Fredrikson & BYRON, P.A.

June 15, 2017

Daniel Wolf
Minnesota Public Utilities Commission
121 Seventh Place East
Suite 350
St. Paul MN 55101-2147

Re: Notification of Pending Route Permit Application Under Alternative Permitting Process for the Proposed 161 kV Freeborn Wind Farm Transmission Line and Associated Facilities in Freeborn County, Minnesota
PUC Docket No. IP6946/TL-17-322

Dear Mr. Wolf:

Freeborn Wind Energy LLC ("Freeborn Wind"), an affiliate of Invenergy LLC, plans to file a route permit application for a 161 kilovolt ("kV") high voltage transmission line in Freeborn County, to interconnect the proposed Freeborn Wind Farm ("Project") being developed by Freeborn Wind.

Because the high voltage transmission line is between 100 and 200 kV, the transmission line and associated facilities are eligible for the alternative permitting process, as provided under Minn. R. 7850.2800, subp. 1(C). As required by Minn. R. 7850.2800, subp. 2, Freeborn Wind is hereby notifying the Minnesota Public Utilities Commission of its intent to submit a route permit application for the Project under the alternative permitting procedures of Minn. R. 7850.2800 - .3900.

Freeborn Wind anticipates filing the route permit application in July 2017.

Sincerely,

/s/ *Christina K. Brusven*

Christina K. Brusven
Direct Dial: 612.492.7412
Email: cbrusven@fredlaw.com

AFFIDAVIT OF SERVICE

In the Matter of the Application of Freeborn Wind Energy LLC for a 161 kV Freeborn Wind Farm Transmission Line and Associated Facilities in Freeborn County, Minnesota

PUC Docket No. IP6946/TL-17-322

STATE OF MINNESOTA)
) SS.
COUNTY OF HENNEPIN)

Kristen A. Swenson, of the City of Minneapolis, the County of Hennepin, State of Minnesota, being duly sworn on oath, deposes and states that on the 15th day of June, 2017, she e-filed with the Minnesota Public Utilities Commission the following:

1. Notification of Pending Route Permit Application Under Alternative Permitting Process; and

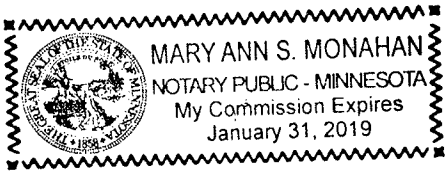
2. Affidavit of Service.

A copy has also been served in accordance with the attached service list.

Kristen Swenson
Kristen A. Swenson

Subscribed and sworn to before me
this 15th day of June, 2017

Mary Ann S. Monahan
Notary Public



PUC Docket No. IP6946/TL-17-3220
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Freeborn Wind Farm to Glenworth Substation

Transmission Line Route Permit Application

Alternative Permitting Process

Construction of a New 161 kV Transmission Line

PUC Docket No. IP6946/TL-17-322

September 20, 2017

Prepared by:

FREEBORN
WIND FARM

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1.0 Executive Summary

1.1 Project Summary

Freeborn Wind Energy LLC, (Freeborn Wind) respectfully submits this application for a Route Permit (Application) to the Minnesota Public Utilities Commission (MPUC or Commission) pursuant to Minnesota Statutes (Minn. Stats.) Chapter 216E and Minnesota Rules (Minn. R.) Chapter 7850.

Freeborn Wind requests a Route Permit to construct a new approximately seven-mile long 161 kilovolt (kV) high voltage transmission line (HVTL) needed to interconnect the proposed up to 200 megawatt (MW) Freeborn Wind Farm located in Freeborn County, Minnesota and Worth County, Iowa. The Minnesota portion of the Freeborn Wind Farm will consist of up to 84 MW and is under permit review in MPUC Docket No. IP6946/WS-17-410.[1] The proposed 161 kV transmission line project includes a new transmission line between the proposed Freeborn Wind Farm Substation (Wind Farm Substation) to be located in Freeborn County, MN and the existing Glenworth Substation located just southeast of Glenville, MN (Project).

The location of the proposed route (Proposed Route) for the Project is shown in Figure 1.[2]

This Application is submitted pursuant to the Alternative Permitting Process outlined in Minn. Stats. § 216E.04 and Minn. R. 7850.2800 to 7850.3900. The Project qualifies for the Alternative Permitting Process because it is between 100 kV and 200 kV. Minn. Stats. § 216E.04, subd. 2(3), and Minn. R. 7850.2800, Subp. 1(C).

Freeborn Wind has worked closely with the landowner participants in the Freeborn Wind Farm to develop a route for the Project that considers the routing factors set forth in Minn. Stats. § 216E.03, subd. 7 and Minn. R. 7850.4100 and minimizes impacts to landowners and the environment.

Freeborn Wind has, through voluntary agreements, obtained the private real estate rights necessary to construct the Project within the Proposed Route. If additional property rights are required for the Project, Freeborn Wind will seek to negotiate a voluntary easement agreement with each affected landowner. If Freeborn Wind and the landowner are unable to negotiate an easement for the right-of-way, Freeborn Wind will acquire the required real property rights through exercise of the power of eminent domain pursuant to Minnesota Statutes Chapter 117. The process of exercising the power of eminent domain is called condemnation.

The transmission line will be constructed using primarily monopole steel and wood structures. The typical right-of-way (ROW) width for the Project will be 80 feet and the typical span will be 550-900 feet. The Project is expected to be completed at the end of 2020 with an estimated cost of $3.7 million.

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[1] A new Freeborn Wind Farm, Wind Farm Substation and collector lines are included as part of the requested approval in the Site Permit Application for the Freeborn Wind Farm project. *In the Matter of the Application of Freeborn Wind Energy LLC for a Large Wind Energy Conversion System Site Permit for the 84 MW Freeborn Wind Farm in Freeborn County*, MPUC Docket No. IP6946/WS-17-410.

[2] All figures are located at the end of the narrative portion of this Application and before the Appendix.

Freeborn Wind respectfully requests that the Commission approve the Proposed Route and authorize a route width of 200 feet on each side of the Proposed Route centerline (400 feet total width) for a majority of the Proposed Route, with expanded areas at the substations, and narrowed areas near three residential parcels, a communication tower, and along US 65. The requested route width is shown on Figure 2.

1.2 Completeness Checklist

The content requirements for a Route Permit application with the Commission under the Alternative Permitting Process are identified in Minn. R. 7850.2800 – 7850.3900. The Commission submittal requirements are listed in Table 1 below with references indicating where the information can be found in this Application.

Table 1: Completeness Checklist

Authority	Required Information	Application Section
Minn. R. 7580.2800, Subp. 1(C)	**Subpart 1 Eligible Projects**	
	An applicant for a Site Permit or a Route Permit for one of the following projects may elect to follow the procedures of parts 7850.2800 to 7850.3900 instead of the full permitting procedures in part 7850.1700 to 7850.2700 for high voltage transmission lines (HVTLs) of between 100 and 200 kV.	2.5
Minn. R. 7580.2800, Subp. 2	**Subpart 2. Notice to Commission**	
	An applicant for a permit for one of the qualifying projects in subpart 1, who intends to follow the procedures of parts 7850.2800 to 7850.3700, shall notify the PUC of such intent, in writing, at least 10 days before submitting an application for the projects.	2.6 and Appendix A
Minn. Stat. Section 216E.04, Subd. 3; Minn. R. 7580.3100	**Contents of Application (Alternative Permitting Process)**	
	The applicant for a Route Permit who chooses to follow the procedures outlined in the Alternative Permitting Process shall include in the Application the same information required in part 7850.1900, except the applicant need not propose any alternative routes to the preferred route. If the applicant has rejected alternative routes, the applicant shall include in the Application the identity of the rejected routes and an explanation of the reasons for rejecting them.	4.3

Table 1: Completeness Checklist

Authority	Required Information	Application Section
Minn. R. 7850.1900, Subp. 2 (applicable per Minn. R. 7850.3100)	**Route Permit for HVTL**	
A.	A statement of proposed ownership of the facility at the time of filing the Application and after commercial operation.	2.1
B.	The precise name of any person or organization to be initially named as permittee or permittees and the name of any other person to whom the permit may be transferred if transfer of the permit is contemplated.	2.3
C.	At least two proposed routes for the proposed HVTL and identification of the applicant's preferred route and the reasons for the preference.	Not applicable per Minn. R. 7850.3100 (however, see 4.3)
D.	A description of the proposed HVTL and all associated facilities including the size and type of the HVTL.	3.2, 4.1, 5.1.1
E.	The environmental information required under 7850.1900, Subp. 3.	Chapter 6.0 See Minn. R. 7850.1900, Subp. 3(A)-(H) below
F.	Identification of land uses and environmental conditions along the proposed routes.	Chapter 6.0
G.	The names of each owner whose property is within any of the proposed routes for the HVTL.	Appendix E
H.	United States Geological Survey topographical maps or other maps acceptable to the Commission showing the entire length of the HVTL on all proposed routes.	Figures 2 and 8
I.	Identification of existing utility and public rights-of-way along or parallel to the proposed routes that have the potential to share the right-of-way with the proposed line.	Chapter 4.0, 5.0
J.	The engineering and operational design concepts for the proposed high voltage transmission line, including information on the electric and magnetic fields of the transmission line.	Chapter 5.0
K.	Cost analysis of each route, including the costs of constructing, operating, and maintaining the HVTL that are dependent on design and route.	3.4, 5.1.6

Table 1: Completeness Checklist

Authority	Required Information	Application Section
L.	A description of possible design options to accommodate expansion of the HVTL in the future.	4.4
M.	The procedures and practices proposed for the acquisition and restoration of the right-of-way, construction, and maintenance of the HVTL.	5.1.3-5.1.5
N.	A listing and brief description of federal, state, and local permits that may be required for the proposed HVTL.	7.4
O.	A copy of the Certificate of Need (CON) or the certified HVTL list containing the proposed HVTL or documentation that an application for a CON has been submitted or is not required.	2.4 Not applicable per Minn. Stat. §§ 216B.2421, subd. 2(3) and 216B.243
Minn. R. 7850.1900, Subp. 3 (applicable per Minn. R. 7850.2800)	**Environmental Information**	
A.	A description of the environmental setting for each route.	6.1
B.	A description of the effects of construction and operation of the facility on human settlement, including, but not limited to, public health and safety, displacement, noise, aesthetics, socioeconomic impacts, cultural values, recreation, and public services.	6.2
C.	A description of the effects of the facility on land-based economies, including, but not limited to, agriculture, forestry, tourism, and mining.	6.3
D.	A description of the effects of the facility on archaeological and historic resources.	6.4
E.	A description of the effects of the facility on the natural environment, including effects on air and water quality resources and flora and fauna.	6.5
F.	A description of the effects of the facility on rare and unique natural resources.	6.6
G.	Identification of human and natural environmental effects that cannot be avoided if the facility is approved at a specific site or route.	Chapter 6.0
H.	A description of the measures that might be implemented to mitigate the potential human and environmental impacts in items A to G and the estimated costs of such mitigative measures.	Chapter 6.0

2.0 Introduction

2.1 Statement of Ownership

Freeborn Wind is an affiliate of Invenergy LLC (Invenergy). Invenergy develops, builds, owns, and operates large-scale power plants across four core technologies: wind (77 projects, 10,071 MW); natural gas (10 projects, 5,519 MW); solar (12 projects, 231 MW); and battery storage (6 projects, 94 MW) (https://invenergyllc.com/projects/overview, accessed July 26, 2017). Invenergy projects are mainly located in the U.S., with other projects located in Japan, Poland, Scotland, and Uruguay. Invenergy has a proven development track record of 102 large-scale projects with more than 3,400 wind turbines placed in service and over 15,900 MW built. As part of Invenergy's various generation projects, Invenergy has permitted and built 401 miles of transmission lines greater than 69 kV and continues to operate 251 miles of those lines.

