of the Gold route segment, but impacts are not anticipated.

Wireless Internet and Cellular Phones

Impacts to wireless internet and cellular phone signals are not anticipated to occur for any routing option.

Mitigation

Impacts to radio frequencies can be avoided by increasing the distance between the receiver and the HVTL or by increasing signal strength through antenna modifications. Use of different antennas or satellite dishes, or adjusting their locations, will typically resolve any impacts to television signals. In situations where a HVTL does cause electronic interference, Commission route permits require permittees to take actions which are feasible to restore or provide reception equivalent to reception levels before construction of the HVTL.⁹⁶

Land Use and Zoning

The overall impact intensity level is anticipated to be minimal for all routing options. Potential impacts to zoning are anticipated to be long-term and localized. Impacts can be mitigated. Impacts to non-participating landowners along the Gold routing options are unavoidable. These impacts will be long-term and significant.

Land use is the use of land by humans, such as residential, commercial or agricultural uses, and often refers to zoning. Zoning is a regulatory tool used by local governments (cities, counties, and some townships) to promote or restrict certain land uses within specific geographic areas. Power lines have the potential to impede current and future land use.

A route permit from the Commission supersedes local zoning, building, or land use rules.⁹⁷ Though zoning and land use rules are superseded, the Commission’s route permit decision must be guided, in part, by consideration of impacts to local zoning and land use in accordance with the legislative goal to “minimize human settlement and other land use conflicts.”⁹⁸

All routing options are located within Freeborn County’s Agricultural District. The district provides for “suitable areas of the county to be retained in agricultural use; regulate scattered non-farm development; regulate wetlands and woodlands, which, because of their unique physical features, provide a valuable natural resource; and secure economy in governmental expenditures for public services, utilities and

⁹⁵ Appendix C Information Inquiry #1.

⁹⁶ Generic Route Permit Template at Section 5.4.3.

⁹⁷ Minn. Stat. 216E.10, subd. 1.

⁹⁸ Minn. Stat. 216E.03, subd. 7.

schools.”⁹⁹ The ordinance does not specifically address power lines; however, a variety of conditional uses not directly associated with agriculture may be permitted.

The Floodplain District regulates development in flood hazard areas to promote public health, safety, and the general welfare. The Floodplain District “is also intended to preserve the natural characteristics and functions of watercourses and floodplains in order to moderate flood and stormwater impacts, improve water quality, reduce soil erosion, protect aquatic and riparian habitats, provide recreational opportunities, provide aesthetic benefits and enhance community and economic development.”¹⁰⁰ The district is subdivided into Floodway, Flood Fringe, and General Floodplain based on FEMA Digital Flood Rate Insurance Maps.

The project area intersects Floodway and Flood Fringe. Power lines are a permitted use in Floodway provided the DNR Area Hydrologist is notified at least ten days prior to the issuance of any permit, and certain construction standards are met.¹⁰¹ In Flood Fringe “any residential or nonresidential structure or use of a structure or land is a permitted use, provided it does not constitute a public nuisance,” and certain construction standards are met.¹⁰²

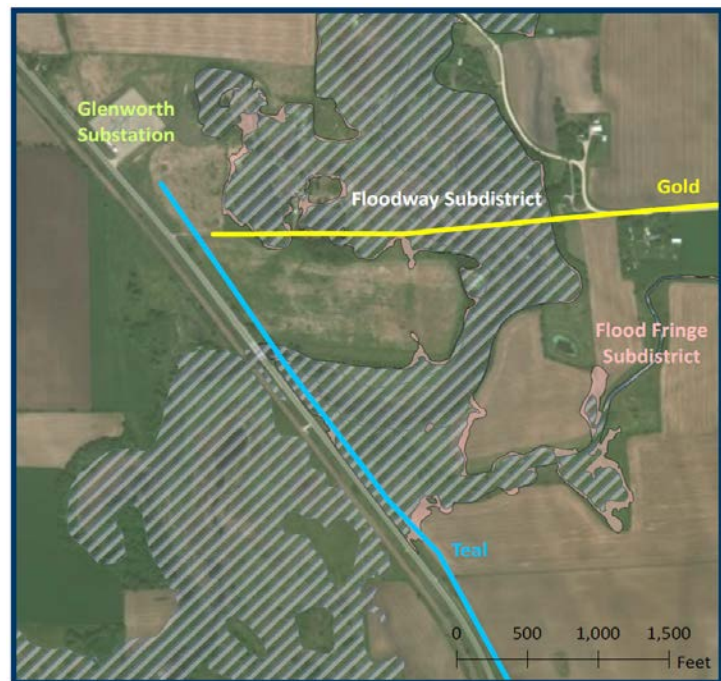
As used in this EA, a participating landowner is a person who has signed a land agreement with Freeborn Wind that would allow the company to place a transmission line on their property. A non-participating landowner is a person who has not signed a land agreement with Freeborn Wind that would allow the company to place a transmission line on their property. Non-participating landowners may have signed other agreements with the company that are unrelated to land rights. Landowner status is depicted on **Map 6**.

Potential Impacts

The overall impact intensity level is anticipated to be minimal for all routing options. Potential impacts to zoning are anticipated to be long-term and localized. Impacts can be mitigated.

All routing options affect non-participating landowners, that is, all options have a portion of the route width on non-participating property. These

Figure 9 Freeborn County Floodplain District



⁹⁹ Freeborn County (April 19, 2017) *Section 42-103 Freeborn County Ordinance*, Available at: https://library.municode.com/mn/freeborn_county/codes/code_of_ordinances.

¹⁰⁰ Freeborn County (April 19, 2017) *Section 42-389 Freeborn County Ordinance*, Available at: https://library.municode.com/mn/freeborn_county/codes/code_of_ordinances.

¹⁰¹ Freeborn County (April 19, 2017) *Section 42-392 Freeborn County Ordinance*, Available at: https://library.municode.com/mn/freeborn_county/codes/code_of_ordinances.

¹⁰² Freeborn County (April 19, 2017) *Section 42-393 Freeborn County Ordinance*, Available at: https://library.municode.com/mn/freeborn_county/codes/code_of_ordinances.

impacts can be avoided through prudent routing within the route width. Impacts to non-participating landowners along the Gold routing options are unavoidable. These impacts will be long-term and significant.

The existence of a power line easement restricts certain land uses of a property, which might interfere with the underlying zoning designation. Most commonly these restrictions manifest by precluding tree plantings or erecting permanent structures that might obstruct or interfere with the safe operation of the power line. Planting agricultural crops or using the right-of-way for pasture land is generally not precluded. Potential impacts to agricultural operations are discussed in the AGRICULTURE SECTION. Forestry and mining operations do not occur within the route width of any routing option. Impacts to Freeborn County Zoning Ordinances are not anticipated.

Mitigation

Potential impacts to current and future land use can be mitigated by selecting routes and alignments that are compatible, to the extent possible, with current and future land use and zoning. Selecting routes on participating landowner's property reduces impacts to non-participating landowners. Impacts to individual parcels can be mitigated through negotiated easement agreements. These agreements are not within the scope of this EA.

Noise

Specific impacts are associated with the construction and operational phases of the project. The overall impact intensity level during construction is anticipated to be minimal for all routing options. Potential impacts are anticipated to be short-term and not exceed state noise standards. These localized impacts will affect unique resources (residences). Impacts are unavoidable but can be minimized. Operational noise impacts are anticipated to be negligible for all routing options.

Noise can be defined as any undesired sound.¹⁰³ It is measured in units of decibels on a logarithmic scale. The A-weighted scale (dBA) is used to duplicate the sensitivity of the human ear.¹⁰⁴ A three dBA change in sound is barely detectable to average human hearing, whereas a five dBA change is clearly noticeable. A 10 dBA change is perceived as a sound doubling in loudness. Noise perception is dependent on a number of factors, including: wind speed, wind direction, humidity, and natural and built landscape features between the noise source and the receptor.

Minnesota's noise standards are based on noise area classifications (NAC), which correspond to the location of the listener (often referred to as a "receptor"). These classifications are not necessarily synonymous with local zoning classifications. NACs are assigned to areas based on the type of land use activity occurring at that location. For example, household units (including farm houses), designated camping and picnicking areas, resorts and group camps are assigned to NAC 1; recreational activities (except designated camping and picnicking areas) and parks are assigned to NAC 2; agricultural and related activities are assigned to NAC 3. A complete list is available at Minnesota Rule 7030.0050.

Noise standards are expressed as a range of permissible dBA over a one-hour time period. L₁₀ may be exceeded 10 percent of the time, or six minutes per hour, while L₅₀ may be exceeded 50 percent of the

¹⁰³ Minnesota Pollution Control Agency (n.d.) *Noise Program*, Retrieved May 9, 2018, from: <https://www.pca.state.mn.us/air/noise-program>.

¹⁰⁴ Minnesota Pollution Control Agency (November 2015) *A Guide to Noise Control in Minnesota*, Retrieved May 9, 2018, from: <https://www.pca.state.mn.us/sites/default/files/p-gen6-01.pdf>.

time, or 30 minutes per hour. Standards vary between daytime and nighttime hours. There is no limit to the maximum loudness of a noise.¹⁰⁵ **Table 6** provides current Minnesota noise standards.

The proposed project is in a rural area. Ambient noise levels in these locations are generally between 30 and 40 dBA during daytime hours. Noise levels will increase sporadically with passing vehicle traffic, high winds, or use of farm equipment, all-terrain vehicles, or snowmobiles. The primary noise receptors within the local vicinity of the project are residences and farmsteads. Residences are assigned to NAC 1.

Potential Impacts

Specific impacts are associated with construction and operation. Impacts are anticipated to be similar for all routing options, except that the Gold routing options impacts more residences within 800 feet of the anticipated alignment (**Table 5**).

Construction

The overall impact intensity level is anticipated to be minimal for all routing options. Potential impacts are anticipated to be short-term and not exceed state noise standards. These localized impacts will affect unique resources (residences). Impacts are unavoidable but can be minimized.

Table 6 Noise Area Classifications (dBA)

| Noise Area Classification (NAC) | Daytime (7:00 a.m. to 10:00 p.m.) | | Nighttime (10:00 p.m. to 7:00 a.m.) | |
|---------------------------------|-----------------------------------|-----------------|-------------------------------------|-----------------|
| | L ₁₀ | L ₅₀ | L ₁₀ | L ₅₀ |
| 1 | 65 | 60 | 55 | 50 |
| 2 | 70 | 65 | 70 | 65 |
| 3 | 80 | 75 | 80 | 75 |

Source: Minnesota Pollution Control Agency (2015).

Intermittent construction noise will occur and is dependent upon the activity. Major noise producing activities are associated with clearing and grading, material delivery, auguring foundation holes, setting structures, and stringing conductors. Noise from heavy equipment and increased vehicle traffic will be intermittent and occur during daytime hours. Noise associated with heavy equipment can range between 80 and 90 dBA at full power 50 feet from the source.¹⁰⁶ Heavy equipment generally runs at full power up to 50 percent of the time.¹⁰⁷ Point source sounds decrease six dBA at each doubling of distance;¹⁰⁸ a 90 dBA sound at 50 feet is perceived as a 72 dBA sound at 400 feet and a 60 dBA sound at 1,600 feet.

Construction noise might exceed state noise standards. Any exceedance of noise standards would be short-term and confined to daytime hours. An exceedance need not occur for an impact to occur. Residences within 400 feet of the different routing options are as follows: Teal 2; Orange 2; all Purple 0; Gold parallel 4; and Gold overbuild 5.

¹⁰⁵ Minnesota Pollution Control Agency (November 2015) at page 2.

¹⁰⁶ Federal Highway Administration (August 24, 2017) *Noise: Construction Noise Handbook*, Retrieved April 24, 2018, from: https://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/handbook09.cfm.

¹⁰⁷ Federal Highway Administration (August 24, 2017).

¹⁰⁸ Minnesota Pollution Control Agency (November 2015) at page 10.

Operation

Impacts from operation of the HVTL are anticipated to be negligible for all routing options.

Audible noise from power lines is created by small electrical discharges at specific locations along the surface of the conductor that ionize surrounding air molecules. This phenomenon—common to all power lines—is known as corona and sounds like a subtle crackling sound. In general, any imperfection on the surface of the conductor might be a source for corona. Examples include dust and dirt, or nicks and burrs from construction. Resulting noise levels are dependent upon voltage level (corona noise increases as voltage increases) and weather conditions.

In foggy, damp, or rainy conditions, audible corona noise is common. In light rain, dense fog, snow or other relative moist conditions, corona noise might be higher than rural background levels. In heavy rain, corona noise increases even more, but because background noise increases too, corona noise is undetectable. During dry weather, corona noise is less perceptible.

Freeborn Wind indicates that anticipated corona generated noise during inclement weather will be 27 dBA for 10 minutes of every hour at 11 feet from the single-circuit HVTL. Along the Purple and Gold overbuild options, conservative estimates for audible corona noise during inclement weather are anticipated to be 32 dBA for 10 minutes of every hour at 40 feet from the transmission lines.¹⁰⁹ The Center for Hearing and Communication indicates that rainfall is commonly measured at 50 dBA,¹¹⁰ meaning rainfall covers the corona noise it creates.

Mitigation

Commission route permits require permittees to adhere to MPCA noise standards.¹¹¹ The company indicates it will use sound control devices on vehicles and equipment, for example, mufflers; conduct construction activities during daylight hours, and, to the greatest extent possible, during normal business hours; and not run vehicles and equipment unnecessarily. Noise impacts are not anticipated during operation of the project; therefore, no mitigation is proposed.

Property Values

Potential impacts to property values within the local vicinity could occur; however, specific changes to a property's value are difficult to determine. On whole, impacts are anticipated to be negative but minimal. However, impacts to specific properties within the route width could be moderate. Long-term impacts might or might not occur.

The impacts to property values that result from the construction of power lines have been studied for over half a century. These studies have focused primarily on residential, agricultural, and undeveloped properties as opposed to commercial or industrial properties. While the research demonstrates that property value impacts vary, the majority indicate that HVTLs have “no significant impact or a slight negative impact on residential properties.”¹¹² In sum, impacts from HVTLs on property values depend upon “many factors, including market condition, location, and personal preference.”¹¹³

¹⁰⁹ Appendix C Information Inquiry #3

¹¹⁰ Center for Hearing and Communication (n.d.) *Common Environmental Noises*, Retrieved May 9, 2018, from: <http://chchearing.org/noise/common-environmental-noise-levels/>

¹¹¹ Generic Route Permit Template at Section 5.3.5.

¹¹² Pitts, Jennifer, and Jackson, Thomas (2007) *Power Lines and Property Values Revisited*, The Appraisal Journal 75(4):323-325, Retrieved May 9, 2018, from: <http://www.real-analytics.com/>.

¹¹³ Pitts and Jackson (2007).

The impact to property values from the presence of a HVTL can be measured in three ways: sale price, marketing time, and sales volume.¹¹⁴ These measures are influenced by a complex interaction of factors. A majority of these factors are parcel specific, and can include: condition, size, improvements, acreage and neighborhood characteristics; the proximity to schools, parks and other amenities; and the presence of existing infrastructure, for example, highways or railways. In addition to property-specific factors, local and national market trends, as well as interest rates can affect all three measures. The presence of a HVTL becomes one of many interacting factors that could affect a specific property value.

Generally, impacts to property values resulting from the existence of an HVTL are based on individual perceptions relating to “aesthetic concerns about the effect of overhead wires and supporting towers on views [and] concerns about the possible adverse health impacts associated with exposure to electromagnetic fields (EMFs).”¹¹⁵ Whether or not an HVTL would encumber future land use is also reported as a consideration.¹¹⁶

Researchers have used survey-based techniques and statistical analyses to draw conclusions about the relationship between HVTLs and property values. In general, surveys provide useful insights into buyer behavior based on stated preferences or when market data is not available.¹¹⁷ However, survey research presents inherent disadvantages; for example, respondents might not give realistic or truthful responses.¹¹⁸ Additionally, conducting a survey regarding the relationship between HVTLs and property values in and of itself might trigger negative responses from respondents.¹¹⁹

The results of survey studies are generally consistent, and can be summarized as follows:

- A high proportion of the residents were aware of the HVTLs at the time of purchase.
- Between one-half and three-fourths of the respondents have negative feelings about the HVTLs.
- The negative feelings center on fear of effects to health, aesthetics, and property values.
- Of those who have negative feelings about HVTLs, the majority (67 percent to 80 percent) report that the purchase decision and the price they offered to pay were not affected by the HVTL.¹²⁰

The use of multiple regression statistical analysis is generally accepted as the current professional and academic standard for evaluating potential property value impacts, as it reflects the actual behavior of

¹¹⁴ Kinnard, William and Dickey, Sue Ann (April 1995) A Primer on Proximity Impact Research: Residential Values Near High-Voltage Transmission Lines, *Real Estate Issues* 20(1):23-29.

¹¹⁵ Roddewig, Richard and Brigden, Charles (2014) *Power Lines and Property Prices*, *Real Estate Issues* 39(2):15-33.

¹¹⁶ For example Chalmers, James and Voorvaart, Frank (2009) *High-Voltage Transmission Lines: Proximity, Visibility, and Encumbrance Effects*, *The Appraisal Journal* 77(3):227-245, Retrieved May 9, 2018, from: <http://www.myappraisalinstitute.org/webpac/pdf/TAJ2009/TAJSU09pg.227-245.pdf>.

¹¹⁷ See Jackson, Thomas and Pitts, Jennifer (2010) *The Effects of Electric Transmission Lines on Property Values: A Literature Review*, *Journal of Real Estate Literature* 18(2):239-259, Retrieved May 9, 2018, from: <http://www.real-analytics.com/>; see also Kinnard and Dickey (1995).

¹¹⁸ Electric Power Research Institute (November 2003) *Transmission Lines and Property Values: State of the Science*, Retrieved May 9, 2018, from: <http://www.epri.com/abstracts/Pages/ProductAbstract.aspx?ProductId=000000000001005546>.

¹¹⁹ See Electric Power Research Institute (November 2003), page 2-1 (stating “it is the nature of a questionnaire that by asking a question on a topic, the importance of that topic is highlighted”).

¹²⁰ Chalmers and Voorvaart (2009), page 229-230.

property buyers and sellers in terms of recorded sales prices, while controlling for other factors, for example, home size.¹²¹ This type of analysis allows researchers to identify “revealed preferences” or what people actually did, in contrast to survey research, which identifies what people say they would do.¹²² This type of research requires large data sets; therefore, it is less subjective and more reliable than paired sales studies.¹²³ The results are often reported as an average change over a number of properties; however, the effect to individual properties can vary—increase or decrease—widely.¹²⁴

The results of these studies can be summarized, generally, as follows:

- Over time, there is a consistent pattern with about half of the studies finding negative property value effects and half finding none.
- When effects have been found, they tend to be small; almost always less than 10 percent and usually in the range of 3 percent to 6 percent.
- Where effects are found, they decay rapidly as distance to the lines increases and usually disappear at about 200 feet to 300 feet.
- Two studies investigating the behavior of the effect over time find that, where there are effects, they tended to dissipate over time.¹²⁵

Potential Impacts

Impacts to property values within the local vicinity could occur; however, specific changes to a property’s value are difficult to determine. Impacts, if they occur, are expected to decay over time. Property value impacts fall off rapidly over distance; therefore, potential impacts are anticipated to be localized. On whole, impacts are anticipated to be minimal and dissipate quickly at distances greater than 400 feet from the HVTL. Impacts to specific properties within the route width could be moderate. Long-term impacts might or might not occur.

Impacts could occur across all routing options. The project is in an area previously impacted by power lines, a substation, and communications tower. The impact to property values from these existing facilities is unknown. The HVTL will change aesthetics in the area. This change will be incremental. The project will not significantly encumber future land uses, such as agricultural operations, because the majority of its length—regardless of routing option—follows existing roadways, transmission lines, or field lines. The Gold and Purple route segments are collocated with existing transmission lines for their entire length. More residences are within the Gold route width than any other routing option. Existing transmission lines and roadways would be two of many factors affecting the value of an individual property.

Mitigation

Impacts to property values can be mitigated by reducing aesthetic impacts, perceived health risks, and encumbrances to future land use. Property value impacts can also be mitigated through inclusion of specific conditions in individual easement agreements with landowners along the route. These agreements are not within the scope of this EA.

¹²¹ Kinnard and Dickey (April 1995), page 25; Chalmers and Voorvaart (2009), page 228.

¹²² See Kinnard and Dickey (April 1995); see also Jackson and Pitts (2010).

¹²³ Chalmers and Voorvaart (2009) at page 228; Kinnard and Dickey (April 1995) at page 25 (a paired sales study involves an appraiser comparing the value of two similar properties, one of which is not impacted by an HVTL).

¹²⁴ Electric Power Research Institute (November 2003).

¹²⁵ Chalmers and Voorvaart (2009).

Recreation

The overall impact intensity level along the Teal and Orange routes is anticipated to be minimal; impacts along the Gold routing options are anticipated to be moderate; impacts along the Purple routing options will not occur. Potential impacts are anticipated to be short- and long-term, localized, and affect a unique resource.

Outdoor recreational opportunities in the project area include hiking, biking, boating, fishing, camping, swimming, cross country skiing, snowmobiling, hunting, and nature viewing.¹²⁶ Several designated snowmobile trails are within the local vicinity of the project.

The HVTL intersects the Shell Rock River State Water Trail. “A water trail is a stretch of river or lake that is mapped and managed especially for canoeing, kayaking, boating and camping. There are 35 Minnesota state water trails featuring public water accesses, campsites, rest areas and over 4,500 miles of paddling.”¹²⁷ The HVTL is within 1,600 feet of the Shell Rock Wildlife Management Area (WMA), which is on the west side of U.S. Highway 65 overlapping the Shell Rock River. WMAs are “established to protect those lands and waters that have a high potential for wildlife production, public hunting, trapping, fishing, and other compatible recreational uses. There are over 1.3 million acres of habitat in about 1,500 WMAs located throughout the state.”¹²⁸

There are no other DNR classified lands, such as State Forests, State Parks, State Trails, Aquatic Management Areas (AMAs), or Scientific and Natural Areas (SNAs); federal park, forests, or refuges; or county parks within the local vicinity of the project.

Potential Impacts

The overall impact intensity level along the Teal and Orange routes is anticipated to be minimal; impacts along the Gold routing options are anticipated to be moderate; impacts along the Purple routing options will not occur. Potential impacts are anticipated to be short- and long-term, localized, and affect a unique resource.

Power lines have the potential to impact recreational activities. Impacts might be negative if the line interferes with the resources that provide these activities, for example, changing the aesthetic of a recreational destination in a way that reduces visitor use. Alternatively, a power line might increase recreational opportunities, for example, a right-of-way clearing might provide increased opportunities for wildlife viewing.

Noise impacts from construction are anticipated to be short-term and intermittent. Operational noise is negligible, and will not affect recreationalists. Dust associated with construction might indirectly impact recreationalists or natural areas. New built features (structures) will be introduced near, but not within, the Shell Rock River Water Trail, the Shell Rock River WMA, and existing snowmobile trails. Conductors will span these resources. While visual impacts will occur, the HVTL would not impede recreational activities, such as snowmobiling, canoeing, kayaking, or fishing.

¹²⁶ Application at page 39.

¹²⁷ Minnesota Department of Resources (n.d.) *Minnesota State Water Trails*, Retrieved April 26, 2018, from: <https://www.dnr.state.mn.us/watertrails/index.html> .

¹²⁸ Minnesota Department of Natural Resources (n.d.) *More About Wildlife Management Areas*, Retrieved April 30, 2018, from: <https://www.dnr.state.mn.us/wmas/description.html> .

The Teal and Orange routes would cross the Shell Rock River adjacent to U.S. Highway 65. The Gold parallel option would cross adjacent to the existing Dairyland Line. The Gold overbuild option would not introduce a new feature once constructed, in terms of the number of features currently crossing the river, however, the new structure would be significantly larger than the existing Dairyland Line. Constructing the Gold overbuild option would require the new line be built while the existing line remained in service resulting in similar construction related impacts. On whole, the Gold routing options would likely draw the attention of recreationalists to the HVTL because of their width (parallel) or size and height (overbuild). The presence of the highway and railway bridges adjacent to the Teal and Orange routes would likely focus recreationalist's attention on passing traffic or trains as opposed to the HVTL.

A designated snowmobile trail travels north-south between 830th and 840th Avenues. The trail intersects the right-of-way of the Teal and Orange routes prior to reaching the Purple or Gold route segments. As such, this trail would be impacted equally regardless of which routing option is selected. A second trail crosses U.S. Highway 65 at the existing Glenworth Substation, and skirts the extreme northwest portion of the common route width. This trail would also be impacted equally regardless of which routing option is selected. Snowmobile trails cross or follow existing built features; therefore, the proposed HVTL is consistent with visitor expectations in this area.

Potential impacts along the Teal and Orange routes are anticipated to be short- and long-term, of a small size, and localized. The HVTL will affect a unique resource currently impacted at this location; therefore, impacts will be incremental. The river crossing is unavoidable, but is minimized at this location. The overall impact intensity level is anticipated to be minimal.

Potential impacts along the Gold routing options are anticipated to be short- and long-term, of medium size, and affect a unique resource. The river crossing is unavoidable and cannot be minimized as well as other routing options. The overall impact intensity level is anticipated to be moderate.

Mitigation

Impacts to recreation can be mitigated by selecting routes and alignments that avoid resources utilized for recreational purposes. Impacts can also be mitigated by reducing impacts to natural landscapes during construction.

Socioeconomics

The overall impact intensity level is anticipated to be minimal and positive for all routing options. Potential impacts will be short-term and small in size.

Table 7 provides information about total population and household income, and percentage of minority population and individuals below the poverty level. The median household income and the percentage of individuals living below the poverty level in Shell Rock Township is lower than Minnesota as a whole. Minority groups make up a smaller percentage of the total population than Minnesota as a whole.

Table 7 Population and Economic Profile

| Location | Total Population* | Percent Minority Population*‡ | Median Household Income** | % Below Poverty Level** |
|---------------------|-------------------|-------------------------------|---------------------------|-------------------------|
| Minnesota | 5,303,925 | 14.7% | \$63,217 | 10.8% |
| Freeborn County | 31,255 | 6.8% | \$48,827 | 11.2% |
| Shell Rock Township | 427 | 2.6% | \$54,500 | 4.5% |
| Glenville | 643 | 2.0% | \$45,938 | 11.6% |
| Albert Lea | 18,016 | 10.0% | \$42,128 | 14.5% |

* Source: U.S. Census Bureau, 2010 Census.

** Source: U.S. Census Bureau, 2012-2016 American Community Survey 5-year Estimates.

‡ Minority population includes all persons excluding those who self-identified as white.

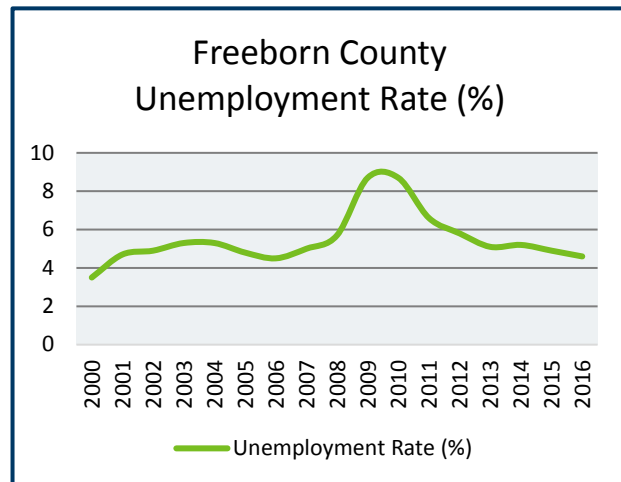
The region has recovered from job losses associated with the Great Recession in terms of overall employment. Many of these jobs were associated with the Mayo Clinic in Rochester. “The highest employment growth industries between 2003 and 2012 were health care and social assistance (10,480 new jobs); administrative and support and waste management and remediation services (3,065 new jobs); and management of companies and enterprises (1,277 new jobs). The industries suffering the most jobs losses during the period include manufacturing (5,513 lost jobs), construction (2,577 lost jobs), and retail trade (1,405 lost jobs).”¹²⁹

Potential Impacts

The overall impact intensity level is anticipated to be minimal and positive for all routing options. Potential impacts will be short-term and small in size.

Positive economic impacts include increased expenditures, for example, food and fuel, at local businesses during construction. Freeborn Wind indicates that some materials may be purchased locally depending on availability, and terms and conditions. Construction of the project will generate up to 30 temporary jobs at any given time over an approximately six-month period. It is unknown if these will be local jobs. The project will not disrupt local communities or businesses and does not disproportionately impact low-income or minority populations. Adverse impacts are not anticipated.

Figure 10 Freeborn County Unemployment Rate



Sources: patchworknation.org; American FactFinder

The Gold overbuild option would necessitate retirement of the existing Dairyland Line in select locations such as the Shell Rock River crossing. The Dairyland Line was constructed in 2012. Dairyland will not likely be financially affected because, presumably, Freeborn Wind will be responsible for construction costs.

¹²⁹ *Id.* at page 5.

Some might consider retiring a six-year-old transmission line an inefficient use of resources; others might recognize that companies routinely relocate power lines for a variety of reasons.

Mitigation

Adverse impacts are not expected; therefore, mitigation is not proposed.

Human Health and Safety

Construction and operation of transmission lines has the potential to impact human health and safety.

Electric and Magnetic Fields

The overall impact intensity level is anticipated to be minimal for all routing options. Impacts to human health are not anticipated. Impacts will be long-term and localized. Potential impacts can be mitigated.

EMFs are invisible forces that result from the presence of electricity. EMF occurs naturally and is caused by weather or the geomagnetic field. EMFs are also caused by all electrical devices and is found wherever people use electricity. EMFs are characterized and distinguished by their frequency, that is, the rate at which the field changes direction each second. Electrical lines in the United States have a frequency of 60 cycles per second or 60 hertz. EMF at this frequency level is extremely low frequency EMF (ELF-EMF).

Voltage on a conductor creates an electric field that surrounds and extends from the wire. Using water moving through a pipe as an analogy, voltage is equivalent to the pressure of the water moving through the pipe. The strength of the electric field produced is associated with the voltage of the power line and is measured in kilovolts per meter (kV/m). The strength of an electric field decreases rapidly as it travels from the conductor, and is easily shielded or weakened by most objects and materials, such as buildings.

Current moving through a conductor creates a magnetic field that surrounds and extends from the wire. Using the same analogy, current is equivalent to the amount of water moving through the pipe. The strength of a magnetic field produced is associated with the current moving through the power line and is measured in milliGauss (mG). Similar to electric fields, the strength of a magnetic field decreases rapidly as the distance from the source increases; however, unlike electric fields, magnetic fields are not easily shielded or weakened.

“The strongest ... electric fields that are ordinarily encountered in the environment exist beneath high voltage transmission lines. In contrast, the strongest magnetic fields ... are normally found very close to motors and other electrical appliances, as well as in specialized equipment...”¹³⁰ **Table 8** and **Table 9** provide examples of electric and magnetic fields associated with common household items.

Health Studies

In the late-1970s, epidemiological studies indicated a possible association between childhood leukemia and ELF-EMF levels.¹³¹ “Epidemiologists observe and compare groups of people who have had or have not had certain diseases and exposures to see if the risk of disease is different between the exposed and

¹³⁰ World Health Organization (n.d.) *What are Electromagnetic Fields?*, Retrieved March 30, 2018, from: <http://www.who.int/peh-emf/about/WhatIsEMF/en/index3.html>.

¹³¹ National Institute of Environmental Health Sciences (2002) *EMF: Electric and Magnetic Fields Associated with the Use of Electric Power*, Retrieved May 8, 2018, from: https://www.niehs.nih.gov/health/materials/electric_and_magnetic_fields_associated_with_the_use_of_electric_power_questions_and_answers_english_508.pdf.

unexposed groups, but does not control the exposure and cannot experimentally control all the factors that might affect the risk of disease.”¹³²

Table 8 Electric Field Strength of Common Household Items¹³³

| Appliance | Distance: 1 ft | |
|--------------|----------------|------|
| | V/m | kV/m |
| Stereo | 180 | 0.18 |
| Iron | 120 | 0.12 |
| Refrigerator | 120 | 0.12 |
| Mixer | 100 | 0.10 |
| Toaster | 80 | 0.08 |
| Hair Dryer | 80 | 0.08 |
| Television | 60 | 0.06 |
| Vacuum | 50 | 0.05 |

Table 9 Magnetic Field Strength of Common Household Items¹³⁴

| Appliance | Measured in milliGuass (mG) | | |
|--------------|-----------------------------|--------------|---------------|
| | 1 inch | 1 foot | 3 feet |
| Circular saw | 2,100 to 10,000 | 9 to 210 | 0.2 to 10 |
| Drill | 4,000 to 8,000 | 22 to 31 | 0.8 to 2 |
| Microwave | 750 to 2,000 | 40 to 80 | 3 to 8 |
| Blender | 200 to 1,200 | 5.2 to 17 | 0.3 to 1.1 |
| Toaster | 70 to 150 | 0.6 to 7 | < 0.1 to 0.11 |
| Hair dryer | 60 to 200 | < 0.1 to 1.5 | < 0.1 |
| Television | 25 to 500 | 0.4 to 20 | < 0.1 to 1.5 |
| Coffee maker | 15 to 250 | 0.9 to 1.2 | < 0.1 |

Ever since, researchers have examined possible links between ELF-EMF exposure and health effects through epidemiological, animal, clinical, and cellular studies. To date, “no mechanism by which ELF-EMFs or radiofrequency radiation could cause cancer has been identified. Unlike high-energy (ionizing) radiation, EMFs in the non-ionizing part of the electromagnetic spectrum cannot damage DNA or cells directly.”¹³⁵ “The few studies that have been conducted on adults show no evidence of a link between EMF exposure and adult cancers, such as leukemia, brain cancer, and breast cancer.”¹³⁶ “Overall there is

¹³² National Institute of Environmental Health Sciences (2002).

¹³³ German Federal Office for Radiation Safety.

¹³⁴ Long Island Power Authority.

¹³⁵ National Cancer Institute (May 27, 2016) *Magnetic Field Exposure and Cancer*, Retrieved March 30, 2018, from: <http://www.cancer.gov/about-cancer/causes-prevention/risk/radiation/magnetic-fields-fact-sheet>.

¹³⁶ National Institute of Environmental Health Sciences (March 22, 2018) *Electric and Magnetic Fields*, Retrieved May 8, 2018, from: <http://www.niehs.nih.gov/health/topics/agents/emf/index.cfm>.

no evidence that exposure to ELF magnetic fields alone causes tumors. The evidence that ELF magnetic field exposure can enhance tumor development in combination with carcinogens is inadequate.”¹³⁷

In 2002, the Minnesota State Interagency Working Group on EMF Issues, comprised of staff from Commerce, MPCA, Commission, Department of Health, and Environmental Quality Board, was tasked to study issues related to EMF. The group published *A White Paper on Electric and Magnetic Field Policy and Mitigation Options*, and concluded the following:

Some epidemiological results do show a weak but consistent association between childhood leukemia and increasing exposure to EMF.... However, epidemiological studies alone are considered insufficient for concluding that a cause and effect relationship exists, and the association must be supported by data from laboratory studies. Existing laboratory studies have not substantiated this relationship..., nor have scientists been able to understand the biological mechanism of how EMF could cause adverse effects. In addition, epidemiological studies of various other diseases, in both children and adults, have failed to show any consistent pattern of harm from EMF.

The Minnesota Department of Health concludes that the current body of evidence is insufficient to establish a cause and effect relationship between EMF and adverse health effects. However, as with many other environmental health issues, the possibility of a health risk from EMF cannot be dismissed.¹³⁸

Regulations and Guidelines

Currently, there are no federal regulations regarding allowable ELF-EMF produced by power lines in the United States; however, state governments have developed state-specific regulations. For example, Florida limits electric fields to 2.0 kV/m and magnetic fields to 150 mG at the edge of the right-of-way for 161 kV transmission lines.¹³⁹ Additionally, international organizations have adopted standards for exposure to electric and magnetic fields (**Table 10**).

Table 10 International Electric and Magnetic Field Guidelines

| Organization | Electric Field (kV/m) | | Magnetic Field (mG) | |
|---|-----------------------|--------------|---------------------|-------------------------------|
| | Public | Occupational | Public | Occupational |
| Institute of Electrical and Electronics Engineers | 5.0 | 20.0 | 9,040 | 27,100 |
| International Commission on Non-Ionizing Radiation Protection | 4.2 | 8.3 | 2,000 | 4,200 |
| American Conference of Industrial Hygienists | — | 25.0 | — | 10,000/ 1,000 ^a |
| National Radiological Protection Board | 4.2 | — | 830 | 4,200 |

^a For persons with cardiac pacemakers or other medical electronic devices

¹³⁷ World Health Organization (2007) *Extremely Low Frequency Fields*, Retrieved April 17, 2018, from: <http://www.who.int/peh-emf/publications/Comple DEC 2007.pdf?ua=1> at page 10.

¹³⁸ State of Minnesota, State Interagency Working Group on EMF Issues (2002) *A White Paper on Electric and Magnetic Field (EMF) Policy and Mitigation Options*, Retrieved May 9, 2018, from: <http://www.capx2020.com/Images/EMFWhitePaper2002.pdf>.

¹³⁹ Florida Department of State (June 1, 2008) Rule 62-814.450 Electric and Magnetic Field Standards, Retrieved May 9, 2018 from: <https://www.flrules.org/gateway/ruleNo.asp?id=62-814.450>.

The Commission limits the maximum electric field under HVTLs in Minnesota to 8.0 kV/m.¹⁴⁰ It has not adopted a standard for magnetic fields.

Potential Impacts

The overall impact intensity level is anticipated to be minimal for all routing options. Impacts to human health are not anticipated. Impacts will be long-term and localized.

In its route permit application Freeborn Wind calculated electric and magnetic fields associated with the “expected peak current flows based on the Project nameplate rating of 200 MW or 717 Amps”¹⁴¹ or normal operation. The company also calculated EMFs for the Purple and Gold routing options “based on a maximum steady state line rating of the conductor of 1008 Amps at a maximum voltage of 161 kV.” The company would not operate the project at this voltage, rather, this the electrical limit. This limit was not calculated for all potential alignment configurations.

EMF calculations are provided in **Table 11**. The calculated maximum electric field for single-circuit 161 kV is 3.32 kV/m (electrical limit) at the HVTL centerline and 1.31 kV/m (normal operation; 22-foot right-of-way) at the right-of-way edge. These values are less than the Commission standard of 8.0 kV/m. The calculated maximum magnetic field for single-circuit 161 kV is 219.75 mG (electrical limit) at the HVTL centerline and 54.21 mG (electrical limit) at the right-of-way edge. These values are below state and international standards developed for magnetic fields. The Gold overbuild option is a triple-circuit transmission line. Electric fields would cancel and be below 2.0 kV/m within the right-of-way. Magnetic fields would be 389.78 mG at the centerline and 209.05 mG at the edge of the right-of-way.

Table 11 EMF Tables

| 22-Foot Right-of-Way 161 kV Single Circuit (717 Amps) | | | | | | | |
|---|-------|-------|-------|-------|-------|-------|-------|
| Right-of-Way Width (ft) | -11 | -9 | -3 | 0 | 3 | 9 | 11 |
| Electric Field (kV/m) | 1.21 | 1.40 | 1.58 | 1.59 | 1.58 | 1.40 | 1.31 |
| Magnetic Field (mG) | 27.47 | 42.37 | 49.74 | 51.39 | 49.74 | 42.37 | 30.68 |

| 80-Foot Right-of-Way 161 kV Single Circuit (717 Amps) | | | | | | | |
|---|-------|-------|-------|-------|-------|-------|-------|
| Right-of-Way Width (ft) | -40 | -25 | -12 | 0 | 12 | 25 | 40 |
| Electric Field (kV/m) | 0.34 | 0.80 | 1.02 | 0.97 | 1.02 | 0.80 | 0.45 |
| Magnetic Field (mG) | 27.47 | 42.37 | 49.74 | 51.39 | 49.74 | 42.37 | 30.68 |

| 80-Foot Right-of-Way 161 kV Single Circuit (1008 Amps) | | | | | | | |
|--|-------|-------|--------|--------|--------|-------|-------|
| Right-of-Way Width (ft) | -40 | -25 | -12 | 0 | 12 | 25 | 40 |
| Electric Field (kV/m) | 0.09 | 0.43 | 1.87 | 3.32 | 1.83 | 0.41 | 0.09 |
| Magnetic Field (mG) | 54.21 | 96.65 | 166.55 | 219.75 | 164.32 | 95.24 | 53.54 |

| 150-Foot Right-of-Way 161 kV Single Circuit Substation Dead End (717 Amps) | | | | | | | |
|--|------|-------|-------|-------|-------|-------|------|
| Right-of-Way Width (ft) | -75 | -50 | -25 | 0 | 25 | 50 | 75 |
| Electric Field (kV/m) | 0.11 | 0.21 | 0.21 | 0.05 | 0.19 | 0.19 | 0.10 |
| Magnetic Field (mG) | 6.06 | 10.90 | 19.71 | 25.91 | 19.30 | 10.44 | 5.62 |

¹⁴⁰ Generic Route Permit Application at 5.4.2.

¹⁴¹ Application at page 25.

| 80-Foot Right-of-Way 161 kV Single Circuit Substation Dead End (1008 Amps) | | | | | | | |
|--|-------|-------|-------|-------|-------|-------|-------|
| Right-of-Way Width (ft) | -40 | -25 | -12 | 0 | 12 | 25 | 40 |
| Electric Field (kV/m) | 0.44 | 0.46 | 0.29 | 0.09 | 0.33 | 0.49 | 0.46 |
| Magnetic Field (mG) | 34.75 | 45.85 | 54.14 | 57.22 | 54.30 | 46.07 | 34.95 |

| 80-Foot Right-of-Way 161/69 kV Double Circuit (1008 Amps) | | | | | | | |
|---|-------|-------|--------|--------|--------|--------|-------|
| Right-of-Way Width (ft) | -40 | -25 | -12 | 0 | 12 | 25 | 40 |
| Electric Field (kV/m) | 0.19 | 0.65 | 1.37 | 2.01 | 1.98 | 1.12 | 0.35 |
| Magnetic Field (mG) | 51.63 | 75.81 | 102.02 | 124.08 | 127.14 | 101.59 | 67.91 |

| 80-Foot Right-of-Way 161/69/69 kV Triple Circuit (1008 Amps) | | | | | | | |
|--|--------|--------|--------|--------|--------|--------|--------|
| Right-of-Way Width (ft) | -40 | -25 | -12 | 0 | 12 | 25 | 40 |
| Electric Field (kV/m) | 1.66 | 1.92 | 1.30 | 1.14 | 1.29 | 1.90 | 1.64 |
| Magnetic Field (mG) | 209.62 | 314.70 | 375.56 | 389.78 | 374.42 | 313.28 | 209.05 |

EMF from adjacent or underground lines would be cumulative, but were not included in the calculations. Freeborn Wind indicated that depending on phase spacing, phase rotation, and the current flowing through the lines, it is possible that the fields will cancel, yielding a net zero electric or magnetic field.¹⁴²

Mitigation

No health impacts due to EMF are anticipated; therefore, no mitigation is proposed. However, the Commission has adopted a prudent avoidance approach when routing HVTLS. If warranted the Commission considers, and may require, mitigation strategies to minimize EMF exposure levels associated with HVTLS. Consistent with this, basic mitigation measures are prudent. EMF diminishes with distance from a conductor; therefore, EMF exposure levels can be minimized by routing HVTLS away from residences and other locations where citizens congregate to the extent practicable.

Changes in engineering, for example, conductor configurations that facilitate phase cancellation between circuits, can also minimize EMF exposure levels. Freeborn Wind indicates that changing the phase angle for the triple-circuit 161/69/69 kV line needed for the Gold overbuild option can modify EMF levels (Table 12).

Table 12 EMF Phase Angle Change

| 80 Foot Right-of-Way 161/69/69 kV Triple Circuit Phase Angle Change (1008 Amps) | | | | | | | |
|---|-------|-------|-------|-------|-------|-------|-------|
| Right-of-Way Width (ft) | -40 | -25 | -12 | 0 | 12 | 25 | 40 |
| Electric Field (kV/m) | 0.21 | 0.56 | 0.41 | 0.54 | 0.41 | 0.65 | 0.32 |
| Magnetic Field (mG) | 36.76 | 41.76 | 45.54 | 66.17 | 79.34 | 73.59 | 49.64 |

Implantable Medical Devices

The overall impact intensity level is expected to be negligible across routing options. Impacts to human health are not anticipated. Potential impacts, should they occur, would be long-term and localized. Impacts can be mitigated.