In Minnesota, Invenergy operates the Cannon Falls Energy Center, a 357 MW natural gas combustion turbine power plant in Cannon Falls, MN. Cannon Falls Energy Center began operation in 2008 and provides natural-gas fired peaking power and all the electricity generated is committed to Northern States Power Company, a Minnesota corporation doing business as Xcel Energy (Xcel Energy) (see Minnesota Environmental Quality Board Docket No. 04-85-OPPS). Freeborn Wind and Invenergy do not own or operate, or have financial interest in any other generation facilities in Minnesota.

In addition to this application for a Route Permit, Freeborn Wind has also applied to the MPUC for a Site Permit for the Minnesota portion of the Freeborn Wind Farm Project consisting of up to 200 MW of wind in Minnesota and Iowa.

On September 21, 2016, Freeborn Wind entered into a Purchase and Sale Agreement (PSA) with Xcel Energy, and Invenergy Wind Development North America LLC. On October 24, 2016, Xcel Energy filed an Initial Petition notifying the Commission of its selection of Freeborn Wind (the Initial Petition), along with several other wind energy projects Xcel Energy proposed to purchase and self-build.[3] On March 15, 2017, Xcel Energy filed a Supplemental Wind Petition seeking approval of 1,550 MW of wind energy, 750 MW of self-build wind (including the Freeborn Wind Farm) and 800 MW of wind energy power purchase agreements.[4] As summarized in the Supplemental Wind Petition, Xcel Energy utilized the Commission-approved resource acquisition process approved by the Commission as part of its approval of Xcel Energy's last integrated resource plan.[5] The Commission approved Xcel Energy's Supplemental Wind Petition, including

[3] Xcel Energy's Petition, *In the Matter of the Petition of Xcel Energy for Approval of the Acquisition of Wind Generation from the Company's 2016-2030 Integrated Resource Plan*, MPUC Docket No. E002/M-16-777 (October 24, 2016).

[4] Xcel Energy's Supplement, *In the Matter of the Petition of Xcel Energy for Approval of the Acquisition of Wind Generation from the Company's 2016-2030 Integrated Resource Plan*, MPUC Docket No. E002/M-16-777 (March 15, 2017).

[5] *Id.* at 3-12. *See also* Order Approving Plan with Modifications and Establishing Requirements for Future Resource Plan Filings, *In the Matter of Xcel Energy's 2016-2030 Integrated Resource Plan*¸ MPUC Docket No. E002/RP-15-21 (January 11, 2017), Ordering Point 5.

the Purchase and Sale Agreement on September 1, 2017.[6]

If the MPUC grants the requested Site Permit and Route Permit, the Freeborn Wind entity will be transferred from Invenergy to Xcel Energy. Xcel Energy will then become the owner of Freeborn Wind, and be responsible for fulfilling all of the conditions set forth in any Site Permit or Route Permit granted by the Commission. Freeborn Wind, then owned by Xcel Energy, would construct, own, and operate both the Freeborn Wind Farm and this Project.

2.2 Requested Action

This Application is submitted under the Alternative Permitting Process under Minn. Stat. §216E.04, subd. 2(3) and Minn. R. 7850.2800 to 7850.3900. See Minn. R. 7850.2800, Subp. 1(C). The rules require the applicant to propose one route. Minn. R. 7850.3100. The applicant must also describe any alternative routes that were considered, but rejected, and provide its reasons for rejecting them. In developing the Proposed Route, Freeborn Wind evaluated alternate route segments which are described in Section 4.3.

For reasons presented herein, Freeborn Wind prefers the Proposed Route for constructing the new 161 kV transmission line to connect the Wind Farm Substation to the point of interconnection (POI) at the existing Glenworth Substation (see Figures 1 and 2). Freeborn Wind respectfully requests that the Commission approve the Proposed Route and authorize a route width of 200 feet on each side of the proposed transmission line route centerline (400 feet total width) for a majority of the route. Freeborn Wind requests an expanded route width at the substations and narrowed route width near three residential parcels, a communication tower, and along US 65 of the Proposed Route as herein described (see Section 4.2.1 and Figure 2).

This Application demonstrates that construction of the Project along the Proposed Route will comply with the applicable standards and criteria set out in Minn. Stat. § 216E.03, subd. 7 and Minn. R. 7850.4100. The Project, as proposed, will support the State's goals to conserve resources, minimize environmental, human settlement, and land use impacts, and supports the State's electric energy security through the construction of efficient, cost-effective electric transmission infrastructure.

Freeborn Wind notes that the Project will not be constructed unless the Commission issues a Site Permit for the Freeborn Wind Farm.

2.3 Permittee/Project Manager

The permittee for the proposed Project is:

Permittee: Freeborn Wind Energy LLC

Contact: Dan Litchfield
Senior Manager, Project Development

[6] *In the Matter of the Petition of Xcel Energy for Approval of the Acquisition of Wind Generation from the Company's 2016-2030 Integrated Resource Plan*, Order Approving Petition, Granting Variance, and Requiring Compliance Filing, MPUC Docket No. E002/M-16-777 (Sept. 1, 2017).

Address: Invenergy
One South Wacker Drive, Suite 1800
Chicago, IL 60606

Phone: (312) 582-1057

E-mail: dlitchfield@invenergyllc.com

2.4 Certificate of Need Summary

Minn. Stat. Section 216B.243, subd. 2 states that "no large energy facility" shall be sited or constructed in Minnesota without the issuance of a Certificate of Need by the Commission. The proposed Project is not classified as a "large energy facility" under Minn. Stat. §§ 216B.243 and 216B.2421, subd. 2(3). While the Project is an HVTL with a capacity of 100 kV or more, it is not more than 10 miles long in Minnesota and it does not cross a state line. Therefore, a Certificate of Need is not required for the Project.

2.5 Alternative Permitting Process for Route Permit

The Minnesota Power Plant Siting Act (PPSA) provides that no person may construct an HVTL without a Route Permit from the Commission. Minn. Stat. § 216E.03, subd. 2. Under the PPSA, an HVTL includes a transmission line that is 100 kV or more and it greater than 1,500 feet in length. Minn. Stat. § 216E.01, subd. 4. The proposed 161 kV transmission line is an HVTL greater than 1,500 feet in length and, therefore, a Route Permit is required from the Commission prior to construction.

The 161 kV Project qualifies for review under the Alternative Permitting Process authorized by Minn. Stat. § 216E.04, subd. 2(3) and Minn. R. 7850.2800, Subp. 1(C) because the Project is an HVTL between 100 and 200 kV. Accordingly, Freeborn Wind is following the provisions of the Alternative Permitting Process outlined in Minn. R. 7850.2800 to 7850.3900 for this Project.

2.6 Notice to the Commission

Freeborn Wind notified the Commission on June 15, 2017 by letter (mailed and electronically filed) that it plans to file a Route Permit application for the Project and that it intends to use the Alternative Permitting Process of Minn. R. 7850.2800 - .3900 for the Project (Appendix A). This letter complies with the requirement of Minn. R. 7850.2800, Subp. 2, to notify the Commission of this election at least 10 days prior to submitting an application for a Route Permit.

3.0 Project Information

3.1 Project Location

The Project is located entirely within Shell Rock Township in Freeborn County. The origin of the Proposed Route is at the Wind Farm Substation at the southeast corner of the intersection of 110th Street and 840th Avenue in Shell Rock Township, Freeborn County, MN, approximately 7 miles southeast of the Glenworth Substation.

Figure 2 includes detailed maps of the Proposed Route. Table 2 below identifies the county, township, and Public Land Survey (PLS) designation of areas crossed by the Proposed Route.

Table 2: Project Location

County/Township	PLS Township	PLS Range	PLS Sections
Freeborn/Shell Rock	101 N	20W	7, 8, 16, 17, 20, 21, 25, 26, 27, 28, 35, 36

3.2 Project Proposal

Freeborn Wind proposes to construct approximately 7.0 miles of a new single circuit 161 kV transmission line. The Project is needed to interconnect the Freeborn Wind Farm. The 161 kV voltage was determined by Freeborn Wind Energy, the Midcontinent Independent System Operator (MISO), Inc. and ITC Midwest LLC (ITC) to be the appropriate voltage because it is connecting the Freeborn Wind Farm to the existing 161/69 kV Glenworth Substation. As the Freeborn Wind Farm's electrical collection system operates at 34.5 kV, it makes sense to transform that voltage only once. In addition, a 161 kV voltage more efficiently transmits energy, thus 161 kV was selected for the Project.

The line will originate at the Wind Farm Substation and run northwest to the POI, the existing Glenworth Substation (Figure 5). Buried 34.5 kV collector lines from the proposed Freeborn Wind Farm will transmit electricity generated from the wind turbines to the Wind Farm Substation.[7] The voltage will be increased from 34.5 kV to 161 kV at the Wind Farm Substation and power transmitted via the Project's aboveground 161 kV transmission line to the Glenworth Substation (Figures 1 and 2).

Separately, ITC will make modifications and network upgrades at the Glenworth Substation. These modifications will be constructed pursuant to the Generator Interconnection Agreement entered into between Freeborn Wind, ITC, and MISO on April 3, 2017. These upgrades include a dead-end structure, a disconnect switch, three capacitance coupled voltage transformer and a new 161/69 kV transformer, and relay protection of the radial line to the generating facility. The Glenworth Substation 161 kV bus will also be expanded to add a fourth circuit breaker and a new terminal to the ring.

3.3 Project Schedule

Construction of the Project is expected to begin in the second quarter of 2020, and Freeborn Wind anticipates a December 2020 in-service date for the proposed facilities. Table 3 provides a summary of the estimated permitting, construction, and in-service schedule for the Project. This schedule is based on information available at the date of this filing and planning assumptions that balance the timing of implementation with the availability of crews, materials, and other practical considerations. This schedule may be revised as further information is developed.

[7] As noted, the Wind Farm Substation and associated collector lines are being permitted separately as part of the Freeborn Wind Farm Project, Site Permit Application, PUC Docket No. IP6946/WS-17-410.

Table 3: Estimated Project Schedule

Project Task	Date
File Route Permit Application with the Commission	September 2017
Route Permit Review Process Complete / Route Permit Issued	June 2018
Begin Proposed Transmission Line Construction	May 2020
In-Service Date	December 2020

3.4 Project Costs

The total estimated Project cost of the transmission line along the Proposed Route is approximately $3.7 million. This estimate is an engineering estimate and expected to reflect actual Project costs within 20 percent. Final Project costs are dependent on a variety of factors, including the approved route, timing of construction, cost of materials, and labor. A breakdown of the estimated Project cost is shown in Table 4.

Table 4: Estimated Project Costs

Project Item	Cost
Land acquisition and permitting	$300,000
Design, procurement and construction	$3,000,000
Post-construction close-out, permit compliance	$400,000
Total project cost	$3.7 million

As stated above, if the MPUC grants the necessary approvals, Freeborn Wind will construct, operate, and maintain the proposed 161 kV transmission line, as well as the Freeborn Wind Farm. Operating and maintenance costs after construction of the transmission line will be nominal for several years because the line will be new and minimal initial vegetation management is required. The anticipated annual operating and maintenance costs for the 161 kV transmission line is approximately $1,500 per mile. The principal operating and maintenance costs include inspections which are typically ground-based and occasionally done by aerial inspections, generally on a yearly basis.

4.0 Facility Description and Route Selection Process

4.1 Transmission Line Description

The Proposed Route includes constructing approximately 7.0 miles of new 161 kV transmission line that will connect the proposed Wind Farm Substation to the existing Glenworth Substation. See Figures 1 and 2.

The new 161 kV single circuit line will originate at the proposed Wind Farm Substation site located at the southeast corner of the intersection of 110th Street and 840th Avenue in Shell Rock Township (Figure 1). From the Wind Farm Substation, the proposed line will go north and parallel 840th Avenue, then turn west and cross through agricultural land to west of 820th Avenue. It will then turn north and stair-step northwest through more agricultural land and crosses 810th Avenue and parallels 130th Street until it reaches the east side of US 65.

At this point the line goes north/northwest, adjacent to the east side of US 65 crossing more agricultural land, the Shell Rock River and natural areas associated with the Shell Rock River and terminates at the existing Glenworth Substation (Figure 2). Additional details regarding the Proposed Route are included in Table 5 below.

Table 5: Detailed Description of Proposed Route

Proposed Route Location	Approximate Distance	ROW Width	Route Width	Routing and Crossing Summary
Wind Farm Substation to 1st Turn	0.9 mile	80 feet (ft)	400 ft with an additional 200 ft buffer around proposed Project O&M/Substation parcel	From the Wind Farm Substation, the route goes north, crosses 110th Street and then parallels the east side of 840th Avenue at edge of farmland.
1st Turn to 2nd Turn	1.0 miles	80 ft	400 ft	Route turns west and crosses 840th Avenue (0.9 mile) and County Ditch No. BRJ (0.9 mile) along farmland and parcel boundary.
2nd turn to 3rd turn	~123 ft	22 ft	400 ft	The route turns northwest and crosses County Road 108/830th Avenue along farmland and parcel boundary.
3rd turn to 4th turn	1.3 miles	80 ft	400 ft	The route turns due west and crosses 820th Avenue until a turning point at 3.1 miles.
4th turn to 5th turn	0.7 mile	80 ft	400 ft	At 3.1 miles, the route turns north and crosses farmland along parcel boundaries and 120th Street.
5th turn to 6th turn	0.3 mile	80 ft	400 ft	At 3.9 miles, the route turns west and crosses farmland along parcel boundaries. The route crosses an existing transmission line at 4.15 miles.
6th turn to 7th turn	0.5 mile	80 ft	400 ft with a narrowed route width of 310 ft near the	At 4.2 miles, the route turns north and crosses farmland, paralleling an

Table 5: Detailed Description of Proposed Route

Proposed Route Location	Approximate Distance	ROW Width	Route Width	Routing and Crossing Summary
			communication tower site at 130th Street (200 ft on west side of route centerline and 110 ft on east side)	existing transmission line, until it reaches the south side of 130th Street. At 130th Street, the route passes by an existing communication tower at 4.7 miles.
7th turn to 8th turn	0.9 mile	80 ft	400 ft with a narrowed route width of 260 ft at crossing of 130th Street and 810th Avenue between residences (200 ft on north side of route centerline and 60 ft on south side of centerline)	At 4.7 miles, the route turns west and crosses farmland on the south site of 130th Street. As the route approaches 810th Avenue, it bears northwest and crosses to the north side of 130th Street to minimize impacts to homes located on either side of 130th Street, and continues to cross farmland.
8th Turn to Glenworth Substation	1.4 miles	80 ft	262 ft with 200 ft route width east of route centerline and 62 ft route width west of route centerline and additional varying route width up to 292 ft of Glenworth Substation parcel boundary	At 5.6 miles, the route goes north/northwest and parallels the east side of US 65 and crosses farmland until 6.2 miles. From 6.2 to 6.5 miles, the route crosses the Shell Rock River and associated wetlands along the river.

4.2 Route Width and Alignment Selection Process

4.2.1 Route Width

The PPSA directs the Commission to locate transmission lines in a manner that "minimize[s] adverse human and environmental impact while ensuring continuing electric power system reliability and integrity and ensuring their electric needs are met and fulfilled in an orderly and timely fashion" (Minn. Stat. § 216E.02, subd. 1). The PPSA also authorizes the Commission to meet its routing responsibility by designating a "route" for a new transmission line when it issues

a Route Permit. The route may have "a variable width of up to 1.25 miles" within which ROW for the facilities can be located (Minn. Stat. § 216E.01, subd. 8).

The Applicant proposes a route width of 200 feet on each side of the proposed transmission line route centerline (400 feet total width) for a majority of the route (Figure 2).

A wider route width is requested around the substations to accommodate final transmission line design as well as narrowed route width near three residential parcels, a communication tower, and along US 65. Freeborn Wind requests a varying route width extending up to 292 feet from the Glenworth Substation parcel boundary, and a route width of 200 feet off of the Wind Farm Substation site boundary (Figure 2).

4.2.2 Route Selection Process

When submitting an application under the Alternative Permitting Process, the applicant must submit one proposed route. Minn. Stat. § 216E.01, subd. 4(3). The Applicant must also "identify in the application any other sites or routes that were rejected by the applicant." *Id.* This section describes Freeborn Wind's development of the Proposed Route and the routes and route segments Freeborn Wind rejected.

In developing the Proposed Route and route alternatives in this Application, Freeborn Wind first reviewed the statutory and rule criteria set forth in the PPSA, Minn. Stat. Chapter 216E, and Minn. R. 7850.4100. Freeborn Wind also considered the State's policy of non-proliferation of new infrastructure routes.

The Proposed Route was developed with the following primary objectives:

- satisfies Minnesota routing requirements;
- parallels existing roads, survey boundaries, field lines, natural division lines, and transmission lines on land leased by Freeborn Wind;
- minimize impacts to residences and farmsteads;
- minimize creation of new infrastructure corridors by locating proposed transmission facilities near existing transmission and transportation alignments; and
- minimize impacts to environmental and other sensitive resources.

Freeborn Wind has worked closely with the landowner participants in the Freeborn Wind Farm to develop a route for the Project. The Proposed Route in this Application was further developed by Freeborn Wind's land agents; permitting and engineering personnel based on their investigation of the overall Project area and communications with landowners, existing electric transmission facilities, utility, and roadway ROWs; and input from government entities, applicable regulatory agencies, and the public.

Freeborn Wind performed analysis of environmental resources in the Project area using regulatory and other natural resource information, Geographic Information System data, computer mapping, aerial photographs, and topographic maps. Environmental resources, human settlement, economic, cultural resources, natural environment, and rare and unique natural resources identified along the

Proposed Route are discussed in Sections 6.1 to 6.6 of this Application. The Proposed Route is designed to avoid or minimize Project impacts.

To evaluate the route options, Freeborn Wind considered the following land use/ROW, residential, and environmental criteria:

- **Existing Land Use and Transmission Line, Roads, survey lines, natural division lines, and agricultural field boundaries and Other ROWs**: Freeborn Wind identified and mapped the locations of existing electric transmission lines, road ways, survey lines, natural division lines, and agricultural field boundaries. Freeborn Wind then assessed whether the proposed transmission line could be co-located with or parallel to these features. Because most the Project area consists of farmland, Freeborn Wind reviewed parcel boundaries and assessed the potential for routing the proposed transmission line near these boundaries to minimize the impact to land use. Land use and infrastructure is discussed in Sections 6.1, 6.2.2, and 6.3.1.
- **Residences and Farmsteads**: Residences and farmsteads within 500 feet of the Proposed Route and each route alternative were identified and mapped. The number of residences and farmsteads along each route alternative was analyzed and tabulated.
- **Wetlands**: Wetlands along the Proposed Route and each route alternative were identified using existing data and desktop tools and mapped. Wetlands along the routes are primarily small emergent wetlands associated with drainages and/or small depressions near or adjacent to the road. Because a significant amount of the Proposed Route crosses agricultural land, only one wetland area lies within segments of the Proposed Route. This wetland area is located around the Shell Rock River that is east and south of the existing Glenworth Substation. Wetlands are discussed in Section 6.5.2.2.
- **Streams and Drainages**: Streams and drainages along the Proposed Route and each route alternative were identified using desktop resources and mapped. The only stream crossing of the Proposed Route is located at the Shell Rock River. Freeborn Wind plans to span the Shell Rock River to avoid potential impacts and it will obtain a permit from the Minnesota Department of Natural Resources (MnDNR) for this crossing. Water resources are discussed in Section 6.5.2.
- **Flora, Fauna, and Rare & Unique Natural Resources**: Freeborn Wind reviewed publicly available rare and natural resource data and information, and consulted with applicable resource agencies, to identify and map the locations of such features near the Proposed Route and route alternatives. This information is being used to avoid and minimize potential Project impacts and are further discussed in Sections 6.5.1 to 6.5.4, and 6.6.
- **Cultural Resources**: A cultural resources literature review was conducted on the Project area and applying a 1-mile buffer. The Project area has a low to moderate potential to contain significant cultural resources due to geography and history. Cultural resources are discussed in Section 6.4.

After developing a preliminary route, and taking into account landowner input and the Wind Farm Substation location, Freeborn Wind mailed notice of the Project to municipal and regulatory stakeholders on April 27, 2017, and requested comments on the proposed Project (Appendix D).

As of the filing date of this Application, stakeholder responses were received from the U.S. Army Corps of Engineers (USACE), MnDNR, Minnesota Department of Transportation (MnDOT), and the Minnesota Historical Society (MHS)/State Historic Preservation Officer. These comments are summarized in applicable portions of the Application in Section 6.0 below (also see Appendix E).

4.3 Alternative Route Segments Considered and Rejected

In evaluating the route for the proposed Project, Freeborn Wind considered the following two alternative route segments and one alternative route (see Figure 4). In accordance with Minn. R 7850.3100, Freeborn Wind describes each of the alternative route segments/route below and the reasons they were rejected.