EMF may interfere with implantable electromechanical medical devices, such as pacemakers, defibrillators, neurostimulators, and insulin pumps. Most research on electromagnetic interference and medical devices relates to pacemakers. Laboratory tests indicate that interference from magnetic fields

¹⁴² Appendix C Information Inquiry #2

in pacemakers is not observed until 2,000 mG—a field strength greater than that associated with transmission lines.¹⁴³ As a result, research has focused on electric field impacts.

Electric fields may interfere with a pacemaker’s ability to sense normal electrical activity in the heart. In the unlikely event a pacemaker is impacted, the effect is typically a temporary asynchronous pacing (commonly referred to as reversion mode or fixed rate pacing). The pacemaker returns to its normal operation when the person moves away from the source of the interference.

“While the present-day units are better shielded against EMF interference than their earlier counterparts, sensitivity to electric field exposure is inevitable.”¹⁴⁴ Interference in unipolar pacemakers that results in asynchronous pacing may occur with electric fields ranging from 1.2 to 1.7 kV/m; however, other units are unaffected at 8.0 kV/m.¹⁴⁵ In general, electric interference must be at levels above 5.0 kV/m to interfere with modern, bipolar pacemaker behavior.¹⁴⁶ Some models appear unaffected at 20 kV/m.¹⁴⁷

There are no sensitive receptors such as hospitals or nursing homes located within the route width of any routing option; three residences are within the route width of the Gold routing options. The regular presence of implantable medical devices is not expected.

Potential Impacts

The overall impact intensity level is expected to be negligible across routing options. Impacts to human health are not anticipated. Potential impacts, if they occur, would be long-term and localized.

The calculated maximum electric field strength directly underneath the proposed transmission line is 3.32 kV/m. This field strength is below the 5.0 kV/m interaction level for modern, bipolar pacemakers, but might interact with older, unipolar pacemakers. Therefore, impacts to unipolar pacemakers might occur directly underneath the HVTL.

Mitigation

Impacts to implantable medical devices and persons using these devices are not expected to occur; moving away from the HVTL centerline would return the pacemaker to normal operation. Therefore, mitigation is not proposed. Mitigation strategies for EMF exposure are discussed in ELECTRIC AND MAGNETIC FIELDS.

Stray Voltage

The overall impact intensity level to residences or farming operations from neutral-to-earth voltage, as well as induced voltage upon metal objects within the route width, is negligible for all routing options. Potential impacts can be mitigated.

¹⁴³ Electric Power Research Institute (1997) *Susceptibility of Implanted Pacemakers and Defibrillators to Interference by Power-Frequency Electric and Magnetic Fields*, Retrieved May 9, 2018, from: <https://www.epri.com/#/> at page 8-1.

¹⁴⁴ Electric Power Research Institute (1997) at page 8-1.

¹⁴⁵ Electric Power Research Institute (1997) at page 7-9.

¹⁴⁶ Pinski, Sergio L. and Trohman, Richard G. (2002) *Interference in Implanted Cardiac Devices, Part 1*, Journal of Pacing and Clinical Electrophysiology (25)9:1,367-1,381, Retrieved April 30, 2018, from: <http://www.pacericd.com/documents/ARTICLES/EMI%20Part%201%20JPCE%202002.pdf>.

¹⁴⁷ Electric Power Research Institute (1997) at page 8-2.

In general terms, stray voltage is “voltage caused by an electric current in the earth, or in groundwater, resulting from the grounding of electrical equipment or an electrical distribution system.”¹⁴⁸ Stray voltage encompasses two phenomena: neutral-to-earth (NEV) voltage and induced voltage.

Neutral-to-Earth Voltage

NEV is a type of stray voltage that can occur where distribution lines enter structures. “Electrical systems— farm systems and utility distribution systems—are grounded to the earth to ensure safety and reliability... Inevitably, some current flows through the earth at each point where the electrical system is grounded and a small voltage develops.”¹⁴⁹ This extraneous voltage appears on metal surfaces in buildings, barns, and other structures.

NEV is typically experienced by livestock that contact one or more metal objects on a farm, for example, feeders, waterers, or stalls. Metal objects on a farm are grounded to earth through electrical connections. Livestock, by virtue of standing on the ground, are also grounded to earth. If an animal touches two points at different voltages (one at neutral voltage and the other near true ground),¹⁵⁰ a small current will flow through the livestock to the ground because the animal completes the electrical circuit.¹⁵¹

Despite metal objects and livestock both being grounded to the earth there are a number of factors that affect the effectiveness of their respective ground, that is, a good or poor ground. In metal objects these include wire size and length, quality of connections, number and resistance of ground rods, and electrical current being grounded.¹⁵² Likewise, a number of factors also determine the extent to which livestock are grounded, for example, if the animal is standing on wet or dry ground.¹⁵³ Stray voltage results from this difference in the effectiveness of grounding and on the resulting electrical currents. It can exist at any farm, house, or business that uses electricity, independent of a nearby transmission line.

If NEV is prevalent in an agricultural operation it can affect livestock health. This concern has primarily been raised on dairy farms because of its potential to affect milk production and quality. NEV is by and large an issue associated with distribution lines and electrical service at a residence or on a farm. Transmission lines do not create NEV stray voltage as they do not directly connect to businesses, residences, or farms.

Potential Impacts

The proposed HVTL does not interconnect to businesses or residences within any routing option, and does not change local electrical service. As a result, impacts to residences or farming operations from NEV are not anticipated.

¹⁴⁸ Edison Electric Institute (April 2005) *Glossary of Electric Industry Terms*, Washington, DC: Edison Electric Institute (2005).

¹⁴⁹ Wisconsin Public Service Corporation (2011) *Answers to Your Stray Voltage Questions: Backed by Research*, Retrieved April 17, 2018, from: http://www.wisconsinpublicservice.com/business/pdf/farm_voltage.pdf at page 1.

¹⁵⁰ North Dakota State University Agricultural Engineering Department (1986) *Extension Publication #108: Stray Voltage*.

¹⁵¹ Michigan Agricultural Electric Council (October 2008) *Stray Voltage: Questions and Answers*, Retrieved April 17, 2018, from: <http://maec.msu.edu/Stray%20Voltage%20Brochure%202008.pdf>.

¹⁵² North Dakota State University Agricultural Engineering Department (1986).

¹⁵³ *Ibid.*

Mitigation

Impacts from NEV are not anticipated; therefore, no mitigation is proposed.

Induced Voltage

The electric field from a transmission line can extend to nearby conductive objects, for example, metal buildings or fence posts, and induce a voltage upon them. This phenomenon is dependent on many factors, including the shape, size, orientation, capacitance, and location of the object along the right-of-way. If these conductive objects are insulated or semi-insulated from the ground and a person touches them, a small current will pass through the person's body to the ground. This may be accompanied by a spark discharge and mild shock similar to what can occur when an individual walks across a carpet and touches a grounded object or another person.

The primary concern with induced voltage is not the voltage, but rather the current that flows through a person to the ground when touching the object. To ensure safety in the proximity of transmission lines, NESC requires that any discharge be less than five milliAmperes. In addition, the Commission's electric field limit of 8 kV/m is designed to prevent serious shock hazards due to induced voltage. Proper grounding of metal objects under and adjacent to HVTLs is the best method of avoiding these shocks.

Transmission lines may cause additional current to flow on distribution lines where these lines parallel. When distribution lines are properly wired and grounded, these additional currents are not significant. However, if distribution lines are not properly wired and grounded, these additional currents could create induced voltage impacts.

Potential Impacts

The project may induce a voltage on insulated metal objects within the final right-of-way; however, the Commission requires that transmission lines be constructed and operated to meet NESC standards as well as the Commission's own electric field limit of 8 kV/m reducing these impacts. As a result, impacts due to induced voltage are not anticipated to occur.

Mitigation

Potential impacts are avoided or minimized by Commission permit requirements.¹⁵⁴ As a result, further mitigation is not proposed.

Any person with questions about a new or existing metal structure can contact Freeborn Wind for further information about proper grounding requirements. If other problems exist Freeborn Wind will conduct an inspection to assess and determine the cause of the problems that might be related to the HVTL, and identify possible solutions.

Public Services

Transmission lines have the potential to impact public services, such as roads or airports. These impacts are usually temporary, for example, road closures or restrictions associated with stringing conductors. Impacts can be long-term if they change the area in a way that precludes or limits public services.

¹⁵⁴ Generic Route Permit Template at Section 5.4.2.

Emergency Services

The overall impact intensity level for all routing options will be negligible. Impacts to emergency communications are not anticipated. Impacts to emergency response, if they occur, are anticipated to be minimal. Potential impacts can be mitigated.

Emergency services in the project area are provided by multiple entities—fire service by Glenville and Myrtle Fire Departments; ambulance service by Gold Cross Ambulance; and law enforcement by Freeborn County Sheriff.¹⁵⁵

Potential Impacts

Power line construction and operation can potentially impact emergency services by interfering with the ability to communicate during an emergency or respond to an emergency.

Emergency Communication

Impacts to emergency communications systems (ARMER System) were discussed previously. Impacts to this system are not anticipated; therefore, impacts to emergency communications are not expected.

Emergency Response

Traffic related impacts are discussed in ROADS AND HIGHWAYS. During construction localized traffic delays and possible re-routes could interrupt or delay emergency vehicles. These impacts will be intermittent and short-term. No long-term impacts are anticipated once the HVTL is operational. Impacts can be mitigated.

Mitigation

Notifying emergency responders of traffic interruptions can mitigate short-term impacts to emergency response. Freeborn Wind committed to coordinating with local jurisdictions to develop temporary lane closure protocols that would provide safe access for sheriff, fire, and ambulance through alternative routes. Long-term impacts are not anticipated; therefore, no mitigation is proposed.

Roads and Highways

The overall impact intensity level for all routing options will be minimal. Potential impacts are anticipated to be short-term and localized.

State routing policy indicates a preference for consolidating HVTLs with existing infrastructure, including transportation rights-of-way. Minnesota Statute 216E.03, subdivision 7, directs the Commission to “make specific findings that it has considered locating a route for a [HVTL] on an existing high-voltage transmission route and the use of parallel existing highway right-of-way and, to the extent those are not used for the route, the commission must state the reasons.”

In its January 3, 2018, comment letter, MnDOT indicated its desire to work to accommodate HVTLs, such as the proposed project, within or as near as feasible to trunk highway rights-of-way in a manner that preserves “the safety of the traveling public and highway workers and effective operation of the highway system now and into the foreseeable future.”¹⁵⁶ U.S. Highway 65 is a trunk highway. MnDOT continued: “If [the Commission] approved route should place the proposed HVTL in an area that does occupy a

¹⁵⁵ Freeborn County (n.d.) *Freeborn County Interactive Web Map*, Retrieved April 27, 2018, from: <https://www.co.freeborn.mn.us/>.

¹⁵⁶ Department of Transportation (January 3, 2018) *Scoping Comments*, eDockets No. [20181-138602-01](#).

portion of MnDOT right-of-way, [Freeborn Wind] would need to submit a Utility Accommodation on Trunk Highway Right-of-Way (Form 2525)."¹⁵⁷

Potential Impacts

The overall impact intensity level for all routing options will be minimal. Potential impacts are anticipated to be short-term and localized.

During construction short-term localized traffic delays and re-routes might occur. Delays will likely be associated with material delivery and worker transportation. Road crossings might also necessitate short-term impacts to traffic when stringing conductors. Freeborn Wind does not intend to locate structures within road right-of-way, though HVTL right-of-way might overlap with road right-of-way. Should this occur it is unlikely to affect the safety of the traveling public or road/highway operations. Additional costs to maintain road rights-of-way should not be incurred as a result of the project.

Mitigation

Impacts to roads and vehicular traffic can be mitigated through coordination with appropriate road authorities, including MnDOT, as well as by selecting routes, alignments, and structure placements that minimize interference with roadways. The following practices can be used to mitigate impacts:

- Safety requirements for maintaining the flow of traffic should be met;
- If necessary, pilot vehicles can accompany the movement of heavy equipment;
- Deliveries can be timed to avoid traffic congestion and dangerous situations on the roadway;
- Traffic control barriers and warning devices can be used as necessary; and
- Temporary guard structures should be used to support the conductor above vehicle traffic.

Freeborn Wind committed to develop structure placement and construction procedures in consultation with state, county, and local roadway authorities to meet requirements for clear zones and roadside obstructions.¹⁵⁸

Utilities

The overall impact intensity level for all routing options will be minimal. Impacts are anticipated to be limited to electrical and telephone outages. Electrical outages along the Teal and Orange routes will be short-term and localized; outages necessary for the Gold and Purple overbuild options might extend beyond the project area. Telephone outages, if they occur, would be localized. Potential impacts can be minimized.

Utilities within the project area are typical of rural areas across southern Minnesota. Exceptions include the relatively extensive electric infrastructure associated with the existing Glenworth Substation, which is visible along U.S. Highway 65 (**Figure 11**).

Water

The project area is not serviced by city water supply or sanitary sewer; these services are provided by individual wells and septic systems. No residences are within the anticipated right-of-way of any routing option.

¹⁵⁷ *Ibid.*

¹⁵⁸ Application at page 42.

Electricity

Freeborn-Mower provides electrical service in the project area and distribution lines are located throughout. Several planned outages would be necessary to construct the HVTL.

Natural Gas

The Federal Pipeline and Hazardous Materials Safety Administration developed the Pipeline Information Management Mapping Application (PIMMA) for use by pipeline operators and federal, state, and local government officials. The application contains hazardous liquid and gas transmission pipelines, Liquefied Natural Gas plants, and breakout tank data. Registered EERA staff reviewed PIMMA and determined these facilities are not present in the project area. The majority of residents within the project area utilize propane.

Figure 11 Existing Infrastructure: Glenworth Substation and Other Infrastructure



Fiber Optic and Telephone

Fiber optic and telephone cables exist in the project area. Based on survey information provided by the company, fiber optic cables are buried along both sides of U.S. Highway 65. Telephone cable is buried on the south side of 130th Street along the Teal and Orange route anticipated alignments. It is also buried along 140th Street and River Road parallel to the Gold routing options.

Potential Impacts

The overall impact intensity level for all routing options will be minimal. Impacts are anticipated to be limited to electrical and telephone outages. Electrical outages along the Teal and Orange routes will be short-term and localized; outages necessary for the Gold and Purple overbuild options might extend beyond the project area. Telephone outages, if they occur, would be localized. Potential impacts can be minimized.

Power lines have the potential to damage or interfere with public utilities, or preclude construction and operation of new utility infrastructure.

Water

Potential impacts to water utilities could occur if structures damage, or impede the use of, wells and septic systems. No residences are located within the right-of-way of any routing option; therefore, impacts to wells and septic systems will not occur. No long-term impacts are anticipated.

Electric

Depending on the route selected, outages on existing power lines will be necessary to construct the project. A distribution outage will be necessary along 830th Avenue. A maximum outage time of two hours

is predicted should an outage occur.¹⁵⁹ Transmission outages would be necessary to construct the Gold and Purple overbuild options. These outages would again be of a short duration. It is unknown if, or how many, customers these outages would affect.

Freeborn Wind indicates that outages will not be necessary at perpendicular crossings—the company will use temporary protective guards or clearance structures. Clearances associated with existing power lines will be code compliant. No customer is expected to lose electrical service for an extended period as a result of construction. Impacts are unavoidable. No long-term impacts are anticipated.

Natural Gas

Natural gas pipelines are not located in the project area. Impacts will not occur. No long-term impacts are anticipated.

Fiber Optic and Telephone

Fiber optic cables are outside the anticipated right-of-way of all routing options. No impacts will occur. Long-term impacts are not anticipated. Telephone cable parallels the Teal and Orange routes along 130th Street and the Gold routing options along 140th Street. Perpendicular crossings occur at various locations. Short-term outages might occur, but can be mitigated. Long-term impacts are not anticipated.

Mitigation

Freeborn Wind indicates that “construction and operation of the project will be in accordance with associated federal, state, and local permits and laws, as well as industry construction and operation standards and best practices.”¹⁶⁰ The project will meet or surpass NERC and NESC standards.¹⁶¹

Potential impacts can be avoided by marking underground utilities prior to construction and avoiding these areas during construction. The location of underground utilities can be identified using Gopher State One Call during engineering surveys once a route is selected. If a utility is identified within the right-of-way a structure or the utility itself might need to be relocated. Relocating a utility would need to be coordinated with the affected utility. Typically, these issues do not cause significant modifications to the HVTL or affected utility.

Electrical outages can be minimized by using the minimum number necessary and informing customers of the outage well in advance. Additionally, necessary transmission outages should be coordinated through Midwest Independent System Operators (MISO).

No long-term impacts to utilities will occur; therefore, mitigation is not proposed.

Land-Based Economies

Transmission line structures and conductors have the potential to impact land-based economies by precluding or limiting land use for other purposes.

¹⁵⁹ Personal communication, Freeborn-Mower Electric Cooperative.

¹⁶⁰ Application at page 41.

¹⁶¹ Application at page 16.

Agriculture

The overall impact intensity level for all routing options will be minimal, except that the Purple and Gold routing options reduce long-term agricultural impacts. Potential impacts are anticipated to be short- and long-term and of a small size. These localized impacts will affect a unique resource that is common in the project area. Impacts can be mitigated.

Farming occurs throughout Freeborn County. The following summary is based on information from the Census of Agriculture, which is conducted by the United States Department of Agriculture (USDA). The agricultural census is a complete count of farms and ranches and the people who operate them, including small plots with at least \$1,000 in annual sales.¹⁶² In 2012 there were 1,222 individual farms using 382,018 acres of farmland—a slight decrease in overall numbers and acres from 2007. However, the value of the products sold, both crop sales and livestock sales, increased an average of 82 percent per farm from about \$200,000 to \$370,000. Average farm size also increased from 309 to 340 acres during this time. Cropland is the dominant agricultural land use. Farmers in Freeborn County raise a variety of commodities; however, the top crop items, in acres, include corn for grain and soybeans for beans. The top livestock inventory item is by far hogs and pigs.

NCLD agricultural cover types (cultivated crops) within the route width of the different routing options are as follows: Teal Route 270 acres 78 percent, Orange Route 209 acres 75 percent, Purple Route Segment 70 acres 96 percent, Gold Route Segment 82 acres 65 percent. Land cover types within the project area—in Minnesota—are approximately 84 percent agricultural.

Important Farmland

Although much of the land in southern Minnesota has historically been used for agriculture, there are differences in the quality and suitability of land for purposes of agricultural production. “Under current drainage conditions, approximately 128,503 acres in Freeborn County are considered prime farmland or farmland of statewide importance.”¹⁶³ Federal regulations at 7 C.F.R. 657.5(a)(1) defines prime farmland, in part, as:

Land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed, including water management, according to acceptable farming methods. In general, prime farmlands have an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no rocks. They are permeable to water and air. Prime farmlands are not excessively erodible or saturated with water for a long period of time, and they either do not flood frequently or are protected from flooding.

Although “prime farmland” characteristics are the same nationwide, certain soils that do not meet these specific characteristics are nevertheless important at a statewide level. Farmland of statewide importance

¹⁶² U.S. Department of Agriculture (2012) 2012 Census of Agriculture: Freeborn County, Minnesota Profile, Retrieved April 18, 2018, from: https://www.agcensus.usda.gov/Publications/2012/Online_Resources/County_Profiles/Minnesota/cp27047.pdf.

¹⁶³ Application at page 43.

is land, in addition to prime and unique farmlands, that is of statewide importance for the production of food, feed, fiber, forage, and oil seed crops.¹⁶⁴

Criteria for defining and delineating farmland of statewide importance are determined by the appropriate state agency or agencies. Generally, additional farmlands of statewide importance include those that are nearly prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some soils might produce as high a yield as prime farmlands if conditions are favorable. In some States, additional farmlands of statewide importance may include tracts of land that have been designated for agriculture by state law.¹⁶⁵

The Soil Survey Geographic Database (SSURGO)¹⁶⁶ contains soil information collected by the USDA National Cooperative Soil Survey. Soils classified as prime farmland or farmland of statewide importance within the route width of the different routing options are as follows: Teal Route 155 acres 44 percent, Orange Route 135 acres 45 percent, Purple Route Segment 49 acres 68 percent, Gold Route Segment 66 acres 53 percent. Prime farmland and farmland of statewide importance account for 50 percent of soils in the project area (**Map 7**).

Potential Impacts

The overall impact intensity level for all routing options will be minimal, except that the Purple and Gold routing options reduce long-term agricultural impacts. Potential impacts are anticipated to be short- and long-term and of a small size. These localized impacts will affect a unique resource that is common in the project area. Impacts can be mitigated.

Distinct impacts to agricultural lands and operations occur during the construction and operational phases of a power line project. Construction impacts are short-term and limit land use generally. Potential impacts also include soil rutting and compaction as a result of repeated access to the right-of-way—especially during spring or when wet conditions are present. Drain tile might be struck when auguring structure holes. Lands within the route width may not be available for agricultural use during construction; lands within the marshaling yard or set-up area will not be available for agricultural use during construction. The impacts above all have potential to result in crop losses.

Impacts from the operation of a power line involve the long-term presence of structures and conductors. These impacts can remain within the immediate footprint, or may extend beyond it if the power line impedes the use of farm or irrigation equipment or interferes with aerial spraying. Improper soil restoration practices could lead to drainage concerns or top soil erosion. Again, these impacts have potential to result in crop losses.

Specific impacts to aerial spraying are anticipated to be minimal; the majority of all routing options follow existing rights-of-way or field lines. The Teal and Orange routes follow the existing ITC Line at a distance for a portion of their length. This would result in an approximately 257 foot gap between the HVTL and

¹⁶⁴ Minnesota Department of Commerce (January 2015) *Environmental Assessment: Aurora Distributed Solar Project*, Retrieved April 27, 2018, from: <https://mn.gov/commerce/energyfacilities/resource.html?id=34069>, at page 48.

¹⁶⁵ *Id.* at 48, 49.

¹⁶⁶ Note: SSURGO data and NLCD data are unrelated. As used here, SSURGO data shows soil types; NLCD shows land cover types regardless of the underlying soil.

the existing ITC Line. This would likely make both aerial spraying and future irrigation difficult in this half-mile section of line.

The Purple and Gold overbuild options would not cause long-term impacts to farmland because these routing options would be located within existing transmission line rights-of-way. Construction related impacts would be similar given the use of a shoo-fly line. The height and size of these structures could impact aerial spraying, but these impacts would be negligible given the presence of existing transmission lines in these areas.

The physical impacts described above can lead to financial impacts, for example, loss of farming income or decreases in property value. While short-term impacts will occur during construction, long-term operational impacts are not anticipated.

Mitigation

Impacts to agricultural lands and operations can be avoided or minimized by prudent routing and placement of structures within the selected route. This includes selecting routes and structure placements that avoid agricultural fields; follow existing infrastructure or property lines; or parallel field lines. Paralleling immediately adjacent to existing rights-of-way mitigates impacts more so than following at a distance. Impacts can also be minimized through appropriate construction and remediation practices. The following measures can mitigate impacts to agricultural soils and production:

- Limiting movement of crews and equipment to the right-of-way to the greatest extent possible.
- Identify agricultural drain tile in consultation with landowners prior to earth disturbing activities.
- Scheduling construction during periods when agricultural activities will be minimally affected.
- Compensating the landowner for any crop or property damage.
- Repairing ruts that are hazardous to agricultural operations.
- Alleviating soil compaction.
- Restoring the land and facilities as nearly as practicable to their original conditions.
- Promptly repairing or replacing fences, gates, and similar improvements that are removed or damaged.

Freeborn Wind committed to the following mitigation measures in its route permit application:

Freeborn Wind will compensate landowners for any damage to crops, fences, and drain tiles due to construction of the Project per the terms of the easement agreements. In some cases, Freeborn Wind may engage an outside contractor to restore the damaged property to as near as possible to its original condition.¹⁶⁷

Landowners will be compensated for the use of their land through easement payments. Additionally, to minimize loss of farmland and to ensure reasonable access to the land near the poles, Freeborn Wind intends to place the poles outside of the public roadway ROWs close as practicable to it. If possible, Freeborn Wind will attempt to construct the transmission line before crops are planted or following harvest. Freeborn Wind will compensate landowners for crop damage and soil compaction that occurs as a result of the Project. Soil compaction will be addressed by compensating the farmer to de-compact the ground or by using contractors to

¹⁶⁷ Application at page 22.

chiselplow the site. Easement Agreements with landowners address de-compaction measures and compensation for soil compaction.¹⁶⁸

Additionally, the Commission requires permittees to compensate landowners for crop losses and damaged drain tile.¹⁶⁹

Tourism

The overall impact intensity level for all routing options is anticipated to be minimal. Potential impacts will be of a short duration and localized. Impacts will affect unique resources. Regardless of the route selected, the project will not preclude future tourist activities.

In 2016 the leisure and hospitality industry in Freeborn County accounted for about \$44 million in gross sales, and 1,020 private sector jobs.¹⁷⁰ Tourist activities within project area are primarily associated with the recreational activities discussed in RECREATION. These activities are primarily associated with the Shell Rock River State Water Trail and local snowmobile trails. Power lines can impact tourism if they affect visitor experiences at tourism sites, through aesthetic or noise impacts, or degrade the natural or man-made resources that provide tourist-type activities.

Potential Impacts

The overall impact intensity level for all routing options is anticipated to be minimal. Potential impacts will be of a short duration and localized. Impacts will affect unique resources.

Noise impacts from construction will be short-term and intermittent. Operational noise will be below ambient noise levels. Aesthetic impacts vary by routing alternative and are anticipated to be similar near tourist-type activities. Potential impacts to recreation are anticipated to be minimal to moderate. Regardless of the route selected, the project will not preclude future tourist activities.

Mitigation

Impacts to tourism can be mitigated by selecting routes and alignments that avoid natural and man-made resources utilized for tourist-type activities. Potential impacts to tourism can also be mitigated by reducing noise and aesthetic impacts, as well as impacts to natural landscapes during construction.

Archeological and Historic Resources

Impacts are not anticipated. The overall impact intensity level is negligible for all routing options.

Archeological resources are locations where objects or other evidence of archaeological interest exist, and can include aboriginal mounds and earthworks, ancient burial grounds, prehistoric ruins, or historical remains.¹⁷¹ Historic resources are sites, buildings, structures, or other antiquities of state or national significance.¹⁷²

To identify potential impacts to archaeological or historic resources Freeborn Wind retained a cultural resource specialist at Merjent, Inc. to conduct a cultural resource literature review.

¹⁶⁸ Application at page 44.

¹⁶⁹ Generic Route Permit Template at Section 5.2.17.

¹⁷⁰ Explore Minnesota (February 2018) *Tourism and Minnesota's Economy*, Retrieved May 3, 2018, from: <http://www.exploreminnesota.com/industry-minnesota/tools-training/tourism-awareness/>.

¹⁷¹ See Minn. Stat. 138.31, subd. 14.

¹⁷² See Minn. Stat. 138.51.

Merjent collected cultural resource data from the SHPO site files in St. Paul, Minnesota regarding documented archaeological sites, standing historic structures, and previously executed cultural resource surveys. This information was then used to identify site types that may be encountered and landforms or areas that have a higher potential for containing significant cultural resources. Collected data includes archaeological site files, architecture inventory files, and previous cultural resources studies and reports.¹⁷³

The literature review identified two previously reported architectural resources. “The first property (FE-GLE-001) is the Glenville Creamery. The second property (FE-GLE-004) is the Glenville Methodist Episcopal Church.” Both of these structures are located within the City of Glenville.

The Minnesota Historical Society, Historic Preservation Office (SHPO), reviewed the project. SHPO indicated that, “based on our review of the project information, we conclude that there are no properties listed in the National or State Registers of Historic Places, and no known or suspected archaeological properties in the area that will be affect by this project.”¹⁷⁴

Prior to construction the company will conduct a Phase I Survey in cooperation with SHPO to determine if archaeological sites exist and, if so, their boundaries. “A Phase I survey provides enough information to allow consideration of avoidance if a site is to be impacted by an undertaking and to gather enough information to allow for reasonable recommendations for more detailed work should it be necessary.”¹⁷⁵

Freeborn Wind committed to the following in its route permit application:

The archaeological resources inventory will focus on areas proposed for ... construction, including transmission structure locations, associated construction access roads, and workspace areas. These investigations will be conducted by a professional archaeologist.... Survey strategies ... for the archaeological resource inventory will depend on surface exposure and the characteristics of the landforms proposed for development. After receiving the proposed final Project route and layout, archaeologists will design an appropriate survey strategy for archaeological resources. This proposed survey strategy will be shared with SHPO to gather its input on the methodology prior to completing the study. It is anticipated that the Phase I Archaeological Survey will be conducted during early spring or late fall 2018, when ground surface visibility is optimum for visual survey.

If archaeological resources are identified during the survey, an archaeologist will identify the location and record Universal Transverse Mercator coordinates so that project design, engineering, and construction staff can consider the location and adjust construction plans. If project design and construction plans cannot be adjusted, further investigation of the resource may be needed. Also, if human remains are found, Freeborn Wind will notify law enforcement.... If the remains are determined to be archaeological, Freeborn Wind will coordinate with the SHPO.¹⁷⁶

Potential Impacts

Impacts are not anticipated for any routing option. The overall impact intensity level is negligible.

Power lines have potential to impact these resources. Construction can disrupt or remove archeological resources and impair or decrease the value of historic resources. Based on the literature review and SHPO

¹⁷³ Application at page 45.

¹⁷⁴ Application at Appendix D.

¹⁷⁵ Minnesota Historical Society (July 2005) *SHPO Manual for Archaeological Projects in Minnesota*, Retrieved May 4, 2018, from: https://mn.gov/admin/assets/archsurvey_tcm36-327672.pdf at page 27.

¹⁷⁶ Application at pages 45, 46.

concurrency—and considering that NLCD classifies 92 percent of the project area as developed or cultivated crops—impacts to archaeological or historic resources are not anticipated. Once a route has been determined, Freeborn Wind will need to further evaluate the specific impacts of that route.

Mitigation

Prudent routing can avoid impacts to archaeological and historic resources. This is the preferred mitigation. If previously unidentified archaeological sites are found during construction, Freeborn Wind would be required to stop construction and contact SHPO to determine how best to proceed.¹⁷⁷ Ground disturbing activity will stop and local law enforcement will be notified should human remains be discovered.¹⁷⁸ Because impacts to archeological and historic resources are not anticipated mitigation is not proposed.

Natural Resources

Power lines have the potential to impact the natural environment. Impacts are dependent upon many factors, such as how the transmission line is designed, constructed and maintained. Other factors, for example, the environmental setting, must be considered. Impacts can and do vary significantly both within, and across, projects.

Air Quality

The overall impact intensity level during construction and operation is anticipated to be minimal for all routing options. Potential impacts will be short- and long-term, of a small size, and not affect a unique resource. Impacts are unavoidable, but can be minimized.

“Air quality in Minnesota has generally improved over the past 20 years, but current levels of air pollution still contribute to health impacts.”¹⁷⁹ According to the MnRiskS model developed by MPCA, cancer and non-cancer health risks from air pollutants released by permitted and non-permitted sources in Freeborn County are low.¹⁸⁰

Potential Impacts

Distinct impacts to air quality occur during construction and operation of a power line.

Construction

Construction related impacts are anticipated to be short-term and localized. Impacts are unavoidable, but can be minimized. Fugitive dust is a particulate air pollutant. Construction activities, such as clearing vegetation and setting structures, may create exposed areas susceptible to wind erosion. Construction vehicles and motorized equipment will emit exhaust and might generate fugitive dust. Emissions associated with construction are dependent upon weather conditions and the specific activity occurring. For example, traveling to a construction site on a dry gravel road will result in more fugitive dust than traveling the same road when wet.

¹⁷⁷ Generic Route Permit Template at Section 5.3.14.

¹⁷⁸ *Ibid.*

¹⁷⁹ Minnesota Pollution Control Agency (January 2015) *Air Quality in Minnesota: 2015 Report to the Legislature*, Retrieved May 4, 2018, from: <https://www.pca.state.mn.us/sites/default/files/lraq-1sy15.pdf> at page 1.

¹⁸⁰ See Minnesota Pollution Control Agency (n.d.) *MNRisks: Pollutant Priorities*, Retrieved April 13, 2018, from: <https://www.pca.state.mn.us/air/mnrisk-pollutant-priorities> (Where a health benchmark is a concentration level in the air that is unlikely to result in health effects after a lifetime of exposure; a concentration to benchmark ratio less than one is below the health benchmark. The highest ratios in Freeborn County for cancer and non-cancer health risks are 0.38 and 0.11, respectively, and are located in Albert Lea.)

Operation

Impacts related to operation of the HVTL are anticipated to be long-term, of a small size, and localized. Impacts are unavoidable and do not affect a unique resource. Power lines produce ozone and nitrous oxide through the corona effect—the ionization of air molecules surrounding the conductor. Ozone production from a conductor is proportional to temperature and sunlight and inversely proportional to humidity. These compounds contribute to smog and adverse health effects.¹⁸¹ Minnesota has an ozone standard of 70 parts per billion (ppb) measured over a daily eight-hour average of the three-year average of the annual fourth-highest daily maximum.¹⁸² The national ozone standard is 0.070 ppm over a 3-year average of the annual fourth-highest daily maximum eight-hour average concentration.¹⁸³ Ozone and nitrous oxide emissions are anticipated to be well below these limits.¹⁸⁴ Emissions associated with maintenance of the HVTL are, like construction emissions, dependent upon weather conditions and the specific activity occurring.

Mitigation

Freeborn Wind will use BMPs to minimize fugitive dust emissions during construction, including controlling soil tracking into roadways and wetting road surfaces. The company indicates it will not run vehicles and equipment unnecessarily reducing carbon emissions. Freeborn Wind proposes no other mitigative measures. Additional mitigation might include planting a seasonal cover crop in agricultural row crop fields to stabilize soils, thereby reducing potential wind erosion. Any planting must be negotiated with the landowner.

Geology and Topography

The overall impact intensity level is anticipated to be negligible for all routing options. Potential impacts are not anticipated. Should impacts occur they can be mitigated.

The topography within the project area is gently rolling. Elevations range from about 1,200 to 1,300 feet above sea level, with lower elevations and steeper slopes associated with the Shell Rock River in the northwest ascending to the south and east. According to the Minnesota Geological Survey depth to bedrock within the route width of the different routing options varies from 50 to 125 feet.

“Karst is defined as terrain with distinctive landforms and hydrology created primarily from the dissolution of soluble rocks.”¹⁸⁵ “Over time, this process creates unusual surface and subsurface features ranging from sinkholes, springs and disappearing streams, to complex underground drainage systems and caves.”¹⁸⁶ It is mainly, but not exclusively, formed on limestone. In Minnesota, karst topography is generally found in the southeast.

¹⁸¹ U.S. Environmental Protection Agency (December 7, 2017) *Ozone Pollution*, Retrieved April 26, 2018, from: <https://www.epa.gov/ozone-pollution>.

¹⁸² Minn. R. 7009.0080.

¹⁸³ U.S. Environmental Protection Agency (December 20, 2016) *National Ambient Air Quality Standards (NAAQS) Table*, Retrieved April 26, 2018, from: <https://www.epa.gov/criteria-air-pollutants/naaqs-table>.

¹⁸⁴ Application at page 46.

¹⁸⁵ Minnesota Department of Natural Resources (2016) *Minnesota Regions Prone to Surface Karst Feature Development Series GW-01*, Retrieved April 26, 2018, from: http://files.dnr.state.mn.us/waters/groundwater_section/mapping/gw/gw01_report.pdf.

¹⁸⁶ Minnesota Pollution Control Agency (n.d.) *Karst: A Complex Landscape Sculpted by Water*, Retrieved April 26, 2018, from: <https://www.pca.state.mn.us/sites/default/files/karst-poster.pdf>.

DNR maintains several GIS layers about karst topography. The first is an inventory of features such as sinkholes, springs, and stream sinks extracted from the karst feature database of Southeastern Minnesota. DNR also maintains a GIS layer that outlines areas where karst features can form on the land surface and where karst conditions are present in the subsurface. EERA staff reviewed these layers, no karst features or areas were identified within the route width of any routing option.

A geotechnical investigation was performed as part of the wind farm project. The report concluded there are no karst features at the site of any proposed wind turbine location. The investigation did not consider HVTL structure locations.

Potential Impacts

The overall impact intensity level is anticipated to be negligible for all routing options. Potential impacts are not anticipated. Should impacts occur they can be mitigated.

Structures will be installed at existing grade; therefore, impacts to topography are not expected. Should grading occur it would be restricted to only that necessary to establish a flat, safe workspace—major topographical changes to the landscape would not occur. Freeborn Wind does not anticipate any grading will be necessary. Structures will be directly imbedded to a depth of 10 to 13 feet or be mounted on drill pier foundations that will be up to 30 feet deep. Neither will contact bedrock. Freeborn Wind committed to geotechnical testing HVTL structure locations prior to construction. Structure design and location will be determined based upon the results of this testing, and will be sited to avoid karst features.

Mitigation

Impacts to topography and bedrock are not anticipated. Beyond Freeborn Wind’s commitment to conduct geotechnical surveys to identify the presence of karst features at potential structure locations no mitigation is proposed.

Groundwater

The overall impact intensity level for all routing options is anticipated to be minimal. Impacts will be short-term (years) and localized.

The project splits the South-Central Groundwater Province, where unconsolidated glacial sediments “are typically clayey and may contain limited extent surficial and buried sand aquifers” but “sedimentary bedrock aquifers are commonly used,” and the Southeastern Groundwater Province, where unconsolidated sediments “are thin or absent and, therefore, not used or relatively unimportant [as aquifers], except in major river valleys where sediment thickness is greater,” however, the province is underlain by productive bedrock aquifers.”¹⁸⁷

According to the Pollution Sensitivity of Near-Surface Materials,¹⁸⁸ areas of both high and low sensitivity are present in the project area. High sensitivity is present in the northwest; low sensitivity exists in all other areas (**Figure 12**). The sensitivity to pollution of near-surface materials is an estimate of the time it takes for water to travel through the unsaturated zone to reach the water table, which for the purposes of the model was assumed to be 10 feet below the land surface.¹⁸⁹ A rating was applied across the state,

¹⁸⁷ Minnesota Department of Natural Resources (n.d.(d)) *Groundwater Provinces*, Retrieved April 13 2018, from: <http://dnr.state.mn.us/groundwater/provinces/index.html>.

¹⁸⁸ Adams, R. (June 2016) *Pollution Sensitivity of Near-Surface Materials*, Retrieved May 9, 2018, from: <https://www.leg.state.mn.us/docs/2017/other/170839.pdf>.

¹⁸⁹ *Id.* at page 3.

defined as the vertical travel time of water to reach a depth of 10 feet. Water travels through an area of “high” sensitivity to a depth of 10 feet in less than 170 hours, whereas it takes water 430 to 1,600 hours to reach that same depth in areas rated as “low”.¹⁹⁰

Glenville Water Supply

Wellhead protection areas exist “to prevent contamination of public drinking water supplies by identifying water supply recharge areas and implementing management practices for potential pollution sources found within those areas.”¹⁹¹ The City of Glenville has an established wellhead protection area and an established drinking water supply management area (DWSMA). A DWSMA is the “surface and subsurface area surrounding a public water supply well or intake that must be managed to optimize protection of drinking water sources.”¹⁹² The vulnerability of a DWSMA is “an assessment of the likelihood that the aquifer within the DWSMA is subject to impact from overlying land and water uses.”¹⁹³ The Department of Health considers all surface water sources vulnerable, and groundwater sources could be vulnerable if the local geology lacks protective layers between the ground surface and the drinking water aquifer. The Glenville Source Water Assessment indicates that Well #241980 (265 ft) and Well #217116 (370 ft) are not vulnerable.¹⁹⁴ The assessment states that a buried sewer line is the only potential source of contamination within 200 feet of the water system’s source.

Private Wells

Private wells exist throughout the project area. “The Minnesota Well Index provides basic information about location, depth, geology, construction and static water level, for many wells and borings drilled in Minnesota. It by no means contains information for all the wells and borings and the absence of information about a well on a property does not mean there is no well on that property.”¹⁹⁵ One verified well (#226437) is located within the Gold route width. It is 144 feet deep.

There are several unverified wells within the project vicinity. The location of these wells has not been verified, and their “location” might be placed at the center of the section or 1/4 section depending on what was reported in the well log. As such, planning decisions should not be made relying on these locations. These wells range in depth from 110 to 172 feet deep.

Pentachlorophenol

If Freeborn Wind uses wood structures, the structures will be treated using industry standard substances that comply with applicable regulations. The company, through Bell Lumber & Pole Co., has indicated that it will use pentachlorophenol (penta) as a preservative for wood protection. Penta is used on wood structures to repel water, improve dimensional stability, and reduce checking and splitting, and is

¹⁹⁰ Adams, R. (June 2016).

¹⁹¹ Minnesota Pollution Control Agency (n.d.) *Wellhead and Source Water Protection Programs*, Retrieved May 4, 2018, from: <https://www.pca.state.mn.us/water/wellhead-and-source-water-protection-programs>.

¹⁹² Minnesota Department of Health (n.d.) *Source Water Assessments*, Retrieved May 4, 2018, from: https://swareport.web.health.state.mn.us/SWA_Info.html?what=pa.

¹⁹³ Minnesota Stormwater Manual (October 24, 2016) *Stormwater and Wellhead Protection*, Retrieved May 4, 2018, from: https://stormwater.pca.state.mn.us/index.php/Stormwater_and_wellhead_protection

¹⁹⁴ Minnesota Department of Health (n.d.) *Glenville Source Water Assessment*, Retrieved May 4, 2018, from: https://swareport.web.health.state.mn.us/SWA_Factsheet.html?pwsid=1240010#.

¹⁹⁵ Minnesota Department of Health (n.d.) *Minnesota Well Index*, Retrieved May 4, 2018, from: <https://apps.health.state.mn.us/cwi/#>.

consistent with American Wood Protection Association Standard U1-17.¹⁹⁶ Penta has been used as a wood preservative in utility poles for more than 80 years; there are 36 million penta-treated utility poles in service across the United States. “It was once one of the most widely used biocides in the United States, but it is now a restricted use pesticide and is no longer available to the general public.”¹⁹⁷

“Penta is extremely toxic to humans from acute (short-term) ingestion and inhalation exposure.”¹⁹⁸ Chronic exposure to penta by inhalation in humans has resulted in effects on the respiratory tract, blood, kidney, liver, immune system, eyes, nose, and skin. Human studies are inconclusive regarding penta exposure and reproductive effects, but suggest an association between exposure to penta and cancer.

Penta is a nonflammable and noncorrosive chemical that has limited solubility in water,¹⁹⁹ and lasts for hours or days in air, soil, and water.²⁰⁰ When exposed to natural sunlight penta undergoes rapid photodegradation with half-lives of 20 minutes.²⁰¹ Penta is absorbed by soil particles and has a low to moderate movement through acidic soils. Since most agricultural soils are acidic, it is unlikely that penta will move to lower depths in substantial amounts. Penta appears not to move away from structures—a study on penta adjacent to 31 utility poles in New York indicates that levels of penta at one meter from the pole were below the detectible limit.²⁰² Penta can travel within the wood structure reaching lower depths as a result of gravity.

The main defense against contamination of groundwater from penta is microbial degradation under aerobic and anaerobic conditions. Degradation in soil under aerobic conditions is more rapid than under anaerobic conditions where half-lives of 1 to 2 months have been observed.²⁰³ The Environmental Protection Agency (EPA) has concluded that in “considering the total amount of penta available for leaching from utility poles per area while in use, the relatively moderate mobility through the soil profile ... and the moderate degradation under aerobic and aerobic conditions..., contamination of water by penta and its metabolites should not be a concern.”²⁰⁴

¹⁹⁶ American Wood Protection Association (2017) *Standard U1-17*, Retrieved April 18, 2018, from: <http://www.awpa.com/standards/U1excerpt.pdf>.

¹⁹⁷ PubChem Open Chemistry Database (n.d.) *Pentachlorophenol*, Retrieved April 18, 2018, from: <https://pubchem.ncbi.nlm.nih.gov/compound/pentachlorophenol#section=Top>.

¹⁹⁸ Environmental Protection Agency (January 2000) *Pentachlorophenol*, Retrieved May 4, 2018, from: <https://www.epa.gov/sites/production/files/2016-09/documents/pentachlorophenol.pdf>.

¹⁹⁹ U.S. Environmental Protection Agency (September 2010) *Toxicological Review of Pentachlorophenol*, Retrieved April 18, 2018, from: http://cfpub.epa.gov/ncea/iris/iris_documents/documents/toxreviews/0086tr.pdf at page 3.