4.3.1 Alternative Route Segment A

Alternative Route Segment A extends from the existing Glenworth Substation to the southeast and parallels the east side of US 65 for approximately 0.4 mile. At this point it crosses the US 65, the Union Pacific (UP) railway line, the Shell Rock River, and flood plain/wetlands associated with the river, and continues paralleling the west side of US 65, outside of the MnDOT ROW and the railway line for approximately 0.8 mile. It then turns east and crosses the railway line and US 65 and joins the Proposed Route. A portion of this route segment that is located on the west side of the railway line and US 65 crosses through the eastern edge of the Shell Rock Wildlife Management Area (WMA).

Because this alternative route segment crosses the Shell Rock WMA and associated sensitive natural resources, and it would involve two crossings of both US 65 and the UP railway, Freeborn Wind rejected it from further consideration. The Proposed Route was moved to the east side of US 65 to avoid impacts to the Shell Rock WMA and sensitive natural features located on the west side of US 65, and avoids multiple crossings of US 65 and the UP railway.

4.3.2 Alternative Route Segment B

Alternative Route Segment B extends from the existing Glenworth Substation to the east and crosses the Shell Rock River and associated flood plain/wetlands for approximately 0.5 mile (see Figure 4). At this point it turns north and passes within approximately 260 feet and 622 feet of two farmsteads/residences, respectively, and parallels River Road for approximately 0.1 mile. The alternative route segment then goes east along the edge of farmland and into a farm field where it turns south, crosses River Road and an existing 69 kV transmission line and passes within approximately 530 feet of another farmstead. It then turns east, crossing Drainage Ditch No. 49 and farmland, and passing within approximately 230 feet of another farmstead, until it reaches 810th Avenue. At 810th Avenue, the route segment turns south and parallels the west side of 810th Avenue crossing Tile Line BR A and farmland for approximately 0.2 mile. It then turns east crossing 810th Avenue and follows the parcel boundary between two farm fields, a shelterbelt, and small wooded area for approximately 0.5 mile. At this point, it turns south, parallels, but does not overlap, an existing 69 kV transmission line ROW on an adjacent parcel owned by a non-Project participant for 0.5 mile. The route follows a parcel boundary and crosses farmland and two potential wetlands, passing within approximately 390 feet of another farmstead, to where it meets the Proposed Route at 130th Street.

Freeborn Wind rejected Alternative Route Segment B because it created comparatively more impacts to residences/farmsteads and farmland than the equivalent portion of the Proposed Route in the vicinity of the Glenworth Substation, and it crosses more centrally through the middle of an National Wetlands Inventory (NWI) wetland complex associated with the Shell Rock River (which does not parallel an existing road/railroad) compared to the Proposed Route which crosses the river adjacent to US 65 and the UP railway. This alternative route segment is located within approximately 230 to 590 feet of five residences/farmsteads versus the equivalent Proposed Route segment which is located within approximately 329 and 385 feet of two residences/farmsteads, respectively. Additionally, Freeborn Wind rejected this alternative for multiple reasons, including the fact Freeborn Wind was not able to obtain landowner agreements for the entire length of this alternative route segment.

4.3.3 Alternative Route C

Alternative Route C contains some similar route segments as the Proposed Route, but varies in four locations (Figure 4). From the proposed Wind Farm Substation, this route crosses 110th Street to the west side of 840th Avenue, heads north across farmland until it turns west where it joins with the Proposed Route. After crossing County Road 108/830th Avenue, Alternative Route C goes north along the west side of County Road 108/830th Avenue and parallels farmland until it reaches 120th Street. It goes west along the south side of 120th Street and farmland for approximately 1.5 miles, passing within approximately 110 to 260 feet of three residences/farmsteads and several vegetated areas. It then crosses 120th Street and goes north along a parcel boundary crossing farmland and paralleling an existing 69 kV transmission line, then also parallels the Proposed Route for an approximate one-mile segment to 130th Street. At 130th Street, this alternative route passes along the east side of the communication tower, passes within 509 feet of another farmstead, crosses 130th Street, passes within approximately 390 feet of another farmstead, and continues north along farmland and continuing parallel to the existing 69 kV transmission line for approximately 0.5 mile where it turns west. It then follows a parcel boundary crossing farmland and 810th Avenue, and passing within approximately 222 and 277 feet of two additional residences/farmsteads, respectively, until reaching US 65 where it joins the Proposed Route alignment.

Freeborn Wind rejected Alternative Route C because it created more impacts than the equivalent Proposed Route. As described above, this alternative route is located within 110 to 509 feet of seven residences/farmsteads. In contrast, there are only two residences/farmsteads impacted by the Proposed Route. Freeborn Wind also rejected this alternative route because certain participating landowners requested the shift to the Proposed Route.

4.4 Design Options to Accommodate Future Expansion

The proposed 161 kV transmission line is designed to meet current and projected needs. While the Freeborn Wind Farm is proposed to be up to 200 MW, the proposed transmission line would be designed, constructed, and operated to be capable of supporting and transmitting up to 265 MW of electricity. The capacity provided by the Project allows for potential future additional generation in Iowa and southern Minnesota to be interconnected to the electric grid. Freeborn Wind does not anticipate the need to connect the Wind Farm Substation to the Glenworth Substation at a higher

voltage than 161 kV within the foreseeable future and is, therefore, not proposing to build the line to accommodate greater voltage or transfer capacity than proposed.

5.0 Engineering Design, Construction and Right-of-Way Acquisition

5.1 Structure, Right-of-Way, Construction, and Maintenance

5.1.1 Transmission Line Structures

The proposed structures for the Project are wood, laminated wood, or steel poles with braced post insulators. Schematics of the proposed structure types are shown in Figure 6. Depending upon soil conditions, Freeborn Wind proposes to use direct embedded poles for tangent structures. Rock-filled culvert or concrete drilled pier foundations may be required in areas with poor soils. Deadend structures will be installed with concrete drilled pier foundations.

Wood or laminated brace post poles are proposed to be used for the majority of the Project. Additionally, a cantilever design may be used in some locations with all davit arms and conductors installed on one side of the pole to allow a narrower ROW on the non-conductor side to allow the poles to be closer to the parcel boundary where adjacent landowners are not participating.

The proposed 161 kV transmission line will be constructed with T2 477 kcmil ACSR "Hawk" conductor which has a capacity of 265 MW at 161 kV or a conductor with comparable capacity with a phasing space of 11.0 feet. The typical span between poles outside of substation locations will be approximately 550 to 900 feet. A summary of the structure design and foundation for the proposed line is included in Table 6.

The proposed 161 kV transmission line will be designed to meet or surpass all relevant local and state codes, North American Electric Reliability Corporation standards, the National Electric Safety Code (NESC), and Xcel Energy standards. Appropriate standards will be met for construction and installation, and applicable safety procedures will be followed during and after installation.

5.1.2 Right-of-Way Width

The entire length of the proposed Project will require new ROW (Figure 2).

The area of the Project route width is approximately 344.8 acres and the area of the ROW is approximately 64.1 acres.

The typical ROW width for the Project is proposed to be 80 feet wide (40 feet on either side of the centerline) (Figure 2). The standard alignment will be with a delta-designed poles centered in the ROW, with 40 feet of ROW on each side of the centerline. See Figure 2 for width of ROW for the Project and Figure 6, pages 2 and 3 for the delta-designed poles. For the segments of turn 1 to turn 2 and turn 3 to turn 4, Freeborn Wind proposes to use a vertical configuration (all conductors are located on one side of the pole. This design is needed to create the correct approach angle for the segment of turn 2 to turn 3 that uses the 22 foot wide ROW across County Road 108/830th

Avenue.). When this vertical design is used, the ROW will be offset with a width of 30 feet from the parcel boundary to the centerline (non-conductor side) and 50 feet on the opposite side of the centerline on the conductor side to provide for adequate clearances. See Figure 2 for width of ROW and Figure 6, page 1 for vertical pole designs. Table 6 indicates what portions of the route will have the line centered in the middle of the ROW and which areas, using the vertical design, will be offset from center.

In one location, at the crossing of County Road 108/830th Avenue at one-quarter mile south of 120th Street a narrowed ROW is proposed to maintain the ROW for the Project within land owned by participating landowners and within public road ROW where Freeborn Wind is seeking a utility permit from Freeborn County. A vertical design with a 22-foot ROW will be used on this single, short span. See Figure 6, page 4. A map showing the area is provided below.

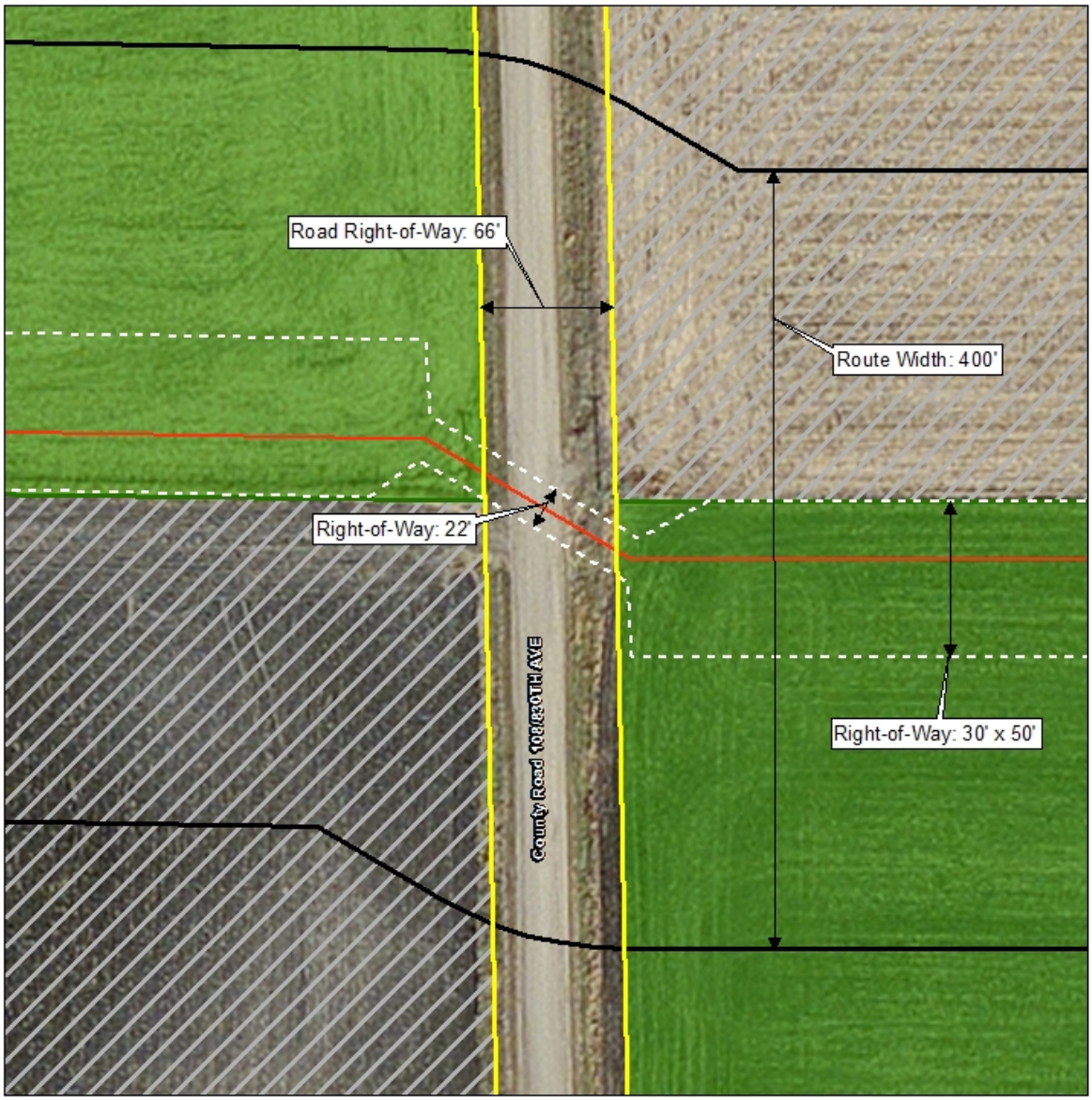
The green shaded parcels are owned by participating landowners. The gray shaded parcels are owned by non-participating landowners. Freeborn Wind engineers developed a design in this limited area that can be operated in a 22-foot ROW, which is within the 66 foot wide County Road 108 ROW (see above). To ensure adequate clearances, Freeborn Wind proposes a special design using two deadend structures as shown in Figure 6 (pages 4 of 5). The two poles will be located 123 feet apart and the 22-foot ROW would apply only to the area between the two poles. The area needed for construction will be contained on the participating landowners' parcels. The existing distribution line will be buried in this location. Freeborn Wind continues to talk with adjacent landowners and the County and may propose to change the design and alignment within the Proposed Route if a voluntary easement is obtained or to meet County requirements.