²⁰⁰ Centers for Disease Control and Prevention, Agency for Toxic Substances & Disease Registry (January 21, 2015) *Toxic Substances Portal – Pentachlorophenol*, Retrieved April 18, 2018, from: <http://www.atsdr.cdc.gov/PHS/PHS.asp?id=400&tid=70>.

²⁰¹ Environmental Protection Agency (February 19, 1999) *Reregistration Eligibility Decision Document for Pentachlorophenol*, Retrieved May 4, 2018, from: https://www3.epa.gov/pesticides/chem_search/cleared_reviews/csr_PC-063001_19-Feb-99_035.pdf at page 30.

²⁰² U.S. Environmental Protection Agency (September 30, 2004) *EPA-HQ-OPP-2004-0402-0015 Pentachlorophenol: Environmental Exposure/Modeling*, Retrieved May 4, 2018, from: <http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OPP-2004-0402-0015> at page 6

²⁰³ Environmental Protection Agency (February 19, 1999) at page 30

²⁰⁴ U.S. Environmental Protection Agency (September 30, 2004) at pages 2, 3.

The Risk Assessment and Science Support Branch within EPA calculated estimated concentrations of penta in the environment using modeling. Results of the study were as follows:

Penta is not mobile and has a low persistency in the environment. It dissipates through photo-degradation. After leaching out of the utility pole surface and reaching to the soil, penta is adsorbed to the soil particles. Penta has a very low solubility. Because of its affinity for soil particles, penta will not move downward into the ground water. Penta moves into surface waters adsorbed to the soil particles through runoff. Therefore, the effects of penta on ground and drinking water will be minimal.

Should penta reach groundwater it “metabolizes rapidly under aerobic aquatic conditions and has a half-life of less than five days. Under anaerobic conditions, it metabolizes a little more slowly with a half-life of about 34 days.... It is, therefore, not a persistent substance in natural waters.”²⁰⁵

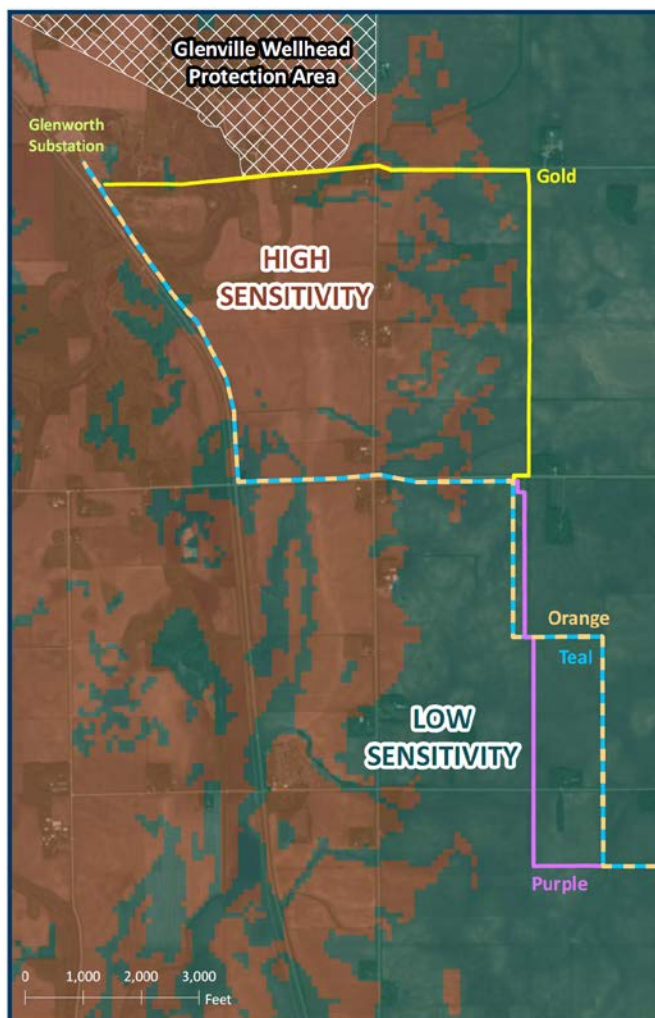
Concrete

Some ten billion tons of concrete is produced in the world each year, “with a significant quantity used in the construction of structures that are built in water, such as bridge supports, piers, and culverts.”²⁰⁶

Concrete is the most widely used construction material on the planet. It is manufactured by mixing together cement, aggregates, water, air, and various admixtures. Conventional hardened concrete is comprised of approximately 30 percent cement pastes by volume and 18 percent pore voids.²⁰⁷

When concrete structures contact ground water the pore voids are filled with water. “Groundwater chemistry is affected when brought into contact with or close proximity to such structures since the hydration products of cement can be dissolved and leached into the groundwater.”²⁰⁸ “The most common constituents of the cement paste that can be leached are the alkali salts followed by calcium hydroxide.”²⁰⁹

Figure 12 Pollution Sensitivity of Near-Surface Materials and Wellhead Protection Area



²⁰⁵ Environmental Protection Agency (February 19, 1999) at page 7

²⁰⁶ Law, D., Setunge, S., Adamson, R., and Dutton, L. (August 2013) *Effect of Leaching from Freshly Cast Concrete on pH*, MAGAZINE OF CONCRETE RESEARCH, Retrieved May 9, 2018, from: <https://www.researchgate.net/>.

²⁰⁷ Shi, C. and Spence, R. (July 15, 2005) *High pH Groundwater – The Effect of the Dissolution of Hardened Cement Pastes*, THE WATER ENCYCLOPEDIA, John Wiley & Sons.

²⁰⁸ Shi, C. and Spence, R. (July 15, 2005).

²⁰⁹ Philip, J., and Clifton, J., (n.d.) *Durability of Concrete for Underground Containment of LLW*, Retrieved May 9, 2018, from: <http://www.wmsym.org/archives/1989/V2/113.pdf>.

Additionally, soluble components of concrete might leach into the surrounding soil or groundwater prior to setting and hardening of the concrete.

Generally, the interaction between the concrete and the soil-rock surrounding it controls the chemistry of the groundwater near concrete foundations. Both are porous, and a common transitional zone is established. "Cement chemistry dominates within the bulk of concrete structure and local groundwater chemistry dominates within the bulk of the soil-rock. The width of this transitional zone is controlled mainly by the rate of flow of the groundwater around the surface of the concrete, with higher flows resulting in a narrower zone."²¹⁰ The width of the transitional zone can be significant for concrete sitting in stagnant water. The pH of liquid leaching from concrete can be as high as 13.5, which is significantly higher than groundwater. Therefore, "increased pH of groundwater can be expected around the surface of concrete but is not expected to penetrate far into the groundwater matrix, because the transport rate from the concrete is low."²¹¹

Potential Impacts

The overall impact intensity level for all routing options is anticipated to be minimal. Impacts will be short-term (years) and localized.

Potential impacts to groundwater can occur directly or indirectly. Direct impacts are generally associated with construction, for example, construction may require "drilling to depths that can penetrate shallow water tables or open access channels to deeper aquifers."²¹² Wood structures will be imbedded directly into the ground to depths of 10 to 13 feet. Some of these structures may come into direct contact with groundwater. Penta may reach groundwater from direct contact or from the soil through runoff and leaching. Generally, leaching is greatest in the first year. Penta is metabolized under both aerobic and anaerobic conditions, or is absorbed. It has low solubility in water.

Drilled pier foundations eight feet in diameter and up to 30 feet deep will be used for dead-end or steep angled structures. When concrete foundations are used some portion of the soluble components of the cement paste can leach into groundwater prior to the setting and hardening of the concrete. This will change the pH of groundwater around the surface of the concrete, but should not extend far from the concrete foundation.

Freeborn Wind indicates that dewatering is only necessary if a bentonite slurry cannot be utilized to create a seal against groundwater. This might occur where a high water table combined with granular soil is encountered. If dewatering is necessary to place the foundations the water removed from foundation sites could contain sediments or pollutants that might be introduced into surface waters, which can have an impact on groundwater. The company does not anticipate that dewatering will be necessary.

Impacts to surface waters can lead to indirect impacts to groundwater. For example, construction activities can directly or indirectly lead to increased turbidity of surface waters through sedimentation. These contaminated surface waters might then flow to groundwater. Contamination is not limited to sediment, any surface water pollutant, such as oil, can reach groundwater.

²¹⁰ Shi, C. and Spence, R. (July 15, 2005).

²¹¹ *Ibid.*

²¹² Maryland Department of Natural Resources (n.d.) Impacts of Power Generation and Transmission: Water Resources, Retrieved May 4, 2018, from: <http://pprp.info/ceir17/HTML/Chapter4-2-2.html>.

Mitigation

Indirect impacts to groundwater can be mitigated by avoiding or minimizing impacts to surface waters. Direct impacts to groundwater, that is, leaching from penta structure poles or concrete foundations where groundwater is present is difficult to mitigate. Dewatering might minimize potential impacts. Should dewatering be required, Freeborn Wind will work with MPCA to minimize runoff to surface and groundwater.

Rare and Unique Resources

The overall anticipated impact intensity level is negligible to minimal for all routing options. Potential impacts, if they occur, would be indirect, short-term, and localized. Impacts would affect unique resources, and can be mitigated.

DNR established several classifications for rare plant or animal communities across the state, including SNAs, High Conservation Value Forest, Minnesota Biological Survey (MBS) Native Plant Communities, and MBS Sites of Biodiversity Significance. SNAs and High Conservation Value Forest do not occur in the project area. Two native plant communities, both Mesic Prairie, are within the project area. These communities are associated with the ditch between U.S. Highway 65 and the railroad, and outside the route width of any routing option. Two Sites of Biodiversity Significance are within the project area, but, like the native plant communities, are located to the west of U.S. Highway 65 and outside the route width of any routing option. The Shell Rock site does not meet MBS standards for a outstanding, high, or moderate rank.

NHIS Database

The Division of Ecological and Water Resources within DNR manages the Natural Heritage Information System (NHIS). “The NHIS provides information on Minnesota's rare plants, animals, native plant communities, and other rare features. The NHIS is continually updated as new information becomes available, and is the most complete source of data on Minnesota's rare or otherwise significant species, native plant communities, and other natural features. Its purpose is to foster better understanding and conservation of these features.”²¹³

NHIS data includes federally endangered, threatened, or candidate plant species, and endangered or threatened animal species. The system also includes state endangered, threatened, or special concern species. In some areas surveys have not been conducted extensively or recently making the NHIS database a source of information, but not the sole source for identifying these resources.

Freeborn Wind requested DNR staff to query the NHIS and identify rare and unique natural resources within one mile of the proposed project. In the interim, the company independently reviewed NHIS data to provide information about rare and unique resources in its route permit application. On January 5, 2018, DNR emailed Freeborn Wind indicating that staff reviewed the route permit application and “determined that rare features have been adequately addressed in the [application].”²¹⁴ DNR further indicated that its email served “as a concurrence for the rare features assessment” and can be “used in lieu of a formal Natural Heritage letter.”²¹⁵

²¹³ Minnesota Department of Natural Resources (n.d.) *Natural Heritage Information System*, Retrieved April 25, 2018, from: <http://www.dnr.state.mn.us/nhnrp/nhis.html>.

²¹⁴ Freeborn Wind Energy LLC (April 24, 2018) *Natural Heritage Concurrence*, eDockets No. [20184-142258-02](#).

²¹⁵ *Ibid*.

The route permit application indicated, and DNR concurred, that the following rare features are present within the project area: one record of a state-threatened vascular plant and one record of a vertebrate animal species of special concern. The application also discussed the Northern long-eared bat.

EERA review of the NHIS database found two additional species present within the project area: one record of a vascular plant of special concern and one record of a vascular plant on the watch list. Staff also reviewed the Minnesota Statewide Mussel Survey. Several records were returned within the project area; however, none indicated the presence of state or federally listed species. Results of a USFWS IPaC Information for Planning and Consultation review indicate the Northern Long-eared bat might be potentially affected by activities in the project area.²¹⁶ There are no federal critical habitats in the project area.

Species

The EA does not map rare features found in the NHIS database. This is because DNR requires that public display of NHIS data either mask the identity or location of rare features due to the vulnerability of some species to exploitation. One occurrence of a threatened vascular plant is within the local vicinity of the Teal and Orange routes, but no occurrences are within the route width of any routing option.

Edible Valerian was not formerly rare in Minnesota, but near total destruction of prairie and fen habitats reduced populations to small, isolated fragments in habitat remnants on roadsides and railroad rights-of-way. The species appears to favor moist, sunny, calcareous habitats, including calcareous fens, wet meadows, and moist prairies.²¹⁷ It is considered imperiled in Minnesota because of rarity or some factor(s) making it vulnerable to extirpation, but is considered secure globally. This occurrence was observed in 2009 and estimated to have poor viability.

Wild Sweet William was probably rather common in pre-settlement times, but the conversion of wet/mesic prairie in southeast Minnesota to agriculture has destroyed or degraded most of its habitat. Further risk of decline comes from invasive species. The species prefers sun and moist soils, and is found in wet meadows, prairies, and ditches.²¹⁸ It is considered vulnerable in Minnesota because it is rare or uncommon, or found in a restricted range, but is considered secure globally. This occurrence was also observed in 2009 and estimated to have poor viability.

Cowbane is one of the several white-flowered carrot species found in moist to wet places. It is most similar to Water Parsnip and Water Hemlock. Cowbane is far less common than these two species. It prefers part shade to sun and wet prairies, fens, sedge meadows, swamps, and marshes.²¹⁹ A species rank has not been assigned, but is considered secure globally. This occurrence was observed in 2008 and estimated to have fair to poor viability.

²¹⁶ United States Fish and Wildlife Service (n.d.) *IPaC Information for Planning and Consolation*, Retrieved May 9, 2018, from: <https://ecos.fws.gov/ipac/>.

²¹⁷ Minnesota Department of Natural Resources (2018) *Valeriana edulis var. ciliata*, Retrieved May 9, 2018, from: <https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=PDVAL03073>.

²¹⁸ Minnesota Wildflowers (n.d.) *Wild Sweet William*, Retrieved May 9, 2018, from: <https://www.minnesotawildflowers.info/flower/wild-sweet-william>.

²¹⁹ Minnesota Wildflowers (n.d.) *Cowbane* Retrieved May 9, 2018, from: <https://www.minnesotawildflowers.info/flower/cowbane>.

Northern long-eared bats, a state-listed species of special concern, can be found throughout Minnesota. During the winter this species hibernates in caves and mines, and during the active season (approximately April-October) it roosts underneath bark or in cavities or crevices of both live and dead trees. The spread of white-nose syndrome across the eastern United States has become the major threat to the species. Activities that might impact this species include, but are not limited to, wind farm operation, any disturbance to hibernacula, and destruction or degradation of habitat (including tree removal). The NHIS database does not contain any known occurrence of Northern long-eared bat roosts or hibernacula within the project area.²²⁰

Suckermouth minnows are a plains species tolerant of moderate turbidity. It occurs along runs and riffles of creeks and small to medium (sometimes large) rivers with substrates ranging from sand and gravel to large boulders. It spawns presumably over gravelly riffles.²²¹ It is considered vulnerable in Minnesota because it is rare or uncommon, or found in a restricted range, but is considered secure globally. This occurrence was observed in 2011. The condition of the observation site was considered excellent, but a viability status was not assigned.

Potential Impacts

The overall impact intensity level is anticipated negligible to minimal for all routing options. Potential impacts, if they occur, would be indirect, short-term, and localized. Impacts would affect unique resources, and can be mitigated.

Power lines can impact rare and unique resources during both construction and operation. Adverse impacts include the taking or displacement of individual plants or animals, invasive species introduction, habitat loss, and, for avian species, collision with conductors or electrocution. Impacts to rare and unique resources are not necessarily adverse. In some limited cases, power line rights-of-way can be managed to provide habitat, for example, nesting platforms can be built on top of transmission structures for use by rare avian species. Rare and unique features were identified in the project area, but do not occur in the route width of any routing option. Impacts to Northern-long eared bats are anticipated to be negligible.

Mitigation

Impacts to rare and unique resources can be avoided by selecting routes, alignments, and structure placements away from these resources and their habitats to the extent practicable. If these resources cannot be avoided, impacts can be minimized by routing alignments or placing structures away from rare and unique resources; spanning these resources; or using seasonal construction practices within the selected route. Upon determination of a final route, biological surveys may be required as a permit condition should resource agencies deem it necessary.

The following mitigation measures can help to avoid or minimize impacts to rare and unique resources:

- Minimize tree felling and shrub removal that are important to local wildlife. Schedule tree clearing in winter when the Northern long-eared bat is not anticipated to be present.

²²⁰ Minnesota Department of Natural Resources (2018) *Myotis septentrionalis*, Retrieved May 9, 2018, from: <https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=AMACCO1150>

²²¹ Red List (n.d.) *Phenacobius mirabilis*, Retrieved May 9, 2018, from: <http://www.iucnredlist.org/details/191291/0>.

- Implement water and soil conservation practices to protect topsoil and adjacent water resources. Minimize soil erosion by containing excavated material, protecting exposed soil, and stabilizing restored soil.
- Re-vegetate disturbed areas with certified weed-free, native species that provide value to local wildlife species where applicable.

Under the USFWS Interim 4(d) Rule for the Northern long-eared bat, incidental take of the species is prohibited if it results from removing a known occupied maternity roost tree or from tree removal activities within 150 feet of a known occupied maternity roost tree from June 1 through July 31.²²² While no known maternity roost trees exist in the project area, the species might use the area; therefore, tree removal should not occur from June 1 to July 31.

Conducting surveys for sensitive plants during appropriate periods to properly identify their presence along the selected right-of-way before clearing can help to minimize impacts to rare plant species. If surveys identify these species individual avoidance and minimization measures can be developed in coordination with appropriate resource agencies. Preparation and development of a Vegetation Management Plan, in consultation with resources agencies, is a common special condition used by the Commission when issuing route permits.²²³

Soils

The overall impact intensity level is anticipated to be minimal for all routing options. Potential impacts will be short-term, localized, and do not affect a unique resource. Impacts can be minimized.

A soil association is a pair or group of dissimilar soils occurring in a regularly repeating pattern that are closely associated geographically.”²²⁴ Associations are named after their major soils. The different routing options intersect six soil associations. The Teal and Orange routes cross all six associations: Moland-Merton-Maxcreek-Canisteo (3619); Webster-Nicollet-Clarion-Canisteo (1750); Webster-Nicollet-Lester (1752); Lester-Hamel (3504); Webster-Estherville-Dickinson (3616); and Meyer-Estherville-Biscay (3510). The Purple route crosses two associations: Webster-Nicollet-Lester (1752) and Lester-Hamel (3504). The Gold route also crosses two associations: Lester-Hamel (3504) and Webster-Estherville-Dickinson (3616). Descriptions of the major soils that make up the above associations are described on pages 31 and 32 of the route permit application.

Biscay clay loam, zero to two percent slopes; Dakota loam, zero to two percent slopes; Glencoe clay loam, zero to one percent slopes; Lester loam, two to six percent slopes; Maxcreek silty clay loam; Nicollet clay loam, one to three percent slopes; and Webster clay loam, zero to 2 percent slopes (most common) are the most common soils within the project area that intersect with any routing option. These soils are considered “very deep.” Soils range from very poorly drained to excessively drained.

Potential Impacts

The overall impact intensity level is anticipated to be minimal for all routing options. Potential impacts will be short-term, localized, and do not affect a unique resource. Impacts can be minimized.

²²² United States Fish and Wildlife Service (March 12, 2018) *Northern Long-eared Bat Key to the Northern Long-eared Bat 4(d) Rule for Non-Federal Activities*, Retrieved May 9, 2018, from: <https://www.fws.gov/midwest/endangered/mammals/nleb/KeyFinal4dNLEB.html>

²²³ Generic Route Permit Application at Section 6.0.

²²⁴ Soil Survey Division Staff (n.d.) *Soil Survey Manual*, Retrieved May 9, 2018, from: https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcseprd1335011.pdf

Soil compaction and rutting will occur from movement of construction vehicles along the right-of-way. Installing structures requires removing and handling soils, which, along with vegetation clearing and minor grading, will expose soils to wind and water erosion. Topsoil could be lost to improper handling or erosion. The AGRICULTURE SECTION discussed impacts to prime farmland and farmland of statewide importance. Prime farmland and farmland of statewide importance account for 50 percent of soils in the project area.

Structure will be imbedded directly into the ground or on concrete foundations. Penta reaches soils through leaching from the structure. Generally, leaching is greatest in the first year. Leached penta is metabolized under both aerobic and anaerobic conditions, or is absorbed. It generally does not extend beyond one meter. Soluble components of concrete may leach into soils prior to the setting and hardening when drilled pier foundations are used.

The Purple and Gold overbuild options will not result in additional structures on the landscape, but do require construction of a temporary shoo-fly line while the existing transmission line is removed. This would occur within the existing right-of-way. Use of a shoo-fly line increases direct and indirect impacts to soils because the shoo-fly line itself must be installed and removed and the existing transmission line must be removed. These impacts are anticipated to be minimal.

Mitigation

Potential impacts to soils can be mitigated by using BMPs and standard construction practices. A variety of methods can be used to minimize soil erosion. Common mitigation measure employed to minimize soil erosion include:

- Promptly seeding to establish temporary or permanent vegetative cover on exposed soil.
- 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 certified weed free hay or straw.
- Erecting or using sediment control fences that are intended to slow water 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.

Freeborn Wind committed to the following in its route permit application:

As construction on each parcel is completed, disturbed areas will be restored to their original condition to the maximum extent practicable. Areas disturbed during construction will be repaired and restored to pre-construction contours as required so that all surfaces drain naturally, blend with natural terrain and are left in a condition that will facilitate natural revegetation, provide for proper drainage, and prevent erosion.²²⁵

Freeborn Wind will obtain a National Pollution Discharge Elimination System stormwater permit, which is necessary for the project. During construction, Freeborn Wind will follow standard erosion control measures identified in the applicable Stormwater BMP Manual, such as using silt fences to minimize the potential for

²²⁵ Application at page 22.

erosion and sedimentation into water bodies within the project area. Freeborn Wind will maintain sound water and soil conservation practices during construction and operation of the transmission line to protect topsoil and adjacent water resources and minimize soil erosion. Practices include using traditional and low-impact development stormwater management approaches, such as managing stormwater on-site, controlling rate and volume of stormwater reaching receiving waters to predevelopment levels, installing vegetated buffers, containing excavated material, protecting exposed soil, stabilizing restored soil, and revegetation. Specific BMPs and practices will be developed once [a route is selected by the Commission], and as engineering and design of the project are being finalized and incorporated into the project-specific Stormwater Pollution Prevention Plan.²²⁶

Soil erosion mitigation measures are standard Commission permit conditions.²²⁷

Surface Water

The overall impact intensity level is anticipated to be minimal for all routing options. Potential impacts are anticipated to be short-term, of a small size, and localized. Impact can be mitigated.

The project is within the Shell Rock River watershed, which is part of the Cedar River Basin.²²⁸ The Shell Rock River drains approximately 160,000 acres (246 square miles)—all in Freeborn County. It begins at Albert Lea Lake, and flows through Freeborn County until it reaches the Cedar River in Iowa, which is a tributary to the Mississippi River. The project will cross the Shell Rock River. It also crosses perennial drainage ditches and intermittent streams.

Public Waters

Certain waters in Minnesota are classified as public waters under Minnesota Statute 103G.005. A public waters designation means that DNR has regulatory jurisdiction over the use of the water, meaning lake, watercourse, or wetland. Utilities are required to obtain a license to cross state lands and waters.²²⁹ Projects affecting the course, current, or cross-section of lakes, wetlands, and streams that are public waters may require a Public Waters Work Permit.²³⁰ The Teal, Orange, and Gold routing options cross a public water: the Shell Rock River. The Gold route segment crosses an additional public water: an unnamed stream.

Impaired Waters List

“The federal Clean Water Act requires states to designate beneficial uses for all waters and develop water quality standards to protect each use.”²³¹ Minnesota water quality standards protect lakes, rivers, streams, and wetlands by defining how much of a pollutant (bacteria, nutrients, turbidity, mercury, etc.) can be in the water before it is no longer drinkable, swimmable, fishable, or useable in other, designated ways (called “beneficial uses”). The Shell Rock River’s designated beneficial use is aesthetic enjoyment.

²²⁶ Application at page 49.

²²⁷ Generic Route Permit Template at Section 5.3.7.

²²⁸ Minnesota Pollution Control Agency (n.d.) *Basins and Major Watersheds in Minnesota*, Retrieved April 25, 2018, from: <https://www.pca.state.mn.us/sites/default/files/wq-ws1-01.pdf> .

²²⁹ Minn. Stat. 84.415.

²³⁰ Minnesota Department of Natural Resources (n.d.) *Requirements for Projects Involving Public Waters Work Permits*, Retrieved March 15, 2018, from: http://www.dnr.state.mn.us/waters/watermgmt_section/pwpermits/requirements.html.

²³¹ Minnesota Pollution Control Agency (n.d.) *Water Quality Standards*, Retrieved April 25, 2018, from: <https://www.pca.state.mn.us/water/water-quality-standards> .

The Shell Rock River, from Albert Lea Lake to Goose Creek, is listed on the MPCA Impaired Waters List. An impaired water fails to meet one or more water quality standards. The Shell Rock River is listed for aquatic macroinvertebrates bioassessments, dissolved oxygen, fishes bioassessments, nutrient/eutrophication biological indicators, pH, and turbidity that affect aquatic life. These designations do not impact aquatic recreation, aquatic consumption, or drinking water.²³² The majority of these issues appear to stem from the river's headwater lakes: Pickerel, Fountain, and Albert Lea.²³³

Once a waterbody is added to this list, a Total Maximum Daily Load (TMDL) must be developed for it. "A TMDL is the maximum amount of a pollutant a body of water can receive without violating water quality standards, and an allocation of that amount to the pollutant's sources. The TMDL process identifies all sources of a pollutant and determines how much each source must reduce its contribution in order to meet the standard."²³⁴ Currently a TMDL has been approved for fecal coliform, but are needed for dissolved oxygen, fishes bioassessments, aquatic macroinvertebrate bioassessments, nutrient/eutrophication biological indicators, pH, and turbidity.²³⁵

Potential Impacts

Impacts are similar for all routing options, except that the Purple routing options do not cross surface waters. Potential impacts are anticipated to be short-term, of a small size, and localized. Impacts can be minimized. The overall impact intensity level is anticipated to be minimal.

Surface waters can be impacted during construction because of vegetation clearing, ground disturbances, and construction traffic. These activities can speed water flow and expose previously undisturbed soils, increasing erosion and the potential for sediment to reach surface waters. Disturbed soils will generally be limited to pole locations; however, areas outside these locations may be disturbed. Impacts are not anticipated once the project is constructed.

Mitigation

Impacts to surface waters can be avoided by selecting routes, alignments, and pole placements outside of surface waters. Additionally, spanning waterbodies and watercourses avoids direct impacts to surface waters within the selected route. Other mitigation measures include using BMPs to reduce soil erosion. Temporary bridges can span watercourses, if necessary, to avoid driving vehicles in a stream or river bed. Construction and maintenance during frozen ground conditions also minimizes impacts to surface waters.

Standard mitigation measures regarding water resources are included as Commission permit conditions.²³⁶ Freeborn Wind would be required to obtain all necessary "downstream" permits for construction of the project. This will include a License to Cross Public Lands and Waters from DNR, which will require the company to demonstrate that the water crossings are consistent with best practices.

Freeborn Wind committed to the following in its route permit application:

²³² Minnesota Pollution Control Agency (April 4, 2018) *Minnesota's Proposed 2018 Impaired Waters List*, Retrieved April 25, 2018, from: <https://www.pca.state.mn.us/sites/default/files/wq-iw1-58.xlsx> .

²³³ See Minnesota Pollution Control Agency (n.d.) *Shell Rock River*, Retrieved April 25, 2018, from: <https://www.pca.state.mn.us/water/watersheds/shell-rock-river#overview> .

²³⁴ Minnesota Pollution Control Agency (n.d.) *Total Maximum Daily Load (TMDL) Projects*, Retrieved April 25, 2018, from: <https://www.pca.state.mn.us/water/total-maximum-daily-load-tmdl-projects> .

²³⁵ Minnesota Pollution Control Agency (n.d.) *Impaired Water Viewer: Impaired Waters Draft 2018*, Retrieved April 25, 2018, from: <https://www.pca.state.mn.us/water/impaired-waters-viewer-iwav#glossary> .

²³⁶ Generic Route Permit Template at Section 5.3.8.

Freeborn Wind will obtain a National Pollution Discharge Elimination System stormwater permit, which is necessary for the project. During construction, Freeborn Wind will follow standard erosion control measures identified in the applicable Stormwater BMP Manual, such as using silt fences to minimize the potential for erosion and sedimentation into water bodies within the project area. Freeborn Wind will maintain sound water and soil conservation practices during construction and operation of the transmission line to protect topsoil and adjacent water resources and minimize soil erosion. Practices include using traditional and low-impact development stormwater management approaches, such as managing stormwater on-site, controlling rate and volume of stormwater reaching receiving waters to predevelopment levels, installing vegetated buffers, containing excavated material, protecting exposed soil, stabilizing restored soil, and revegetation. Specific BMPs and practices will be developed once [a route] has been approved..., and as engineering and design of the project are being finalized and incorporated into the Project-specific Stormwater Pollution Prevention Plan. Once the project is completed, it will have no impact on surface water quality.²³⁷

Vegetation

The overall impact intensity level for all routing options is minimal. Potential impacts will be short-term and of a small size. Impacts will be localized and not affect unique resources. Impacts can be minimized.

Prior to European settlement Freeborn County was dominated by bur oak savanna, but areas of tallgrass prairie and maple-basswood forest were common.²³⁸ Today, many areas have been converted to agricultural production. Land cover types within the project area—in Minnesota—are approximately 84 percent cultivated crops and eight percent developed space, for example, homesteads and roads. Grassland accounts for four percent and wetlands account for three percent of land cover types.²³⁹

Table 11 summarizes NLCD land cover by route width, the table is color coded to coincide with **Map 5**, which illustrates land cover within the project area.

Table 13 NLCD Land Cover by Route Width

| NLCD Cover Type | Teal | | Orange | | Gold | | Purple | |
|---------------------|-------|-----|--------|-----|-------|-----|--------|-----|
| | Acres | %** | Acres | %** | Acres | %** | Acres | %** |
| Open Water | < 0 | < 0 | < 0 | < 0 | 2 | 2 | - | - |
| Developed* | 65 | 20 | 60 | 22 | 20 | 16 | 2 | 3 |
| Forest | - | - | - | - | 1 | 1 | < 0 | < 0 |
| Shrub/Scrub | - | - | - | - | - | - | - | - |
| Grassland | 1 | 1 | 1 | < 0 | 9 | 7 | - | - |
| Pasture/Hay | - | - | - | - | - | - | - | - |
| Cultivated Crops | 270 | 78 | 209 | 75 | 82 | 65 | 70 | 96 |
| Woody Wetlands | - | - | - | - | 2 | 2 | - | - |
| Herbaceous Wetlands | 8 | 2 | 8 | 3 | 11 | 9 | - | - |

* Developed includes open space, low intensity, medium intensity, and high intensity.

** Percent might not equal 100 due to rounding.

²³⁷ Application at page 49.

²³⁸ Minnesota Department of Natural Resources (n.d.) *Oak Savanna Subsection*, Retrieved April 3, 2018, from: <https://www.dnr.state.mn.us/ecs/222Me/index.html>.

²³⁹ U.S. Geological Survey (2011) *NLCD 2011 Land Cover*, Retrieved May 9, 2018, from <https://www.mrlc.gov/nlcd2011.php>.

| | |
|-----------------------------|---|
| Open Water: | Areas of open water, generally with less than 25 percent cover of vegetation or soil. |
| Developed: | All developed areas, including areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses to highly developed areas where people reside or work in high numbers. |
| Forest: | Areas dominated by trees generally greater than 15 feet tall, and greater than 20 percent of total vegetation cover. |
| Grassland: | Areas dominated by graminoid or herbaceous vegetation, generally greater than 80 percent of total vegetation. These areas are not subject to intensive management such as tilling, but can be utilized for grazing. |
| Cultivated Crops: | Areas used for the production of annual crops, such as corn and soybeans. Crop vegetation accounts for greater than 20 percent of total vegetation. This class also includes all land being actively tilled. |
| Woody Wetlands: | Areas where forest or shrubland vegetation accounts for greater than 20 percent of vegetative cover and the soil or substrate is periodically saturated with or covered with water. |
| Herbaceous Wetlands: | Areas where perennial herbaceous vegetation accounts for greater than 80 percent of vegetative cover and the soil or substrate is periodically saturated with or covered with water. |

While not reflected in the table above, there is a small three-tenths of an acre woodlot within the Teal and Orange route width (**Figure 13**).

DNR maps native prairie. There are no mapped native prairies within any routing option, “but not all native prairies have been identified and mapped so there may be unmapped areas. Therefore, Freeborn Wind conducted in-field native prairie evaluations in September 2015 and November 2016. There are 19.3 acres of potential prairie ... near the Glenworth Substation and north of the Shell Rock River.”²⁴⁰

The Minnesota Department of Agriculture (MDA) administers the Minnesota Noxious Weed Law. Noxious weeds are defined as an annual, biennial, or perennial plant designated to be injurious to public health, the environment, public roads, crops, livestock, or other property. The purpose of the law is to protect residents of Minnesota from the injurious effects of these weeds.²⁴¹ MDA lists four categories of noxious weeds with differing levels of eradication, control, reporting, transport, sales, and propagation requirements. There are 14 weeds on the eradicate list and nine on the control list; there are 15 restricted weeds.²⁴² None of the weeds on these lists are to be transported, propagated, or sold in the state.

²⁴⁰ Application at page 50.

²⁴¹ Minnesota Department of Agriculture (2018) *2018 Noxious Weed List*, Retrieved May 3, 2018, from: http://www.mda.state.mn.us/plants/pestmanagement/weedcontrol/~/_media/Files/plants/weeds/noxiousweeds2018.pdf.

²⁴² *Ibid.*

Potential Impacts

The overall impact intensity level for all routing options is minimal. Potential impacts will be short-term and of a small size. Impacts will be localized and not affect unique resources. Impacts can be minimized.

Construction activities will cause both short- and long-term impacts to vegetation. Short-term impacts will result from grading and other physical disturbances. Construction activities, such as site preparation and structure installation might remove, disturb, or compact vegetation. Establishing and using access roads and staging and stringing areas will concentrate surface disturbance and equipment use causing short-term impacts to vegetation.

Construction activities could introduce noxious weeds and invasive species, especially ground disturbance that leaves soils exposed for extended periods, introduction of topsoil contaminated with weed seeds, vehicles importing weed seed from a contaminated site to an uncontaminated site, and conversion of landscape type, particularly from forested to open settings. Noxious weeds have potential to dominate and displace native plants and plant communities, permanently altering ecosystem functions.

Long-term impacts include removal of woody vegetation within the right-of-way, which will result in conversion to low-stature vegetation (shrubs and grasses) throughout its length. Freeborn Wind would routinely clear woody vegetation from the right-of-way to ensure it does not interfere with the safe operation of the HVTL. Removal of woody vegetation will widen existing corridors through wooded areas, or remove wooded areas from the landscape. Habitat fragmentation is discussed in more detail in the WILDLIFE SECTION. Conversion of wooded landscapes to open landscapes could indirectly affect native vegetation by increasing potential for spread of invasive and non-native species. Tree clearing would occur along the Gold parallel option and the Teal and Orange routes. Some removal might occur along the Gold overbuild option, but because this routing option uses existing rights-of-way impacts are not expected.

The project will not cross mapped native prairie; however, the Teal, Orange, and Gold routing options will cross potential prairie. This resource will be spanned. The Purple and Gold overbuild options will require construction of a temporary shoo-fly line while the existing transmission line is removed. This would occur within the existing right-of-way. Use of a shoo-fly line increases direct impacts to vegetation.

Maintenance and emergency repair activities could result in direct impacts to vegetation from removal, disturbance, or compaction caused by these activities. Maintenance and emergency repair is expected to be infrequent throughout the life of the project, and potential impacts to vegetation would be short-term and more localized than construction-related impacts.

Mitigation

Impacts to vegetation, especially trees, can be avoided or minimized by selecting routes or alignments within selected routes that avoid important vegetation resources. Collocating with existing infrastructure rights-of-way, for example, roadways or transmission lines, might limit tree removal. Plant communities can be spanned. Additionally, new plantings within the right-of-way of compatible cover types, or planting of tall-growing trees in areas outside the right-of-way can mitigate impacts.

Figure 13 Woodlot near 130th Street and U.S. Highway 65



Freeborn Wind committed to “reseed 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.”²⁴³ The company indicates that common practices will be used to reestablish vegetation. These include: soil decompaction; erosion control; hydro seeding or planting individual seeds or seedlings of non-invasive, native species; and monitoring to insure invasive species do not take hold and the vegetation establishes.

Mitigation measures to reduce the spread of invasive and non-native plant species during construction include: regular frequent cleaning of construction equipment and vehicles; minimizing ground disturbance to the greatest degree practicable and rapid revegetation of disturbed areas with native or appropriately certified weed-free seed mixes; conducting field surveys of the right-of-way prior to construction to identify areas containing noxious weed (weed surveys during construction would identify infestations of the right-of-way and staging sites); eradicating new infestations as soon as practicable in conjunction with property owners input.

Impacts to areas considered potential native prairie can be mitigated by limiting ground disturbance to the greatest extent possible. Freeborn Wind indicates that it intends to coordinate with DNR and use native seed mix for revegetation in this area.

Finally, impacts can be mitigated by compensating individual landowners through negotiated easement agreements. Mitigation and restoration measures for vegetation are standard Commission route permit conditions.²⁴⁴

Wetlands

The overall impact intensity level is minimal for all routing options. Potential impacts will be short- and long-term and of a small size. Impacts can be minimized.

“Wetlands are areas where the frequent and prolonged presence of water at or near the soil surface drives the natural system meaning the kind of soils that form, the plants that grow and the fish and/or wildlife communities that use the habitat. Swamps, marshes, and bogs are well-recognized types of wetlands. However, many important specific wetland types have drier or more variable water systems....”²⁴⁵

Wetlands provide many ecological benefits, such as erosion and flood control, fish and wildlife habitat, and groundwater recharge and discharge.²⁴⁶ They also serve as a “natural filter” by trapping and absorbing sedimentation and some pollutants. Approximately 10.62 million acres of wetlands are found across Minnesota.²⁴⁷ Wetlands vary by soil, hydrology, and vegetation, and are typically seasonal in their extent.

Certain wetlands are federally protected under Section 404 of the Clean Water Act. “Section 404 requires a permit before dredged or fill material may be discharged into waters of the United States,” including

²⁴³ Application at page 23.

²⁴⁴ Generic Route Permit Template at Section 5.3.9.

²⁴⁵ U.S. Environmental Protection Agency (April 23, 2018) *Section 404 of the Clean Water Act: How Wetlands are Defined and Identified*, Retrieved May 9, 2018, from: <http://www.epa.gov/cwa-404/section-404-clean-water-act-how-wetlands-are-defined-and-identified>.

²⁴⁶ Minnesota Department of Natural Resources (n.d.(h)) *Wetlands*, Retrieved April 25, 2018, from: <https://www.dnr.state.mn.us/wetlands/index.html>.

²⁴⁷ Minnesota Department of Natural Resources (May 2013) *Status and Trends of Wetlands in Minnesota: Wetland Quantity Trends from 2006 to 2011*, Retrieved April 25, 2018, from: https://files.dnr.state.mn.us/eco/wetlands/wstmp_trend_report_2006-2011.pdf, at page 1.

wetlands.²⁴⁸ This permit is administered by USACE. Under Section 401 of the Clean Water Act “any applicant for a federal license or permit to conduct an activity that may result in a discharge of a pollutant into waters of the United States to obtain a certification from the State in which the discharge originates that the discharge complies the applicable water quality standards.”²⁴⁹ In Minnesota, the MPCA administers Section 401 on non-tribal lands and issues a Water Quality Certification that becomes a condition of the federal permit.

In Minnesota, wetlands are also protected under the WCA, which is administered by the Board of Water and Soil Resources. Freeborn County oversees local implementation of the WCA in the project area. The WCA requires that any person “proposing to impact a wetland to first, attempt to avoid the impact; second, attempt to minimize the impact; and finally, replace any impacted area with another wetland of at least equal function and value.”²⁵⁰

USFWS began producing wetland maps, known as the National Wetland Inventory (NWI), based on aerial photographs and Natural Resources Conservation Service soil surveys starting in the 1970s. DNR led a multi-agency collaborative effort to update and replace the original 1980s NWI maps. The updated NWI data are primarily based on spring aerial imagery acquired in 2010 and 2011, elevation data, and other more modern data. Field checking was performed on a limited subset of data.

“It is important to remember that the NWI was never intended to serve as jurisdictional wetland delineation and should not be used as such. Wetland inventories determined from aerial photography and other remote sensing information cannot be expected to be able to precisely determine jurisdictional wetland boundaries for the purposes of wetland permitting. Qualified wetland professionals should perform wetland delineations for this purpose in the field.”²⁵¹ The NWI Update is nonetheless a useful planning tool that “indicates a high probability of the presence of wetlands in a location.”²⁵²

Wetlands are present throughout the project area; however, the vast majority are associated with the Shell Rock River Crossing (**Map 8**). **Table 14** provides approximate acres of potentially impacted wetlands were calculated using GIS desktop analysis using the NWI Update. Colors in **Table 14** and **Map 8** coincide. This exercise indicated that the route widths of the Teal and Orange routes and the Gold options intersect undelineated wetlands. Wetland types include freshwater emergent and forested/shrub wetlands. Generally, these wetlands can be described as shallow open water areas and marshes, shrub and hardwood wetlands, and seasonally flooded basins.²⁵³

Potential Impacts

The overall impact intensity level is expected to be minimal for all routing options. Impacts will be short- and long-term and of a small size. Impacts can be minimized.

²⁴⁸ Environmental Protection Agency (December 5, 2017) *Section 404 of the Clean Water Act: Section 404 Permit Program*, Retrieved April 25, 2018, from: <https://www.epa.gov/cwa-404/section-404-permit-program>.

²⁴⁹ Minnesota Pollution Control Agency (n.d.) *Clean Water Act Section 401 Water Quality Certifications*, Retrieved May 3, 2018, from: <https://www.pca.state.mn.us/water/clean-water-act-section-401-water-quality-certifications>.

²⁵⁰ Minn. R. 8420.0100, subp. 2.

²⁵¹ Minnesota Department of Natural Resources (n.d.) *NWI Project FAQs*, Retrieved April 25, 2018, from: https://www.dnr.state.mn.us/eco/wetlands/nwi_faq.html.

²⁵² *Ibid.*

²⁵³ Minnesota Department of Natural Resources (n.d.) *Wetlands*, Retrieved April 25, 2018, from: <https://www.dnr.state.mn.us/wetlands/index.html>.

Table 14 NWI Wetlands in Route Width

| NWI Wetlands* | Teal | Orange | Purple | Gold | Project Area |
|---------------------------|-------|--------|--------|-------|--------------|
| | Acres | Acres | Acres | Acres | Acres |
| Freshwater Emergent | 5.69 | 5.69 | -- | 7.59 | 398 |
| Freshwater Forested/Shrub | 0.79 | 0.79 | -- | 0.76 | 84 |
| Freshwater Pond | -- | -- | -- | 2.11 | 39 |
| Riverine | 1.51 | 1.51 | -- | 2.05 | 61 |

*Non-delineated wetlands.

Wetlands consist of organic soils comprised of layers of decomposed plant material that formed very slowly. It is not easy to repair a disturbed wetland.²⁵⁴ When construction of a power line requires activity near or across a wetland, potential to impact it exists. However, crossing a wetland does not necessarily mean it will be impacted; in some cases it can be spanned.

When crossing a wetland requires construction activities within the wetland strong potential for impacts exists. Construction typically includes vegetation clearing, movement of soils, and traffic. These activities can lead to direct or indirect impacts. For example, access roads cause soil compaction, which can change water flow to the wetland (indirect), or soil erosion runoff, which can increase water turbidity levels (direct). Impacts that influence the hydrology in the area—even small changes—might significantly impair the function of the wetland.

Regardless of whether a power line can span a wetland, safe operation of the line will necessitate removal of woody vegetation. In areas where forested/shrub wetlands exist this will result in wetland conversion, that is, tree clearing will change the function of a forested/shrub wetland to a different wetland type within the right-of-way. Ongoing maintenance makes this conversion permanent. Consequently, the type and magnitude of wetland function would change, for example, wildlife habitat, flood flow attenuation, and sediment stabilization and retention.

Potential impacts to non-delineated wetlands are identified below. Freeborn Wind anticipates that a limited number of structures will be placed within a delineated wetland.

Teal and Orange Potential impacts are identical. These routes cross emergent and forested wetlands. Tree clearing would be necessary within forested/shrub wetlands. The route width overlaps emergent, forested, and riverine wetland classifications. Specifically, it crosses shallow marsh and seasonally flooded basin (PEM1C, PEM1A); shrub and hardwood wetland (PSS1C, PFO1A) and river (R2UBH). The shrub wetland is outside the anticipated right-of-way, the hardwood wetland is not.

According to desktop review, the area is tree covered; therefore, staff has no reason to believe that hardwood wetlands do not occur in this location. GIS and Google Earth²⁵⁵ measurements are consistent in that fifteen hundredths of an acre of hardwood wetland would be converted to a different wetland type. This wetland is adjacent to U.S. Highway 65, as such, the quality of habitat it provides is unknown. It likely filters water coming from the highway before it reaches the Shell Rock River; however, any wetland type would be expected to serve this purpose.

²⁵⁴ Public Service Commission of Wisconsin (July 2013).

²⁵⁵ Google (February 6, 2018) *Google Earth Pro*.

Gold This routing option crosses emergent and forested wetlands. It is likely that tree clearing would not be necessary within forested/shrub wetlands. The route width overlaps an approximately four-tenths of an acre classified as hardwood wetland (PF01C). This wetland is outside the parallel option proposed right-of-way but the overbuild option right-of-way crosses about 850 square feet of non-delineated wetland. It is unlikely this wetland type would be impacted, however, considering an existing right-of-way would be followed. Further, this wetland is on a non-participating landowners homestead.

The remaining wetlands crossed are associated with the Shell Rock River. Here the route width overlaps emergent, forested, pond, and riverine wetland classifications. Specifically, it crosses shallow marsh (PEM1C, PEM1F); shrub wetland (PSS1A); shallow open water community (PUBFx, PUBF); and river (R2UBH). Similar to above, the shrub wetland is outside the parallel option proposed right-of-way but the overbuild option crosses about 500 square feet of the wetland. Again, it is unlikely this wetland type would be impacted; however, considering an existing right-of-way would be followed. This wetland is also not on participating landowner's property.

Purple Impacts to wetlands will not occur.

Mitigation

Potential impacts to wetlands can be avoided by selecting routes, alignments, and structure placements outside of wetlands. When a wetland crossing is unavoidable spanning wetlands to the greatest extent possible is the preferred mitigation. If wetlands cannot be avoided, impacts can be minimized by a variety of strategies including: use of construction mats and silt tubes, conducting construction and maintenance activities during winter months when the ground is frozen, spreading spoils from structure placement outside the wetland, assembling structures on upland areas prior to site installation, and transporting crews and equipment, to the extent possible, over improved roads and via routes which minimize transit over wetlands. Commission route permits require permittees to avoid and minimize wetland impacts.²⁵⁶

Freeborn Wind committed to the following mitigation in the route permit application:

Freeborn Wind will not allow construction equipment to be driven across waterways unless there is no other reasonable alternative for construction and only after discussion with the appropriate resource agency and any necessary permits are obtained. Where waterways must be crossed to pull in the new conductors and shield wires, workers may walk across or use boats. These construction practices help prevent soil erosion and ensure that equipment fueling and lubricating will occur at a distance from waterways.²⁵⁷

In wetland areas, pole locations will be placed in upland areas to span over wetlands to the greatest extent possible. Construction crews will maintain sound water and soil conservation practices during construction and operation of the facilities to protect topsoil and adjacent water resources and to minimize soil erosion. Practices may include containing excavated material, protecting exposed soil, and stabilizing restored soil. Crews will avoid major disturbance of individual wetlands and drainage systems during construction. This will be accomplished by strategically locating new access roads outside of wetlands and other sensitive areas to the extent practicable, minimizing the length of roads, and spanning wetlands and drainage systems where possible.²⁵⁸

²⁵⁶ Generic Route Permit Template at Section 5.3.8.

²⁵⁷ Application at pages 21, 22.

²⁵⁸ Application at page 22.

All mapped water features will be field-delineated prior to construction. If wetland impacts cannot be avoided, Freeborn Wind will submit a permit application to the USACE for dredge and fill within waters of the U.S. under Section 404 of the Clean Water Act, to the Local Government Unit for Minnesota Water Conservation Act coverage, and the MPCA for Water Quality Certification under Section 401 of the Clean Water Act prior to construction.²⁵⁹

Wildlife and Wildlife Habitat

Impacts to wildlife are similar, except that greater potential for bird collisions occurs along the Purple and Gold overbuild options. Potential impacts will be short- and long-term, of a relative small size, and localized. Impacts to unique resources are not anticipated. While direct significant impacts (severe injury or death) may occur to individuals, population level impacts are not anticipated. The overall impact intensity level is expected to be minimal.

Potential impacts to wildlife habitat are anticipated to be similar for all routing options. Impacts will be short- and long-term, of a relative small size, and localized. The overall impact intensity level is expected to be minimal.

Landscape types and vegetation communities vary throughout the project area; however, the majority of habitat within the route width of the various routing options is disturbed open land habitat dominated by agricultural row crops. Fallow fields, fencerows, and woodlots throughout the local vicinity provide habitat for terrestrial and avian wildlife. The Shell Rock River area provides wetland habitats in the local vicinity of the different routing options.

Wildlife

Wildlife species utilizing the local vicinity are adapted to agriculture and developed landscapes. Terrestrial wildlife species in the project area are common species associated with disturbed habitats, and are accustomed to human activities occurring in the area, for example, agricultural activities and road traffic. Common mammals that are likely to occur include opossum, eastern cottontail, white-tailed deer, raccoon, and prairie mole; common reptiles and amphibians include gopher snake, American toad, northern leopard frog, and snapping turtle.²⁶⁰

Freeborn Wind has conducted a number of wildlife studies for the wind farm portion of the project documenting avian and bat use of the project area, including the different HVTL routing options. These include: raptor nest study, eagle nest monitoring, follow-up eagle nest study, large bird use study, small-bird use study, wetland bird use study, and bat acoustic study.²⁶¹ Based on these studies, the most commonly observed passerine species include the European starling, common grackle, red-winged blackbird, house sparrow, American robin, horned lark, and song sparrow. Common large birds in the project area include the American crow, Canada goose, greater white-fronted goose, mallard, and blue-winged teal.²⁶²

There are no bald eagle nests within the route width of any routing option. The closest bald eagle nest is located approximately 1,500 feet to the west of the Teal and Orange routes along the Shell Rock

²⁵⁹ Application at page 48.

²⁶⁰ *Id.* at page 52.

²⁶¹ *Id.* at page 51.

²⁶² *Id.* at page 51.

River.²⁶³ However, residents in the area commonly observe bald eagles throughout the project area.²⁶⁴ Southern Minnesota is home to other raptor species as well, such as the red-tailed hawk.

Wildlife Habitat

Habitat for **open land** wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Habitat for **woodland** wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Habitat for **wetland** wildlife consists of open, marshy or swampy shallow water areas.²⁶⁵

There are no WMAs, AMAs, Sites of Biodiversity Significance, or SNAs; or USFWS Waterfowl Production Areas within the route width of any routing option. One WMA exists to the west of the project just across U.S. Highway 65 along with a MBS Site of Biodiversity Significance. These features were discussed previously in RARE AND UNIQUE RESOURCES SECTION.

Habitat Fragmentation is “usually defined as a landscape-scale process involving both habitat loss and the breaking apart of habitat.”²⁶⁶ This definition, however, does not isolate the impact of fragmentation independent of habitat loss. The potential impact from habitat fragmentation—when controlled for habitat loss—is “generally much weaker than the effects of habitat loss,” and is “at least as likely to be positive as negative.”²⁶⁷ Negative impacts associated with habitat fragmentation include 1) an increased number of smaller habitat patches interspersed among larger areas of non-suitable habitat, and 2) increased “edge for a given amount of habitat.”²⁶⁸

“An ‘edge’ is the boundary, or interface, between two biological communities or between different landscape elements.”²⁶⁹ Edge effects may alter habitats that are important to interior forest dwellers through microclimate changes to these areas. Additionally, increased predation, competition, and parasitism from plants and animals intruding on interior forest environments can become more prevalent, as well as interior forest species increasingly moving through and along edges, that is, habitat transition areas.²⁷⁰ In locations where the HVTL will parallel existing right-of-way, edge effects will be limited to one side. As a result, edge effects are expected to intensify in locations where new right-of-way will be created and lessen where existing is expanded.

²⁶³ *Id.* at page 51.

²⁶⁴ See Minnesota Department of Commerce (n.d.) *Public Comments and Meeting Notes*, Retrieved February 21, 2018, from: <https://mn.gov/commerce/energyfacilities/resource.html?id=34765>.

²⁶⁵ United States Department of Agriculture (1980) *Soil Survey of Freeborn County, Minnesota*, Retrieved May 10, 2018, from: https://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/minnesota/MN047/0/Freeborn_MN.pdf.

²⁶⁶ Fahrig, L. (2003) *Effects of Habitat Fragmentation on Biodiversity*, ANNUAL REVIEW OF ECOLOGY AND SYSTEMATICS 2003(34):487-515, Retrieved May 7, 2018, from: http://www.montana.edu/hansenlab/documents/bio515_13/fahrig%202003.pdf at page 487.

²⁶⁷ *Id.* at page 502.

²⁶⁸ *Id.* at page 505.

²⁶⁹ British Columbia Ministry of Forests Research Program (June 1998) *Biodiversity and Interior Habitats: The Need to Minimize Edge Effects*, Retrieved April 25, 2018, from: <https://www.for.gov.bc.ca/hfd/pubs/Docs/En/En21.pdf>.

²⁷⁰ British Columbia Ministry of Forests Research Program (June 1998); see also Fahrig, L. (2003) at page 505.

Potential Impacts: Wildlife

Impacts to wildlife are similar, except that greater potential for bird collisions occurs along the Purple and Gold routing options. Potential impacts will be short- and long-term, of a relative small size, and localized. Impacts to unique resources are not anticipated. While direct significant impacts (severe injury or death) might occur to individuals, population level impacts are not anticipated. The overall impact intensity level is expected to be minimal.

Terrestrial Species

Wildlife using the route width are expected to relocate during construction due to increased noise and human activity. Direct significant impacts to individual species might occur during structure placement, that is, small species individuals might be crushed. The majority of wildlife would likely return to the area after construction; however, others might be permanently displaced. Because surface waters will be spanned impacts to aquatic species are not anticipated. Population level effects will not occur.

Avian Species

Birds using the route width might relocate during construction due to increased noise and human activity. The majority of would likely return to the area after construction; however, others might be permanently displaced. Construction and operation of the project is not expected to impact eagle nests or foraging areas. Once constructed, birds might collide with or be electrocuted by conductors and equipment, either of which could easily result in death. Collisions are more likely for large-bodied birds with long wing spans, such as swans, geese, and ducks; however, any size species could collide with a conductor. The Purple and Gold overbuild options are more likely to cause bird collisions due the vertical height of the HVTL and the number of conductors.

Electrocution is also more common in large bodied birds, but, again, any species can be electrocuted. Because of their smaller size, electrocution risk is greater on distribution lines.²⁷¹

During scoping individuals raised specific concerns about bald eagles. Power lines electrocute all types of birds, including bald eagles, “because many designs of electric industry hardware place conductors and groundwires close enough together that raptors can touch them simultaneously with their wings or other body parts.”²⁷² Electrocution is most prevalent when the power line structure is the tallest feature on the landscape, such as on a bluff or in an open prairie.

Dry feathers provide insulation; therefore, “birds must typically contact electrical equipment with conductive fleshy parts for electrocution to occur. Fleshy parts include the feet, mouth, bill, and the wrists from which the primary feathers originate.”²⁷³ Bald eagles have wingspans ranging from five and one-half to eight feet and heights of 18 to 28 inches. Wrist-to-wrist distances approach 36 inches. Because bald eagles use power line structures as a perch for a variety of reasons, such as resting, sunning, feeding, hunting, and territorial defense,²⁷⁴ the most critical component of avian electrocution is the “physical

²⁷¹ Avian Power Line Interaction Committee, Edison Electric Institute, and California Energy Commission (2006) *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006*, Retrieved April 11, 2018, from: <https://www.nrc.gov/docs/ML1224/ML12243A391.pdf> at page 56.

²⁷² Avian Power Line Interaction Committee, Edison Electric Institute, and Raptor Research Foundation (1996) *Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 1996*, Retrieved April 11, 2018, from: <https://law.resource.org/pub/us/cfr/ibr/002/aplic.raptor.1996.pdf> at page 15.

²⁷³ Avian Power Line Interaction Committee, et. al., (2006) at pages 36, 37.

²⁷⁴ Avian Power Line Interaction Committee, et. al., (1996) at page 15.

separation between energized and/or grounded structures, conductors, hardware, or equipment that can be bridged by birds to complete a circuit. As a general rule, electrocution can occur on structures with the following:

- Phase conductors separated by less than the wrist-to-wrist or head-to-toe distance of a bird;
- Distance between grounded hardware (for example, grounded wires, metal braces) and any energized phase conductor that is less than wrist-to-wrist or head-to-foot distance of a bird.”²⁷⁵

Freeborn Wind indicates the project will be constructed to meet standards established by the Avian Power Line Interaction Committee (APLIC), which leads the electric utility industry in protecting avian resources while enhancing reliable energy delivery.²⁷⁶ Further, the company stated that “Xcel Energy transmission line design standards provide adequate spacing to eliminate the risk of raptor electrocution.”²⁷⁷

In 2002, Xcel Energy Operating Companies, including Xcel Energy, entered into a voluntary Memorandum of Understanding with the USFWS to work together to address avian issues throughout its service territories. The Memorandum of Understanding sets forth standard reporting methods and the development of Avian Protection Plans (APP) for each state that Xcel Energy serves. APPs include designs and other measures aimed at preventing avian electrocutions as described in guidance provided by the APLIC and the guidelines for developing APPs. The APP for the Minnesota Territory is complete and retrofit actions for areas with potential avian impacts are underway across the territory. Xcel Energy also addresses avian issues related to transmission projects by:

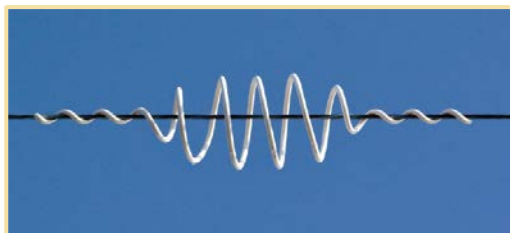
- Working with resource agencies such as DNR and USFWS to identify areas that may be appropriate for marking transmission line shield wires with bird diverters; and
- Attempting to avoid areas known as primary migration corridors or migratory resting areas.²⁷⁸

Mitigation: Wildlife

Potential impacts to wildlife can be avoided by routing power lines away from habitat or migratory corridors. Impacts can be minimized by spanning quality habitats and minimizing the number of structures to the extent practicable.

Impacts to avian species can be minimized by diverting bird flights away from transmission lines through the use of bird diverters placed on shield wires. Diverters are placed on the top shield wire because of the natural tendency for birds to avoid obstacles in flight by increasing altitude. Bird diverters can be used over open water and wetland areas, or near natural openings and funnels within forested areas near habitats used by avian species, especially waterfowl species. Freeborn Wind indicates it will work with DNR to identify areas where bird flight diverters are needed.

Figure 14 Bird Diverter



²⁷⁵ Avian Power Line Interaction Committee, et. al., (2006) at page 55.

²⁷⁶ Avian Power Line Interaction Committee (2018) *Avian Power Line Interaction Committee*, Retrieved May 7, 2018, from: www.aplic.org.

²⁷⁷ Application at page 52.

²⁷⁸ Application at page 51.

Impacts to avian species caused by electrocution can be mitigated by the use of BMPs for conductor spacing and shielding. These practices are codified in APLIC standards. Adherence to these standards is a standard Commission route permit condition.²⁷⁹

Potential Impacts: Wildlife Habitat

The overall impact intensity level is expected to be minimal for all routing options. Impacts will be short- and long-term, of a relative small size, and localized.

Clearing vegetation within rights-of-way can widen existing corridors or bisect “greenfield” areas to establish new right-of-way. The composition and structure of vegetation—and, as a result, wildlife habitat—will be altered in these areas. Habitat loss has a consistent negative affect on biodiversity and can adversely impact species richness, population growth rates, reductions in habitat specialist species, and breeding success, among other measures.²⁸⁰

The majority of the project area is classified as developed or cultivated cropland; therefore, any impacts to wildlife habitat will limited to areas near the Shell Rock River. While forested wetlands will be converted to low stature wetlands, quality habitat conversion will be minimal given the proximity to U.S. Highway 65. The HVTL would be located adjacent to an existing rights-of-way near the Shell Rock River meaning these effects would largely be limited to one side of the right-of-way and would not create newly fragmented areas. The potential for the introduction and spread of invasive plant species exists.

Wildlife Habitat Mitigation

Use of existing rights-of-way can minimize habitat loss, and paralleling existing rights-of-way can minimize habitat fragmentation. Coordination with resource agencies can help to identify native seed mixes that provide greatest benefit to wildlife. Freeborn Wind committed to “reseed 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.”²⁸¹

The wire/border zone method allows for different types and heights of vegetation based on whether the vegetation is directly underneath the conductor (wire zone) or elsewhere in the right-of-way (border zone). This “softens” the edge of the habitat transition zone. This type of vegetation management might be appropriate in areas near the Shell Rock River.

Wire Zone: Area directly underneath the conductors, including potential conductor sway. Vegetation in this zone consists of low-growing forbs and grasses.

Border Zone: Area that begins at the outside edge of the wire zone and extends to the edge of the ROW. This zone may contain additional low-growing woody plants and trees.

²⁷⁹ Generic Route Permit Template, Section 5.3.15.

²⁸⁰ See Fahrig, L. (2003).

²⁸¹ Application at page 23.

Cumulative Potential Effects

Cumulative potential effects result from the incremental effects of a project in addition to other projects in the environmentally relevant area. Impacts will be “cumulative” with the wind farm project for the following resource topics: aesthetics; noise; property values; socioeconomics; emergency services; roads; agriculture; archeological and historic resources; air quality; rare and unique resources; soils; vegetation; wildlife;

Minnesota Rule 4410.0200, subpart 11a, defines “cumulative potential effects,” in part, as the “effect on the environment that results 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 ... regardless of what person undertakes the other projects or what jurisdictions have authority over the project.”

The “environmentally relevant area” includes locations where the potential effects of the proposed project coincide with the potential effects of other projects to impact the elements studied in POTENTIAL IMPACTS AND MITIGATION. In general, this area includes the ROI for the different resource elements.

EERA staff determined what projects are “reasonably likely to occur.”²⁸² When making this determination, staff considered “whether any applications for permits have been filed with any units of government or whether detailed plans and specifications have been prepared for the project, among other considerations.”²⁸³ A project need not be permitted to be considered reasonably likely to occur. In this instance, a permit application has been filed with the Commission for the Freeborn Wind Farm that would occur in the environmentally relevant area.

The following subsection analyses the cumulative potential effects of the project and the wind farm where potential effects coincide. EERA staff is evaluating the wind farm even though the final determination on the site permit is unknown. In making this evaluation, EERA staff is not indicating this project will be built. Rather, EERA is indicating the *potential* for it to be permitted and constructed based on the guidance of Minnesota Rule 4410.0200.

In instances where the potential impacts of other projects coincide with the potential impacts of the proposed project in the environmentally relevant area, these effects are cumulative. Cumulative potential effects may or may not change the overall impact intensity level.

Analysis Assumptions

The following assumptions regarding the construction and normal operation of the Freeborn Wind Farm were used only for the purposes of this cumulative potential effects analysis:

- The wind farm site permit will be approved, and not significantly modified from the Commission’s approved draft site permit.
- The wind farm will be constructed as proposed by Freeborn Wind in the site permit application and as required by the Commission’s issued draft site permit, including turbine and infrastructure layout.
- Wind turbines are operated as indicated by Freeborn Wind and the conditions specified in the Commission’s issued draft site permit.

²⁸² Minn. R. 4410.0200, subp. 11a.

²⁸³ *Ibid.*

- The wind farm will be completely decommissioned and removed at the end of the site permit and operational life of the project (30 years).

Analysis Background

The ROI for cumulative potential effects varies across elements and is consistent with the ROI identified in POTENTIAL IMPACTS AND MITIGATION. Cumulative potential effects—where they coincide—increase or decrease the breadth of the impact to the resources and elements studied in POTENTIAL IMPACTS AND MITIGATION. This might or might not change the impact intensity level assigned to the resource or element.

The following graphics are used to illustrate the potential for cumulative potential effects:

- ▲ Cumulative potential effects are anticipated.
- ▼ Cumulative potential effects are NOT anticipated.
- ◆ Cumulative potential effects are uncertain.

Where cumulative effects are anticipated a written description is provided. Where cumulative potential effects are not anticipated no further analysis is provided. For the purposes of this EA, actions that have occurred in the past and their associated impacts are considered part of the existing environmental and were analyzed in POTENTIAL IMPACTS AND MITIGATION. The source of information regarding the wind farm is the site permit application unless otherwise noted.

Human Settlement

This section describes cumulative potential effects to human settlement. **Table 15** illustrates the potential for cumulative effects.

Table 15 Potential for Cumulative Potential Effects: Human Settlement

| Element/Resource | Region of Influence | Potential for Cumulative Effects | | |
|-------------------------|---------------------|----------------------------------|-----------|-----------|
| | | Short-term | Long-term | Permanent |
| Aesthetics | Local Vicinity | ▲ | ▲ | ▼ |
| Cultural Values | Project Area | ▼ | ▼ | ▼ |
| Displacement | Right-of-Way | ▼ | ▼ | ▼ |
| Electrical Interference | Right-of-Way | ▼ | ▼ | ▼ |
| Land Use | Right-of-Way | ▼ | ▼ | ▼ |
| Noise | Local Vicinity | ▲ | ▲ | ▼ |
| Property Values | Local Vicinity | ▲ | ◆ | ◆ |
| Recreation | Local Vicinity | ▼ | ▼ | ▼ |
| Socioeconomics | Freeborn County | ▲ | ▲ | ▲ |

Aesthetics

The ROI for aesthetics is the local vicinity. The projects will potentially use the same truck haul routes during construction. The Viewshed to travelers on U.S. Highway 65 will include both wind turbines and HVTL structures. Residences will be within the local vicinity of wind turbines and HVTL structures and

conductors. Short- and long-term cumulative effects will occur along the Teal and Orange routes. The overall impact intensity level is expected to remain moderate.

Along the Teal and Orange routes, one residence that is within approximately 1,600 feet and 1,189 feet of the rotor swept zone of turbines 22 and 23, respectively, and within approximately 350 feet of the HVTL. The residence would have the visual impact of the transmission line to the south, and the turbines would be within the line of sight when looking northwest and northeast. Another residence is 322 feet south of the HVTL and turbine 23 is 1,538 feet to the northwest. Turbine 26 will be located 1,550 feet to the northeast of a residence, and the HVTL would be 732 feet to the south of the same residence. From this residence the northeast and southern viewshed will be impacted. Turbine 37 will be about 1,600 feet to the northwest of a residence, and the HVTL would be 675 feet to the west of the same residence. From this residence the viewshed, the northwest and the west will be impacted by the HVTL and turbine 37.

Other residences are located within the local vicinity of a turbine or HVTL routing option, but are not within 1,600 feet of both projects; therefore, cumulative effects are not anticipated at those residences. There are no residences within the local vicinity of a turbine and the Purple or Gold routing options; therefore, cumulative effects are not anticipated at those residences.

Individuals traveling on U.S. Highway 65 might experience visual impacts. The highway is not registered or identified as a Scenic Byway; therefore, individuals traveling on the highway are likely not anticipating a scenic viewshed. Impacts to the travelling public are not anticipated. The anticipated cumulative impacts to aesthetics when considering proposed turbine locations and all proposed alternative routes are minimal short-term and long-term impacts.

Noise

The ROI for noise is the local vicinity. The projects will potentially use the same truck haul routes during construction. During operation turbines will generate noise, but the HVTL will not generate sufficient noise to result in a cumulative effect. Short- and long-term cumulative effects will occur. The overall impact intensity level is expected to remain minimal.

Heavy truck traffic along established haul routes will generate noise during materials delivery. Construction noise related to the wind turbines is typical of a construction site. During operation noise impacts include: the cooling systems outside the nacelle, internal mechanical parts in the nacelle, and the blades passing by the turbine tower when the turbines are operating.

Noise generated by construction could impact residents that live within the local vicinity of truck haul routes and turbine locations. Noise modeling results, conducted under maximum operating turbine noise output levels, indicate no anticipated exceedance of the daytime or nighttime noise standards for NAC 1 at any occupied residence. The closest turbine is 1,126 feet from a residence. That residence is anticipated to experience 48 dBA of turbine generated noise under the loudest conditions. Under some conditions ambient noise levels plus the wind turbine generated noise may collectively exceed the nighttime 50 dBA Minnesota Noise Standard at some residences. Based on ambient noise level monitoring and noise modeling results, the conditions in which a noise standard exceedance would occur at a residence within the proposed project area is only likely to occur when the ambient noise level is very close to exceedance of, or exceeding, the nighttime 50 dBA Minnesota Noise Standard.

Post-construction noise monitoring is required to determine if the wind turbine modeling accurately predicted turbine generated noise within the project area.²⁸⁴ Additionally, Freeborn Wind must address complaints brought to their attention, which includes noise complaints.²⁸⁵ If post-construction noise monitoring efforts determine that turbine generated noise is exceeding Minnesota Noise Standards, turbine operational adjustments can be implemented to reduce turbine noise outputs under conditions that have been documented to impact residences.²⁸⁶

Property Values

The ROI for property values is the local vicinity. Residences within the local vicinity might see both projects within their viewsheds. Short-term cumulative effects will occur. Staff is uncertain if long-term or permanent impacts will occur. The overall impact intensity level is expected to remain minimal; however, impacts to specific properties could be moderate.

The impacts of wind turbines on property values has been the subject of nationwide research. Findings indicate that some properties decreased in value after a wind turbine was constructed nearby, while some properties increased in value.²⁸⁷ Research indicates that significant impacts to property values from the presence of wind turbines and associated infrastructure are not likely.²⁸⁸ Freeborn Wind conducted a market impact analysis, which determined that impacts to property values from the wind farm will not occur.

Potential impacts to property values will continue to be minimal to moderate long-term impacts on property values during its operational life. Potential impacts are variable, and might be positive or negative. Impacts to property values tend to dissipate over time as facilities become an accepted part of the landscape.

Socioeconomics

The ROI for socioeconomics is Freeborn County, both projects are within the county. Both short- and long-term positive cumulative effects will occur. The overall impact intensity level is expected to be positive and minimal.

The proposed wind farm will generate approximately 200 construction jobs, which will be available to local contractors and laborers.²⁸⁹ Contractors and laborers from outside Freeborn County will assist in construction, so all jobs will not be local. Workers from outside Freeborn County will spend money at local businesses for lodging, meals, and some equipment needs.²⁹⁰ Once operational, 10 permanent operations

²⁸⁴ Minnesota Public Utilities Commission (January 30, 2018) *Order Issuing the Draft Site Permit*, eDockets No. 20181-139549-01 at Section 7.4 Noise Study.

²⁸⁵ *Id.* at Section 9.0 Complaint Procedures.

²⁸⁶ *Id.* at Section 4.3 Noise.

²⁸⁷ Hoen, B., Brown, J., Jackson, T., Wisner, R., Thayer, M., and Cappers, P. (2013) *A Spatial Hedonic Analysis of the Effects of Wind Energy Facilities on Surrounding Property Values in the United States*, ENVIRONMENTAL ENERGY TECHNOLOGIES DIVISION, ERNEST ORLANDO LAWRENCE BERKELEY NATIONAL LABORATORY, Available at: <https://emp.lbl.gov/sites/all/files/lbnl-6362e.pdf>.

²⁸⁸ *Ibid.*

²⁸⁹ Freeborn Wind Energy LLC (December 22, 2017) *Litchfield Direct Testimony Schedules 1-8*, eDockets No. 201712-138399-01.

²⁹⁰ *Ibid.*

and maintenance staff will be available to qualified local laborers.²⁹¹ Operational staff that move into the area could help the local economy by purchasing homes and spending wages at local businesses.

The wind farm will pay landowners for easements to place turbines on their property, which is anticipated to be over \$800,000, annually, for the turbines in the Freeborn County. The proposed wind project is required to pay a production tax, which will be paid to Freeborn County and local townships within the project footprint. These annual production tax payments are estimated to be \$397,000 of which 80% will be allocated to Freeborn County and 20% allocated to local townships.

Construction related jobs and expenditures will have short-term, positive impacts. Operational and maintenance jobs and expenditures, landowner easement payments, and production tax payments will have long-term positive impacts to the local economy.

Public Health and Safety

This section describes cumulative potential effects to public health and safety. **Table 16** illustrates the potential for cumulative effects.

Table 16 Potential for Cumulative Effects: Public Health and Safety

| Element/Resource | Region of Influence | Potential for Cumulative Effects | | |
|------------------|---------------------|----------------------------------|-----------|-----------|
| | | Short-term | Long-term | Permanent |
| EMF | Route Width | ▼ | ▼ | ▼ |
| Medical Devices | Route Width | ▼ | ▼ | ▼ |
| Stray Voltage | Route Width | ▼ | ▼ | ▼ |

Public Services

This section describes cumulative potential effects to public services. **Table 17** illustrates the potential for cumulative effects.

Table 17 Potential for Cumulative Potential Effects: Public Services

| Element/Resource | Region of Influence | Potential for Cumulative Effects | | |
|--------------------|---------------------|----------------------------------|-----------|-----------|
| | | Short-term | Long-term | Permanent |
| Airports | Project Area | ▼ | ▼ | ▼ |
| Emergency Services | Project Area | ▲ | ▲ | ▼ |
| Roads and Highways | Project Area | ▲ | ▲ | ▼ |
| Utilities | Project Area | ▼ | ▼ | ▼ |

* Long-term impacts to emergency services and roads and highways are associated with decommissioning of the wind farm, not the operational life of the project.

Emergency Services

The ROI for emergency services is the project area. The projects will potentially use the same truck haul routes during construction potentially delaying emergency response. Short- and long-term cumulative

²⁹¹ Ibid.

effects will occur. Long-term effects are associated with decommissioning not operation. The overall impact intensity level is expected to remain minimal.

Project construction will result in additional heavy truck traffic and congestion in the project area. This could impact emergency vehicle response time. Haul routes will be established and mapped prior to beginning construction of the proposed project, and emergency responders informed so that necessary adjustments to the responder's route to mitigate impacts to response time due to construction related traffic.

The wind farm will be decommissioned at the end of its operational life. Decommissioning will likely result in an increase in heavy truck traffic on local roads. The Commission requires permittees to develop and maintain a decommissioning plan,²⁹² which will need to address potential traffic impacts. The Commission can require permittees to specify haul routes and coordinate with the local emergency services to ensure that any increases in truck traffic on local roads has a minimal impact on local emergency services.

Potential impacts to emergency response in the project area are anticipated to be short-term and minimal, but will occur during two distinct phases: construction and decommissioning.

Roads and Highways

The ROI for roads and highways is the project area. The projects will potentially use the same truck haul routes during construction. Short- and long-term cumulative effects will occur. Long-term effects are associated with decommissioning not operation. The overall impact intensity level is expected to remain minimal.

Additional heavy truck traffic will impact local roads and bridges during wind farm construction. Additionally, road and intersection widening might be necessary at select locations to allow for material and equipment deliveries. Freeborn Wind will coordinate with county and township staff to develop a road agreement, or similar document, which will detail project related impacts and necessary road upgrades and repairs that must be completed.²⁹³

The wind farm will be decommissioned at the end of its operational life. Decommissioning will likely result in an increase in heavy truck traffic on local roads. The Commission requires permittees to develop and maintain a decommissioning plan,²⁹⁴ which will need to address potential traffic impacts. Permittees will need to address potential road impacts. This is addressed through a local road agreement, or similar document. The permittee will be responsible for any necessary road upgrades and repairs associated with decommissioning.

Potential impacts to roads and highways in the project area are anticipated to be short-term and minimal, but will occur during two distinct phases: construction and decommissioning. Upgrades and repairs might cause traffic delays.

²⁹² Minnesota Public Utilities Commission (January 30, 2018) *Order Issuing the Draft Site Permit*, eDockets No. 20181-139549-01 at Section 11.1 Decommission Plan.

²⁹³ *Id.* at Section 5.2.12 Public Roads.

²⁹⁴ *Id.* at Section 11.1 Decommissioning Plan.

Land-Based Economies

This section describes cumulative potential effects to land-based economies. **Table 18** illustrates the potential for cumulative effects.

Table 18 Potential for Cumulative Impacts: Land-Based Economies

| Element/Resource | Region of Influence | Potential for Cumulative Effects | | |
|------------------|---------------------|----------------------------------|-----------|-----------|
| | | Short-term | Long-term | Permanent |
| Agriculture | Route Width | ▲ | ▲ | ▼ |
| Forestry | Route Width | ▼ | ▼ | ▼ |
| Mining | Route Width | ▼ | ▼ | ▼ |
| Tourism | Project Area | ▼ | ▼ | ▼ |

Agriculture

The ROI for agriculture is the route width. The crane path to be used during construction and decommissioning of the wind farm will overlap with a portion of the Teal and Orange routes. Short- and long-term cumulative effects will occur. The overall impact intensity level is expected to remain minimal.

Construction will result in impacts to the soils and, depending on timing, might result in impacts to growing crops. Heavy equipment working at turbine locations and crane paths between turbine locations will cause soil compaction. Construction of access roads will also cause soil compaction for the operational life of project. Soil disturbance, and possible soil mixing, at individual turbine locations will occur. Drain tile might be damaged. About 33 acres of land will be removed from crop production throughout the operational life of the wind farm. Decommissioning will require field access for heavy construction equipment, which could result in soil compaction and crop damage outside existing access roads and turbine pads.

Freeborn Wind will alleviate soil compaction following construction. Participating landowners will be compensated for crop damage and temporary crop yield reductions that may be due to soil compaction. Freeborn Wind has committed to repairing drain tile, which should minimize agricultural crop impacts. The wind farm will require a decommissioning plan, which could incorporate details on the timing decommissioning outside the active cropping season, which would reduce crop damages. The plan could also specify that heavy equipment will access turbine locations and project infrastructure in the locations utilized during construction to the extent practicable. Once decommissioning is complete, soil compaction will be alleviated where heavy equipment was working and along removed access roads.

Archaeological and Historical Resources

This section describes cumulative potential effects to archaeological and historic resources. **Table 19** illustrates the potential for cumulative effects.

The ROI for archaeological and historic resources is the project area. The projects will be part of the viewshed from archaeological and historic resources in the project area. Additionally, the wind farm crane path will overlap with a portion of the Teal and Orange routes. Because this element focusses on unidentified resources cumulative effects are unknown. The overall impact intensity level is expected to remain minimal.

The wind farm could impact previously unidentified archaeological and historical resources during construction. During operation wind turbines could impact the visual experience of individuals viewing an archaeological or historical site. Decommissioning the wind farm at the end of its operational life might impact archaeological and historical resources if different access routes are utilized.

Freeborn Wind has committed to stopping construction activities and adjusting the construction plan should previously unknown archaeological resources be identified during construction. Turbines are not proposed to be constructed within 1,600 feet of any known archaeological resources. The decommissioning plan could be structured to ensure that heavy equipment accessing the project area during decommissioning would do so through the same areas and in the same manner as construction limiting the potential for disturbance to unidentified archaeological resources.

Cumulative impacts are unknown, but expected to be minimal.

Table 19 Potential for Cumulative Effects: Archaeological and Historic Resources

| Element/Resource | Region of Influence | Potential for Cumulative Effects | | |
|---------------------------------------|---------------------|----------------------------------|-----------|-----------|
| | | Short-term | Long-term | Permanent |
| Archaeological and Historic Resources | Project Area | ◆ | ◆ | ◆ |

Natural Resources

This section describes cumulative potential effects to natural resources. **Table 20** illustrates the potential for cumulative effects.

Table 20 Potential for Cumulative Effects: Natural Resources

| Element/Resource | Region of Influence | Potential for Cumulative Effects | | |
|----------------------|---------------------|----------------------------------|-----------|-----------|
| | | Short-term | Long-term | Permanent |
| Air Quality | Freeborn County | ▲ | ▲ | ▼ |
| Geology | Right-of-Way | ▼ | ▼ | ▼ |
| Topography | Right-of-Way | ▼ | ▼ | ▼ |
| Groundwater | Route Width | ▼ | ▼ | ▼ |
| Rare Resources | Project Area | ▲ | ▲ | ▼ |
| Soils | Right-of-Way | ▲ | ▲ | ▼ |
| Surface Water | Route Width | ▼ | ▼ | ▼ |
| Vegetation | Right-of-Way | ▲ | ▲ | ▼ |
| Wetlands | Route Width | ▼ | ▼ | ▼ |
| Wildlife and Habitat | Route Width | ▲ | ▲ | ▼ |

* Long-term impacts to air quality, soils, and vegetation are associated with decommissioning of the wind farm, not the operational life of the project.

Air Quality

The ROI for air quality is Freeborn County, both project occur in the county. Short- and long-term cumulative effects will occur, except that the long-term effects will occur later in time; not over the operational life of the project. The overall impact intensity level is expected to remain minimal.

Heavy truck traffic and equipment use during construction will generate additional air pollutant emissions. At the end of the wind farm's operational life decommissioning activities will again result a temporary increase in air pollutant emissions.

All project related impacts to the local air quality are anticipated to result from heavy truck traffic during the construction and the decommissioning of the proposed wind energy facility, and the impacts are anticipated to be short-term and minimal.

Rare and Unique Resources

The ROI for rare and unique resources is the project area. The projects overlap habitat used by rare and unique species. Additionally, the wind farm crane path will overlap with a portion of the Teal and Orange routes. Short- and long-term cumulative effects will occur. The overall impact intensity level is expected to remain minimal.

The wind farm and HVTL might impact rare and unique resources during construction and operation. Decommissioning the wind farm might also impact these resources. Current NHIS data indicates the presence of three rare plant species within the wind farm boundary. The project overlaps the range and distribution of four bat species considered to be rare, the Northern long-eared bat, big brown bat, little brown bat, and tri-color bat. Construction could impact plant rare plant species. Once operational turbine blades will strike bat species as they fly within the project area.

Freeborn Wind will not conduct construction activities near any known current records of listed plants species, or rare native plant communities. The wind farm boundary has been identified as a low risk site for avian and bat impacts by DNR; therefore, bat fatalities are anticipated to be low. Freeborn Wind committed to maintain a minimum 1,000 foot turbine setback from potential Northern long-eared bat habitats, which should also provide protection to other State-listed bat species. Permittees are required to conduct operational phase fatality monitoring for avian and bat species at a random selection of turbines.²⁹⁵ Fatality monitoring data is provided to DNR, EERA, and USFWS to determine if additional monitoring is necessary or if turbine operations need to be adjusted to reduce impacts to avian and bat species.²⁹⁶ Permittees are required to feather turbine blades up to the manufacturer's cut-in speed, which helps to reduce bat impacts while minimizing impacts to power production at the facility.²⁹⁷

Construction related impacts are anticipated to be short-term and minimal. Operational impacts are anticipated to be long-term and minimal. Should operational phase fatality monitoring indicate elevated bat fatality levels, the Permittee has operational curtailment options available that will reduce potential project impacts. Permittees are required to report any dead or injured, state or federally listed bat species within 24 hours of being found.²⁹⁸ Should a listed species be found dead or injured, operational

²⁹⁵ Minnesota Public Utilities Commission (January 30, 2018) *Order Issuing the Draft Site Permit*, eDockets No. 20181-139549-01 at Section 7.5.1 Avian and Bat Protection Plan.

²⁹⁶ *Id.* at Section 7.5.1 Avian and Bat Protection Plan.

²⁹⁷ *Id.* at Section 7.5.4 Turbine Operational Curtailment.

²⁹⁸ *Id.* at Section 7.5.3 Immediate Incident Reports.

adjustments can be considered and implemented as determined necessary to reduce these events from occurring in the future.

Soils

The ROI for soils is the right-of-way. The wind farm crane path will overlap with a portion of the Teal and Orange routes. Short- and long-term cumulative effects will occur, except that the long-term effects will occur later in time; not over the operational life of the project. The overall impact intensity level is expected to remain minimal.

During construction heavy equipment, turbine foundations, and access roads will impact soils. Heavy equipment working at turbine locations and crane paths between proposed turbine locations will result in soil compaction. Access roads will cause soil compaction, and will remain in place for the operational life of the wind farm. Turbine foundations will result in soil disturbance and possible soil mixing. Soil erosion might also occur. Decommissioning activities could result in soil compaction while heavy equipment access turbine locations.

The company will secure necessary permits from MPCA prior to construction. These permits will identify BMPs to reduce soil erosion and run off resulting from construction. Freeborn Wind will alleviate soil compaction following construction. The decommissioning plan will detail removal of wind turbines, turbine foundations, access roads, and other project related infrastructure as well as necessary permits and mitigation measures.²⁹⁹

Vegetation

The ROI for vegetation is the right-of-way. The wind farm crane path will overlap with a portion of the Teal and Orange routes. Short- and long-term cumulative effects will occur, except that the long-term effects will occur later in time; not over the operational life of the project. The overall impact intensity level is expected to remain minimal.

The vast majority—38.1 of 38.2 acres—of vegetation removed for the wind farm will be agricultural crop land (33.3 acres) and land classified as developed (4.8 acres). An access road will require clearing approximately 0.1 acres of deciduous forest. Freeborn Wind has proposed to avoid native prairie. Cleared areas will remain so during the operational life of the wind farm, and will be revegetated or returned to agricultural crop production during decommissioning.

Decommissioning could cause removal or damage to vegetation outside of the existing access roads and turbine pads. The decommissioning plan could specify that heavy equipment will access and remove infrastructure using areas used during construction to the maximum extent practicable.

Wildlife

The ROI for terrestrial wildlife is the route width; the ROI for avian species is the local vicinity. The projects overlap habitat used by wildlife species. Additionally, the wind farm crane path will overlap with a portion of the Teal and Orange routes.. Short- and long-term cumulative effects will occur. Additional long-term effects are associated with decommissioning of the project. The overall impact intensity level is expected to remain minimal.

²⁹⁹ Minnesota Public Utilities Commission (January 30, 2018) *Order Issuing the Draft Site Permit*, eDockets No. 20181-139549-01 at Section 11.1 Decommissioning Plan.

Wildlife will be disturbed, displaced, or otherwise impacted (for example, individuals might be crushed) during construction. Terrestrial wildlife species are common species associated with disturbed habitats, and are accustomed to human activities occurring in the area, for example, road traffic and agricultural activities. Permanent displacement is not anticipated. The majority of terrestrial wildlife species in the project areas will likely avoid construction areas, and return when construction is complete. Minimal habitat conversion is anticipated because the majority of land cover types impacted is agricultural land; therefore, wildlife habitat is not anticipated to be permanently converted to a different habitat type.

Avian and bat species might collide with turbines or conductors. Some avian species might exhibit avoidance behavior and divert flight around the project areas. The HVTL could potentially electrocute avian species. Avian species identified in wildlife surveys for the wind farm are common species; the majority capable of avoiding wind turbines during flight by maneuvering around, below, or above individual turbine blade rotor swept areas. No avian species are known to occur that will experience significant stress or significant energy consumption to engage in avoidance flight behaviors within or around the proposed wind farm.

The wind farm boundary has been identified as a low risk site for avian and bat impacts by DNR; therefore, bat fatalities are anticipated to be low. Permittees are required to conduct operational phase fatality monitoring for avian and bat species at a random selection of turbines.³⁰⁰ Fatality monitoring data is provided to DNR, EERA, and USFWS to determine if additional monitoring is necessary or if turbine operations need to be adjusted to reduce impacts to avian and bat species.³⁰¹ Permittees are required to feather turbine blades up to the manufacturer's cut-in speed, which helps to reduce impacts to avian and bat species while minimizing impacts to power production at the facility.³⁰²

Construction, operation, and decommissioning impacts will occur. Impacts are anticipated to be minimal. Should operational phase fatality monitoring indicate elevated avian or bat fatality levels, Freeborn Wind has operational curtailment options available that will reduce potential project impacts.

Unavoidable Impacts

Resource impacts are unavoidable when an impact cannot be avoided even with mitigation strategies

Transmission lines are infrastructure projects that have unavoidable adverse human and environmental impacts. These potential impacts and the possible ways to mitigate against them were discussed above. However, even with mitigation strategies, certain impacts cannot be avoided.

Unavoidable adverse impacts associated with construction of the proposed project include:

- Possible traffic delays and fugitive dust on roadways.
- Visual and noise disturbance to nearby residents and recreationalists.
- Potential impacts to agricultural operations, such as crop losses.
- Soil compaction and erosion.
- Vegetative clearing.