Table 6 summarizes the design characteristics along the Proposed Route for the Project (see below).

Approximately 4.7 miles of the Proposed Route would have 80 feet wide ROW with 40 feet on either side of centerline and approximately 2.3 miles of off-set ROW with 30-50 feet on either side of centerline. As noted, for 123 feet at the crossing at County Road 108/830th Avenue, the ROW will be 22 feet. When the proposed line is parallel to a roadway, poles will generally be placed within the private ROW adjacent to the roadway ROW.

For the proposed Project, approximately 1.5 miles of the Project (21%) will be parallel to existing roadways, resulting in an easement of lesser width being required from any one landowner, and approximately 5.5 miles (79%) will cross farmland.

Map of Crossing at County Road 108/830th Avenue



Source: Maintained ROW Exhibit, Olsson Associates, August 17, 2017

Table 6: Summary of Transmission Line Engineering Design

Line Type	Structure Type (see Figure 6)	Structure Material	ROW Width (feet)	Structure Height (feet)	Foundation Type	Foundation Diameter (feet)	Span Between Structures (feet)
Single Circuit 161 kV (delta – two conductors on one side and one conductor on other side)	Braced Post Structure TSP-161	Wood	80 (40 feet on either side of centerline)	80	Direct embedded (unless unsuitable soil)	3.0	650-900
Single Circuit 161 kV (vertical – conductors on one side)	Braced Post Structure TSVP-161	Wood	80 (30 feet on side without conductors and 50 feet on conductor side)	80	Direct embedded (unless unsuitable soil)	3.0	650-900
Single Circuit 161 kV	Running Angle Structure TS-161L-LA	Laminated Wood	80 (40 feet on either side of centerline)	75	Direct embedded (unless unsuitable soil)	5.0	550-800
Single Circuit 161 kV	Deadend Structure TDE-161L-J	Laminated Wood	22 (11 feet on either side of centerline)	75	Direct embedded (unless unsuitable soil)	6.0	650-850
Single Circuit 161 kV	Substation Deadend Structure SUBDE-161S	Steel	NA - Within substation fenceline	60	Concrete drilled pier	5.0	300

5.1.3 Right-of-Way Evaluation and Acquisition

New ROW is required for the Project. Freeborn Wind has, through voluntary negotiations, acquired all the private land rights necessary to construct the Project along the Proposed Route. Freeborn Wind continues to negotiate with landowners in the Project Area and may propose changes to the transmission line alignment if additional rights are acquired.

5.1.4 Construction Procedures

Construction will not begin until federal, state, and local approvals are obtained, property, and ROWs are acquired, soil conditions are determined, and design is completed for that construction area. The precise timing of construction will take into account various requirements that may be in place due to permit conditions, system loading issues, weather, and available workforce and materials. At this time, no electrical outages to other existing lines are anticipated as a result of construction of the Project.

Freeborn Wind will construct the proposed Project and will notify landowners of anticipated timing of construction. Construction of the Project by Freeborn Wind will follow standard Xcel Energy construction and mitigation practices, including best management practices (BMPs) that were developed from experience with past projects. These practices address ROW clearance, staging, erecting transmission line structures, and stringing transmission lines. Construction and mitigation practices to minimize impacts will be developed based on the proposed schedule for activities, permit requirements, prohibitions, maintenance guidelines, inspection procedures, terrain, and other practices. In certain cases, some activities, such as schedules, are modified to minimize impacts to sensitive environments. BMPs for each specific project are based on the proposed schedules for activities, prohibitions, maintenance guidelines, inspection procedures, and other practices. In some cases these activities, such as schedules, are modified to incorporate BMP installation that will assist in minimizing impacts to sensitive environments. Any contractors involved in construction of the transmission line will adhere to these BMP requirements.

Transmission line structures are generally designed for installation at existing grades. Typically, structure sites with 10 percent or less slope will not be graded or leveled. Sites with more than 10 percent slope will have working areas graded level or fill brought in for working pads. It is preferred to leave the leveled areas and working pads in place for use in future maintenance activities, if practical. If not, the site will be graded back to its original condition and original drainage maintained to the extent possible and imported fill is removed.

Typical construction equipment used on transmission projects includes tree removal equipment, mowers, cranes, backhoes, digger-derrick line trucks, track-mounted drill rigs, dump trucks, front end loaders, bucket trucks, bulldozers, flatbed tractor-trailers, flatbed trucks, pickup trucks, concrete trucks, and various trailers. Many types of excavation equipment are set on wheel or track-driven vehicles. Poles are transported on tractor-trailers. Staging areas are often established for these types of projects. Staging involves delivering the equipment and materials necessary to construct the new transmission line facilities. The materials are stored at staging areas until they are needed for a given Project.

Staging areas may also be required for additional space for storage during construction. These areas will be selected for their location, access, security, and ability to efficiently and safely warehouse supplies. The temporary staging areas outside of the transmission line ROW will be obtained through rental agreements with applicable landowners. For this Project, the staging area(s) will be located within Worth County, Iowa.

Access to the transmission line ROW will be made directly from existing roads or farm field access roads that run parallel or perpendicular to the transmission line ROW. In some situations, private field roads will be used where necessary to accommodate heavy equipment used in construction, including cranes, concrete trucks, and hole drilling equipment. On landowners' parcels, existing access roads may be upgraded or new roads may be constructed to Project specifications. New access roads may also be constructed when no current access is available or the existing access is inadequate to cross roadway ditches. These activities are coordinated with the owner of the property affected and Freeborn County.

Immediately prior to construction, surveyors will stake the transmission line centerline and pole locations. Trees and other vegetation will then be removed from the ROW. Erosion control measures will be installed where needed. When it is time to install the poles, they will either be moved from a staging area or directly delivered by the manufacturer or distributor to the installation location. Insulators and other hardware are attached while the pole is on the ground. The pole is then lifted, placed, and secured.

Poles that are considered medium angle, heavy angle, or dead-end structures will have concrete foundations (see Table 6 and Figure 6). Concrete foundation installation involves excavating and placing temporary steel casing, rebar, concrete, and anchor bolts. The base of the concrete foundation typically projects about one foot above grade. In those cases, holes are drilled in preparation for the foundation. Drilled pier foundations may vary from approximately 3 to 8 feet in diameter and 20 to 30 feet or more in depth, depending on soil conditions. Steel reinforcing bars and anchor bolts are installed in the drilled holes prior to concrete placement. After the concrete foundation is set, the pole is bolted to the foundation.

Tangent and light angle structures (see Table 6 and Figure 6) may be placed on poured concrete foundations or direct embedded. Direct embedding involves digging a hole for each pole, filling it partially with crushed rock, and then setting the pole on top of the rock base. The area around the pole is then backfilled with crushed rock and/or soil once the pole is set. Any excess soil from the excavation will be spread and leveled near the structure or removed from the site, if requested by the property owner or regulatory agency.

Conductor stringing operations require brief access to each structure to secure the conductor wire and shield wire once the final sag is established. Temporary guard or clearance structures are installed, as needed, over existing distribution or communication lines, streets, roads, highways, railways, waterways, or other obstructions after any necessary notifications are made or permits obtained. This ensures that conductors will not obstruct traffic or contact existing energized conductors or other cables. In addition, the conductors are protected from damage.

Environmentally sensitive areas and wetland areas may also require special construction techniques in some circumstances. During construction, the most effective way to minimize

impacts to wet areas will be to span wetlands, streams, and rivers. In addition, 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.

Wetlands present within the Project area are crossed in one location of the Proposed Route near the existing Glenworth Substation and along US 65. In wetland areas, pole locations will be placed in upland areas to span over wetlands to the greatest extent possible. Wetlands in this area are dominated by freshwater emergent wetlands and with lesser amount of freshwater forested/shrub wetlands. If impacts to wetlands occur, they will be minimized through construction practices. 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.

When working in wetland areas, construction crews will consider the following options during construction to minimize impacts:

- crews will attempt to access the wetland with the least amount of physical impact to the wetland (i.e., shortest route);
- the structures will be assembled on upland areas before they are brought to the site for installation; and
- when construction during winter is not practicable, construction mats will be used where wetlands would be impacted.

5.1.5 Restoration Procedures

During construction, crews will limit ground disturbance wherever possible. However, areas are typically disturbed during the normal course of work, which can take several weeks in any one location. 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. The ROW agent will contact each property owner after construction and restoration is completed to determine whether any damage has occurred as a result of a project.

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.

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

Commonly used methods to control soil erosion and assist in reestablishing vegetation include, but are not limited to:

- de-compaction;
- erosion control blankets with embedded seeds;
- silt fences;
- hay bales;
- hydro seeding; and
- planting individual seeds or seedlings of non-invasive, native species and monitoring the new plants to insure invasive species do not take hold.

These erosion control and vegetation establishment practices are used regularly in construction projects and are referenced in the construction storm water permit plans.

5.1.6 Maintenance Procedures

Transmission lines and associated substations are designed to operate for decades and require only moderate maintenance, particularly in the first few years of operation.

The estimated service life of the proposed transmission line for accounting purposes is approximately 40 years. However, practically speaking, HVTLs are seldom completely retired. Transmission infrastructure has very few mechanical elements and is built to withstand weather extremes that are normally encountered. With the exception of severe weather such as tornadoes and heavy ice storms, transmission lines rarely fail.

Transmission lines are automatically taken out of service by the operation of protective relaying equipment when a fault is sensed on the system. Such interruptions are usually only momentary. Scheduled maintenance outages are also infrequent.