³⁰⁰ Minnesota Public Utilities Commission (January 30, 2018) at Section 7.5.1 Avian and Bat Protection Plan.

³⁰¹ Minnesota Public Utilities Commission (January 30, 2018) *Order Issuing the Draft Site Permit*, eDockets No. 20181-139549-01 at Section 7.5.1 Avian and Bat Protection Plan.

³⁰² *Id.* at Section 7.5.4 Turbine Operational Curtailment.

- Disturbance and temporary displacement of wildlife, as well as direct impacts to wildlife inadvertently struck or crushed during structure placement or other activities.
- Minor amounts of habitat loss.

Unavoidable adverse impacts associated with the operation of the proposed project include:

- Visual impact of structures and conductors.
- Loss of land use for other purposes, such as agriculture, where structures are placed.
- Injury or death of avian species that collide with, or are electrocuted by, conductors.
- Interference with AM radio signals.
- Potential decrease to property values.
- Continued maintenance of tall-growing vegetation.
- Potential impacts to agricultural operations, such as structures interfering with aerial spraying.

Irreversible and Irrecoverable Resource Commitments

Resource commitments are irreversible when it is impossible or very difficult to redirect that resource to a different future use; an irretrievable commitment of resources means the resource is not recoverable for later use by future generations

Irreversible impacts include the land required to construct the transmission line. While it is possible that the structures and conductors could be removed and the right-of-way restored to previous conditions, this is unlikely to happen in the reasonably foreseeable future. The loss of forested wetlands is considered irreversible, because replacing these wetlands would take a significant amount of time. Certain land uses within the ROW will no longer be able to occur.

An irretrievable commitment of resources means the resource is not recoverable for later use by future generations. These impacts are primarily related to project construction, including the use of water, aggregate, hydrocarbons, steel, concrete, wood, and other consumable resources. The commitment of labor and fiscal resources is also considered irretrievable.

Routing Factors

The analysis that follows applies the information and data available in the route permit application and the EA to the factors the Commission must consider when making a route permit decision.

The Minnesota Legislature directed the Commission to select HVTL routes that minimize adverse human and environmental impacts while insuring continuing electric power system reliability and integrity.³⁰³ An HVTL route must be compatible with environmental preservation and the efficient use of resources while also insuring electric energy needs are met and fulfilled in an orderly and timely fashion.³⁰⁴

Minnesota Statute 216E.03, subdivision 7(b) identifies 12 considerations that the Commission must take into account when designating a route for a HVTL. These considerations are further clarified and expanded by Minnesota Rule 7850.4100, which identifies 14 factors the Commission must consider when making a permit decision. These factors are:

- 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; and
- N.** irreversible and irretrievable commitments of resources.

³⁰³ Minn. Stat. 216E.02, subd. 1.

³⁰⁴ *Ibid.*

The analysis applies the routing factors to the project, and discusses the relative merits of the different routing options. Graphics are used to illustrate impacts across routing options, followed by discussion. Where impacts are anticipated to be minimal across all routing options, no discussion is provided.

- Routing option is consistent with the routing factor OR impacts are anticipated to be minimal with the application of BMPs and general route permit conditions
- ◆ Routing option is consistent with routing factor but less so that other options OR impacts are anticipated to be minimal to moderate with the application of BMPs and general route permit conditions, but may require special conditions or selection of specific routing options to mitigate OR impacts might be minimal but the potential for impacts is greater than the other options
- Routing option is not consistent with routing factor or consistent only in part OR impacts are anticipated to be moderate or significant and unable to be mitigated

Table 21 Relative Merits of Routing Factors

| Element | Teal | Orange | Purple | | Gold | |
|-----------------------------------|------|--------|----------|-----------|----------|-----------|
| | | | Parallel | Overbuild | Parallel | Overbuild |
| Factor A: Human Settlement | | | | | | |
| Aesthetics | ◆ | ◆ | ● | ● | ◆ | ◆ |
| Displacement | ● | ● | ● | ● | ● | ● |
| Cultural Values | ● | ● | ● | ● | ● | ● |
| Electrical Interference | ● | ● | ● | ● | ● | ● |
| Floodplains | ● | ● | ● | ● | ● | ● |
| Land Use and Zoning | ● | ● | ● | ● | ■ | ■ |
| Noise | ● | ● | ● | ● | ◆ | ◆ |
| Property Values | ● | ● | ● | ● | ● | ● |
| Recreation | ● | ● | ● | ● | ◆ | ◆ |
| Socioeconomics | ● | ● | ● | ● | ● | ● |
| Factor A: Public Services | | | | | | |
| Airports | ● | ● | ● | ● | ● | ● |
| Emergency Services | ● | ● | ● | ● | ● | ● |
| Roads and Highways | ● | ● | ● | ● | ● | ● |
| Utilities | ● | ● | ● | ● | ● | ● |

| Element | Teal | Orange | Purple | | Gold | |
|--|------|--------|----------|-----------|----------|-----------|
| | | | Parallel | Overbuild | Parallel | Overbuild |
| Factor B: Public Safety | | | | | | |
| EMF | ● | ● | ● | ● | ● | ● |
| Medical Devices | ● | ● | ● | ● | ● | ● |
| Stray Voltage | ● | ● | ● | ● | ● | ● |
| Factor C: Land-Based Economies | | | | | | |
| Agriculture | ⬠ | ⬠ | ● | ● | ● | ● |
| Forestry | ● | ● | ● | ● | ● | ● |
| Mining | ● | ● | ● | ● | ● | ● |
| Tourism | ● | ● | ● | ● | ● | ● |
| Factor D: Archaeological and Historic Resources | | | | | | |
| Archaeological | ● | ● | ● | ● | ● | ● |
| Historic | ● | ● | ● | ● | ● | ● |
| Factor E: Natural Resources | | | | | | |
| Air Quality | ● | ● | ● | ● | ● | ● |
| Geology | ● | ● | ● | ● | ● | ● |
| Groundwater | ● | ● | ● | ● | ● | ● |
| Soils | ● | ● | ● | ● | ● | ● |
| Surface Water | ● | ● | ● | ● | ● | ● |
| Topography | ● | ● | ● | ● | ● | ● |
| Vegetation | ● | ● | ● | ● | ● | ● |
| Wetlands | ● | ● | ● | ● | ● | ● |
| Wildlife | ● | ● | ● | ⬠ | ● | ⬠ |
| Wildlife Habitat | ● | ● | ● | ● | ● | ● |
| Factor F: Rare and Unique Resources | | | | | | |
| Rare and Unique | ● | ● | ● | ● | ● | ● |
| Factor H: Paralleling | | | | | | |
| — | ● | ● | ● | ● | ● | ● |
| Factor J: Use of Existing Infrastructure | | | | | | |
| — | — | — | — | ● | — | ● |
| Factor L: Cost | | | | | | |
| — | ● | ● | ● | ● | ● | ■ |

Factor A: Effects on Human Settlement

| Element | Teal | Orange | Purple | | Gold | |
|-------------------------|------|--------|----------|-----------|----------|-----------|
| | | | Parallel | Overbuild | Parallel | Overbuild |
| Human Settlement | | | | | | |
| Aesthetics | 🟡 | 🟡 | 🟢 | 🟢 | 🟡 | 🟡 |
| Land Use and Zoning | 🟢 | 🟢 | 🟢 | 🟢 | 🔴 | 🔴 |
| Noise | 🟢 | 🟢 | 🟢 | 🟢 | 🟡 | 🟡 |
| Recreation | 🟢 | 🟢 | 🟢 | 🟢 | 🟡 | 🟡 |

Element: Aesthetics

The overall impact intensity level along the Teal, Orange, and Gold overbuild option is anticipated to be moderate. Impacts along the Purple routing options and the Gold parallel option are anticipated to be minimal. Potential impacts will be short- and long-term, localized, and affect both common and unique resources. Impacts are unavoidable.

Element: Land Use and Zoning

The overall impact intensity level to zoning is anticipated to be minimal for all routing options. Potential impacts to zoning are anticipated to be long-term and localized. Impacts can be mitigated. Impacts to non-participating landowners along the Gold routing options are unavoidable. These impacts will be long-term and significant.

Element: Noise

Specific impacts are associated with the construction and operational phases of the project. The overall impact intensity level during construction is anticipated to be minimal for all routing options. Potential impacts are anticipated to be short-term and not exceed state noise standards. These localized impacts will affect unique resources (residences). Impacts are unavoidable but can be minimized. Operational noise impacts are anticipated to be negligible for all routing options.

Element: Recreation

The overall impact intensity level along the Teal and Orange routes is anticipated to be minimal; impacts along the Gold routing options are anticipated to be moderate; impacts along the Purple routing options will not occur. Potential impacts are anticipated to be short- and long-term, localized, and affect a unique resource.

Elements: Displacement, Floodplains

Impacts related to these elements are not anticipated.

Elements: Cultural Values, Electrical Interference, Property Values, Socioeconomics

Impacts related to these elements are anticipated to be minimal with use of standard construction techniques, BMPs, and general permit conditions.

Factor B: Effects on Public Safety

Elements: Electronic and Magnetic Fields, Implantable Medical Devices, Stray Voltage

Impacts related to these elements are anticipated to be minimal with use of standard construction techniques, BMPs, and general permit conditions.

Factor C: Effects on Land-Based Economies

| Element | Teal | Orange | Purple | | Gold | |
|-----------------------------|------|--------|----------|-----------|----------|-----------|
| | | | Parallel | Overbuild | Parallel | Overbuild |
| Land-Based Economies | | | | | | |
| Agriculture | ▲ | ▲ | ● | ● | ● | ● |

Element: Agriculture

The overall impact intensity level for all routing options will be minimal, except that the Purple and Gold routing options reduce long-term agricultural impacts. Potential impacts are anticipated to be short- and long-term and of a small size. These localized impacts will affect a unique resource that is common in the project area. Impacts can be mitigated.

Elements: Forestry, Mining

Impacts related to these elements are not anticipated.

Elements: Tourism

Impacts related to these elements are anticipated to be minimal with use of standard construction techniques, BMPs, and general permit conditions.

Factor D: Effects on Archeological and Historic Resources

Impacts related to these elements are anticipated to be minimal with use of standard construction techniques, BMPs, and general permit conditions.

Factor E: Natural Resources

| Element | Teal | Orange | Purple | | Gold | |
|------------------------------------|------|--------|----------|-----------|----------|-----------|
| | | | Parallel | Overbuild | Parallel | Overbuild |
| Factor E: Natural Resources | | | | | | |
| Wildlife | ● | ● | ● | ▲ | ● | ▲ |

Element: Wildlife

Impacts to wildlife are similar, except that greater potential for bird collisions occurs along the Purple and Gold overbuild options. Potential impacts will be short- and long-term, of a relative small size, and localized. Impacts to unique resources are not anticipated. While direct significant impacts (severe injury or death) may occur to individuals, population level impacts are not anticipated. The overall impact intensity level is expected to be minimal.

Elements: Geology, Topography

Impacts related to these elements are not anticipated.

Elements: Air Quality, Geology, Groundwater, Soils, Surface Water, Vegetation, Wetlands, and Habitat

Impacts related to these elements are anticipated to be minimal with use of standard construction techniques, BMPs, and general permit conditions.

Factor F: Effects on Rare and Unique Resources

Impacts related to these elements are anticipated to be minimal with use of standard construction techniques, BMPs, and general permit conditions.

Factor G: Energy Efficiencies

It is assumed that all routing options maximize energy efficiencies and accommodating expansion of transmission capacity.

Factor H: Use and Paralleling of Existing Rights-of-Way and Field Lines

All routing options use or parallel existing rights-of-way, natural division lines, and agricultural field boundaries for the majority of their length.

Factor I: Existing Generating Plants

Factor I is not applicable.

Factor J: Use of Existing Transmission Rights-of-Way

The Purple and Gold overbuild options use existing transmission rights-of-way; the other routing options do not.

Factor K: Reliability

It is assumed that all routing options are reliable.

Factor L: Cost

| Element | Teal | Orange | Purple | | Gold | |
|----------------|------|--------|----------|-----------|----------|-----------|
| | | | Parallel | Overbuild | Parallel | Overbuild |
| Factor L: Cost | | | | | | |
| — | ● | ● | ● | ● | ● | ■ |

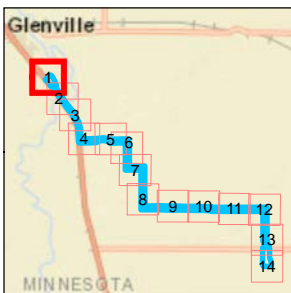
Element: Cost

Costs estimates are engineering estimates, and are anticipated to reflect actual costs within 20 percent. All routing options are within this 20 percent margin of error, except the Gold overbuild option which is anticipated to cost about twice as much as any other routing option.

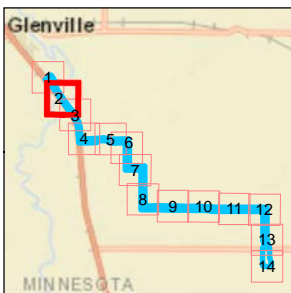
Factor M and Factor N: Unavoidable and Irreversible Impacts

Factor M and Factor N were discussed above.

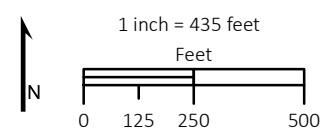
Map 1 Teal Route Detail



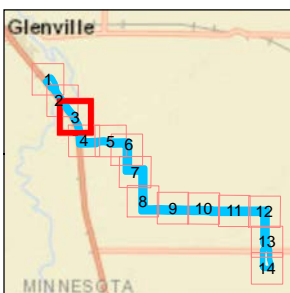
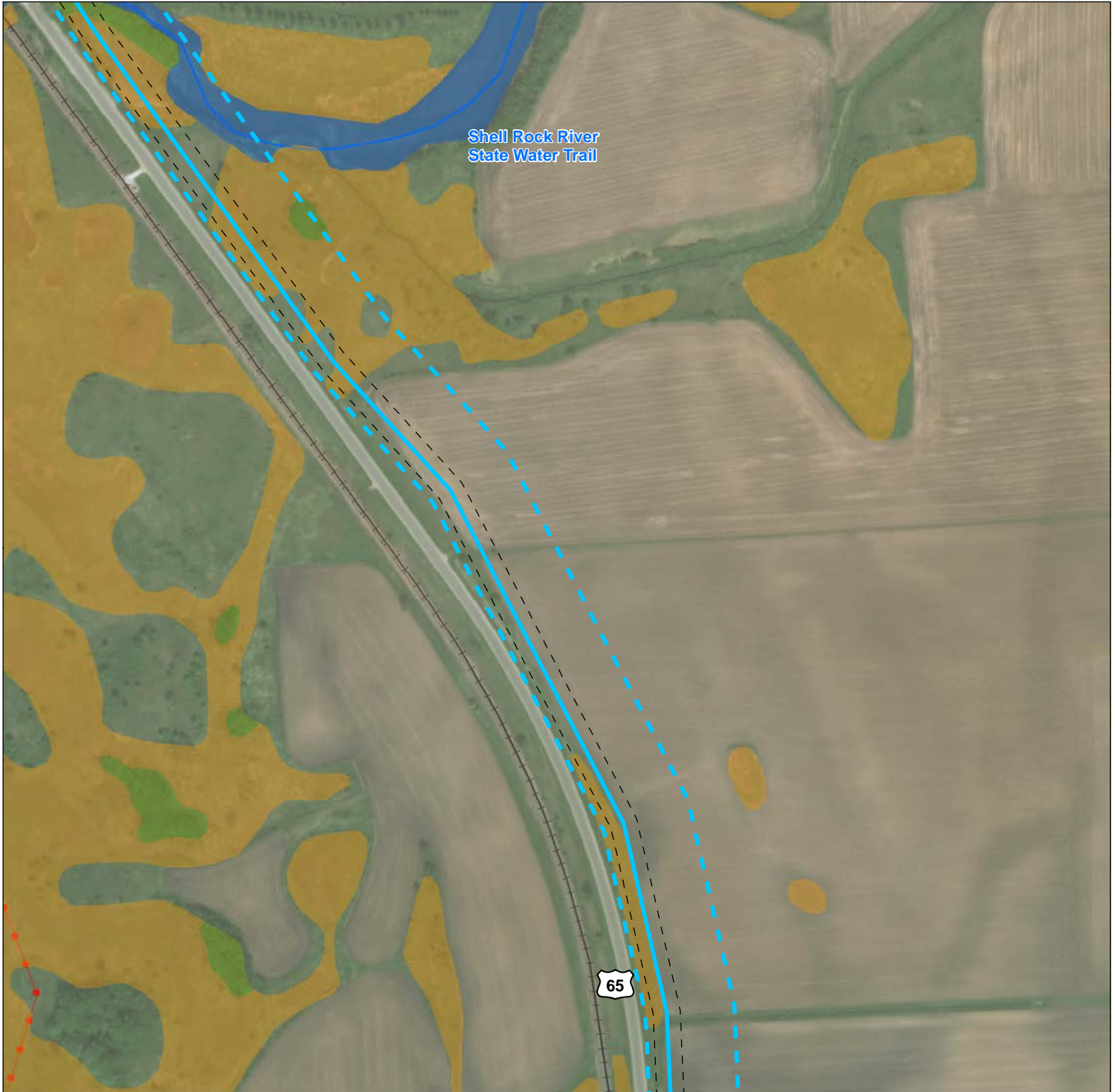
| | | |
|-------------------------------|-----------------------------------|---|
| Anticipated Alignment | Freshwater Emergent Wetland | 1 inch = 435 feet Feet |
| Right-of-Way | Freshwater Forested/Shrub Wetland | |
| Route Width | Freshwater Pond | |
| Glenworth Substation | Lake | |
| Proposed Wind Farm Substation | Riverine | Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community |
| Existing 69 kV HVTL | Existing 161 kV HVTL | |



- Anticipated Alignment
- Right-of-Way
- Route Width
- Glenworth Substation
- Proposed Wind Farm Substation
- Existing 69 kV HVTL
- Existing 161 kV HVTL
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Riverine



Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
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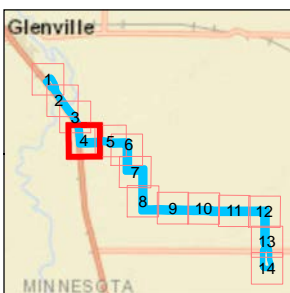
| | |
|-------------------------------|-----------------------------------|
| Anticipated Alignment | Freshwater Emergent Wetland |
| Right-of-Way | Freshwater Forested/Shrub Wetland |
| Route Width | Freshwater Pond |
| Glenworth Substation | Lake |
| Proposed Wind Farm Substation | Riverine |
| Existing 69 kV HVTL | |
| Existing 161 kV HVTL | |

1 inch = 435 feet

Feet

N

Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
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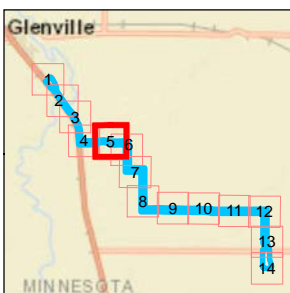
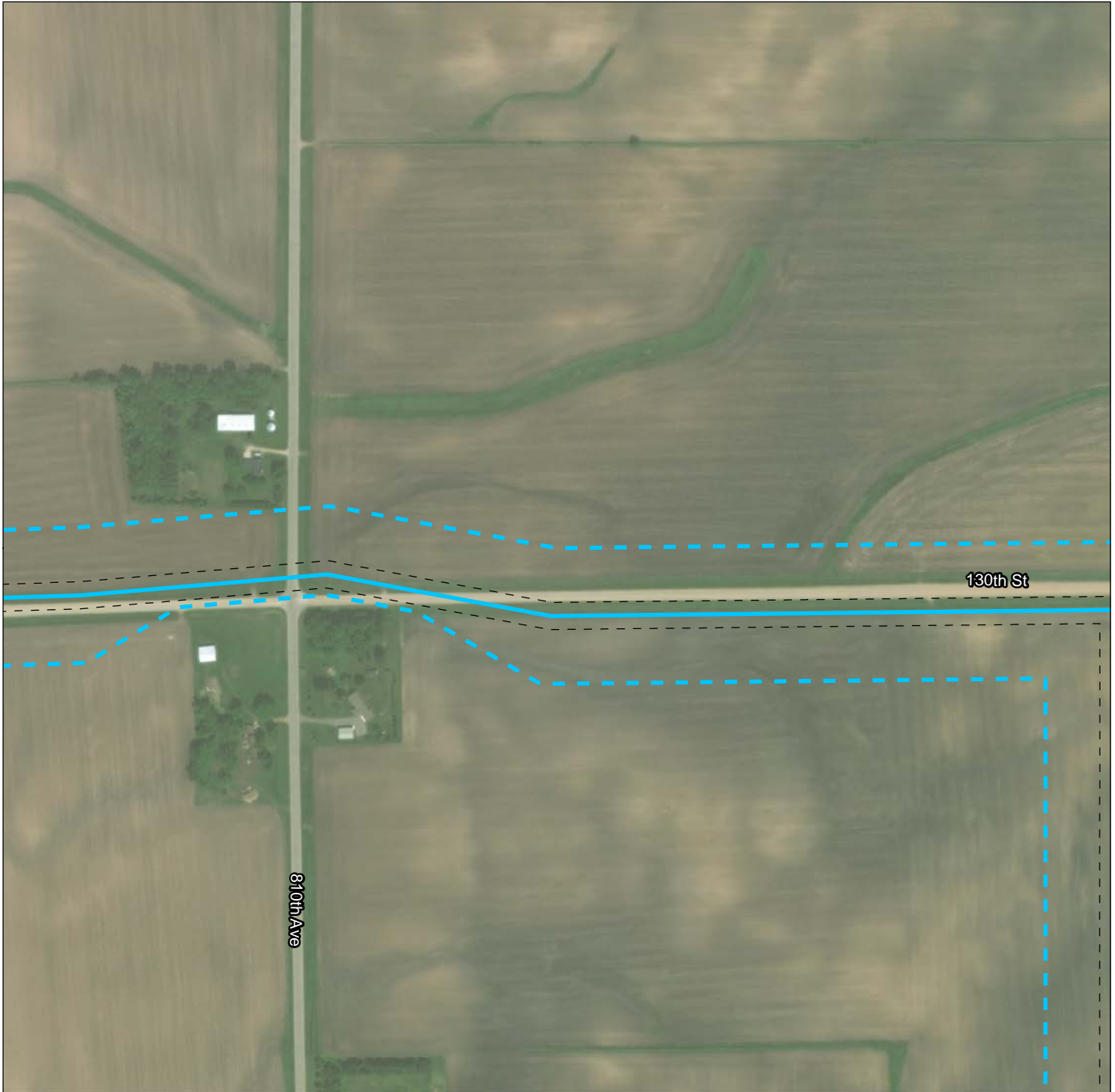
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| Right-of-Way | Freshwater Forested/Shrub Wetland |
| Route Width | Freshwater Pond |
| Glenworth Substation | Lake |
| Proposed Wind Farm Substation | Riverine |
| Existing 69 kV HVTL | |
| Existing 161 kV HVTL | |

1 inch = 435 feet

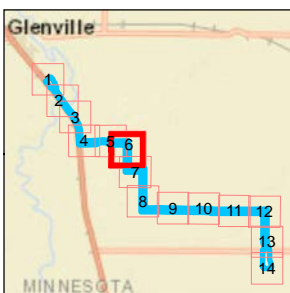
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|-------------------------------|-----------------------------------|--|
| Anticipated Alignment | Freshwater Emergent Wetland | N 1 inch = 435 feet Feet 0 125 250 500 |
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| Route Width | Freshwater Pond | <p>Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community</p> <p>Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community</p> |
| Glenworth Substation | Lake | |
| Proposed Wind Farm Substation | Riverine | |
| Existing 69 kV HVTL | | |
| Existing 161 kV HVTL | | |



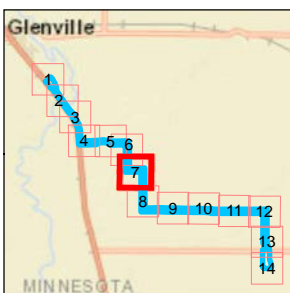
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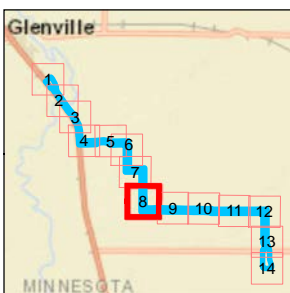
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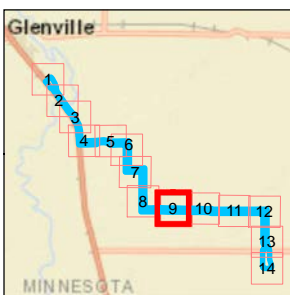
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|-------------------------------|-----------------------------------|--|
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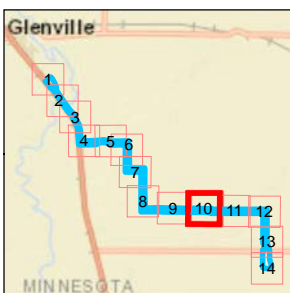
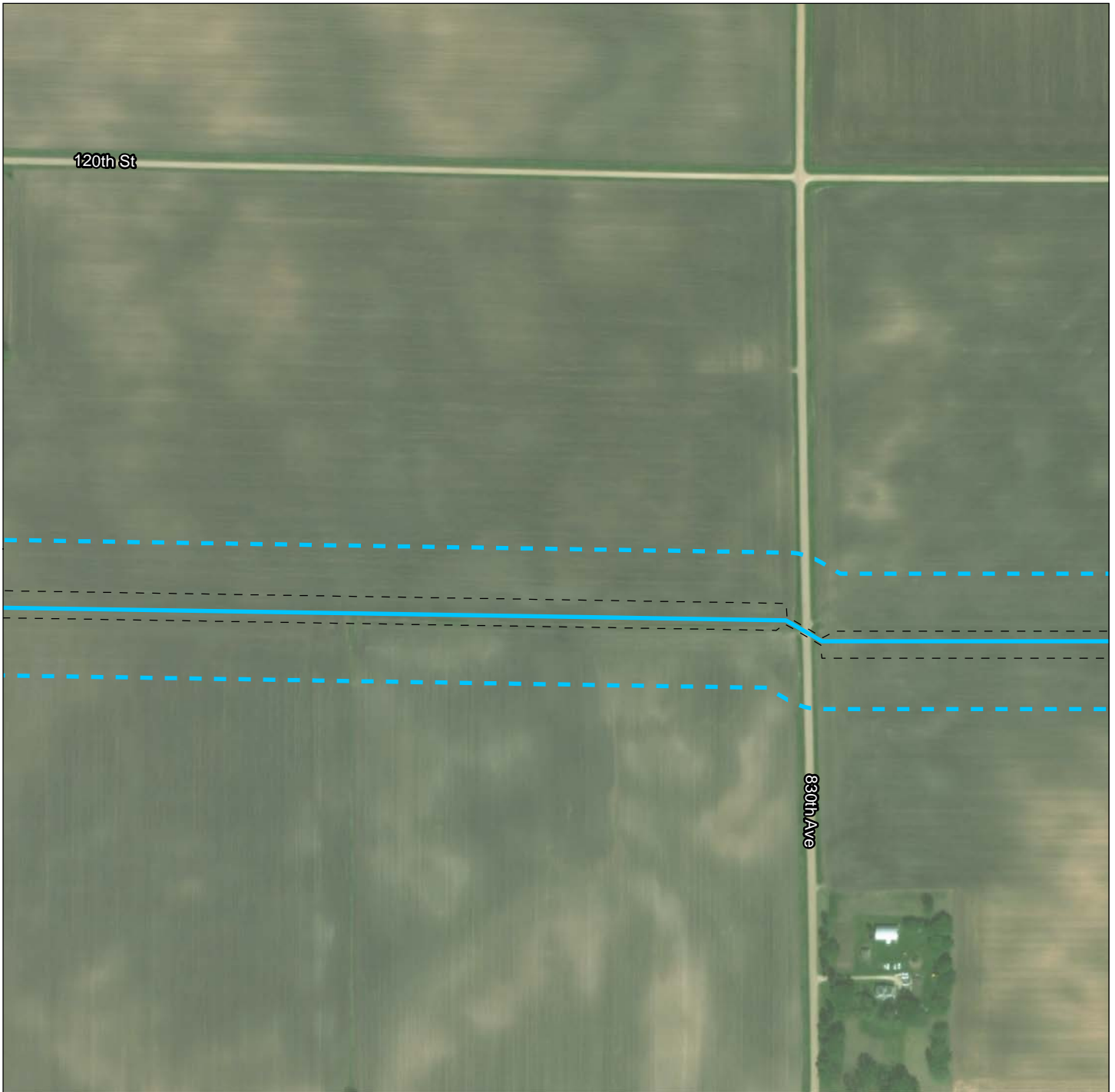
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Feet

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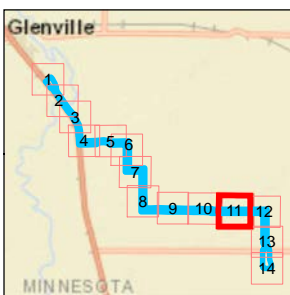
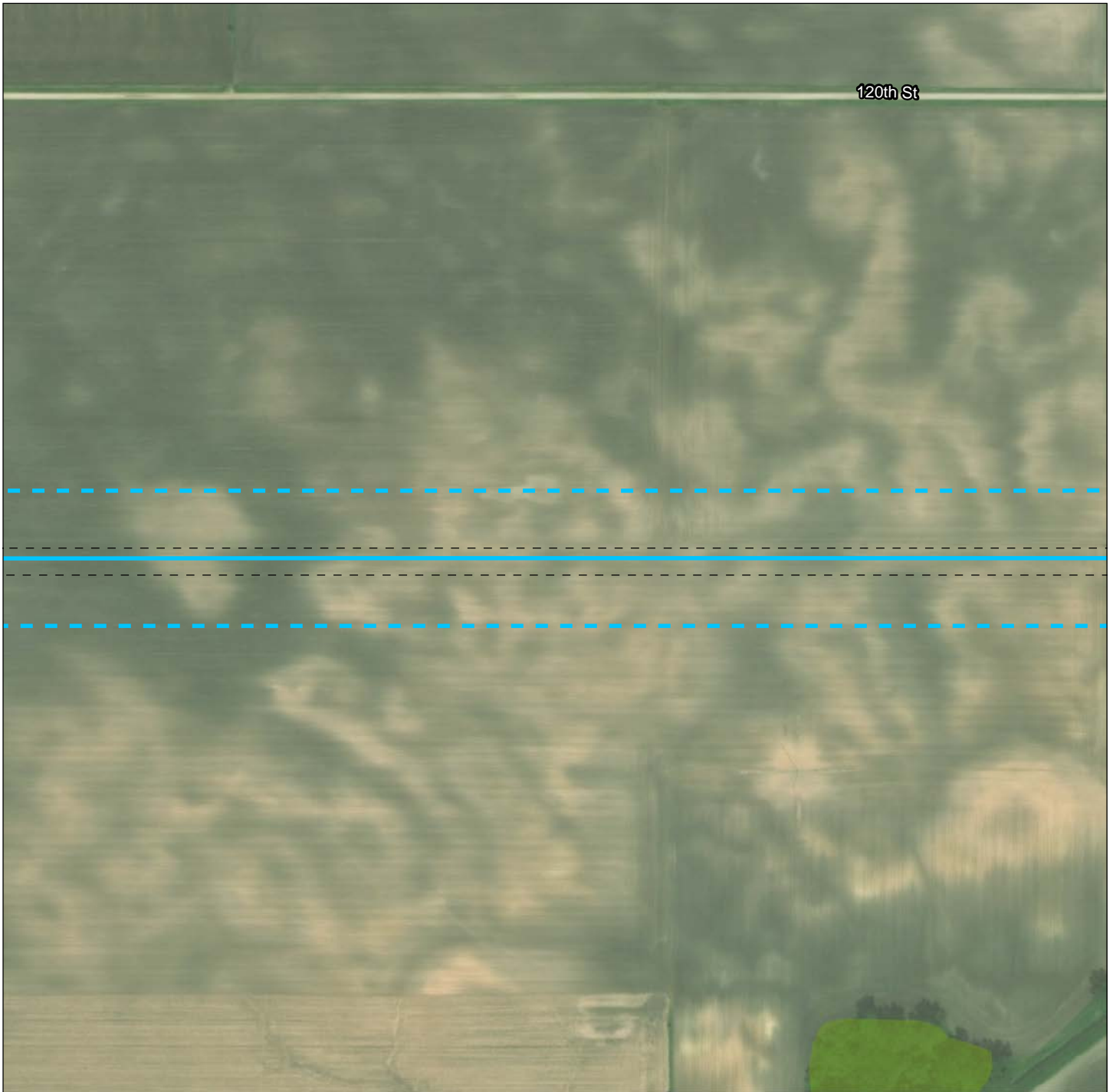
| | |
|-------------------------------|-----------------------------------|
| Anticipated Alignment | Freshwater Emergent Wetland |
| Right-of-Way | Freshwater Forested/Shrub Wetland |
| Route Width | Freshwater Pond |
| Glenworth Substation | Lake |
| Proposed Wind Farm Substation | Riverine |
| Existing 69 kV HVTL | |
| Existing 161 kV HVTL | |

1 inch = 435 feet

Feet

N

Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
 Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



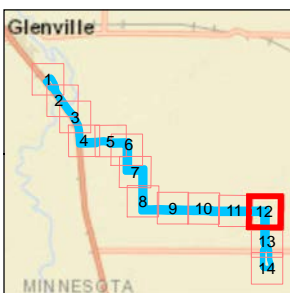
| | |
|-------------------------------|-----------------------------------|
| Anticipated Alignment | Freshwater Emergent Wetland |
| Right-of-Way | Freshwater Forested/Shrub Wetland |
| Route Width | Freshwater Pond |
| Glenworth Substation | Lake |
| Proposed Wind Farm Substation | Riverine |
| Existing 69 kV HVTL | |
| Existing 161 kV HVTL | |

1 inch = 435 feet

Feet

N

Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



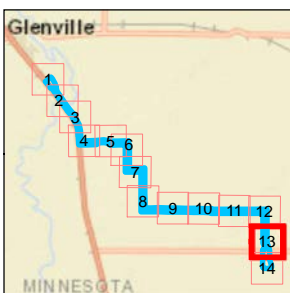
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|-------------------------------|-----------------------------------|
| Anticipated Alignment | Freshwater Emergent Wetland |
| Right-of-Way | Freshwater Forested/Shrub Wetland |
| Route Width | Freshwater Pond |
| Glenworth Substation | Lake |
| Proposed Wind Farm Substation | Riverine |
| Existing 69 kV HVTL | |
| Existing 161 kV HVTL | |

1 inch = 435 feet

Feet

N

Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
 Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



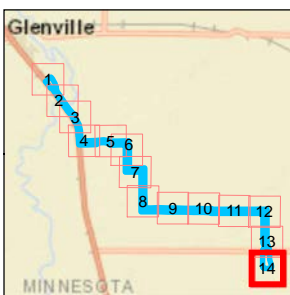
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|-------------------------------|-----------------------------------|
| Anticipated Alignment | Freshwater Emergent Wetland |
| Right-of-Way | Freshwater Forested/Shrub Wetland |
| Route Width | Freshwater Pond |
| Glenworth Substation | Lake |
| Proposed Wind Farm Substation | Riverine |
| Existing 69 kV HVTL | |
| Existing 161 kV HVTL | |

1 inch = 435 feet

Feet

N

Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
 Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



| | |
|-------------------------------|-----------------------------------|
| Anticipated Alignment | Freshwater Emergent Wetland |
| Right-of-Way | Freshwater Forested/Shrub Wetland |
| Route Width | Freshwater Pond |
| Glenworth Substation | Lake |
| Proposed Wind Farm Substation | Riverine |
| Existing 69 kV HVTL | |
| Existing 161 kV HVTL | |

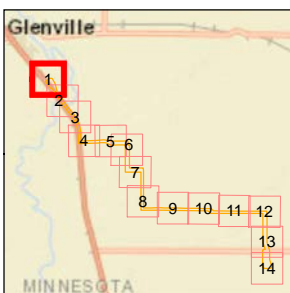
1 inch = 435 feet

Feet

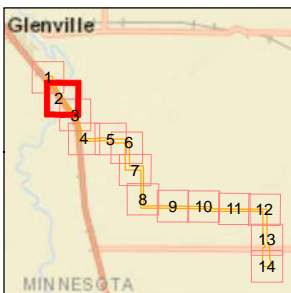
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Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
 Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

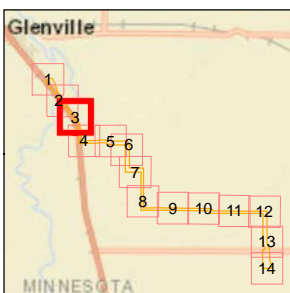
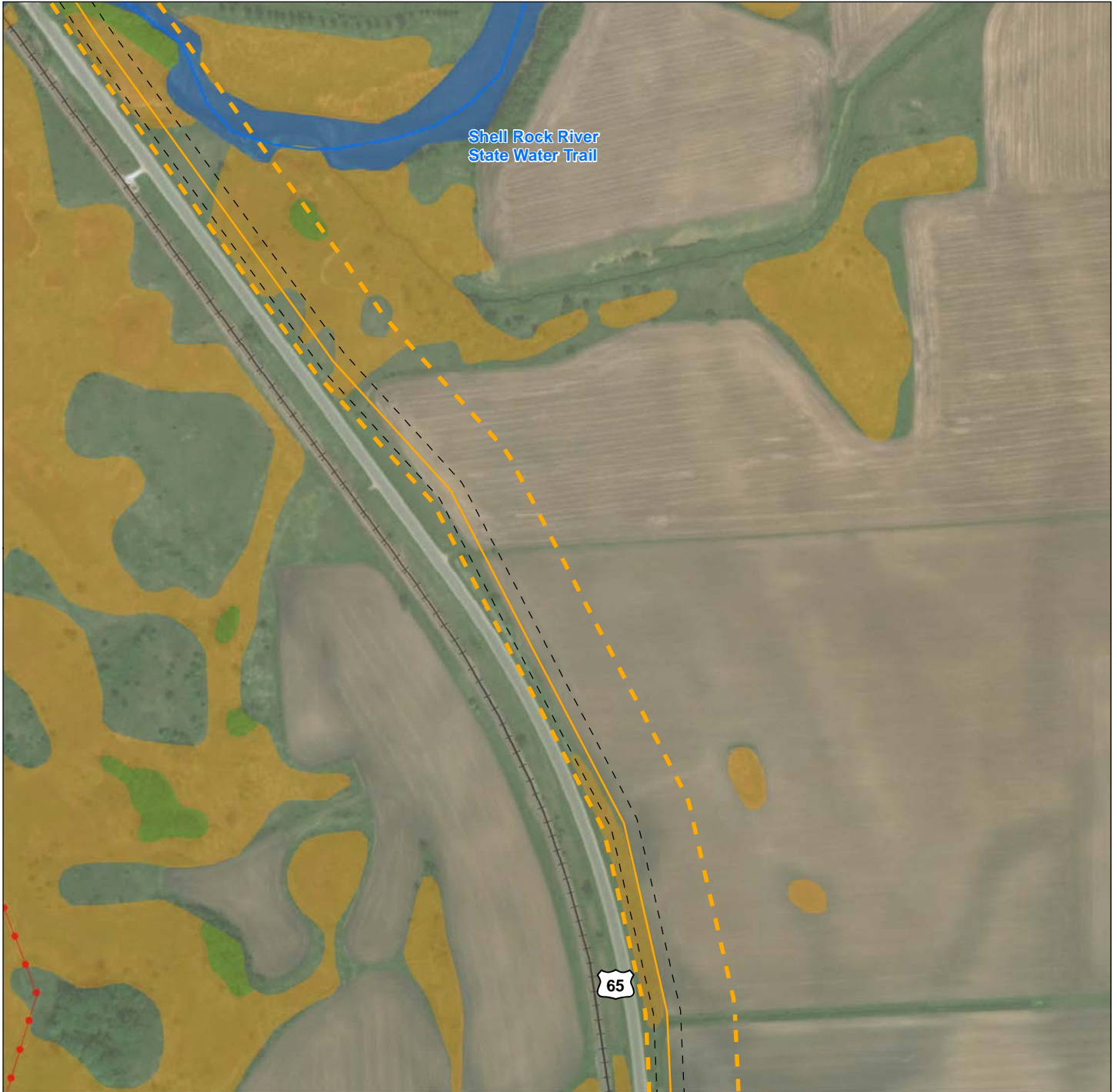
Map 2 Orange Route Detail



| | | |
|-------------------------------|-----------------------------------|--|
| Anticipated Alignment | Freshwater Emergent Wetland | 1 inch = 435 feet Feet 0 125 250 500 |
| Right-of-Way | Freshwater Forested/Shrub Wetland | |
| Route Width | Freshwater Pond | <p>Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community</p> <p>Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community</p> |
| Glenworth Substation | Lake | |
| Proposed Wind Farm Substation | Riverine | |
| Existing 69 kV HVTL | | |
| Existing 161 kV HVTL | | |



| | | |
|-------------------------------|-----------------------------------|---|
| Anticipated Alignment | Freshwater Emergent Wetland | N 1 inch = 435 feet Feet 0 125 250 500 |
| Right-of-Way | Freshwater Forested/Shrub Wetland | |
| Route Width | Freshwater Pond | Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community |
| Glenworth Substation | Lake | |
| Proposed Wind Farm Substation | Riverine | |
| Existing 69 kV HVTL | | |
| Existing 161 kV HVTL | | |



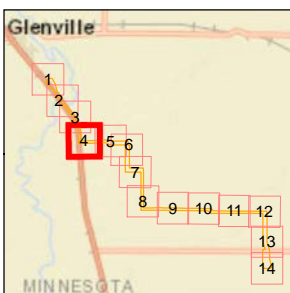
| | |
|-------------------------------|-----------------------------------|
| Anticipated Alignment | Freshwater Emergent Wetland |
| Right-of-Way | Freshwater Forested/Shrub Wetland |
| Route Width | Freshwater Pond |
| Glenworth Substation | Lake |
| Proposed Wind Farm Substation | Riverine |
| Existing 69 kV HVTL | |
| Existing 161 kV HVTL | |

1 inch = 435 feet

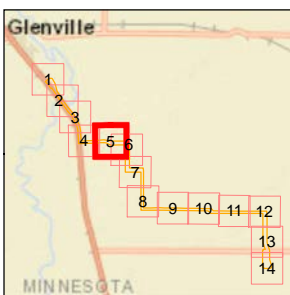
Feet

N

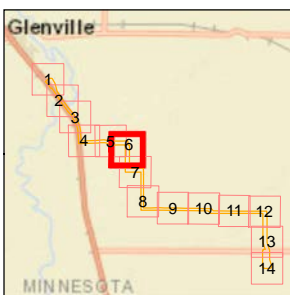
Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
 Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



| | | |
|-------------------------------|-----------------------------------|---|
| Anticipated Alignment | Freshwater Emergent Wetland | N 1 inch = 435 feet Feet 0 125 250 500 |
| Right-of-Way | Freshwater Forested/Shrub Wetland | |
| Route Width | Freshwater Pond | Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community |
| Glenworth Substation | Lake | |
| Proposed Wind Farm Substation | Riverine | |
| Existing 69 kV HVTL | | |
| Existing 161 kV HVTL | | |



| | | |
|-------------------------------|-----------------------------------|---|
| Anticipated Alignment | Freshwater Emergent Wetland | N 1 inch = 435 feet Feet 0 125 250 500 |
| Right-of-Way | Freshwater Forested/Shrub Wetland | |
| Route Width | Freshwater Pond | Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community |
| Glenworth Substation | Lake | |
| Proposed Wind Farm Substation | Riverine | |
| Existing 69 kV HVTL | | |
| Existing 161 kV HVTL | | |



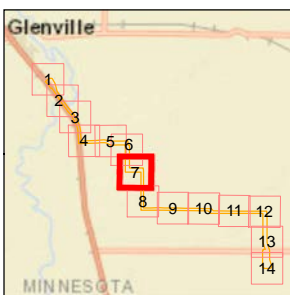
| | |
|-------------------------------|-----------------------------------|
| Anticipated Alignment | Freshwater Emergent Wetland |
| Right-of-Way | Freshwater Forested/Shrub Wetland |
| Route Width | Freshwater Pond |
| Glenworth Substation | Lake |
| Proposed Wind Farm Substation | Riverine |
| Existing 69 kV HVTL | |
| Existing 161 kV HVTL | |