Freeborn Wind will perform regular ground-based and occasional aerial inspections of the transmission line based on its vegetation management schedule, typically yearly. Vegetation that will interfere with the safe operation of the transmission line will be removed using a combination of mechanical and hand clearing, along with an application of herbicides where allowed.

The ROW will be maintained as needed, primarily to ensure tree growth does not impact transmission line operation.

5.2 Electric and Magnetic Fields

The term EMF refers to "electric and magnetic fields" that are coupled together, such as in high frequency radiating fields. For the lower frequencies associated with power lines (referred to as "extremely low frequencies" [ELF]), EMF should be separated into electric fields (EFs) and magnetic fields (MFs), measured in kV per meter (kV/m) and milliGauss (mG), respectively. These fields are dependent on the voltage of a transmission line (EFs) and current carried by a transmission line (MFs). The intensity of the EF is proportional to the voltage of the line, and the intensity of the magnetic field is proportional to the current flow through the conductors. Transmission lines operate at a power frequency of 60 hertz (cycles per second).

5.2.1 Electric Fields

There is no federal standard for transmission line EFs. The Commission, however, has imposed a maximum EF limit of 8 kV/m measured at one meter (3.28 feet) above the ground. *In the Matter of the Route Permit Application for a 345 kV Transmission Line from Brookings County, South Dakota to Hampton, Minnesota*, Docket No. ET-2/TL-08-1474, Order Granting Route Permit (*adopting* Administrative Law Judge [ALJ] Findings of Fact, Conclusions and Recommendation at Finding 194 [April 22, 2010 and amended April 30, 2010]) (September 14, 2010). The standard was designed to prevent serious hazards from shocks when touching large objects parked under alternating current (AC) transmission lines of 500 kV or greater. See "Public Health and Safety Effects of High Voltage Overhead Transmission Lines" prepared by Robert S. Banks, Minnesota Department of Health, 1977.

Table 7 provides the EFs at a calculated nominal conductor voltage of 161 kV for the proposed 161 kV transmission line. The maximum EF, measured at one meter above ground, associated with the Project is calculated to be 1.59 kV/m, which is associated with the 22-foot ROW configuration.

Table 7: Calculated Electric Fields (kV/ft) for Proposed 161 kV Transmission Line Design
(1 meter/3.28 feet above ground)

Structure Type	ROW	Nominal Operating Voltage (kV)	Distance to Centerline (feet)						
Single Circuit Braced Post Structure TSP-161	80-foot normal (40-40 feet)	161	**-40**	**-25**	**-12**	**0**	**12**	**25**	**40**
			0.34	0.80	1.02	0.97	1.02	0.80	0.45
Single Circuit Braced Post Structure TSVP-161	80-foot offset (30-50 feet)	161	**-30**	**-20**	**-10**	**0**	**10**	**20**	**30**
			0.30	0.81	1.00	0.98	1.00	0.71	0.17

Table 7: Calculated Electric Fields (kV/ft) for Proposed 161 kV Transmission Line Design
(1 meter/3.28 feet above ground)

Structure Type	ROW	Nominal Operating Voltage (kV)	Distance to Centerline (feet)						
Single Circuit Lam Deadend Structure TDE-161L-J	22-foot normal (11-11 feet)	161	**-11**	**-9**	**-3**	**0**	**3**	**9**	**11**
			1.21	1.40	1.58	1.59	1.58	1.40	1.31
Single Circuit Lam Running Angle Structure TS-161L-LA	80-foot normal (40-40 feet)	161	**-40**	**-25**	**-12**	**0**	**12**	**25**	**40**
			0.34	0.80	1.02	0.97	1.02	0.80	0.45
Single Circuit Steel Deadend Structure SUBDE-161S	Substation deadend	161	**-75**	**-50**	**-25**	**0**	**25**	**50**	**75**
			0.11	0.21	0.21	0.05	0.19	0.19	0.10

5.2.2 Magnetic Fields

There are presently no Minnesota regulations pertaining to MF exposure.

The MF profiles around the proposed transmission lines for each structure and conductor configuration being considered for the Project are shown in Table 8. MFs were calculated under normal system conditions (systems intact) for the expected peak current flows based on the Project nameplate rating of 200 MW or 717 Amps. The maximum MF, measured at one meter (3.28 feet) above ground, associated with the Project is calculated to be 69.53 mG, which is associated with the 22-foot ROW configuration at the crossing of County Road 108/830th Avenue.

The peak MF values are calculated at a point directly under the transmission line and where the conductor is closest to the ground. The same method is used to calculate the MF at the edge of the ROW. The MF profile data show that MF levels decrease rapidly as the distance from the centerline increases (proportional to the inverse square of the distance from source).

Table 8: Calculated Magnetic Fields (mG) for Proposed 161 kV Transmission Line

Structure Type	ROW	System Condition	Current (amps)	Distance to Centerline (feet)						
Single Circuit Braced Post Structure TSP-161	80-foot normal (40-40 feet)	Normal	717	**-40**	**-25**	**-12**	**0**	**12**	**25**	**40**
				27.47	42.37	49.74	51.39	49.74	42.37	30.68

Table 8: Calculated Magnetic Fields (mG) for Proposed 161 kV Transmission Line

Structure Type	ROW	System Condition	Current (amps)	Distance to Centerline (feet)						
Single Circuit Braced Post Structure TSVP-161	80-foot offset (30-50 feet)	Normal	717	**-30**	**-20**	**-10**	**0**	**10**	**20**	**30**
				27.17	40.74	44.57	44.14	44.57	38.44	22.78
Single Circuit Deadend Structure TDE-161L-J	22-foot normal (11-11 feet)	Normal	717	**-11**	**-9**	**-3**	**0**	**3**	**9**	**11**
				61.85	65.94	69.30	69.53	69.30	65.94	64.08
Single Circuit Running Angle Structure TS-161L-LA	80-foot normal (40-40 feet)	Normal	717	**-40**	**-25**	**-12**	**0**	**12**	**25**	**40**
				27.47	42.37	49.74	51.39	49.74	42.37	30.68
Single Circuit Deadend Structure SUBDE-161S	Substation deadend	Normal	717	**-75**	**-50**	**-25**	**0**	**25**	**50**	**75**
				6.06	10.90	19.71	25.91	19.30	10.44	5.62

Considerable research has been conducted throughout the past three decades to determine whether exposure to power-frequency (60 hertz) MFs causes biological responses and health effects. Epidemiological and toxicological studies have shown no statistically significant association or weak associations between MF exposure and health risks. Public health professionals have also investigated the possible impact of exposure to EMF upon human health for the past several decades. While the general consensus based on research by the U.S. National Cancer Institute, the U.S. National Institute of Environmental Health Sciences, and the World Health Organization (WHO) is that EFs pose no risk to humans, the question of whether exposure to MFs can cause biological responses or health effects continues to be debated.

In 2007, the WHO concluded a review of the health implications of EMFs. In this report, the WHO stated:

> Uncertainties in the hazard assessment [of epidemiological studies] include the role that control selection bias and exposure misclassification might have on the observed relationship between magnetic fields and childhood leukemia. In addition, virtually all of the laboratory evidence and the mechanistic evidence fail to support a relationship between low-level ELF magnetic fields and changes in biological function or disease status. Thus, on balance, the evidence is not strong enough to be considered causal, but sufficiently

> strong to remain a concern. (*Environmental Health Criteria Volume N°238 on Extremely Low Frequency Fields* at p. 12, WHO (2007)).

Also, regarding disease outcomes, aside from childhood leukemia, the WHO stated that:

> A number of other diseases have been investigated for possible association with ELF magnetic field exposure. These include cancers in children and adults, depression, suicide, reproductive dysfunction, developmental disorders, immunological modifications and neurological disease. The scientific evidence supporting a linkage between ELF magnetic fields and any of these diseases is much weaker than for childhood leukemia and in some cases (for example, for cardiovascular disease or breast cancer) the evidence is sufficient to give confidence that magnetic fields do not cause the disease. (*Id.* at p. 12.)

Furthermore, in their "*Summary and Recommendations for Further Study*" WHO emphasized that:

> The limit values in [ELF-MF] exposure guidelines [should not] be reduced to some arbitrary level in the name of precaution. Such practice undermines the scientific foundation on which the limits are based and is likely to be an expensive and not necessarily effective way of providing protection. (*Id.* at p. 12).

The Commission has repeatedly found that "there is insufficient evidence to demonstrate a causal relationship between EMF exposure and any adverse human health effects." See also, *In the Matter of the Application for a HVTL Route Permit for the Tower Transmission Line Project*, Docket No. ET-2, E015/TL-06-1624, Findings of Fact, Conclusions of Law and Order Issuing a Route Permit to Minnesota Power and GRE for the Tower Transmission Line Project and Associated Facilities at p. 23 (Aug. 1, 2007) ("Currently, there is insufficient evidence to demonstrate a causal relationship between EMF exposure and any adverse human health effects."). The Commission again confirmed its conclusion regarding health effects and MFs in the Brookings County – Hampton 345 kV Route Permit proceeding. The ALJ in that proceeding evaluated written submissions and a day-and-half of testimony. The ALJ concluded: "there is no demonstrated impact on human health and safety that is not adequately addressed by the existing State standards for [EF or MF] exposure." *In the Matter of the Route Permit Application by Great River Energy and Xcel Energy for a 345 kV Transmission Line from Brookings County, South Dakota to Hampton, Minnesota*, Docket No. ET-2/TL-08-1474, ALJ Findings of Fact, Conclusions and Recommendation at Finding 216 (April 22, 2010 and *amended* April 30, 2010). The Commission adopted this finding on July 15, 2010. *In the Matter of the Route Permit Application by Great River Energy and Xcel Energy for a 345 kV Transmission Line from Brookings County, South Dakota to Hampton, Minnesota*, Docket No. ET-2/TL-08-1474, Order Granting Route Permit (September 14, 2010).

5.2.3 Stray Voltage

Stray voltage (also known as Neutral to Earth Voltage) is a condition that can occur on the electric service entrances to structures from distribution lines, not transmission lines. More precisely, stray voltage is a voltage that exists between the neutral wire of the service entrance and grounded objects in buildings, such as barns and milking parlors. Because transmission lines convey power

for subsequent distribution and are not connected to non-utility structures, stray voltage is not encountered in such lines. Therefore, stray voltage is not expected to arise from the Project.

5.2.4 Farm Operations, Vehicle Use, and Metals Buildings Near Power Line

Farm equipment, passenger vehicles, and trucks may be safely used under and near power lines. The power lines will be designed to meet or exceed minimum clearance requirements over roads, driveways, cultivated fields, and grazing lands specified by the NESC. Recommended clearances within the NESC are designed to accommodate a relative vehicle height of 14 feet.

Insulated electric fences used in livestock operations can pick up an induced charge from transmission lines. Usually, the induced charge will drain off when the charger unit is connected to the fence. When the charger is disconnected either for maintenance or when the fence is being built, nuisance shocks may result.