1 inch = 435 feet

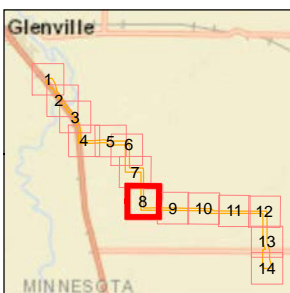
Feet

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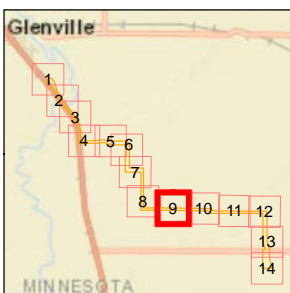
Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
 Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



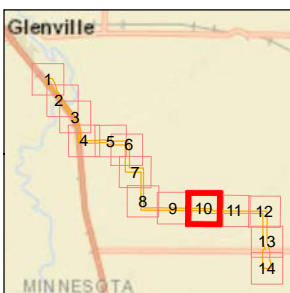
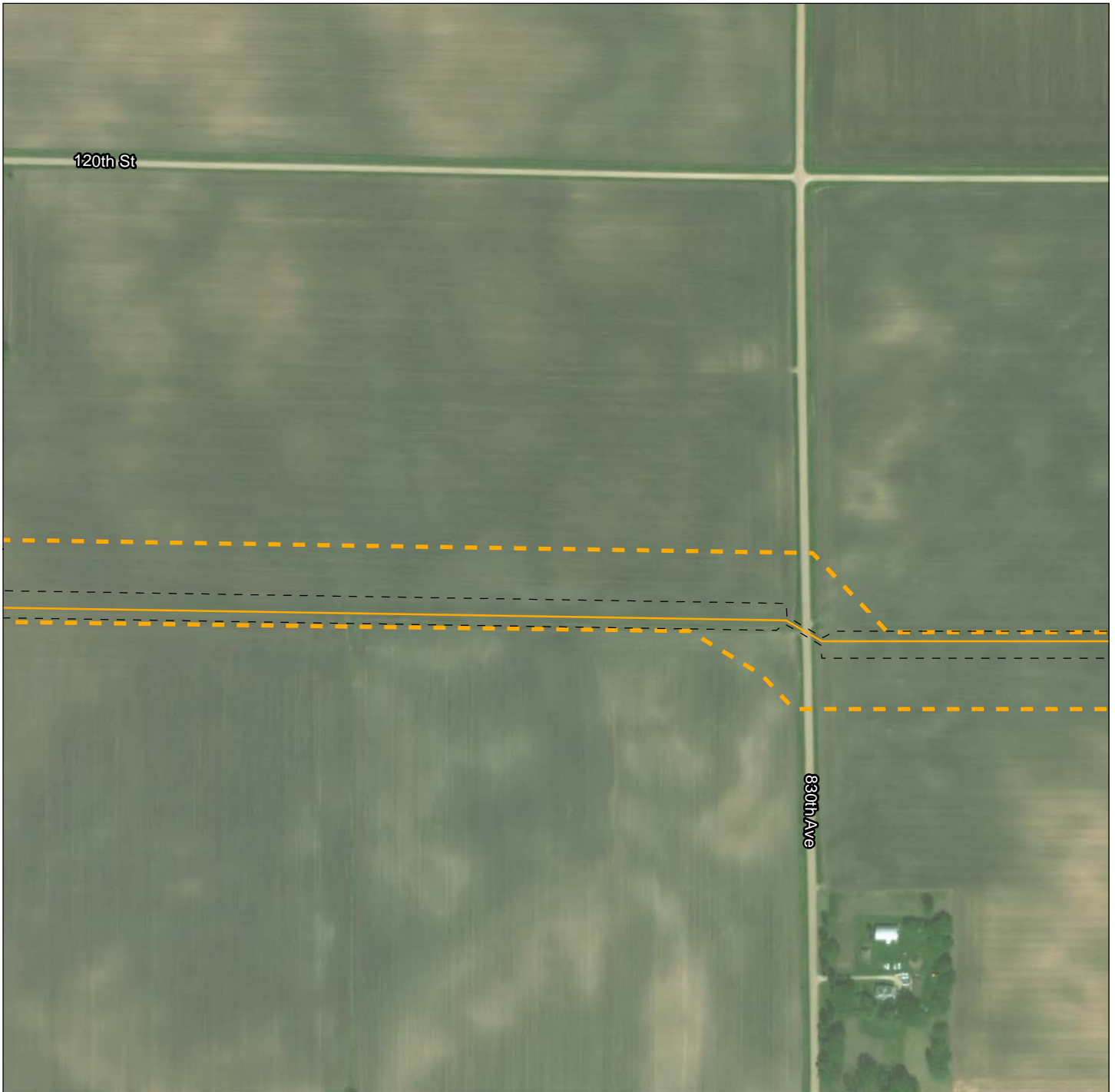
| | | |
|-------------------------------|-----------------------------------|---|
| Anticipated Alignment | Freshwater Emergent Wetland | N 1 inch = 435 feet Feet 0 125 250 500 |
| Right-of-Way | Freshwater Forested/Shrub Wetland | |
| Route Width | Freshwater Pond | Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community |
| Glenworth Substation | Lake | |
| Proposed Wind Farm Substation | Riverine | |
| Existing 69 kV HVTL | | |
| Existing 161 kV HVTL | | |



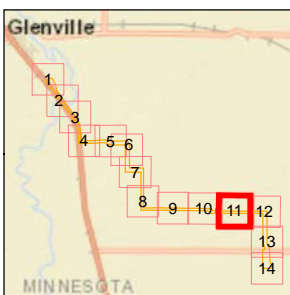
| | | |
|-------------------------------|-----------------------------------|--|
| Anticipated Alignment | Freshwater Emergent Wetland | N 1 inch = 435 feet Feet 0 125 250 500 |
| Right-of-Way | Freshwater Forested/Shrub Wetland | |
| Route Width | Freshwater Pond | <p>Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community</p> <p>Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community</p> |
| Glenworth Substation | Lake | |
| Proposed Wind Farm Substation | Riverine | |
| Existing 69 kV HVTL | Existing 161 kV HVTL | |



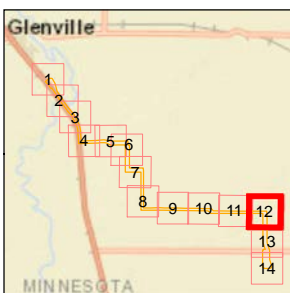
| | | |
|-------------------------------|-----------------------------------|---|
| Anticipated Alignment | Freshwater Emergent Wetland | N 1 inch = 435 feet Feet 0 125 250 500 |
| Right-of-Way | Freshwater Forested/Shrub Wetland | |
| Route Width | Freshwater Pond | Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community |
| Glenworth Substation | Lake | |
| Proposed Wind Farm Substation | Riverine | |
| Existing 69 kV HVTL | Existing 161 kV HVTL | |



| | | |
|-------------------------------|-----------------------------------|---|
| Anticipated Alignment | Freshwater Emergent Wetland | N 1 inch = 435 feet Feet 0 125 250 500 |
| Right-of-Way | Freshwater Forested/Shrub Wetland | |
| Route Width | Freshwater Pond | Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community |
| Glenworth Substation | Lake | |
| Proposed Wind Farm Substation | Riverine | |
| Existing 69 kV HVTL | | |
| Existing 161 kV HVTL | | |



| | | |
|-------------------------------|-----------------------------------|---|
| Anticipated Alignment | Freshwater Emergent Wetland | N 1 inch = 435 feet Feet 0 125 250 500 |
| Right-of-Way | Freshwater Forested/Shrub Wetland | |
| Route Width | Freshwater Pond | Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community |
| Glenworth Substation | Lake | |
| Proposed Wind Farm Substation | Riverine | |
| Existing 69 kV HVTL | | |
| Existing 161 kV HVTL | | |



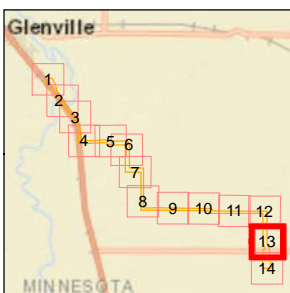
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|-------------------------------|-----------------------------------|
| Anticipated Alignment | Freshwater Emergent Wetland |
| Right-of-Way | Freshwater Forested/Shrub Wetland |
| Route Width | Freshwater Pond |
| Glenworth Substation | Lake |
| Proposed Wind Farm Substation | Riverine |
| Existing 69 kV HVTL | |
| Existing 161 kV HVTL | |

1 inch = 435 feet

0 125 250 500 Feet

N

Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
 Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



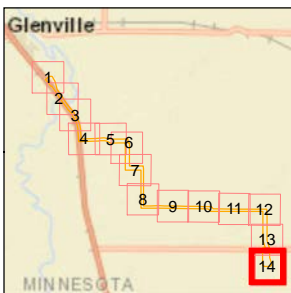
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|-------------------------------|-----------------------------------|
| Anticipated Alignment | Freshwater Emergent Wetland |
| Right-of-Way | Freshwater Forested/Shrub Wetland |
| Route Width | Freshwater Pond |
| Glenworth Substation | Lake |
| Proposed Wind Farm Substation | Riverine |
| Existing 69 kV HVTL | |
| Existing 161 kV HVTL | |

1 inch = 435 feet

Feet

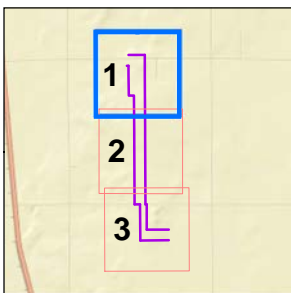
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Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
 Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



| | | |
|-------------------------------|-----------------------------------|---|
| Anticipated Alignment | Freshwater Emergent Wetland | N 1 inch = 435 feet Feet 0 125 250 500 |
| Right-of-Way | Freshwater Forested/Shrub Wetland | |
| Route Width | Freshwater Pond | Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community |
| Glenworth Substation | Lake | |
| Proposed Wind Farm Substation | Riverine | |
| Existing 69 kV HVTL | | |
| Existing 161 kV HVTL | | |

Map 3 Purple Route Segment Detail



| | |
|-----------------------|------------------------------------|
| Anticipated Alignment | Proposed Route Width |
| Right-of-Way (80 ft) | Replaced Portion of Proposed Route |
| Route Width | Existing 69 kV HVTL |
| | Existing 161 kV HVTL |

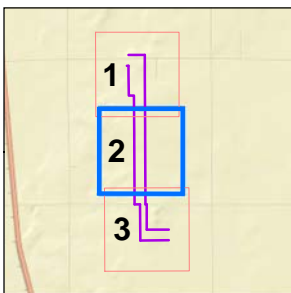
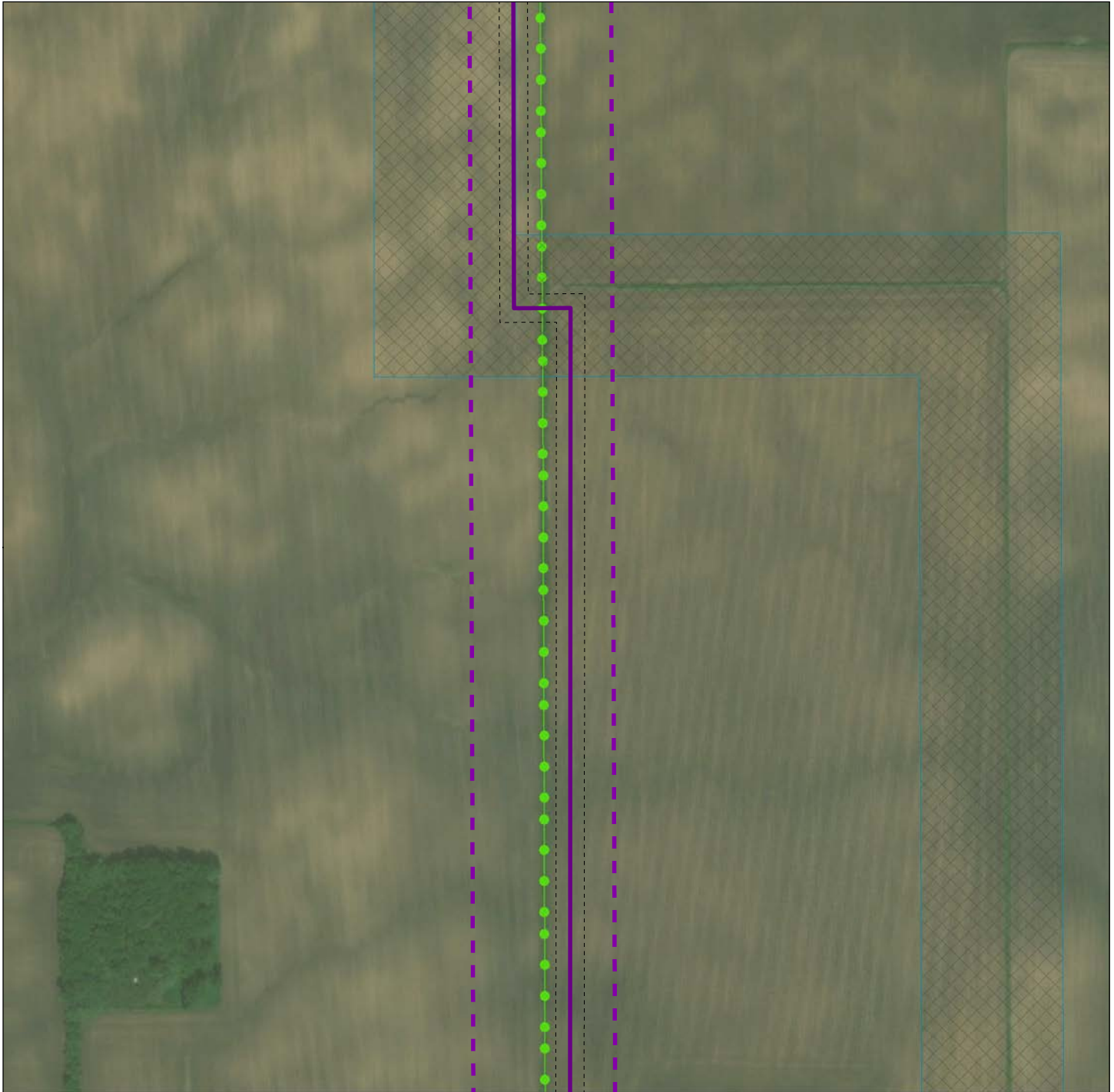
1 inch = 417 feet

Feet

0 125 250 500

N

Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
 Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



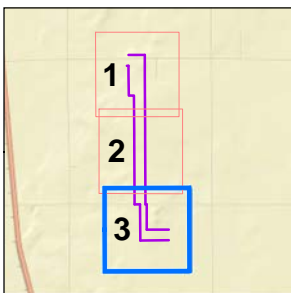
| | |
|-----------------------|------------------------------------|
| Anticipated Alignment | Proposed Route Width |
| Right-of-Way (80 ft) | Replaced Portion of Proposed Route |
| Route Width | Existing 69 kV HVTL |
| | Existing 161 kV HVTL |

1 inch = 417 feet

Feet

0 125 250 500

Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
 Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



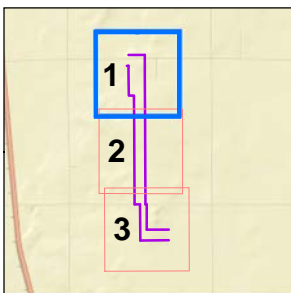
| | | | |
|-----------------------|----------------------|----------------------|------------------------------------|
| Anticipated Alignment | Right-of-Way (80 ft) | Proposed Route Width | Replaced Portion of Proposed Route |
| Route Width | Existing 69 kV HVTL | Existing 161 kV HVTL | |

1 inch = 417 feet

Feet

0 125 250 500

Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
 Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



| | |
|-----------------------|------------------------------------|
| Anticipated Alignment | Proposed Route Width |
| Right-of-Way (80 ft) | Replaced Portion of Proposed Route |
| Route Width | Existing 69 kV HVTL |
| Existing 161 kV HVTL | |

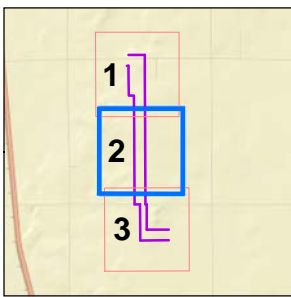
1 inch = 417 feet

Feet

0 125 250 500

N

Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
 Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



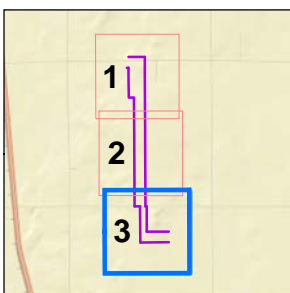
| | | | |
|-----------------------|----------------------|----------------------|------------------------------------|
| Anticipated Alignment | Right-of-Way (80 ft) | Proposed Route Width | Replaced Portion of Proposed Route |
| Route Width | Existing 69 kV HVTL | | |
| | Existing 161 kV HVTL | | |

1 inch = 417 feet

Feet

0 125 250 500

Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
 Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



| | | | |
|--|-----------------------|--|------------------------------------|
| | Anticipated Alignment | | Proposed Route Width |
| | Right-of-Way (80 ft) | | Replaced Portion of Proposed Route |
| | Route Width | | Existing 69 kV HVTL |
| | Existing 161 kV HVTL | | |

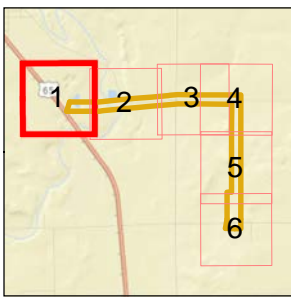
1 inch = 417 feet

Feet

0 125 250 500

Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
 Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Map 4 Gold Route Segment Detail



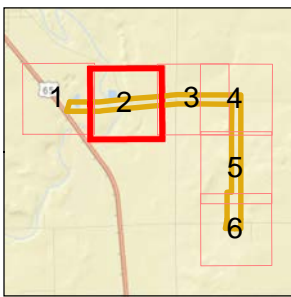
| | |
|------------------------------------|-----------------------------------|
| Anticipated Alignment | Existing 69 kV HVTL |
| Right-of-Way (80 ft) | Existing 161 kV HVTL |
| Route Width | Freshwater Emergent Wetland |
| Proposed Route Width | Freshwater Forested/Shrub Wetland |
| Replaced Portion of Proposed Route | Freshwater Pond |
| Glenworth Substation | Lake |
| | Riverine |

1 inch = 417 feet

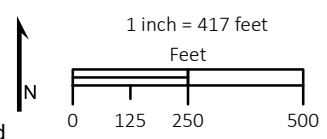
Feet

0 125 250 500

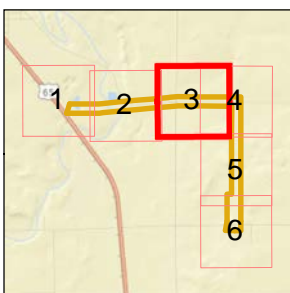
Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
 Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



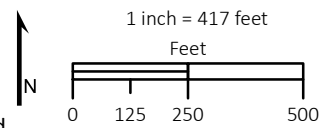
- Anticipated Alignment
- Right-of-Way (80 ft)
- Route Width
- Proposed Route Width
- Replaced Portion of Proposed Route
- Glenworth Substation
- Existing 69 kV HVTL
- Existing 161 kV HVTL
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Riverine



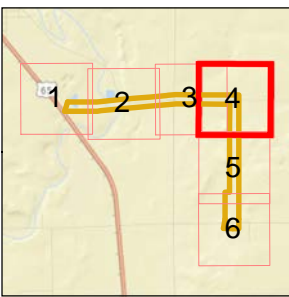
Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
 Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



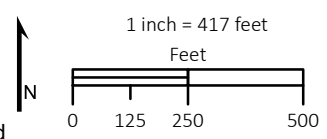
- Anticipated Alignment
- Right-of-Way (80 ft)
- Route Width
- Proposed Route Width
- Replaced Portion of Proposed Route
- Glenworth Substation
- Existing 69 kV HVTL
- Existing 161 kV HVTL
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Riverine



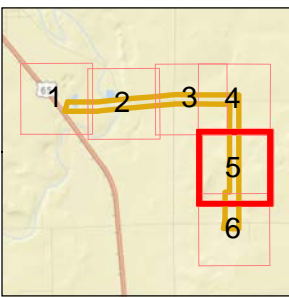
Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
 Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



- Anticipated Alignment
- Right-of-Way (80 ft)
- Route Width
- Proposed Route Width
- Replaced Portion of Proposed Route
- Glenworth Substation
- Existing 69 kV HVTL
- Existing 161 kV HVTL
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Riverine



Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
 Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



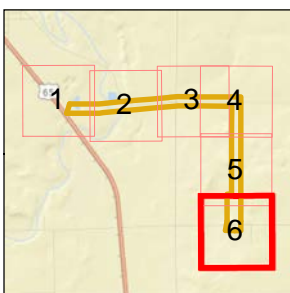
| | |
|------------------------------------|-----------------------------------|
| Anticipated Alignment | Existing 69 kV HVTL |
| Right-of-Way (80 ft) | Existing 161 kV HVTL |
| Route Width | Freshwater Emergent Wetland |
| Proposed Route Width | Freshwater Forested/Shrub Wetland |
| Replaced Portion of Proposed Route | Freshwater Pond |
| Glenworth Substation | Lake |
| | Riverine |

1 inch = 417 feet

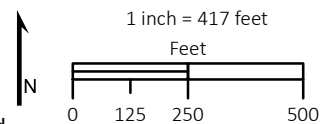
Feet

0 125 250 500

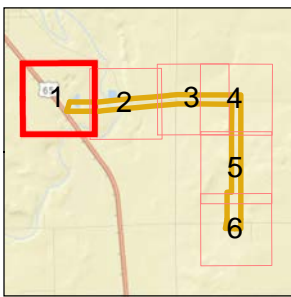
Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
 Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



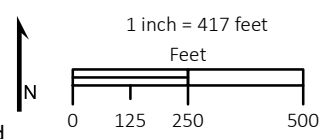
- Anticipated Alignment
- Right-of-Way (80 ft)
- Proposed Route Width
- Replaced Portion of Proposed Route
- Glenworth Substation
- Existing 69 kV HVTL
- - - Existing 161 kV HVTL
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Riverine



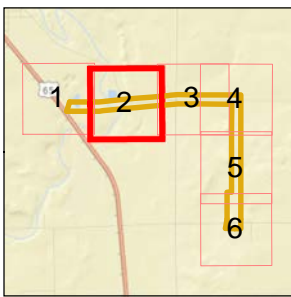
Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
 Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



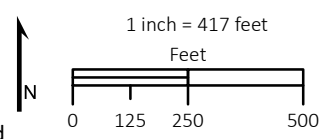
- Anticipated Alignment
- Right-of-Way (80 ft)
- Route Width
- Proposed Route Width
- Replaced Portion of Proposed Route
- Glenworth Substation
- Existing 69 kV HVTL
- Existing 161 kV HVTL
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Riverine



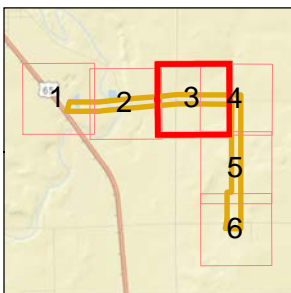
Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



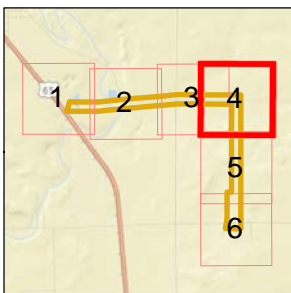
- Anticipated Alignment
- Right-of-Way (80 ft)
- Route Width
- Proposed Route Width
- Replaced Portion of Proposed Route
- Glenworth Substation
- - - Existing 69 kV HVTL
- - - Existing 161 kV HVTL
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Riverine



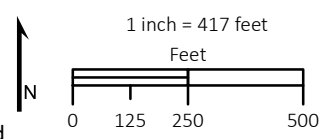
Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
 Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



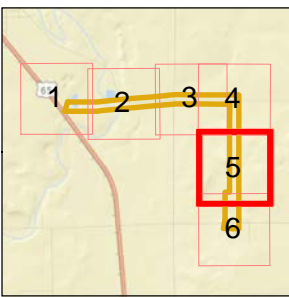
| | | |
|------------------------------------|-----------------------------------|---|
| Anticipated Alignment | Existing 69 kV HVTL | N 1 inch = 417 feet Feet 0 125 250 500 |
| Right-of-Way (80 ft) | Existing 161 kV HVTL | |
| Route Width | Freshwater Emergent Wetland | Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community |
| Proposed Route Width | Freshwater Forested/Shrub Wetland | |
| Replaced Portion of Proposed Route | Freshwater Pond | |
| Glenworth Substation | Lake | |
| | Riverine | |



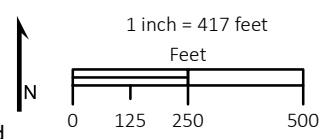
- Anticipated Alignment
- Right-of-Way (80 ft)
- Route Width
- Proposed Route Width
- Replaced Portion of Proposed Route
- Glenworth Substation
- Existing 69 kV HVTL
- Existing 161 kV HVTL
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Riverine



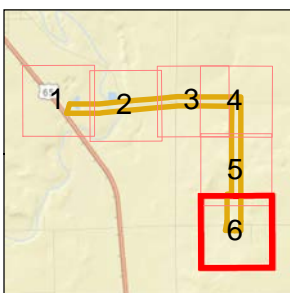
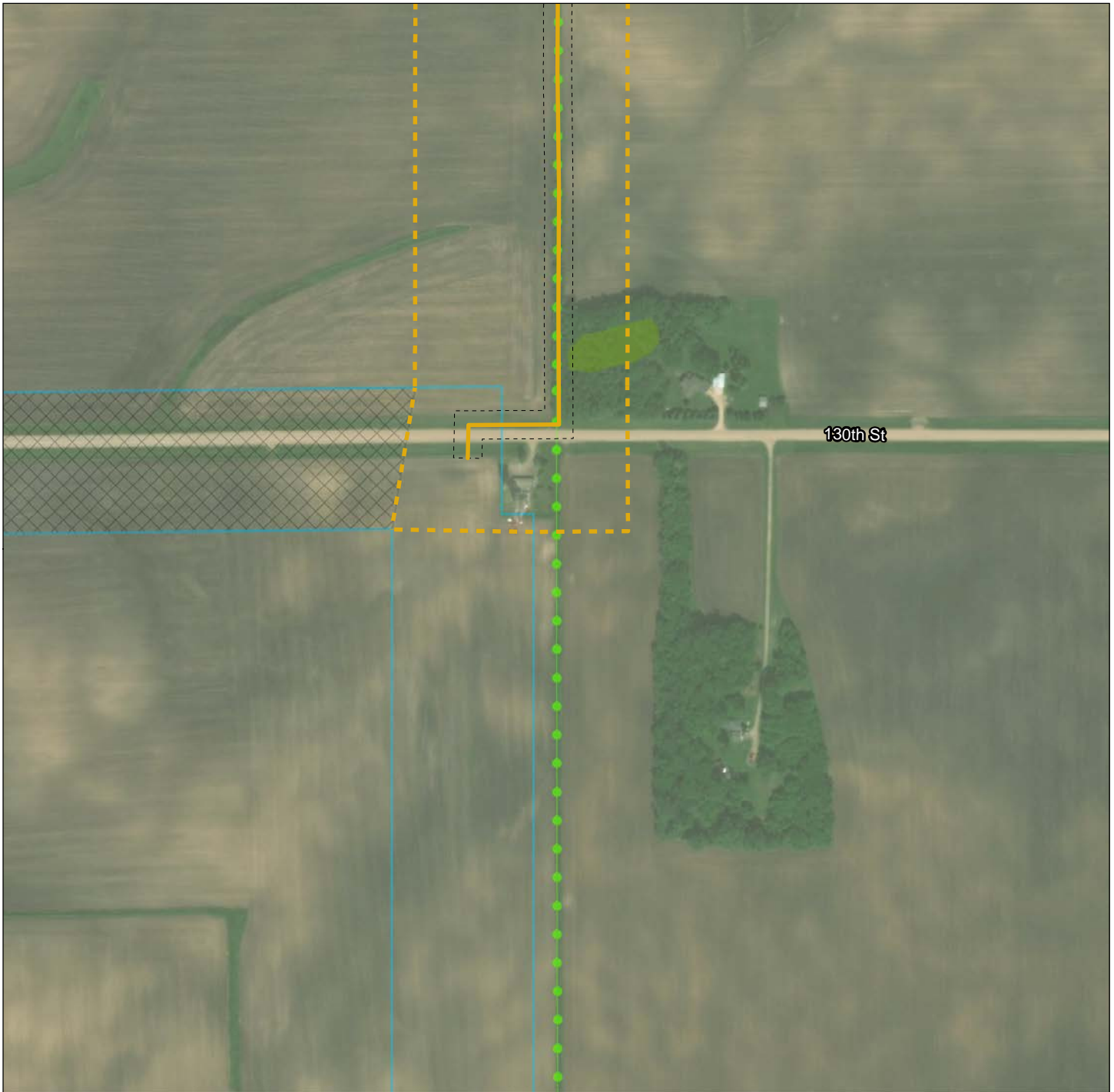
Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



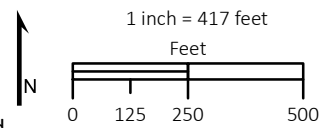
- Anticipated Alignment
- Right-of-Way (80 ft)
- Route Width
- Proposed Route Width
- Replaced Portion of Proposed Route
- Glenworth Substation
- Existing 69 kV HVTL
- Existing 161 kV HVTL
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Riverine



Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
 Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

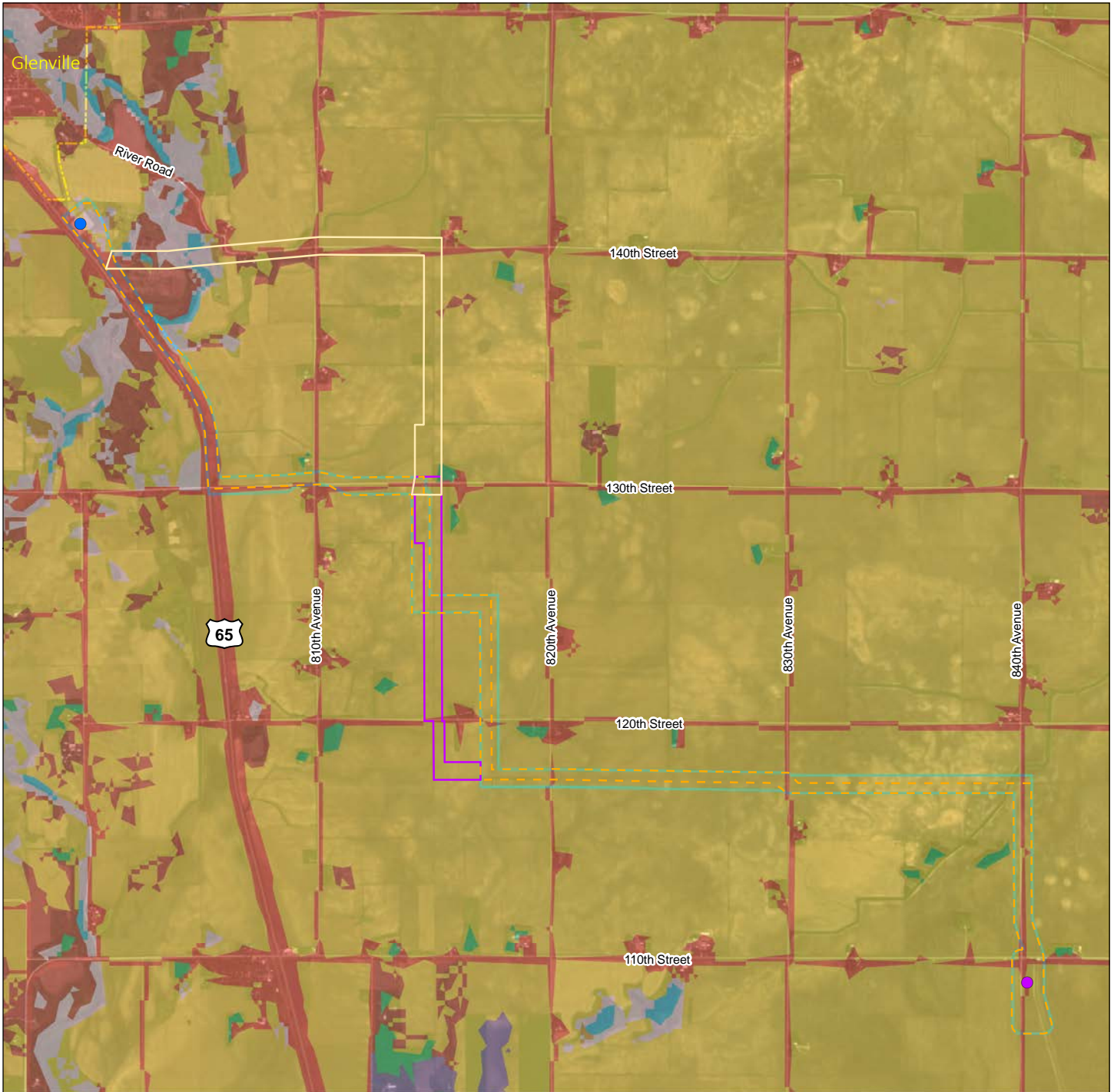


- Anticipated Alignment
- Right-of-Way (80 ft)
- Proposed Route Width
- Replaced Portion of Proposed Route
- Glenworth Substation
- Existing 69 kV HVTL
- Existing 161 kV HVTL
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Riverine



Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Map 5 Land Cover in Project Area



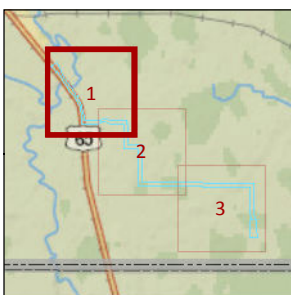
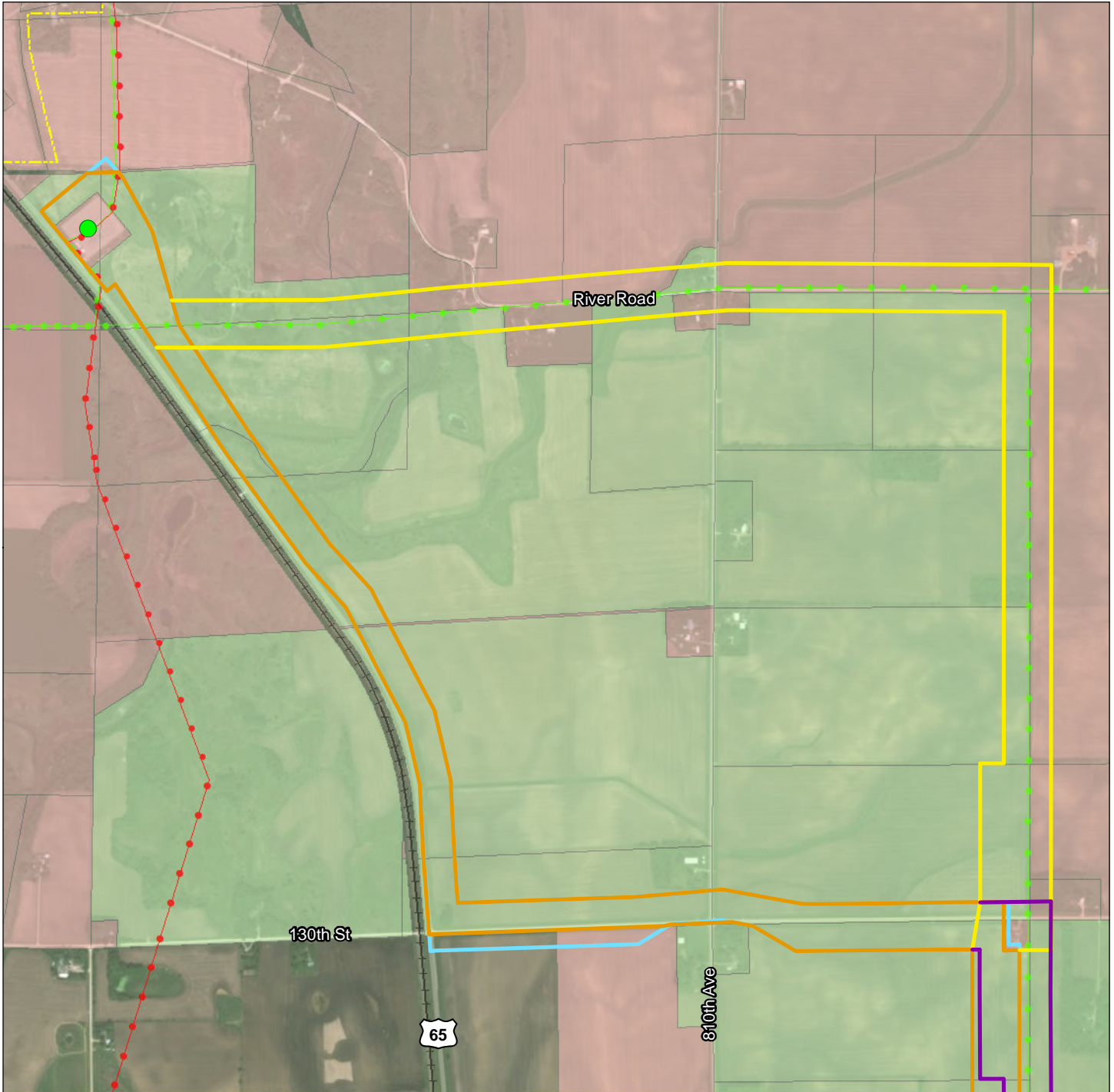
| | | |
|------------------------|---------------|---------------------|
| — TEAL Route | ■ Open Water | ■ Grassland |
| — ORANGE Route | ■ Developed | ■ Pasture/Hay |
| — GOLD Route Segment | ■ Barren Land | ■ Cultivated Crops |
| — PURPLE Route Segment | ■ Forest | ■ Woody Wetlands |
| | ■ Shrub/Scrub | ■ Emergent Wetlands |

1 inch = 3,333 feet

MILES

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Map 6 Participating and Non-Participating Landowners



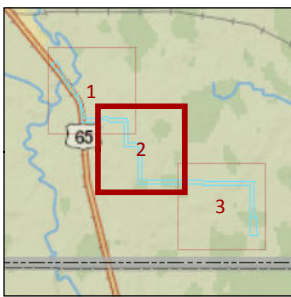
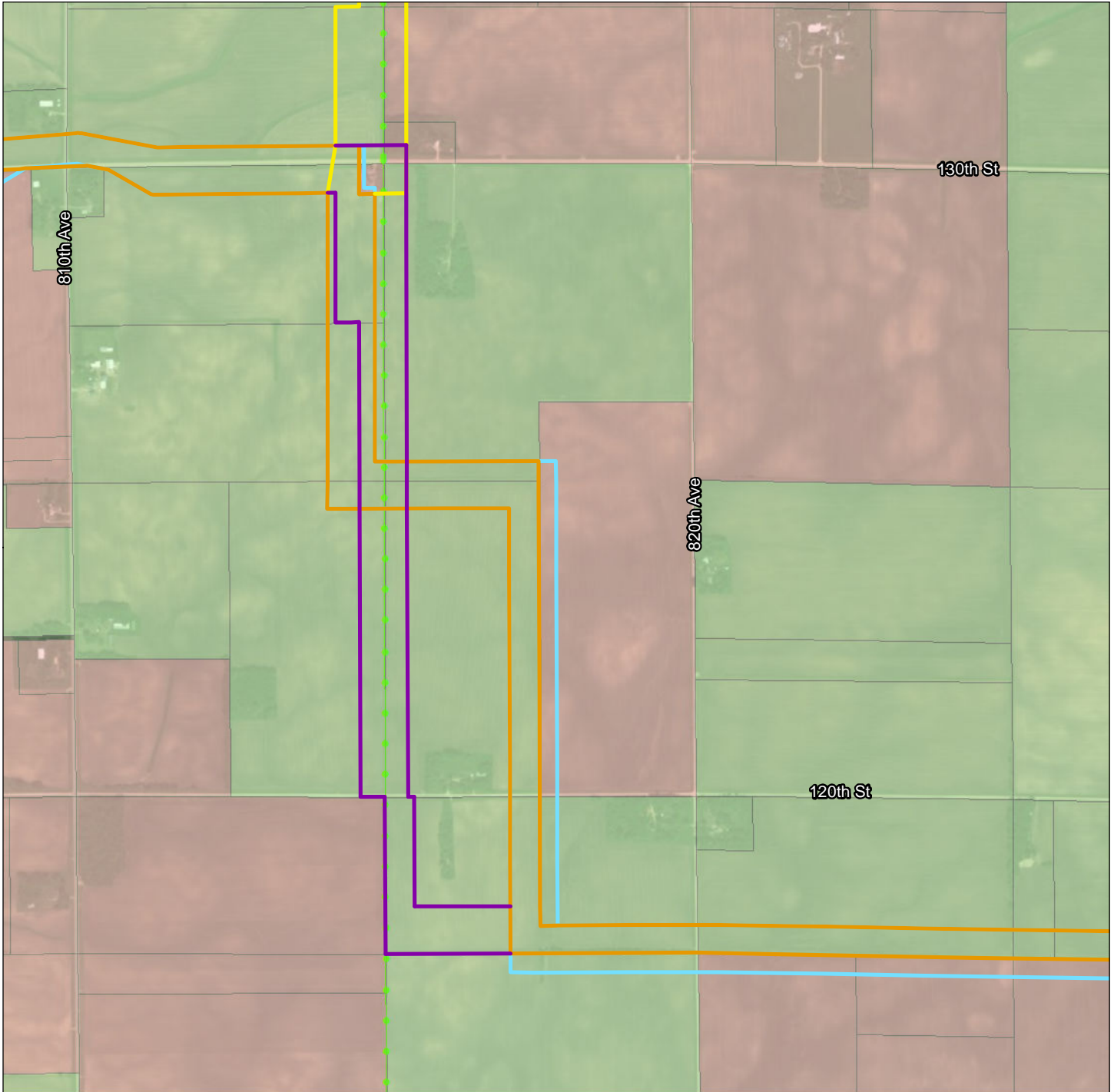
| | |
|-----------------------------|-------------------------------|
| Proposed Route | Glenworth Substation |
| Orange Route | Proposed Wind Farm Substation |
| Purple Route Segment | Existing 69 kV HVTL |
| Gold Route Segment | Existing 161 kV HVTL |
| Non-Participating Landowner | |
| Participating Landowner | |

1 inch = 1,250 feet

Feet

0 1,000 2,000

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
 Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, DeLorme, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.