There is a potential for vehicles under HVTLs to build up an electric charge. Such buildup is a rare event because generally vehicles are effectively grounded through tires. Modern tires provide an electrical path to ground because carbon black, a good conductor of electricity, is added when they are produced. Metal parts of farming equipment are frequently in contact with the ground when plowing or engaging in various other activities. Therefore, vehicles will not normally build up a charge unless they have unusually old tires or are parked on dry rock, plastic, or other surfaces that insulate them from the ground.

Buildings are permitted near transmission lines but are generally prohibited within the ROW itself because a structure under a line may interfere with safe operation of the transmission facilities. For example, a fire in a building on the ROW could damage a transmission line. As a result, NESC guidelines establish clear zones for transmission facilities. Metal buildings may have unique issues. For example, metal buildings near power lines of 200 kV or greater must be properly grounded to mitigate induced charges. 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 could conduct an inspection to assess and determine the cause of problems that may be related to the transmission line, and identify possible solutions to such problems.

If these issues arise, a landowner can contact his or her local utility or Freeborn Wind personnel and obtain information regarding site-specific mitigation techniques to address the situation.

5.2.5 Implantable Medical Devices

EMF may interfere with implantable electromechanical medical devices, such as pacemakers, defibrillators, neurostimulators, and insulin pumps. Most of the research on electromagnetic interference and medical devices relates to pacemakers. Laboratory tests indicate that interference from MFs in pacemakers is not observed until 2,000 mG—a field strength significantly greater than predicted here, thus no impact is expected from MFs. Therefore, the research has focused on EF impacts. EFs may interfere with a pacemaker's ability to sense normal electrical activity in the heart. However, modern "bipolar" cardiac devices are much less susceptible to interactions with EFs. Medtronic and Guidant, manufacturers of pacemakers and other implantable medical devices,

have indicated that EFs below 6 kV/m are unlikely to cause interactions affecting operation of most of their devices. The EFs for the Project are well below levels at which modern bipolar devices are susceptible to interaction with the fields. (*Application to the Minnesota Utilities Commission for a Route Permit, Bull Moose 150 kV Project*, Great River Energy, Docket No. ET2/TL-15-628. August 7, 2015.)

6.0 Environmental Information

6.1 Environmental Setting

This section provides a description of the environmental setting, potential impacts, and mitigative measures that Freeborn Wind has proposed, where applicable, to minimize the impacts of routing, constructing, and operating the Project. The Project is located in the southeast portion of Freeborn County in southcentral Minnesota (Figure 1). The Project area is sparsely populated with predominantly well distributed rural farmsteads located southwest of the cities of Glenville and Albert Lea. Land use of the Project area is agriculture and used for field crops and pastures. Existing facilities and infrastructure in the Project area consists of: farmsteads (residences and agricultural buildings such as barns, sheds, grain storage silos/bins, and associated agricultural outbuildings); rural residences (homes, garages, sheds); highways and roads (US 65, a number of county and township roads, and driveways/access roads to farmsteads/rural residences); the Glenworth Substation; above ground HVTLs; above ground electric distribution lines; a communication tower; and drainage ditches. The proposed Project would add electric transmission structures and conductors along the Proposed Route within the Project area.

Figure 7 indicates environmental and natural features within the Project area. If the proposed transmission lines were removed in the future, the land could be restored to its prior condition and/or put to a different use. Unless otherwise identified in the following text, the costs of the mitigative measures proposed are considered nominal.

The Project is located in the Oak Savanna subsection of the MnDNR's Ecological Classification System (MnDNR, 2009). The Oak Savanna subsection is a series of end moraines that acted to limit the spread of prairie fires from the west and did not support the establishment of hardwood forests from the east. The result was the development of an oak savanna interspersed with areas of tallgrass prairie and maple-basswood forest. The Oak Savanna subsection consists of rolling plains derived of loess-mantled ridges overlying till and bedrock. While the oak savanna, tallgrass prairie, and maple-basswood forest were once common in this region, presently most of the region is agriculture field crops and pastures.

6.1.1 Topography

Freeborn County is in the Central Lowland physiographic province which is characterized by a cover of glacial deposits over flat-lying to gently warped sedimentary rocks. A mantle of glacial drift covers the entire county, although no bedrock is exposed. The subdrift topography generally slopes to the north and northwest.

Freeborn County's highest elevation is 1,463 feet (446 meters) above mean sea level. In the Project area, elevations range from 1,204 to 1,298 feet (367 to 396 meters) above sea level. An elevation map of the Project area is shown on Figure 8.

6.1.1.1 Impacts and Mitigation

Transmission structures and associated facilities will not require significant modification to the existing topographic features and no impacts to topography are anticipated. Therefore, no mitigative measures are proposed.

6.1.2 Geology and Soils

6.1.2.1 Geology

Surficial geology of the Project area consists of glacial deposits associated with the Des Moines Lobe. The drift cover of the Project area is composed predominantly of a mixture of sand, silt, and clay materials with varying quantities of pebbles, cobbles, and boulders. The glacial deposits are mantled over the underlying bedrock structures and range in thickness from 50 to 200 feet. The thickness variability is the result of topographic surface of the underlying bedrock structures (Quade and Rongstad, 1991).

The bedrock underlying the glacial material in the Project area consists of series sandstone, shale, and carbonate deposits dating from the Late Cambrian to Early Ordovician (see Figure 9). This bedrock consists of materials deposited in shallow marine environments that covered this portion of southern Minnesota 500 million years ago. The lithological features of the bedrock in the Project area is relatively uniform as a result of the consistent nature of the geologic processes in the region (Quade and Rongstad, 1991).

According to MnDNR information, there is one site that the MnDNR indicates as an area prone to surface karst features located approximately 2 miles southwest of the Proposed Route. Given this distance and the lack of other documented karst features in the Project area, karst features are not anticipated in the Project area.

6.1.2.2 Impacts and Mitigation

Surficial geology will be minimally disturbed in the location where each pole will be installed in the ground, grading is required for construction purposes, or temporary access roads are required. Due to the depth of bedrock within the Project area, no impacts to bedrock geology are anticipated. Therefore, no mitigative measures are proposed to address bedrock geology.

6.1.2.3 Soils

Five soil associations are found within the Project area (Table 9 and Figure 10). A soil association has a distinctive pattern of soils, relief, and drainage. Each is a unique natural landscape consisting of one or more major soils and other minor soils. The association is named after its major soils.

Table 9: Soil Associations

Soil Association	Route Width Area (acres)	ROW Area (acres)
Webster-Estherville-Dickinson (s3616)	70.5	15.1
Lester-Hamel (s3504)	46.0	9.4
Webster-Nicollet-Lester (s1752)	14.6	2.8
Webster-Nicollet-Clarion-Canisteo (s1750)	111.6	22.2
Moland-Merton-Maxcreek-Canisteo (s3619)	90.2	11.5
Meyer-Estherville Biscay (s3510)	11.9	3.1
Total	344.8	64.1

The Webster-Estherville-Dickinson Association – Webster soils are silty clay loam on a concave slope of about 1 percent gradient in a cultivated field. Webster soils are very deep, poorly drained, moderately permeable soils formed in glacial till or local alluvium derived from till on uplands. Estherville soils are sandy loam, on a plane slope of about 1 percent, on a glacial outwash plain, in a cultivated field. Estherville soils are very deep, somewhat excessively drained soils that formed in 25 to 50 centimeters (cm) of loamy sediments over sandy and gravelly outwash. These soils are on outwash plains, stream terraces, valley trains, and kames on moraines. Dickinson soils are fine sandy loam, on a convex slope of 3 percent, in a cultivated field. Dickinson soils are very deep, well drained soils formed in glacial or alluvial deposits that have been reworked by wind. These soils are on uplands and on treads and risers on stream terraces in river valleys (U.S. Department of Agriculture [USDA], 2016).

The Lester-Hamel Association – Lester soils are loams, on a convex slope of about 9 percent, on a ground moraine, in a cultivated field. Lester soils are very deep, well drained soils that formed in calcareous, loamy till. These soils are convex slopes on moraines and till plains (USDA, 2016). Hamel soils are loams with a 2 percent concave slope on a glacial moraine in a cultivated field. Hamel soils are very deep, poorly drained and somewhat poorly drained soils that formed in slope colluvium and glacial till on moraines. These soils have moderately slow permeability (USDA, 2016).

The Webster-Nicollet-Lester Association – Webster and Lester soils are described above. Nicollet soils are clay loam on a 2 percent plane slope in a cultivated field. Nicollet soils are very deep, somewhat poorly drained soils that formed in calcareous loamy glacial till on till plains and moraines.

The Webster-Nicollet-Clarion-Canisteo Association – Webster and Nicollet soils are described above. Clarion soils are loams on a convex upland with a slope of 4 percent, in a cultivated field. Clarion soils are very deep, moderately well drained soils on uplands formed in glacial till. Canisteo soils are clay loam, on a nearly level to slightly convex slope, on a ground moraine, in a cultivated field. Canisteo soils are very deep, poorly and very poorly drained soils that formed in calcareous, loamy till or in a thin mantle of loamy or silty sediments and the underlying calcareous,

loamy till. These soils are on rims of depressions, depressions, and flats on moraines or till plains (USDA, 2016).

The Moland-Merton-Maxcreek-Canisteo Association – Canisteo soils are described above. Moland soils are silt loam, on a convex, east-facing slope of 5 percent, in a cultivated field. Moland soils are very deep, well drained soils that formed in 35 to 60 cm of silty or loamy sediments and the underlying calcareous, loamy glacial till. These soils are on convex slopes on ground moraines. Merton soils are silt loam, on a linear slope of 2 percent, in a cultivated field. Merton soils are very deep, somewhat poorly drained soils that formed in 35 to 60 cm of silty or loamy sediments and the underlying calcareous, loamy glacial till. These soils are on linear and slightly convex slopes on ground moraines. Max Creek soils are silty clay loam, on a linear slope of less than 1 percent, in a cultivated field. Max Creek soils are very deep, poorly and very poorly drained soils that formed in 65 to 102 cm of loess or silty sediments and the underlying calcareous, loamy glacial till. These soils are on linear or concave slopes on ground moraines.

The Mayer-Estherville-Biscay Association – Mayer soils are very deep, very poorly drained soils located on concave or slightly convex slope of 0 to 2 percent on glacial outwash plains. These soils were formed in 50 to 100 cm of loamy mantle. Estherville soils are described above. Biscay soils are typically loam on level slopes in an outwash plain in a cultivated field, with a slope of 0 to 2 percent. These very deep and very poorly drained soils formed in 50 to 100 cm of loamy glacial outwash.

6.1.2.4 Impacts and Mitigation

Similar to surficial geology, soils will be minimally disturbed in the location where each pole will be installed in the ground, grading is required for construction purposes, or temporary access roads are required. Access to planned structure locations may require clearing and grading to allow for safe passage and use of construction equipment. The area around the foundation locations may be graded to provide a safe working area for excavation and installation of structure foundations. Soil will be removed for installation of structure foundations. This is further discussed in Section 5.1.5.