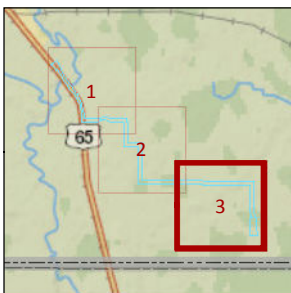
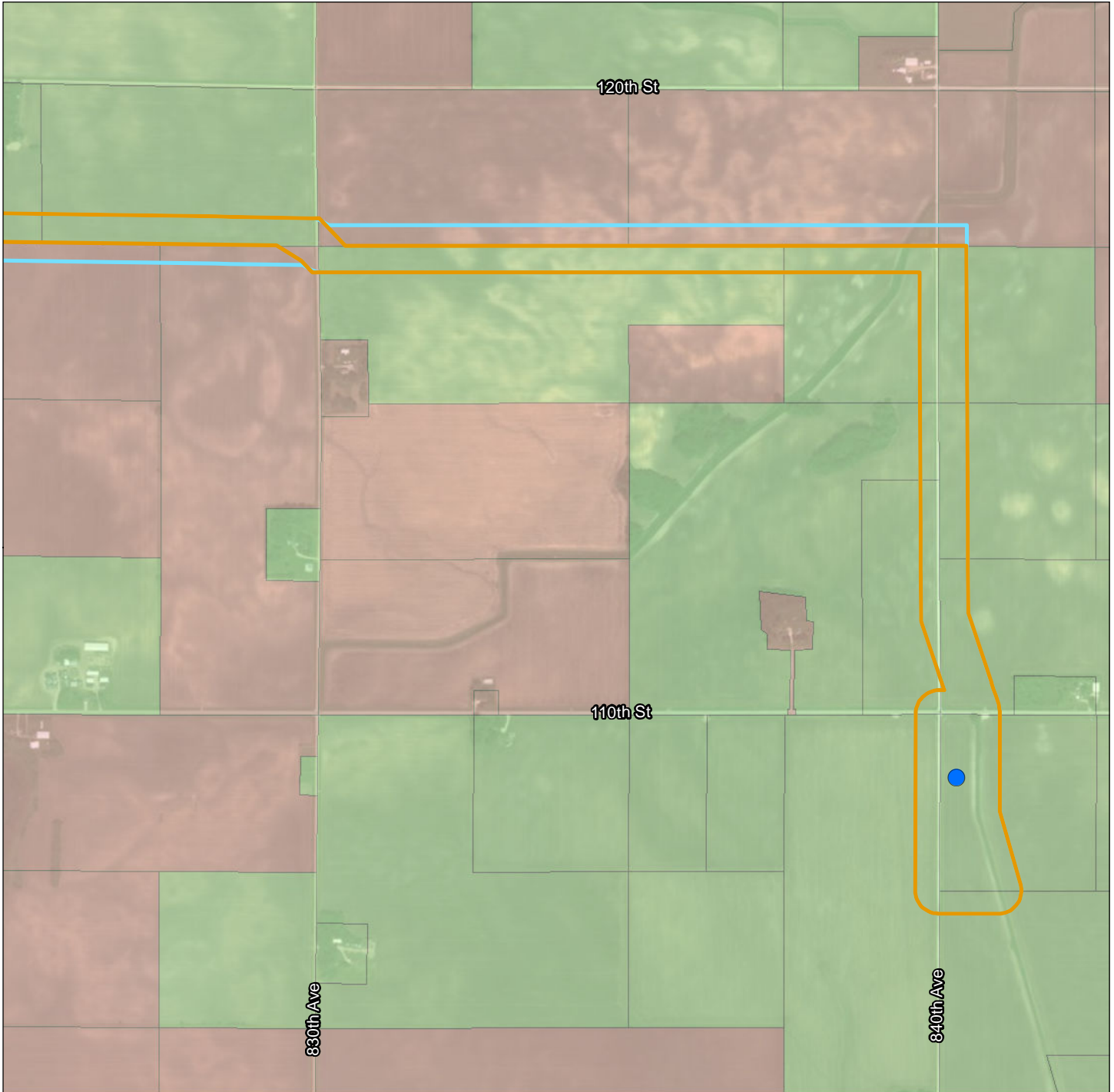
| | |
|-----------------------------|-------------------------------|
| Proposed Route | Glenworth Substation |
| Orange Route | Proposed Wind Farm Substation |
| Purple Route Segment | Existing 69 kV HVTL |
| Gold Route Segment | Existing 161 kV HVTL |
| Non-Participating Landowner | |
| Participating Landowner | |

1 inch = 1,250 feet

Feet

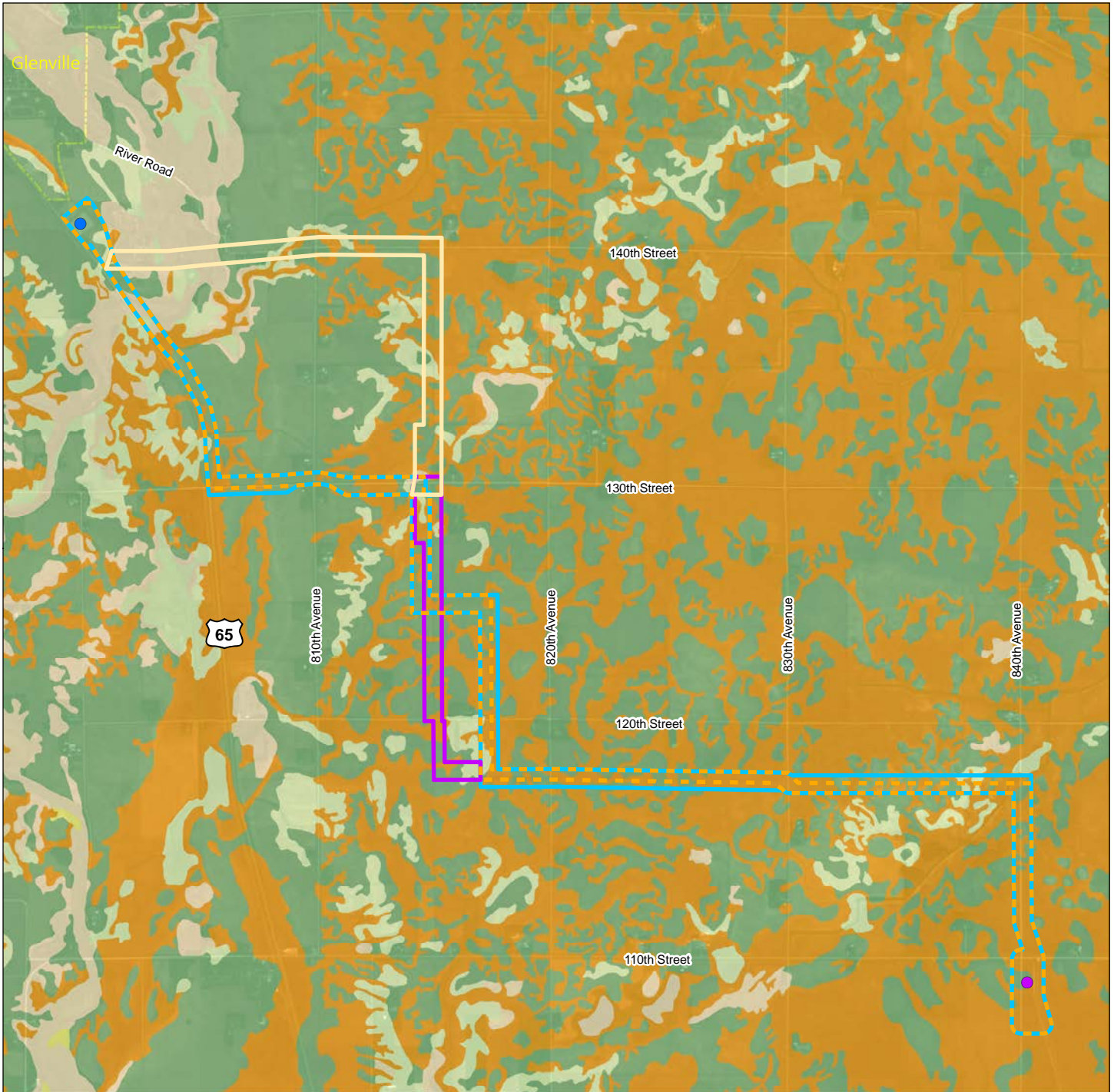
0 1,000 2,000

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, DeLorme, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.



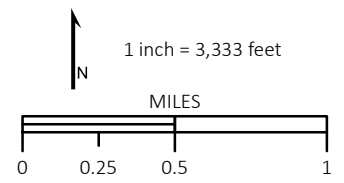
| | | |
|-----------------------------|-------------------------------|--|
| Proposed Route | Glenworth Substation | 1 inch = 1,250 feet Feet 0 1,000 2,000 |
| Orange Route | Proposed Wind Farm Substation | |
| Purple Route Segment | Existing 69 kV HVTL | |
| Gold Route Segment | Existing 161 kV HVTL | Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, DeLorme, HERE, UNER-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp. |
| Non-Participating Landowner | | |
| Participating Landowner | | |

Map 7 Unique Farmland in Project Area



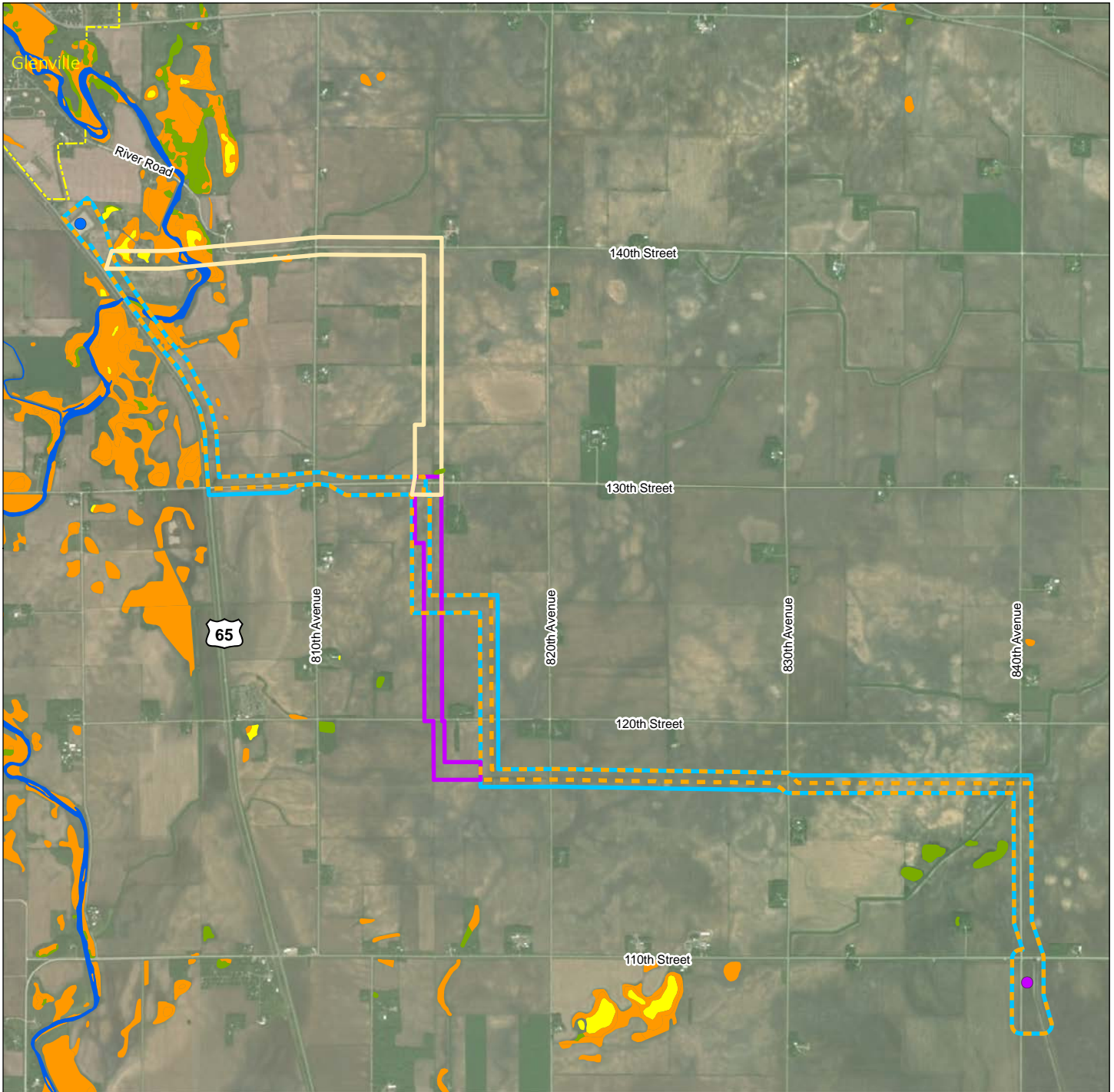
- TEAL Route
- ORANGE Route
- GOLD Route Segment
- PURPLE Route Segment

- All areas are prime farmland
- Farmland of statewide importance
- Not prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding

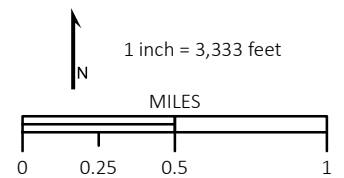


Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Map 8 National Wetland Inventory in Project Area



- | | |
|----------------------|-----------------------------------|
| TEAL Route | Freshwater Emergent Wetland |
| ORANGE Route | Freshwater Forested/Shrub Wetland |
| GOLD Route Segment | Freshwater Pond |
| PURPLE Route Segment | Lake |
| | Riverine |



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Appendix A Scoping Decision (Maps Excluded)

In the Matter of the Application of
Freeborn Wind Energy LLC for a Route Permit
for the Freeborn Wind Transmission Line
in Freeborn County, Minnesota

**Environmental Assessment
Scoping Decision**

Docket No. IP-6946 / TL-17-322

The above matter has come before the deputy commissioner of the Department of Commerce (Commerce or Department) for a decision on the scope of the environmental assessment (EA) to be prepared for the Freeborn Wind Transmission Line Project (project) proposed by Freeborn Wind Energy LLC (Freeborn Wind or Applicant) in Freeborn County, Minnesota. This scoping decision identifies the topics that will be analyzed in the EA, including route and route segment alternatives.

Project Purpose

Freeborn Wind's stated purpose is to interconnect the proposed Freeborn Wind Farm¹ Substation with the existing Glenworth Substation southeast of Glenville, Minnesota, thereby interconnecting the proposed wind farm to the electrical grid.² The Applicant will not construct the project if the Public Utilities Commission (Commission) does not issue a site permit for the wind farm.³

Project Description

Freeborn Wind proposes to construct an approximately seven mile long 161 kilovolt (kV) high voltage transmission line (HVTL) from the proposed Freeborn Wind Farm Substation to the existing Glenworth Substation. As proposed in the application, the new single-circuit HVTL begins at the proposed Freeborn Wind Farm Substation and travels north along 840th Avenue, then turns west and follows field lines past 820th Avenue. The line then turns north and west crossing the existing ITC Midwest LLC 69 kV transmission line (ITC Line). Freeborn Wind proposes to follow the west side of the ITC Line north to 130th Street. The proposed transmission line then turns west and parallels 130th Street until it reaches U.S. Highway 65. From there, it follows the highway north to the interconnection point at the existing Glenworth Substation owned by ITC Midwest LLC.⁴

Freeborn Wind requested a 400-foot route width for the project with wider route widths near substations and narrower route widths near three residences, U.S. Highway 65, and a communications tower.⁵ An 80-foot right-of-way is necessary for the project, except that a 22-foot right-of-way will be used to cross County 108 (830th Avenue).⁶ Structures will generally be 80 feet tall.⁷ Freeborn Wind

¹ Commission Docket No. IP-6946 / 17-410, In the Matter of the Application of Freeborn Wind Energy LLC for a Site Permit for the Freeborn Wind Farm in Freeborn County, Minnesota. Information regarding the proposed wind farm is available at: <https://mn.gov/commerce/energyfacilities/Docket.html?id=34728>.

² Freeborn Wind Energy LLC (September 20, 2017) *Application to the Minnesota Public Utilities Commission for a Route Permit for the Freeborn Wind Transmission Line Project*, eDockets Nos. [20179-135684-01](#), [20179-135684-02](#), [20179-135684-03](#), [20179-135684-04](#), [20179-135685-01](#), [20179-135685-02](#), [20179-135685-03](#), [20179-135685-04](#), [20179-135685-05](#), [20179-135685-06](#), [20179-135685-07](#) (hereinafter "Application").

³ *Id.* at page 6.

⁴ *Id.* at pages 9-11.

⁵ *Id.* at pages 10-12.

⁶ *Ibid.*

⁷ *Id.* at page 19.

anticipates construction to begin in spring 2020, with an in-service date of December 2020.⁸ The project is expected to cost approximately \$3.7 million.⁹

Regulatory Background

The project requires a route permit from the Commission.¹⁰ Because the project would operate at a voltage between 100 and 200 kV it qualifies for the alternative permitting process.¹¹ A certificate of need is not required.¹²

Freeborn Wind filed its route permit application for the project September 20, 2017.¹³ On September 22, 2017, Commission staff issued a notice soliciting comments on the completeness of the application, the presence of contested issues, and other related concerns.¹⁴ Staff subsequently revised this notice and extended the comment period.¹⁵ On December 5, 2017, the Commission issued an order accepting the route permit application as complete and authorizing review under the alternative permitting process.¹⁶

Environmental Review

Environmental review must be completed prior to Commission consideration of a route permit. Commerce Energy Environmental Review and Analysis (EERA) staff conducts environmental review under Minnesota Statute 216E and Minnesota Rule 7850. In preparing environmental review documents EERA staff performs related tasks, including conducting scoping meetings and managing public comment periods.

Environmental Assessment

The alternative permitting process requires preparation of an EA,¹⁷ which is a written document prepared by EERA staff that studies the potential environmental and human impacts of the project and

⁸ Application at pages 8, 9.

⁹ *Id.* at page 9.

¹⁰ See Minn. Stat. 216E.03, subd. 2 (no person may construct a HVTL without a route permit from the Commission); Minn. Stat. 216E.01, Subd. 4 (an HVTL means a conductor capable of operation at a nominal voltage of 100 kilovolts or more and is greater than 1,500 feet in length).

¹¹ Minn. Stat. 216E.04, subd. 2; Minnesota Rule 7850.2800, subp. 1.

¹² See Minn. Stat. 216B.243, subd. 2 (no large energy facility shall be constructed without issuance of a certificate of need); Minn. Stat. 216B.2421, subd. 2 (a large energy facility is any HVTL with a capacity of 100 kV or more and greater than ten miles of its length in Minnesota or that crosses a state line).

¹³ Application.

¹⁴ Minnesota Public Utilities Commission (September 22, 2017) *Notice of Comment Period on Completeness of Route Permit Application*, eDockets No. 20179-135743-01.

¹⁵ Minnesota Public Utilities Commission (October 4, 2017) *Revised Notice of Comment Period on Completeness of Route Permit Application*, eDockets No. 201710-136114-01.

¹⁶ Minnesota Public Utilities Commission (December 5, 2017) Order Finding Application Complete, Varying Scoping Time Frame and Referring the Matter to the Office of Administrative Hearings, eDockets No. 201712-137952-01 (hereinafter "Order").

¹⁷ Minn. Stat. 216E.04, subd. 5; Minn. R. 7850.3700, subp. 1.

ways to minimize, mitigate, or avoid potential impacts.¹⁸ This is the only state environmental review document required for the project.¹⁹

Specifically, Minnesota Rule 7850.3700, subpart 4, requires the EA include: **A.** a general description of the proposed facility; **B.** a list of any alternative . . . routes that are addressed; **C.** a discussion of the potential impacts of the project and each alternative . . . route on the human and natural environment; **D.** a discussion of mitigative measures that could reasonably be implemented to eliminate or minimize any adverse impacts identified for the project and each alternative . . . route analyzed; **E.** an analysis of the feasibility of each alternative . . . route considered; **F.** a list of permits required for the project; and **G.** a discussion of other matters identified in the scoping process.

Scoping Process

Scoping is the first step in the environmental review process. EERA staff use the information gathered during scoping to focus the EA on the most relevant information needed by the Commission to make an informed route permit decision. Scoping includes a public meeting and comment period that provide opportunities for interested persons to help develop the scope of the EA.²⁰

Minnesota Rule 7850.3700, subpart 3, requires Commerce to determine the scope of the EA within 10 days after the close of the public comment period. However, Minnesota Statute 216E.04, subdivision 5, anticipates Commission input into identifying alternatives. Consequently, the Commission extended the 10-day timeframe to allow for its input.²¹

Scoping Process Summary

On December 6, 2017, the Commission and Commerce provided *Notice of Environmental Assessment Scoping and Public Information Meeting*.²² Notice was sent to those individuals on the project contact list and to potentially affected landowners.²³ Freeborn Wind published notice in the *Albert Lea Tribune* on December 8, 2017.²⁴ Additionally, notice was available on the EERA webpage.²⁵

Public Meeting and Comment Period

EERA and Commission staff jointly held the scoping and public information meeting as noticed. The purpose of the meeting was to provide information about the permitting process and the project, answer questions, and gather input regarding potential impacts and mitigative measures that should be studied in the EA. The meeting also provided an opportunity to solicit potential route or route segment

¹⁸ Minn. Stat. [216E.04](#), subd. 5; Minn. R. [7850.3700](#), subp. 4.

¹⁹ Minn. Stat. [216E.04](#), subd. 5; Minn. R. [7850.3700](#), subp. 8; Minn. Rule [4410.4300](#), subp. 6.

²⁰ Minnesota Rule [7850.3700](#), subpart. 2.

²¹ Order.

²² Minnesota Department of Commerce and Minnesota Public Utilities Commission (December 6, 2017) *Notice of Environmental Assessment Scoping and Public Information Meeting*, eDockets No. [201712-137985-01](#).

²³ Minnesota Public Utilities Commission (December 6, 2017) *Certificate of Service*, eDockets No. [201712-137985-02](#).

²⁴ Freeborn Wind Energy LLC (December 10, 2017) *Affidavit of Publication*, eDockets No. [201712-138188-01](#).

²⁵ Minnesota Department of Commerce (n.d.) *Project Docket: Freeborn Wind Transmission Line Project*, Retrieved December 28, 2017, from: <https://mn.gov/commerce/energyfacilities/Docket.html?id=34748>.

alternatives to mitigate potential impacts. EERA staff provided multiple handouts, including a process summary and comment form.²⁶ A court reporter was present to document verbal statements.²⁷

Approximately 50 members of the public attended the meeting. Numerous people provided verbal comments.²⁸ One individual provided a specific route segment alternative for consideration in the EA.²⁹

A public comment period, ending January 3, 2018, provided an opportunity for interested persons to identify issues, mitigation measures, and alternative routes or route segments for consideration in the scope of the EA. Written comments were received from nine individuals, one organization, and one state agency. One commenter included a route segment alternative for consideration in the EA.

Comments Received

Staff received a variety of comments about the project. Individuals discussed the economic benefits of the project, including increased tax revenues, local job creation, and landowner profits. Concerns included but were not limited to impacts resulting from the construction and operation of the project to aesthetics, agriculture (including aerial spraying, crop losses, and drain tile), electrical interference, human health (specifically electric and magnetic fields), induced voltage, karst features, property values, public safety (specifically from potential electrical interference with the Allied Radio Matrix for Emergency Response (ARMER) system), recreation (specifically fishing), the Shell Rock River, soils, stray voltage, transportation, tree clearing, water quality, wetlands, and wildlife and their habitats (with emphasis on bald eagles). Other issues included cumulative impacts and private versus public interests relative to eminent domain and the construction of infrastructure servicing a private entity.

Agency Comments

The Department of Transportation (MnDOT) requested the EA assess the placement of the proposed utility poles in relation to U.S. Highway 65. MnDOT noted that should the Commission approve a route permit that would place the HVTL in an area that occupies a portion of MnDOT right-of-way, Freeborn Wind would need to submit a *Utility Accommodation on Trunk Highway Right-of-Way* (Form 2525). Additionally, MnDOT requests that the company coordinate any route construction work or delivery of materials that may affect MnDOT right-of-way.

Scoping comments are compiled and available to view or download on eDockets or the EERA webpage.³⁰

Route Alternatives

The process for suggesting that route or route segment alternatives be studied in the EA was discussed at the public meeting. Handouts that addressed this topic were provided at the public meeting and posted to the EERA webpage.³¹ Two commenters provided specific alternatives. Minnesota Rule

²⁶ Minnesota Department of Commerce (n.d.) *Environmental Assessment Scoping Meeting Handouts*, Retrieved December 28, 2017, from: <https://mn.gov/commerce/energyfacilities//resource.html?id=34761>.

²⁷ Minnesota Department of Commerce (January 8, 2018) *Public Comments and Meeting Notes*, eDockets No. [20181-138726-01](https://mn.gov/commerce/energyfacilities//resource.html?id=34765).

²⁸ *Ibid.*

²⁹ *Id.* at pages 153, 154 of 234.

³⁰ *Id.*; see also Minnesota Department of Commerce (n.d.) *Public Comments and Meeting Notes*, Retrieved February 21, 2018, from: <https://mn.gov/commerce/energyfacilities/resource.html?id=34765>.

³¹ Environmental Assessment Scoping Meeting Handouts.

7850.3700, subpart 2(B), provides applicants the opportunity to respond to each request that an alternative be included in the EA. Alternatives are further discussed below.

Commission Consideration of Alternatives

On January 25, 2018, EERA staff provided the Commission with a summary of the scoping process.³² The summary indicated that EERA staff would recommend to the deputy commissioner that the scoping decision for the proposed project should include the proposed route from the route permit application (**Teal Route – Figure 2**) and an additional route (**Orange Route – Figure 3**) and route segment (**Purple Route Segment – Figure 4**).

On February 8, 2018, the Commission considered what action, if any, it should take concerning the alternatives put forth during the scoping process. The Commission requested EERA staff study an additional route segment alternative, the **Gold Route Segment (Figure 5)**, as part of the EA.³³ The Commission further requested that, for both the **Purple Route Segment** and the **Gold Route Segment**, the EA assess both paralleling existing utility corridors and using existing utility corridors, for example, overbuilding.³⁴

Having reviewed the matter and consulted with EERA staff, I hereby make the following scoping decision in accordance with Minnesota Rule 7850.3700:

Matters To Be Addressed

The issues outlined below will be analyzed in the EA for the proposed project. The EA will describe the proposed project and the human and environmental resources of the project area. It will provide information on the potential impacts of the proposed project as they relate to the resource topics outlined in this scoping decision, including possible mitigation measures. It will identify impacts that cannot be avoided, irretrievable commitments of resources, and permits from other government entities that might be required. The EA will list information sources.

Description of the Project

- Purpose
- General Description
- Proposed Location
- Route Requirements
- Engineering and Design
- Right-of-Way Acquisition
- Construction
- Operation and Maintenance
- Cost

³² Minnesota Department of Commerce (January 25, 2018) *Scoping Summary*, eDockets No. [20181-139336-01](#).

³³ Minnesota Public Utilities Commission (March 5, 2018) *Order Proposing Additional Route Segment for Consideration in Environmental Assessment and Delegating Authority*, eDockets No. [20183-140767-01](#) at page 4.

³⁴ *Ibid.*

Regulatory Framework

- Certificate of Need
- Route Permit
- Environmental Review Process
- Issues Outside the Scope

Affected Environment, Potential Impacts, and Mitigative Measures

The EA will include a discussion of the following human and environmental resources potentially impacted by the proposed project. Potential impacts, both positive and negative, of the proposed project will be described. Based on the impacts identified, the EA will describe mitigation measures that could reasonably be implemented to reduce or eliminate identified impacts. The EA will describe unavoidable impacts resulting from implementation of the proposed project.

Data and analyses in the EA will be commensurate with the importance of potential impacts and the relevance of the information to a reasoned choice among alternatives and to the consideration of the need for mitigation measures. EERA staff will consider the relationship between the cost of data and analyses and the relevance and importance of the information in determining the level of detail to provide in the EA. Less important material may be summarized, consolidated, or simply referenced.

If relevant information cannot be obtained within timelines prescribed by statute and rule, the costs of obtaining such information is excessive, or the means to obtain it is not known, EERA staff will include in the EA a statement that such information is incomplete or unavailable and the relevance of the information in evaluating potential impacts or alternatives.³⁵

Staff will abbreviate analysis in the EA for resource topics determined insignificant to the Commission's decision in this docket. Abbreviated analysis means that the resource topic will not be discussed in as much detail as the standard analysis. The decision whether to abbreviate analysis for certain resource topics will be made by EERA staff, and will be based on information from the route permit application, field visits, scoping comments received, preliminary environmental analysis, and staff experience with similar projects.

Human Settlement

- Aesthetics
- Cultural Values
- Displacement
- Electronic Interference
- Land Use and Zoning
- Noise
- Public Health and Safety (including electromagnetic fields)
- Public Services and Infrastructure (including transportation and traffic)
- Recreation
- Socioeconomics (including property values)

³⁵ Minn. R. [4410.2500](#).

Land Based Economies

- Agriculture
- Forestry
- Mining
- Tourism

Archaeological and Historic Resources

Archeological resources are locations where objects or other evidence of archaeological interest exist. Historic resources are sites, buildings, structures, or other antiquities of state or national significance.

Natural Environment

- Air
- Geology, Soils and Groundwater
- Rare and Unique Resources
- Surface Water (including the Shell Rock River)
- Vegetation
- Wetlands
- Wildlife (including bald eagles)
- Wildlife Habitat

Unavoidable Impacts

The EA will discuss ways to mitigate potential impacts; however, even with mitigation strategies, certain impacts cannot be avoided.

Irreversible and Irrecoverable Commitments of Resources

Resource commitments are irreversible when it is impossible or very difficult to redirect that resource to a different future use. An irretrievable commitment of resources means the resource is not recoverable for later use by future generations.

The outline above is not intended to serve as a table of contents for the document itself. The EA will address and provide information on the following matters:

Alternative Routes to be Evaluated in the Environmental Assessment

The EA will evaluate the route proposed by Freeborn Wind in their route permit application (**Teal Route**) and one route alternative (**Orange Route**) and 2 route segment alternatives (**Purple Route Segment** and **Gold Route Segment**).

Orange Route. The route alternative uses the Applicant's proposed centerline and right-of-way from the route permit application. This route incorporates a reduced route width for a more precise route location as recommended in Freeborn Wind's January 12, 2018, response comments.

Purple Route Segment. Traveling from the proposed Freeborn Wind Farm Substation (south to north) this route segment breaks from the proposed route in the NE 1/4 of S28, T101, R20W where it continues west to the ITC Line. The route segment travels north along the ITC Line until it reaches 130th Street

where it rejoins the proposed route (**Teal Route**). The EA will study multiple alignments within this route segment—paralleling and collocating with existing transmission right-of-way.

Gold Route Segment. Beginning at 130th Street, this route segment travels north along the ITC Line until it reaches the boundary of S21 and S16, T101, R20W. At this point it turns west and follows the existing 69 kV transmission line owned by Dairyland Power Cooperative along 140th Street and River Road. The alternative crosses the Shell Rock River and rejoins the proposed route (**Teal Route**) in the NW 1/4 of S17, T101, R20W south of the Glenworth Substation. The EA will study multiple alignments within this route segment—paralleling and collocating with existing transmission right-of-way.

Identification of Permits

The EA will include a list of permits or approvals from governments or other entities that might be required for the proposed project.

ISSUES OUTSIDE THE SCOPE OF THE ENVIRONMENTAL ASSESSMENT

The EA will not consider the following:

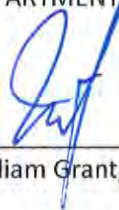
- Any alternative not specifically identified in this scoping decision, including the Association of Freeborn County Landowners' alternative.
- A no-build alternative.
- Issues related to project need, size, type, or timing.
- Impacts of specific energy sources.
- The manner in which landowners are compensated for right-of-way easements.
- The ability of Freeborn Wind to use eminent domain to acquire easement for the project.

SCHEDULE

The EA is anticipated to be completed and available in May 2018. Upon completion of the EA, it will be noticed and made available for review. A public hearing will be held in the project area after the EA has been issued and notice served. Comments on the EA may be submitted into the hearing record.

Signed this 7th day of March 2018

STATE OF MINNESOTA
DEPARTMENT OF COMMERCE



William Grant, Deputy Commissioner

Appendix 2 Generic Route Permit Template

STATE OF MINNESOTA PUBLIC UTILITIES COMMISSION

ROUTE PERMIT FOR A
HIGH-VOLTAGE TRANSMISSION LINE AND ASSOCIATED FACILITIES

IN

[*COUNTY*]

ISSUED TO

[*PERMITTEE*]

PUC DOCKET NO. [*Docket Number*]

In accordance with the requirements of Minnesota Statutes Chapter 216E and Minnesota Rules Chapter 7850, this route permit is hereby issued to:

[*PERMITTEE*]

[*Permittee*] is authorized by this route permit to construct and operate [*Provide a description of the project authorized by the Minnesota Public Utilities Commission*].

The high-voltage transmission line and associated facilities shall be built within the route identified in this permit and as portrayed on the official route maps, and in compliance with the conditions specified in this permit.

Approved and adopted this ____ day of [*Month, Year*]

BY ORDER OF THE COMMISSION

Daniel P. Wolf,
Executive Secretary

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Complaint Procedures for Permitted Energy Facilities

Compliance Filing Procedures for Permitted Energy Facilities

1.0 ROUTE PERMIT

The Minnesota Public Utilities Commission (Commission) hereby issues this route permit to [Permittee Name] (Permittee) pursuant to Minnesota Statutes Chapter 216E and Minnesota Rules Chapter 7850. This permit authorizes the [Permittee Name] to construct and operate an [Provide a description of the project as authorized by the Minnesota Public Utilities Commission], and as identified in the attached route permit maps, hereby incorporated into this document.

1.1 Pre-emption

Pursuant to Minn. Stat. § 216E.10, this permit shall be the sole route approval required to be obtained by the Permittee for construction of the transmission facilities and this permit shall supersede and preempt all zoning, building, or land use rules, regulations, or ordinances promulgated by regional, county, local and special purpose government.

2.0 PROJECT DESCRIPTION

[Provide a description of the project as authorized by the Minnesota Public Utilities Commission]

2.1 Project Location

[Describe the location of the project including details such as the county, state, city, and townships, as appropriate]

| County | Township Name | Township | Range | Section |
|--------|---------------|----------|-------|---------|
| | | | | |

2.2 Substations and Associated Facilities

[Provide a detailed description of the associated facilities and substations as authorized by the Commission]

2.3 Structures

[Provide a detailed description of the structures authorized by the Commission]

2.4 Conductors

[Provide a detailed description of the conductors authorized by the Commission]

The table below details specifics on the various structure and conductor types as presented in the route permit application.

| Line Type | Conductor | Structure | | Foundation | Height | Span |
|-----------|-----------|-----------|----------|------------|--------|------|
| | | Type | Material | | | |
| | | | | | | |

3.0 DESIGNATED ROUTE

The route designated by the Commission in this permit is the route described below and shown on the route maps attached to this permit. The route is generally described as follows:

[Provide detailed description of the authorized route including the route widths and any other specifics relevant to each segment. Also include a reference to the relevant route map to be attached to the permit.]

The identified route widths will provide the Permittee with flexibility for minor adjustments of the specific alignment or right-of-way to accommodate landowner requests and unforeseen conditions. The final alignment (i.e., permanent and maintained rights-of-way) will be located within this designated route unless otherwise authorized by the Commission.

4.0 RIGHT-OF-WAY

The approved right-of-way width for the project is up to [number] feet.

This permit anticipates that the right-of-way will generally conform to the anticipated alignment as noted on the attached route permit maps unless changes are requested by individual landowners or unforeseen conditions are encountered or are otherwise provided for by this permit.

Any right-of-way modifications within the designated route shall be located so as to have comparable overall impacts relative to the factors in Minn. R. 7850.4100, as does the right-of-way identified in this permit, and shall be specifically identified and documented in and approved as part of the plan and profile submitted pursuant to Section 9.1 of this permit.

Where the transmission line parallels existing highway and other road rights-of-way, the transmission line right-of-way shall occupy and utilize the existing right-of-way to the maximum extent possible; consistent with the criteria in Minn. R. 7850.4100 and the other requirements of this permit; and for highways under the jurisdiction of the Minnesota Department of Transportation, the procedures for accommodating utilities in trunk highway rights-of-way.

5.0 GENERAL CONDITIONS

The Permittee shall comply with the following conditions during construction and operation of the transmission line and associated facilities over the life of this permit.

5.1 Permit Distribution

Within 30 days of permit issuance, the Permittee shall provide all affected landowners with a copy of this permit and the complaint procedures. In no case shall the landowner receive this route permit and complaint procedures less than five days prior to the start of construction on their property. An affected landowner is any landowner or designee that is within or adjacent to the permitted route.

At the time of first contact, the Permittee shall also provide all affected landowners with a copy of the Department of Commerce's Rights-of-Way and Easements for Energy Facility Construction and Operation fact sheet.¹

5.2 Notification

The Permittee shall notify landowners or their designee at least 14 days in advance but not greater than 60 days in advance of entering the property.

5.3 Construction and Operation Practices

The Permittee shall follow those specific construction practices and material specifications described in [Permittee Name] Application to the Commission for a route permit for the [Project Name], dated [Date], and the record of the proceedings unless this permit establishes a different requirement in which case this permit shall prevail.

5.3.1 Field Representative

The Permittee shall designate a field representative responsible for overseeing compliance with the conditions of this permit during construction of the project. This person shall be accessible by telephone or other means during normal business hours throughout site preparation, construction, cleanup, and restoration.

The Permittee shall file with the Commission the name, address, email, phone number, and emergency phone number of the field representative 14 days prior to commencing construction.

¹ http://mn.gov/commerce/energyfacilities/documents/Easements%20Fact%20Sheet_08.05.14.pdf

The Permittee shall provide the field representative's contact information to affected landowners, residents, local government units and other interested persons 14 days prior to commencing construction. The Permittee may change the field representative at any time upon notice to the Commission, affected landowners, residents, local government units and other interested persons.

5.3.2 Employee Training and Education of Permit Terms and Conditions

The Permittee shall inform and educate all employees, contractors, and other persons involved in the construction and ongoing operation of the transmission line of the terms and conditions of this permit.

5.3.3 Public Services, Public Utilities, and Existing Easements

During construction, the Permittee shall minimize any disruption to public services or public utilities. To the extent disruptions to public services or public utilities occur these will be temporary and the Permittee will restore service promptly. Where any impacts to utilities have the potential to occur the Permittee will work with both landowners and local agencies to determine the most appropriate transmission structure placement.

The Permittee shall consult with landowners, townships, cities, and counties along the route and consider concerns regarding tree clearing, distance from existing structures, drain tiles, pole depth and placement in relationship to existing roads and road expansion plans.

The Permittee shall cooperate with county and city road authorities to develop appropriate signage and traffic management during construction.

5.3.4 Temporary Work Space

The Permittee shall limit temporary easements to special construction access needs and additional staging or lay-down areas required outside of the authorized right-of-way. Temporary space shall be selected to limit the removal and impacts to vegetation. Temporary easements outside of the authorized transmission line right-of-way will be obtained from affected landowners through rental agreements and are not provided for in this permit.

Temporary driveways may be constructed between the roadway and the structures to minimize impact using the shortest route possible. Construction mats should be used to minimize impacts on access paths and construction areas.

5.3.5 Noise

The Permittee shall comply with noise standards established under Minn. R. 7030.0010 to 7030.0080. Construction and maintenance activities shall be limited to daytime working hours to the extent practicable to ensure nighttime noise level standards will not be exceeded.

5.3.6 Aesthetics

The Permittee shall consider input pertaining to visual impacts from landowners or land management agencies prior to final location of structures, rights-of-way, and other areas with the potential for visual disturbance. Care shall be used to preserve the natural landscape, minimize tree removal and prevent any unnecessary destruction of the natural surroundings in the vicinity of the project during construction and maintenance. The Permittee shall work with landowners to locate the high-voltage transmission line to minimize the loss of agricultural land, forest, and wetlands, and to avoid homes and farmsteads. Structures shall be placed at a distance, consistent with sound engineering principles and system reliability criteria, from intersecting roads, highways, or trail crossings.

5.3.7 Soil Erosion and Sediment Control

The Permittee shall implement those erosion prevention and sediment control practices recommended by the Minnesota Pollution Control Agency Construction Stormwater Program.

The Permittee shall implement reasonable measures to minimize erosion and sedimentation during construction and shall employ perimeter sediment controls, protect 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. Contours shall be graded as required 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. All areas disturbed during construction of the facilities shall be returned to pre-construction conditions.

In accordance with Minnesota Pollution Control Agency requirements, the Permittee shall obtain a National Pollutant Discharge Elimination System (NPDES)/State Disposal System (SDS) Construction Stormwater permit from the Minnesota Pollution Control Agency.

5.3.8 Wetlands and Water Resources

Wetland impact avoidance measures that shall be implemented during design and construction of the transmission line will include spacing and placing the power poles at variable distances to span and avoid wetlands, watercourses, and floodplains. Unavoidable wetland impacts as a result

of the placement of poles shall be limited to the immediate area around the poles. To minimize impacts, construction in wetland areas shall occur during frozen ground conditions where practicable and shall be according to permit requirements by the applicable permitting authority. When construction during winter is not possible, wooden or composite mats shall be used to protect wetland vegetation. Soil excavated from the wetlands and riparian areas shall be contained and not placed back into the wetland or riparian area. Wetlands and riparian areas shall be accessed using the shortest route possible in order to minimize travel through wetland areas and prevent unnecessary impacts. No staging or stringing set up areas shall be placed within or adjacent to wetlands or water resources, as practicable. Power pole structures shall be assembled on upland areas before they are brought to the site for installation.

Areas disturbed by construction activities shall be restored to pre-construction conditions. Restoration of the wetlands will be performed by the Permittee in accordance with the requirements of applicable state and federal permits or laws and landowner agreements.

All requirements of the U.S. Army Corps of Engineers (wetlands under federal jurisdiction), Minnesota Department of Natural Resources (Public Waters/Wetlands), and County (wetlands under the jurisdiction of the Minnesota Wetland Conservation Act) shall be met.

5.3.9 Vegetation Management

The Permittee shall minimize the number of trees to be removed in selecting the right-of-way specifically preserving to the maximum extent practicable windbreaks, shelterbelts, living snow fences, and vegetation in areas such as trail and stream crossings where vegetative screening may minimize aesthetic impacts, to the extent that such actions do not violate sound engineering principles or system reliability criteria.

Tall growing species located within the transmission line right-of-way that endanger the safe and reliable operation of the transmission facility will be removed by the Permittee. The Permittee shall leave undisturbed, to the extent possible, existing low growing species in the right-of-way or replant such species in the right-of-way to blend the difference between the right-of-way and adjacent areas, to the extent that the low growing vegetation that will not pose a threat to the transmission facility or impede construction.

5.3.10 Application of Pesticides

The Permittee shall restrict pesticide use to those pesticides and methods of application approved by the Minnesota Department of Agriculture, Minnesota Department of Natural Resources, and the U.S. Environmental Protection Agency. Selective foliage or basal application shall be used when practicable. All pesticides shall be applied in a safe and cautious manner so as not to

damage adjacent properties including crops, orchards, tree farms, apiaries, or gardens. The Permittee shall contact the landowner or designee to obtain approval for the use of pesticide at least 14 days prior to any application on their property. The landowner may request that there be no application of pesticides on any part of the site within the landowner's property. The Permittee shall provide notice of pesticide application to affected landowners, and known beekeepers operating apiaries within three miles of the project site at least 14 days prior to such application.

5.3.11 Invasive Species

The Permittee shall employ best management practices to avoid the potential spread of invasive species on lands disturbed by project construction activities.

5.3.12 Noxious Weeds

The Permittee shall take all reasonable precautions against the spread of noxious weeds during all phases of construction. When utilizing seed to establish temporary and permanent vegetative cover on exposed soil the Permittee shall select site appropriate seed certified to be free of noxious weeds. To the extent possible, the Permittee shall use native seed mixes. The Permittee shall consult with landowners on the selection and use of seed for replanting.

5.3.13 Roads

The Permittee shall advise the appropriate governing bodies having jurisdiction over all state, county, city or township roads that will be used during the construction phase of the project. Where practical, existing roadways shall be used for all activities associated with construction of the facility. Oversize or overweight loads associated with the facility shall not be hauled across public roads without required permits and approvals.

The Permittee shall construct the least number of site access roads it can. Access roads shall not be constructed across streams and drainage ways without the required permits and approvals. Access roads shall be constructed in accordance with all necessary township, county or state road requirements and permits.

The Permittee shall promptly repair private roads or lanes damaged when moving equipment or when accessing construction workspace, unless otherwise negotiated with the affected landowner.

5.3.14 Archaeological and Historic Resources

The Permittee shall make every effort to avoid impacts to identified archaeological and historic resources when constructing the transmission facility. In the event that a resource is encountered, the Permittee shall contact and consult with the State Historic Preservation Office and the State Archaeologist. Where feasible, avoidance of the resource is required. Where not feasible, mitigation must include an effort to minimize project impacts on the resource consistent with State Historic Preservation Office and State Archaeologist requirements.

Prior to construction, workers shall be trained about the need to avoid cultural properties, how to identify cultural properties, and procedures to follow if undocumented cultural properties, including gravesites, are found during construction. If human remains are encountered during construction, the Permittee shall immediately halt construction and promptly notify local law enforcement and the State Archaeologist. Construction at such location shall not proceed until authorized by local law enforcement or the State Archaeologist.

5.3.15 Avian Protection

The Permittee in cooperation with the Minnesota Department of Natural Resources shall identify areas of the project where bird flight diverters will be incorporated into the transmission line design to prevent large avian collisions attributed to visibility issues. Standard transmission design shall incorporate adequate spacing of conductors and grounding devices in accordance with Avian Power Line Interaction Committee standards to eliminate the risk of electrocution to raptors with larger wingspans that may simultaneously come in contact with a conductor and grounding devices.

5.3.16 Restoration

The Permittee shall restore the right-of-way, temporary work spaces, access roads, abandoned right-of-way, and other public or private lands affected by construction of the transmission line. Restoration within the right-of-way must be compatible with the safe operation, maintenance, and inspection of the transmission line. Within 60 days after completion of all restoration activities, the Permittee shall advise the Commission in writing of the completion of such activities.

5.3.17 Cleanup

All waste and scrap that is the product of construction shall be removed from the right-of-way and all premises on which construction activities were conducted and properly disposed of upon completion of each task. Personal litter, including bottles, cans, and paper from construction activities shall be removed on a daily basis.

5.3.18 Pollution and Hazardous Wastes

All appropriate precautions to protect against pollution of the environment must be taken by the Permittee. The Permittee shall be responsible for compliance with all laws applicable to the generation, storage, transportation, clean up and disposal of all wastes generated during construction and restoration of the right-of-way.

5.3.19 Damages

The Permittee shall fairly restore or compensate landowners for damage to crops, fences, private roads and lanes, landscaping, drain tile, or other damages sustained during construction.

5.4 Electrical Performance Standards

5.4.1 Grounding

The Permittee shall design, construct, and operate the transmission line in a manner so that the maximum induced steady-state short-circuit current shall be limited to five milliamperes root mean square (rms) alternating current between the ground and any non-stationary object within the right-of-way, including but not limited to large motor vehicles and agricultural equipment. All fixed metallic objects on or off the right-of-way, except electric fences that parallel or cross the right-of-way, shall be grounded to the extent necessary to limit the induced short-circuit current between ground and the object so as not to exceed one milliamperere rms under steady state conditions of the transmission line and to comply with the ground fault conditions specified in the National Electric Safety Code. The Permittee shall address and rectify any induced current problems that arise during transmission line operation.

5.4.2 Electric Field

The transmission line shall be designed, constructed, and operated in such a manner that the electric field measured one meter above ground level immediately below the transmission line shall not exceed 8.0 kV/m rms.

5.4.3 Interference with Communication Devices

If interference with radio or television, satellite, wireless internet, GPS-based agriculture navigation systems or other communication devices is caused by the presence or operation of the transmission line, the Permittee shall take whatever action is feasible to restore or provide reception equivalent to reception levels in the immediate area just prior to the construction of the line.

5.5 Other Requirements

5.5.1 Safety Codes and Design Requirements

The transmission line and associated facilities shall be designed to meet or exceed all relevant local and state codes, the National Electric Safety Code, and North American Electric Reliability Corporation requirements. This includes standards relating to clearances to ground, clearance to crossing utilities, clearance to buildings, strength of materials, clearances over roadways, right-of-way widths, and permit requirements.

5.5.2 Other Permits and Regulations

The Permittee shall comply with all applicable state rules and statutes. The Permittee shall obtain all required permits for the project and comply with the conditions of those permits unless those permits conflict with or are preempted by federal or state permits and regulations. A list of the permits known to be required is included in the permit application. The Permittee shall submit a copy of such permits to the Commission upon request.

6.0 SPECIAL CONDITIONS

Special conditions shall take precedence over other conditions of this permit should there be a conflict.

[Describe any special conditions]

Examples of special conditions included in permits:

- *Avian Mitigation Plan*
- *Environmental Control Plan*
- *Agriculture Mitigation Plan*
- *Vegetation Management Plan*
- *Property Restrictions*
- *Minnesota Department of Natural Resources Requirements*
- *Minnesota Pollution Control Requirements*
- *Minnesota State Historical Preservation Office Requirements*
- *Minnesota Department of Transportation Requirements*

7.0 DELAY IN CONSTRUCTION

If the Permittee has not commenced construction or improvement of the route within four years after the date of issuance of this permit the Permittee shall file a report on the failure to construct and the Commission shall consider suspension of the permit in accordance with Minn. R. 7850.4700.

8.0 COMPLAINT PROCEDURES

Prior to the start of construction, the Permittee shall submit to the Commission the procedures that will be used to receive and respond to complaints. The procedures shall be in accordance with the requirements of Minn. R. 7829.1500 or Minn. R. 7829.1700, and as set forth in the complaint procedures attached to this permit.

Upon request, the Permittee shall assist the Commission with the disposition of unresolved or longstanding complaints. This assistance shall include, but is not limited to, the submittal of complaint correspondence and complaint resolution efforts.

9.0 COMPLIANCE REQUIREMENTS

Failure to timely and properly make compliance filings required by this permit is a failure to comply with the conditions of this permit. Compliance filings must be electronically filed with the Commission.

9.1 Plan and Profile

At least 30 days before right-of-way preparation for construction begins on any segment or portion of the project, the Permittee shall provide the Commission with a plan and profile of the right-of-way and the specifications and drawings for right-of-way preparation, construction, structure specifications and locations, cleanup, and restoration for the transmission line. The documentation shall include maps depicting the plan and profile including the right-of-way, alignment, and structures in relation to the route and alignment approved per this permit.

The Permittee may not commence construction until the 30 days has expired or until the Commission has advised the Permittee in writing that it has completed its review of the documents and determined that the planned construction is consistent with this permit. If the Permittee intends to make any significant changes in its plan and profile or the specifications and drawings after submission to the Commission, the Permittee shall notify the Commission at least five days before implementing the changes. No changes shall be made that would be in violation of any of the terms of this permit.

9.2 Status Reports

The Permittee shall report to the Commission on progress during finalization of the route, design of structures, and construction of the transmission line. The Permittee need not report more frequently than monthly. Reports shall begin with the submittal of the plan and profile for the project and continue until completion of restoration.

9.3 Notification to Commission

At least three days before the line is to be placed into service, the Permittee shall notify the Commission of the date on which the line will be placed into service and the date on which construction was complete.

9.4 As-Builts

Within 90 days after completion of construction, the Permittee shall submit copies of all final as-built plans and specifications developed during the project.

9.5 GPS Data

Within 90 days after completion of construction, the Permittee shall submit to the Commission, in the format requested by the Commission, geo-spatial information (e.g., ArcGIS compatible map files, GPS coordinates, associated database of characteristics) for all structures associated with the transmission line and each substation connected.

10.0 PERMIT AMENDMENT

This permit may be amended at any time by the Commission. Any person may request an amendment of the conditions of this permit by submitting a request to the Commission in writing describing the amendment sought and the reasons for the amendment. The Commission will mail notice of receipt of the request to the Permittee. The Commission may amend the conditions after affording the Permittee and interested persons such process as is required.

11.0 TRANSFER OF PERMIT

The Permittee may request at any time that the Commission transfer this permit to another person or entity. The Permittee shall provide the name and description of the person or entity to whom the permit is requested to be transferred, the reasons for the transfer, a description of the facilities affected, and the proposed effective date of the transfer.

The person to whom the permit is to be transferred shall provide the Commission with such information as the Commission shall require to determine whether the new Permittee can comply with the conditions of the permit. The Commission may authorize transfer of the permit after affording the Permittee, the new Permittee, and interested persons such process as is required.

12.0 REVOCATION OR SUSPENSION OF THE PERMIT

The Commission may initiate action to revoke or suspend this permit at any time. The Commission shall act in accordance with the requirements of Minn. R. 7850.5100, to revoke or suspend the permit.

GENERIC TEMPLATE

**MINNESOTA PUBLIC UTILITIES COMMISSION
COMPLAINT HANDLING PROCEDURES FOR
PERMITTED ENERGY FACILITIES**

A. Purpose

To establish a uniform and timely method of reporting and resolving complaints received by the permittee concerning permit conditions for site preparation, construction, cleanup, restoration, operation, and maintenance.

B. Scope

This document describes complaint reporting procedures and frequency.

C. Applicability

The procedures shall be used for all complaints received by the permittee and all complaints received by the Minnesota Public Utilities Commission (Commission) under Minn. R. 7829.1500 or Minn. R. 7829.1700 relevant to this permit.

D. Definitions

Complaint: A verbal or written statement presented to the permittee by a person expressing dissatisfaction or concern regarding site preparation, cleanup or restoration or other route and associated facilities permit conditions. Complaints do not include requests, inquiries, questions or general comments.

Substantial Complaint: A written complaint alleging a violation of a specific permit condition that, if substantiated, could result in permit modification or suspension pursuant to the applicable regulations.

Unresolved Complaint: A complaint which, despite the good faith efforts of the permittee and a person, remains unresolved or unsatisfactorily resolved to one or both of the parties.

Person: An individual, partnership, joint venture, private or public corporation, association, firm, public service company, cooperative, political subdivision, municipal corporation, government agency, public utility district, or any other entity, public or private, however organized.

E. Complaint Documentation and Processing

1. The permittee shall designate an individual to summarize complaints for the Commission. This person's name, phone number and email address shall accompany all complaint submittals.
2. A person presenting the complaint should to the extent possible, include the following information in their communications:
 - a. name, address, phone number, and email address;
 - b. date of complaint;
 - c. tract or parcel number; and
 - d. whether the complaint relates to a permit matter or a compliance issue.
3. The permittee shall document all complaints by maintaining a record of all applicable information concerning the complaint, including the following:
 - a. docket number and project name;
 - b. name of complainant, address, phone number and email address;
 - c. precise description of property or parcel number;
 - d. name of permittee representative receiving complaint and date of receipt;
 - e. nature of complaint and the applicable permit condition(s);
 - f. activities undertaken to resolve the complaint; and
 - g. final disposition of the complaint.

F. Reporting Requirements

The permittee shall commence complaint reporting at the beginning of project construction and continue through the term of the permit. The permittee shall report all complaints to the Commission according to the following schedule:

Immediate Reports: All substantial complaints shall be reported to the Commission the same day received, or on the following working day for complaints received after working hours. Such reports are to be directed to the Commission's Consumer Affairs Office at 1-800-657-3782 (voice messages are acceptable) or consumer.puc@state.mn.us. For e-mail reporting, the email subject line should read "PUC EFP Complaint" and include the appropriate project docket number.

Monthly Reports: During project construction and restoration, a summary of all complaints, including substantial complaints received or resolved during the preceding month, shall be filed by the 15th of each month to Daniel P. Wolf, Executive Secretary, Public Utilities Commission, using the eDockets system. The eDockets system is located at:
<https://www.edockets.state.mn.us/EFiling/home.jsp>

If no complaints were received during the preceding month, the permittee shall file a summary indicating that no complaints were received.

G. Complaints Received by the Commission

Complaints received directly by the Commission from aggrieved persons regarding site preparation, construction, cleanup, restoration, operation and maintenance shall be promptly sent to the permittee.

H. Commission Process for Unresolved Complaints

Commission staff shall perform an initial evaluation of unresolved complaints submitted to the Commission. Complaints raising substantial permit issues shall be processed and resolved by the Commission. Staff shall notify the permittee and appropriate persons if it determines that the complaint is a substantial complaint. With respect to such complaints, each party shall submit a written summary of its position to the Commission no later than ten days after receipt of the staff notification. The complaint will be presented to the Commission for a decision as soon as practicable.

I. Permittee Contacts for Complaints and Complaint Reporting

Complaints may be filed by mail or email to:

[Name]

[Mailing Address]

[Phone]

[Email]

This information shall be maintained current by informing the Commission of any changes as they become effective.

**MINNESOTA PUBLIC UTILITIES COMMISSION
COMPLIANCE FILING PROCEDURE FOR
PERMITTED ENERGY FACILITIES**

A. Purpose

To establish a uniform and timely method of submitting information required by Commission energy facility permits.

B. Scope and Applicability

This procedure encompasses all known compliance filings required by permit.

C. Definitions

Compliance Filing: A filing of information to the Commission, where the information is required by a Commission site or route permit.

D. Responsibilities

1. The permittee shall file all compliance filings with Daniel P. Wolf, Executive Secretary, Public Utilities Commission, through the eDockets system. The eDockets system is located at: <https://www.edockets.state.mn.us/EFiling/home.jsp>

General instructions are provided on the eDockets website. Permittees must register on the website to file documents.

2. All filings must have a cover sheet that includes:
 - a. Date
 - b. Name of submitter/permittee
 - c. Type of permit (site or route)
 - d. Project location
 - e. Project docket number
 - f. Permit section under which the filing is made
 - g. Short description of the filing

3. Filings that are graphic intensive (e.g., maps, engineered drawings) must, in addition to being electronically filed, be submitted as paper copies and on CD. Paper copies and CDs should be sent to: 1) Daniel P. Wolf, Executive Secretary, Minnesota Public Utilities Commission, 121 7th Place East, Suite 350, St. Paul, MN 55101-2147, and 2) Department of Commerce, Energy Environmental Review and Analysis, 85 7th Place East, Suite 500, St. Paul, MN 55101-2198.

The Commission may request a paper copy of any electronically filed document.

GENERIC TEMPLATE

| Filing Number | Permit Section | Description of Compliance Filing | Due Date |
|---------------|----------------|----------------------------------|----------|
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GENERIC TEMPLATE

Appendix 3 Information Inquiries

Please respond to the following questions or provide the requested data. Responses should be contained within this document to the greatest extent possible (11-point Calibri, plain text font, RGB 191, 0, 0). Return the completed document, as a PDF, to Commerce staff ensuring to attach supporting information as necessary. Document data requests as follows: “Requested information sent to *who* by *what means* on *date*.” **Do not eFile your response; staff will attach all responses to the environmental review document.**

If you have questions please contact me at andrew.levi@state.mn.us or (651) 539-1840.

Project: Freeborn Wind Transmission
Number: 1
Date: March 7, 2018

1. Provide a shapefile of existing distribution lines along the different route and route segment alternatives.

Requested information sent to Andrew Levi by email on 3/17/18.

2. Discuss lifecycle impacts. What is the anticipated life of the project? Will the transmission line be decommissioned? If so, how much will decommissioning cost, what is the method and schedule for decommissioning, and how will it be paid for?

The transmission line project (“Project”) proposed in this docket has a useful life of approximately 60 years. The transmission line will support wind turbines in Minnesota and Iowa. Consequently, even if the Freeborn Wind Farm in Minnesota were decommissioned, the line may still be used to support the Iowa wind turbines. In addition, the line has capacity that could be used by a future wind project. Consequently, there are no plans for the transmission line to be decommissioned.

3. Discuss what, if any, construction materials, e.g., structures, will be purchased locally.

The use of local construction materials has not been determined and will depend on local availability, and terms and conditions.

4. What impact, if any, will the proposed project have to the ARMER system?

We do not anticipate any impacts. We had a telephone conversation with Freeborn County IT Director Scott Woitas on 3/12/18 and he said he did not anticipate any impacts to the County’s equipment in the vicinity of the transmission line. We shared the Communications Tower Report and Microwave Study performed for the Freeborn Wind Farm Project with Mr. Woitas, the EERA Scoping Summary, and Mr. Litchfield’s direct testimony from the Freeborn Wind Farm Project, including Schedule 7 (correspondence with MnDOT about ARMER). Mr. Woitas and other Freeborn County personnel are still evaluating the information at this time. Additionally, we have reached out to MnDOT again to ask specifically about the transmission line and they have provided the attached response saying “MnDOT has no concerns with the new transmission line affecting the ARMER system.” The email sent to Mr. Woitas and a pdf of the email response from MnDOT were sent to Andrew Levi by email on 3/17/18.

5. What impact, if any, will the proposed project have to the Freeborn/Mower electric system?

Freeborn Wind Energy's Proposed Route will not have any impact on the Freeborn-Mower Cooperative Services ("Freeborn-Mower") electric system. We've met with and shared our Project plans and they will coordinate with the Project's construction. A member of the public submitted the Gold Route that contemplates a co-location or paralleling with the Dairyland Power Cooperative double circuit 69 kV line. Freeborn-Mower is a Dairyland Power Cooperative member and it is unclear what, if any, impacts the Gold Route would have on its system.

6. Please provide additional information regarding potential impacts to karst features.

A final geotechnical investigation analysis was performed and submitted as part of Docket 17-410. These files can be downloaded via the following links:

| | | |
|----------|----------------------------------|---|
| 12/22/17 | 201712-138399-05 | TESTIMONY--LITCHFIELD SCHEDULE 10 - PART 1 OF 6 |
| 12/22/17 | 201712-138399-06 | TESTIMONY--LITCHFIELD SCHEDULE 10 - PART 2 OF 6 |
| 12/22/17 | 201712-138399-07 | TESTIMONY--LITCHFIELD SCHEDULE 10 - PART 3 OF 6 |
| 12/22/17 | 201712-138399-08 | TESTIMONY--LITCHFIELD SCHEDULE 10 - PART 4 OF 6 |
| 12/22/17 | 201712-138399-09 | TESTIMONY--LITCHFIELD SCHEDULE 10 - PART 5 OF 6 |
| 12/22/17 | 201712-138399-10 | TESTIMONY--LITCHFIELD SCHEDULE 10 - PART 6 OF 6 |

No additional information is available. The report's conclusion was that there were no karst features at the site of any wind turbine locations. Geotechnical drilling for transmission pole locations was not performed, as the final pole locations are not currently known. Geotechnical testing will be conducted on transmission pole sites prior to construction. Pole foundation design will be determined based upon the results of those studies.

7. Is there potential for inductive interference to telephone and cable lines?

None is anticipated.

8. Will wood poles be treated? If so with what?

If the material chosen for the poles is wood, they will be treated with industry standard substances that comply with all applicable regulations. A letter addressing the safety and efficacy of pentachlorophenol from Brian R. Stepaniak, the Environmental, Health and Safety Manager for Bell Lumber & Pole Company was sent to Andrew Levi by email on 3/16/18.

9. Approximately how many trips per day will be needed on local roads during construction?

We will endeavor to get an answer to this question by 3/23/18. We estimate 40-60 trips per day.

10. How will estimated project costs be influenced by the different routing options. Please provide information similar to page 9 of the application for the Purple and Gold Route Segments (both parallel and overbuild options).

See table below for updated cost estimates for the different routing options, all in 2018 dollars:

| Project Item | Submitted Proposed Route | Updated Proposed route | Purple Route co-location/ overbuild | Purple Route Paralleling | Gold Route co-location/ overbuild | Gold Route Paralleling |
|--|--------------------------|------------------------|-------------------------------------|--------------------------|-----------------------------------|------------------------|
| Land acquisition and permitting | \$300,000 | \$400,000 | \$450,000 | \$450,000 | \$550,000 | \$550,000 |
| Design, procurement and construction | \$3,000,000 | \$3,000,000 | \$3,500,000 | \$3,000,000 | \$6,000,000 | \$3,200,000 |
| Post-construction close-out, permit compliance | \$400,000 | \$400,000 | \$400,000 | \$400,000 | \$400,000 | \$400,000 |
| Total | \$3,700,000 | \$3,800,000 | \$4,350,000 | \$3,850,000 | \$6,950,000 | \$4,150,000 |

11. The different routing options will impact project construction and operation and maintenance. Please provide information similar to that found in the application for the Purple and Gold Route Segments (both parallel and overbuild options).

Our expectation is that the to-be constructed Freeborn transmission line ROW would not overlap existing transmission lines' ROW in the paralleling considerations, but the two ROWs could abut each other. So, potentially they will be about 80 feet apart, assuming the existing lines both have 80' ROWs as well. Additional information to define those ROWs is not in the public domain and we have not received additional information from the operators' of the other transmission lines. A co-location or closer parallel would require more detailed engineering attention to ensure the lines don't interact electrically. ~~We will endeavor to get an answer to this question by 3/23/18.~~

As for construction procedures for a co-location, there are two potential scenarios: either the existing lines can be taken out of service during construction of the Freeborn line or they can't. If they can be taken out of service, the existing line would be demolished and new poles with an identical or very similar alignment would promptly be constructed. This would take roughly four months.

In the more likely scenario at the existing lines can't be taken out of service for four months and a co-location is to be done, the existing line would have to be temporarily moved. The process is to build a 'shoo fly' – a temporary line at the edge of the ROW that would support the existing conductors while the new poles were built. FWE LLC would string the conductor on the shoo fly and connect it at each end to an energized portion of the existing line. This would require a one day outage. Because it is a temporary route, the shoo fly ROW could be designed such that it doesn't have to meet permanent clearances. This would allow it to be constructed in the existing ROW. Once the new poles were ready and strung, another one day outage would allow FWE LLC to re-energize the existing line on the new poles.

As for O&M cost estimates, the paralleling options would not change the estimated O&M cost per mile. The longer gold route would cost more, but only because it was longer. For co-location, maintenance costs could increase if a co-location agreement requires FWE LLC to take on some of the O&M responsibility for the existing circuits.

Please respond to the following questions or provide the requested data. Responses should be contained within this document to the greatest extent possible (11-point Calibri, plain text font, RGB 191, 0, 0). Return the completed document, as a PDF, to Commerce staff ensuring to attach supporting information as necessary. Document data requests as follows: "Requested information sent to *who* by *what means* on *date*." **Do not eFile your response; staff will attach all responses to the environmental review document.**

If you have questions please contact me at andrew.levi@state.mn.us or (651) 539-1840.

Project: Freeborn Wind Transmission
Number: 2
Date: April 6, 2018

1. Wildlife friendly erosion control mesh is sometimes required by DNR on their lands. Would the company agree to use wildlife friendly mesh in sensitive areas (i.e., Shell Rock River/wetland areas)? See <http://files.dnr.state.mn.us/eco/nongame/wildlife-friendly-erosion-control.pdf>.

We are open to a discussion on this subject with the MN DNR, but to-date they have not brought it up and our plan is to avoid construction in wetland areas as much as possible and hopefully completely.

2. Will Gopher State One Call be used?

Yes.

3. Set-up areas will be needed for stringing conductors. Approximately how big will they be, how often will they occur, and where will they likely occur? (Exact locations aren't necessary, just general discussion.)

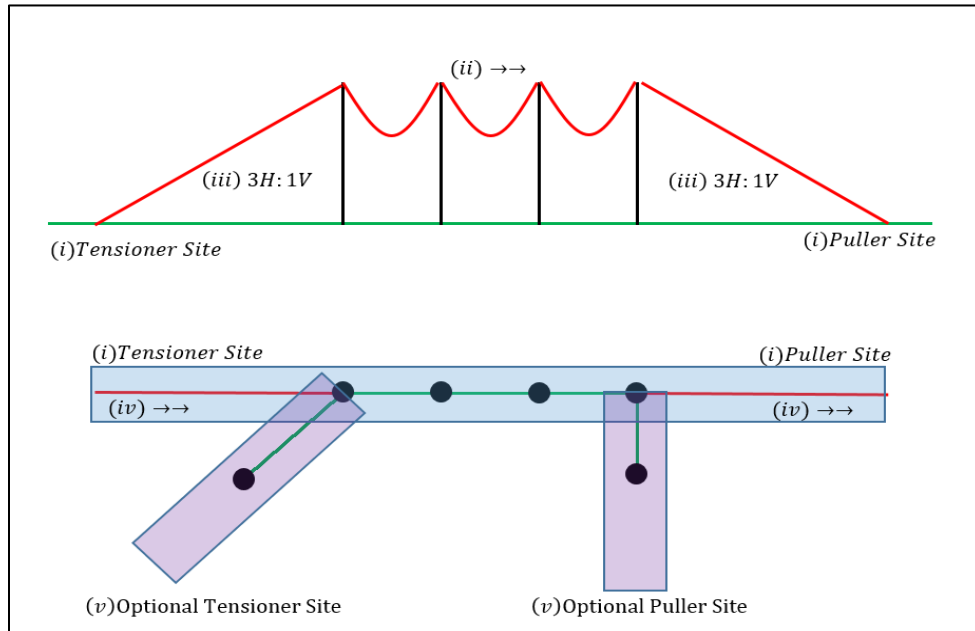
Set up area is 3x the height of structure long and just as wide as the ROW. They will be used only at dead-ends. Teal/purple routes would have 9 of these locations.

Puller-Tensioner sites are identified as locations where the contractor will set up equipment used to pull in and tension the conductor during the last phases of construction. The exact locations are typically determined by the contractor during the pre-construction walk down. These sites are most often located at major obstacles such as when crossing canyons, rivers, roads, lakes, and at large turn points along the alignment. The figure below has been provided to illustrate the additional construction ROW needs. The following describes the puller-tensioner operations:

- i. The contractor will set up a puller station and a tensioner station at the start and end for a given section.
- ii. The wire will be pulled through the section to the puller site while tension is controlled on the back end at the tensioner site to prevent the conductor from grazing the ground and becoming damaged.
- iii. From the last and first structures, the wire is pulled down at a maximum 3H:1V slope. A structure which has an above ground line height of 80 ft would require 240 ft past the structure for the Puller-Tensioner sites.

- iv. Wire is typically pulled in-line, extending the alignment past the last and first structure of a given section.
- v. Puller-Tensioner sites can be setup such that they do not extend past the alignment, but rather follow the alignment through the turn structure. This requires that the contractor be skilled in performing this operation and has the necessary equipment to do so.

Figure: Puller-tensioner Operations

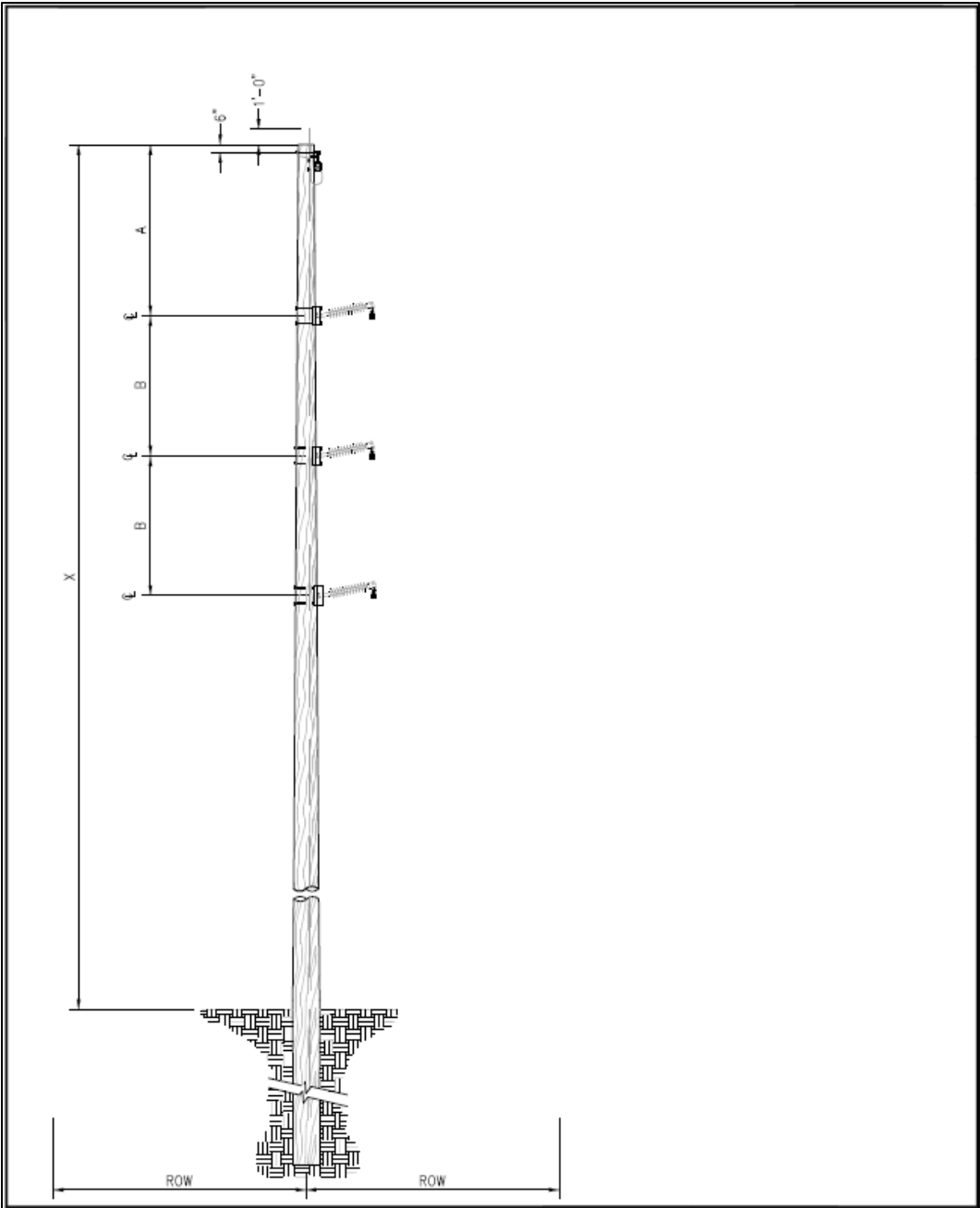


4. Assuming karst is not located, can the diameter and depth of drilled tier foundations be provided? Or at least a more specific range? Also, please provide the same information for directly imbedded holes. For both, how will subsoil be handled, especially within wetlands and agricultural land?

Drilled pier foundations are proposed only for the deadend structures by the two substations. The estimated diameter and depth of a drilled pier foundation is 8 feet wide by 30 feet deep. . The estimated diameter and depth of embedments will be 3 feet wide by 10-13 feet deep.

5. Please provide as much information as possible about the shoo-fly line? How tall will it be? Where will it be located from the current Dairyland and ITC centerlines? How close would it be to residences along the Gold Route?

A shoo-fly line will be a vertical post configuration (see images below). This configuration would be used to control the conductor movement to within the existing ROW. The structures would be built within the existing ROW and offset from the existing center line by approximately 20-30 feet. Final offset would be determined after a full topo and aerial survey is acquired and would be kept to a minimum such to avoid any major disturbance to the landowners within the area. Structure height would be approximately 40 feet above ground for the single circuit ITC 69 kV line and 45 feet above ground for the double circuit Dairyland 69 kV line with span lengths of approximately 300 feet. Temporary lines would built without static protection. The shoo-fly line will be removed after permanent line is completed.

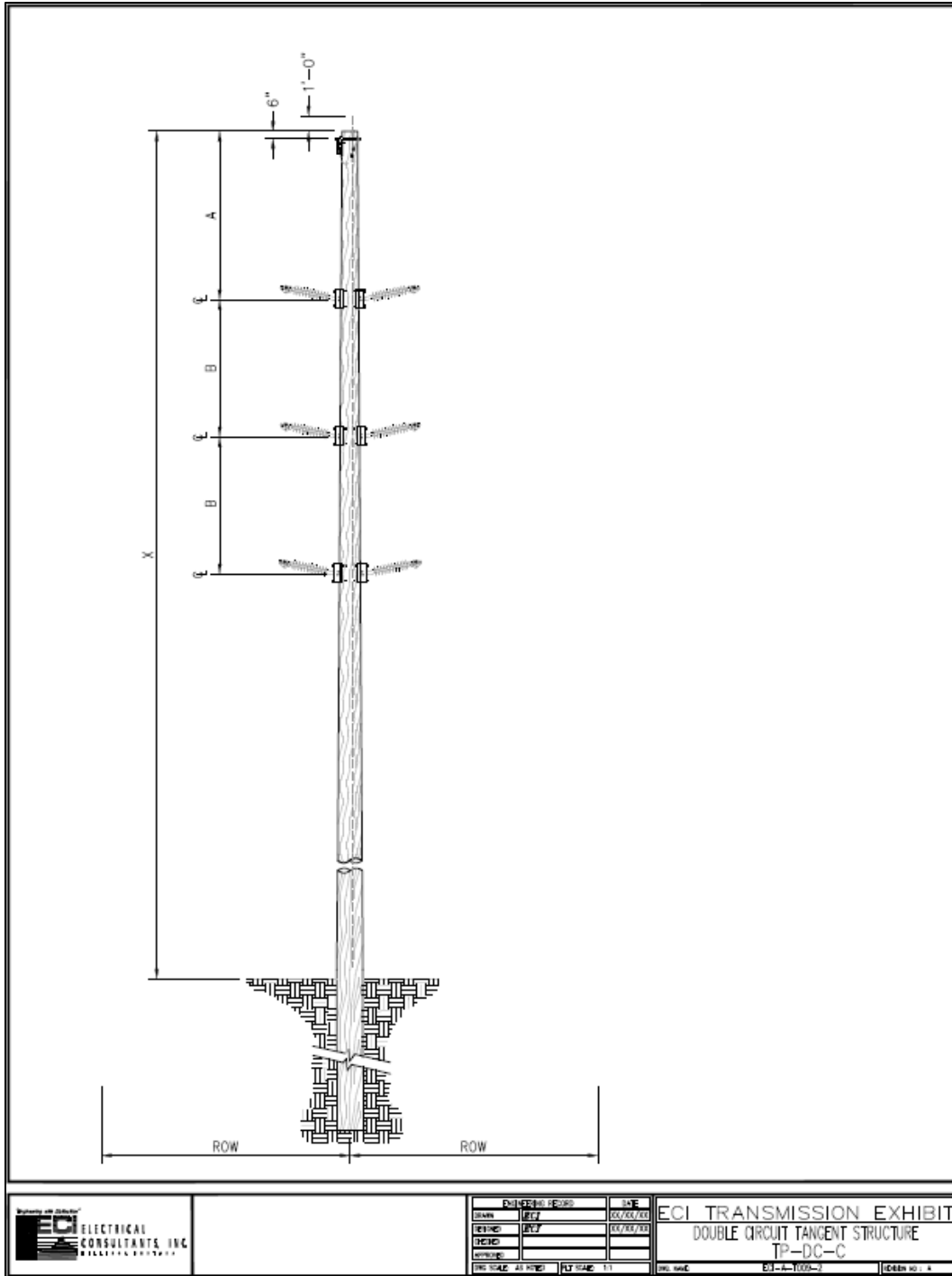


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| ENGINEER | DATE |
| DESIGNER | DATE |
| CHECKER | DATE |
| APPROVED | |
| BY SCALE | AS NOTED |
| BY SCALE | 1:1 |

ECI TRANSMISSION EXHIBIT
SINGLE CIRCUIT TANGENT STRUCTURE
TVP

PROJECT NO. 100-17



6. Please contact Dairyland and ITC and find the average span and height of the existing lines.

The ITC 69 kV line has typical spans of approximately 300 feet with a typical structure height of 60 feet above ground. It was built in 1962 and uses "penguin" conductor.

The Dairyland double circuit 69 kV line has typical spans of approximately 350 feet with an average structure height of 70 feet above ground.

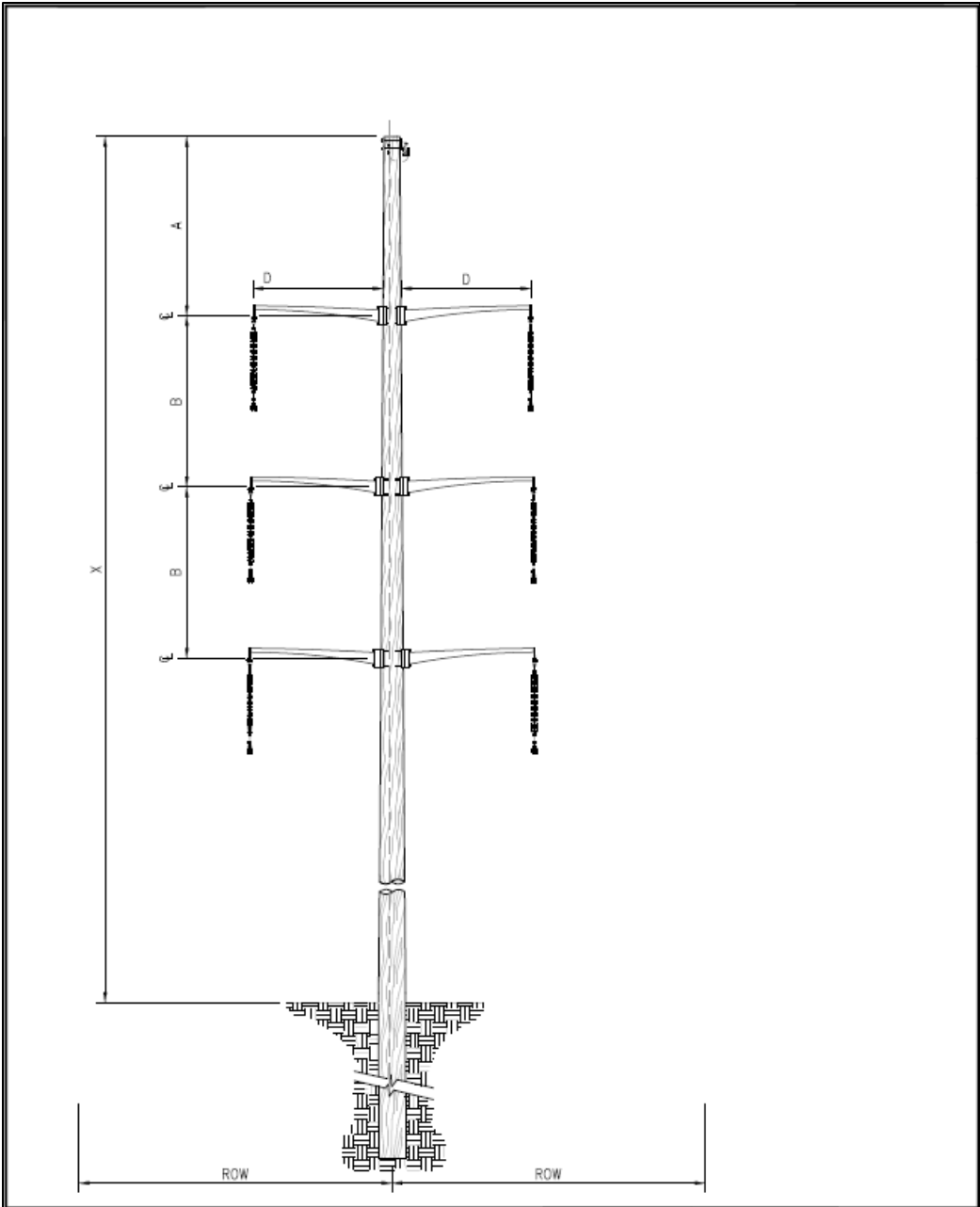
7. Outages along the Dairyland and ITC lines. Who do those outages need to be coordinated with? Is it possible to identify who that will impact beyond stating, e.g., "ITC and its customers"?

We will need to coordinate with Dairyland and ITC outage planning groups.

8. Understanding that coordination would need to occur that hasn't, please provide more information about co-location to the greatest extent you can. In short, take your best guess. What will the poles look like? How tall will they be? What would they be made out of? How would the river crossing work? What would the span be? What would the configuration be?

ITC Double Circuit 69/161 kV co-locate:

- What would the poles look like: see image below, TU-DC, but note that the 69kV side would use smaller insulators
- How tall would they be: 85 – 90 feet aboveground
- What would they be made out of: Round or laminated wood poles with davit arms.




ELECTRICAL CONSULTANTS, INC.
 11111111111111111111

| | |
|-----------|-----------|
| ENGINEER | DAE |
| DRAWN | 00/00/00 |
| CHECKED | 00/00/00 |
| APPROVED | |
| REV SCALE | REV SCALE |

ECI TRANSMISSION EXHIBIT
 DOUBLE CIRCUIT TANGENT STRUCTURE
 TU-DC
 PROJECT NO. 11111111111111111111
 SHEET NO. 1

Dairyland Triple Circuit 69/69/161 kV

- What would they look like: see image below, TH-TC, but note that the 69 kV circuits would use smaller insulators.
- How tall would they be: 90 – 95 feet aboveground, and 120-125 feet at the river crossing.
- What would they be made out of: Wood poles with cross arms but likely steel poles at the river crossing.
- How the river crossing would work: The best option for the river crossing would be to keep the existing structures in service as the new line is built adjacent at a minimum spacing to comply with OSHA requirements for construction clearance--The new poles would have to be approximately 15 feet away from the existing circuits. The span length would be approximately the same (≈ 1100 feet). This span is too long to use a shoo-fly. Having done further research over the past few weeks and now understanding the manner in which the Dairyland line was constructed at this river crossing, the cost estimates provided on 4/3/18 for the Gold Route co-location option should be increased by \$1.1 million for engineering, procurement and construction if the new, co-located line is to be constructed to the same standards as the existing Dairyland line. Freeborn Wind's 4/3/18 response assumed wood poles of a more normal height. To match the existing construction, the structure type would be three-pole, steel, self-supporting with three conductors attached on each pole. It would be similar to the figure TH-TC, but with one more pole and the poles would be free-standing, not braced together as-in the H-frame. A co-location would inefficiently cause an early retirement of these new structures that were just constructed in 2012 and have decades of service ahead of them. Further, the Shell Rock River crossing would present increased wildlife risk. Whereas the majority of the Dairyland route has 4 planes of wires – 1 for each of the 3 phases plus the control wires on top – the river crossing was specially engineered to have only 3 planes of wires to minimize wildlife risk. The structures on either side of the river crossing are 110 feet tall above ground level. Adding a new circuit from the Freeborn Wind project would necessitate an entirely new, custom design that would have poles 120-125 feet tall and a return to 4 planes. This additional plane of wires in the same area would increase collision risk to passing birds and bats.

The Gold route will require additional clearances for 161 kV be met, but no displacement of homes will be required. The additional clearances may be achieved by increasing the required ROW width, but the triple circuit H-frames can be built within the same 80 foot ROW if the span lengths are limited. Efforts can be made to keep the original ROW width but this would be done by increasing the number of structures to reduce conductor movement.

The ROW width calculations are controlled by the extreme wind weather case and summarized below:

Up to 700-ft Span: ROW Width \approx 80 ft.

800-ft Span: ROW Width \approx 90 ft.

900-ft Span: ROW Width \approx 100 ft.

1000-ft Span: ROW Width \approx 110 ft.

11. Please provide your definition of participating and non-participating landowner.

A participant is someone who has signed a land agreement of some sort with the project. A non-participant is someone who has not. This project relies primarily on a standard "Agreement Regarding Easements" document, aka a "wind lease." The vast majority of our proposed route relies on these agreements that give Freeborn Wind the rights to place the transmission line on the landowner's property. However, there are some landowners who did not want the possibility of having wind turbines but agreed to host transmission lines. For these participants we have Transmission Easement Agreements. There are also some landowners who have signed a "Good Neighbor Agreement," aka a "wind rights agreement" with us. Freeborn Wind has no access rights to their land, and, relatedly, no rights to construct anything on their land, but they have effectively leased us their wind, so we can place turbines on adjacent land closer to their property than would otherwise be allowed by the WAB. All of the landowners who signed these agreements are participants, but their degree of participation varies.

Please respond to the following questions or provide the requested data. Responses should be contained within this document to the greatest extent possible (11-point Calibri, plain text font, RGB 191, 0, 0). Return the completed document, as a PDF, to Commerce staff ensuring to attach supporting information as necessary. Document data requests as follows: "Requested information sent to *who* by *what means* on *date*." **Do not eFile your response; staff will attach all responses to the environmental review document.**

If you have questions please contact me at andrew.levi@state.mn.us or (651) 539-1840.

Project: Freeborn Wind Transmission
Number: 3
Date: April 30, 2018

- 1. Did MnDOT respond to your July 28 provided in Appendix D of the route permit application? If so, could you provide a copy? Freeborn has stated that structure placement will be outside of MnDOT right-of-way; however, rights-of-way overlap? Does the company plan on filing a Utility Accommodation on Trunk Highway Right-of-Way (From 2525) with MnDOT?**

No, MnDOT did not respond to our email from 7/28/17. Our email noted that the structures for the line are being designed to be located outside of the MnDOT ROW. For operation and maintenance of the line, Freeborn Wind may need access to the MnDOT ROW. Yes, some ROW may overlap. Upon receipt of a Route Permit and prior to construction, Freeborn Wind will obtain the appropriate approval from MnDOT.

- 2. Please provide corona noise estimates—either engineering estimates, “math” estimates, or similar citation—for the co-location (under/overbuild) routing options.**

See Attachment 1, May 2, 2018 Hankard Environmental Letter.

- 3. Section 6.4 of the application indicates that “no previously documented archaeological sites or inventoried architectural resources are located within the route width of the proposed route”. Were any sites located within one-mile of the project area? If so, do they intersect a routing alternative?**

Part of section 8.6.1 of the Freeborn Wind Energy LLC Site Permit Application dated July 14, 2017, Docket No. IP 6946/WS-17-410 says: “The literature review revealed that no previously documented archaeological sites are located within the Project Area (see Figure 10); however, research did identify the presence of one previously reported archaeological site within the surrounding 1-mile buffer in Minnesota. Site 21FE0024, the Esse Mounds site, is identified as a prehistoric (possible Middle Woodland) burial mound site. It has not been formally evaluated for the National Register of Historic Places (NRHP). As the site is located external to the Project Area it will not be impacted by proposed construction. No additional evaluation efforts will be required.”

At the very top of Figure 10 of the Site Permit Application is the hatching that shows where this site is. The area in question is north of Interstate 90, well beyond the study area for the routing alternatives.

4. Will dewatering be necessary to place structures? Either direct imbedding or drill pier foundations. If so, how will that process work (including mitigation to prevent runoff to surface and groundwater)?

It is unlikely that dewatering would be necessary for direct imbeds. Dewatering is only required if a high water table combined with granular soils is encountered and a bentonite slurry cannot be utilized to create a seal against groundwater. If dewatering is required, Freeborn Wind would work with the Minnesota Pollution Control Agency to ensure to the extent practicable that Minnesota Administrative Rule 7050.0210 and other applicable rules are adhered to minimize the potential for runoff to surface and groundwater.

5. Gold parallel option. What structures would be used to cross the river?

See Attachment 2 which shows the structures that would be used to cross the river.

6. The local utility shapefiles are not projected. Please apply a projection and return.

The shapefiles have been provided under separate cover.