Soil removed for pole installation will be separated as topsoil/subsoil. In non-wetland areas, soil will either be spread at the surface around the foundation location (if the landowner approves) or taken off site and disposed of at an approved location. Soil removed for pole installation in wetland areas will be managed in accordance with applicable BMPs and permit requirements. Where grading or temporary access is required, the sites would be returned to their original land contour and elevation to the greatest extent possible. This is further discussed in Section 5.1.5.

6.2 Human Settlement

6.2.1 Public Health and Safety

The Project will be designed in compliance with local, state, NESC, and Xcel Energy standards regarding clearance to ground, clearance to crossing utilities, clearance to buildings, strength of materials, and ROW widths. Construction crews and/or contract crews will comply with local, state, NESC, and Xcel Energy standards regarding installation of facilities and standard construction practices. Established Xcel Energy and industry safety procedures will be followed

during and after installation of the transmission lines. This will include clear signage during all construction activities.

The proposed transmission lines will be equipped with protective devices to safeguard the public from the transmission lines if an accident occurs, such as a structure or conductor falling to the ground. The protective devices include breakers and relays located where the line connects to the substation(s). The substations are fenced and contain a locking gate for access. The protective equipment will de-energize the line should such an event occur. Proper signage will be posted warning the public of the risk of coming into contact with energized equipment.

6.2.1.1 Impacts and Mitigation

No impacts are anticipated and, therefore, no mitigative measures are proposed.

6.2.2 Residential and Non-Residential Buildings

The Project is located in an area generally designated as an Agricultural District in Freeborn County's Code of Ordinances. Land use within the Project area and Proposed Route is primarily agricultural cropland (see Figure 11). No residences are located within 300 feet of the Proposed Route centerline and two residences are located within 300-500 feet of the Proposed Route centerline. The closest distance that a residence is located to the proposed new line construction is approximately 329 feet (residence is located at the southeastern corner of the intersection of 130th Street and 810th Avenue) as indicated in Figure 3 and Table 10. Both residences that are located within 300-500 feet of the Proposed Route are participants.

There are three non-residential buildings (existing Glenworth Substation, a communication tower, and a shed) located within 500 feet of the route centerline, one at approximately 168 feet, one at approximately 241 feet, and the last at approximately 475 feet.

A review of historic aerial photographs of the Proposed Route indicate little or no change in the distribution or densities of agricultural, residential, commercial, or industrial occupancy features over the past 15 years.

Table 10: Residential and Non-residential Buildings Within 500 Feet of Proposed Line

Building Type	Number of Buildings Within Various Distances Up to 500 Feet	
	0-300 Feet	300-500 Feet
Residential	0	2
Non-residential Building	2	1

6.2.2.1 Impacts and Mitigation

No impacts are anticipated and, therefore, no mitigative measures are proposed.

6.2.3 Displacement

No displacement of farmsteads, residential homes, or businesses will occur as a result of the Project. The NESC and Xcel Energy's standards require certain clearances between transmission line facilities and buildings for safe operation of the proposed transmission line. Freeborn Wind has acquired land rights for a ROW along the Proposed Route for the transmission line that is sufficient to maintain these clearances.

6.2.3.1 Impacts and Mitigation

Because no displacement will occur, no mitigative measures are proposed.

6.2.4 Noise

Noise is emitted from an electrical transmission line during foggy, damp, or rainy weather (inclement weather). Under these conditions power lines can create a "crackling" sound due to the small amount of electricity ionizing the moist air near the wires. This is termed the "corona effect," and is the physical manifestation of energy loss, in which discharged energy is transformed into very small amounts of sound, electromagnetic noise, heat, and chemical reactions of the air components. In addition to noise emission from transmission lines during inclement weather, several other factors, including conductor voltage, conductor shape and diameter, and surface irregularities (such as scratches, nicks, dust, or water drops) can affect a conductor's surface voltage gradient and its corona performance.

Corona noise levels depend on the presence of foul weather, the transmission line conductor design, operating voltage, and the distance from the transmission line. As mentioned above, potentially significant corona-generated noise is only produced during inclement weather. Based on historical weather records for this area, precipitation can be expected about 30% of the time (National Oceanic and Atmospheric Administration, National Climatic Data Center, Albert Lea, 2013). Corona noise levels are generally quite low until the transmission line operating voltage exceeds 345 to 500 kV. For this Project, the transmission line voltage of 161 kV results in minimal noise emission. The ROW width varies along the route, and is approximately 22 feet at its narrowest, and 80 feet in general. The closest residence is located approximately 329 feet from the center of the line.

Corona noise levels from this Project were predicted using equations developed by the Bonneville Power Administration (BPA) (*Formulas for Predicting Audible Noise from Overhead High Voltage AC and DC Lines*, Chartier and Stearns, January 1981, Institute of Electric and Electronic Engineers Transactions on Power Apparatus and Systems, Vol. PAS-100, Iss. 1, pp 121-130, DOI:10.1109/TPAS.1981.316894). These equations use the conductor surface voltage gradient, the number of lines, the diameter of cables, and the number of cables per bundle to predict the overall A-weighted L_{50} (the level exceeded 50 percent of the time period of interest, and is expressed in units of A-weighted decibels [dBA]) at a specified distance from the line. The BPA methodology also allows for the prediction of the overall A-weighted L_{10} at a specified distance. The A-weighted L_{10} is the level exceeded 10 percent of the time period of interest, and is also expressed in dBA. For more information on noise levels, terminology, metrics, and weightings, refer to *A Guide to Noise Control in Minnesota* (Minnesota Pollution Control Agency [MPCA],

2015). For this Project, noise levels were predicted for the Phase III condition, which is the loudest of the three Phases based on conductor size.

Corona noise levels were predicted using the BPA method along the edges of the transmission line ROW, as well as at the residences located near the ROW. Table 11 shows the resulting L_{50} and L_{10} noise levels at the closest residence (approximately 329 feet from the line), and at the edge of the ROW at both its typical width and narrowest.

Table 11: Predicted Corona-Generated Noise Levels during Inclement Weather

Prediction Location	L_{50} (dBA)	L_{10} (dBA)
Closest Residence (~329 feet)	15	18
Along ROW at Typical Width (~40 feet from line to edge of ROW)	22	25
Along ROW at Narrowest Width (~11 feet from line to edge of ROW)	24	27

Noise levels from the transmission line's corona discharge must meet State of Minnesota statutory limits (see Minn. R. Ch. 7030.0040). In Minn. R. Ch. 7030 *Noise Pollution Control*, noise level limits are established according to the land use activity at the location of the receiver. Land uses are divided into four categories called noise area classifications (NACs):

- NAC-1: Residential housing, religious activities, camping and picnicking areas, health services, hotels, educational services;
- NAC-2: Retail, business and government services, recreational activities, transit passenger terminals;
- NAC-3: Manufacturing, fairgrounds and amusement parks, agricultural and forestry activities; and
- NAC-4: Undeveloped and unused land.

The limits for each NAC are given in Minn. R. Ch. 7030.0040 *Noise Standards*, and are shown in Table 12. The limits are defined in terms of the A-weighted L_{50} and A-weighted L_{10}, and the relevant time period is one hour.

Table 12: State of Minnesota Noise Limits

Noise Area Classification	Daytime (7:00 am – 10:00 pm)		Nighttime (10:00 pm – 7:00 am)	
	1-Hour L_{10} (dBA)	1-Hour L_{50} (dBA)	1-Hour L_{10} (dBA)	1-Hour L_{50} (dBA)
1	65	60	55	50
2	70	65	70	65
3	80	75	80	75

Table 12: State of Minnesota Noise Limits

Noise Area Classification	Daytime (7:00 am – 10:00 pm)		Nighttime (10:00 pm – 7:00 am)	
	1-Hour L_{10} (dBA)	1-Hour L_{50} (dBA)	1-Hour L_{10} (dBA)	1-Hour L_{50} (dBA)
4	**	**	**	**
** Not defined for this NAC.				

6.2.4.1 Impacts and Mitigation

According to National Land Database Cover data (2014), land use directly adjacent to the transmission line ROW is mostly undeveloped or agricultural. The noise limits on agricultural lands are 75 dBA (L_{50}) and 80 dBA (L_{10}). The predicted corona noise levels from this Project are orders of magnitude below these limits. There are scattered residences along the proposed route, and the noise limits at those locations are 50 dBA (L_{50}) and 55 dBA (L_{10}) at night (the most restrictive limit). Again, the predicted corona noise levels from this Project are orders of magnitude below these limits. Therefore corona-generated noise may be audible during foul weather within the transmission line ROW which but is expected to be inaudible for most, if not all, of the time at the nearest residences and may be masked by noise from the inclement weather itself.

During construction of the Project, intermittent and infrequent noise from construction vehicles and equipment will occur in the Project area specific to the particular construction activity. Construction activities generating noise include clearing and grading equipment and vehicles, material deliver trucks (e.g., poles, concrete, other construction materials), cranes and conductor stringing equipment, and contractor staff vehicles. Construction noise will occur in material staging areas, along the ROW as it is being prepared and used during construction, and at pole locations.

Construction activities for the Project will generate noise similar to agriculture land use activities (e.g., farm equipment and vehicles). Noise impacts from intermittent and infrequent construction activities will be mitigated by the distance of the activity from a receptor (e.g., construction activities will not be near residences, farmsteads, etc.), using sound control devices on vehicles and equipment (e.g., mufflers), conducting construction activities during day light hours as much as possible during normal business hours, and not running vehicles and equipment when not needed. No noise impacts are anticipated during operation of the Project, therefore no mitigative measures are proposed.

6.2.5 Television and Radio Interference

Corona from transmission line conductors can generate electromagnetic “noise” at the same frequencies that radio and television signals are transmitted. This noise can cause interference with the reception of these signals depending on the frequency and strength of the radio and television signal. Tightening loose hardware on the transmission line usually resolves the problem.

If radio interference from transmission line corona does occur, satisfactory reception from Amplitude Modulation (AM) radio stations previously providing good reception can be restored

by appropriate modification of (or addition to) the receiving antenna system. AM radio frequency interference typically occurs immediately under a transmission line and dissipates rapidly within the ROW to either side.

Frequency Modulation (FM) radio receivers usually do not pick up interference from transmission lines because:

- Corona-generated radio frequency noise currents decrease in magnitude with increasing frequency and are quite small in the FM broadcast band (88-108 Megahertz); and
- The excellent interference rejection properties inherent in FM radio systems make them virtually immune to amplitude type disturbances.

A two-way mobile radio located immediately adjacent to and/or behind a large metallic structure (such as a steel tower) may experience interference because of signal-blocking effects. Movement of either mobile unit so that the metallic structure is not immediately between the two units should restore communications. This would generally require a movement of less than 50 feet by the mobile unit adjacent to a metallic tower.

Television interference is rare but may occur when a large transmission structure is aligned between the receiver and a weak distant signal, creating a shadow effect. Loose and/or damaged hardware may also cause television interference.

6.2.5.1 Impacts and Mitigation

If television or radio interference is caused by or from the operation of the proposed facilities in those areas where good reception is presently obtained, Freeborn Wind will inspect and repair any loose or damaged hardware in the transmission line, or take other necessary action to restore reception to the present level, including the appropriate modification of receiving antenna systems if deemed necessary. If radio or television interference occurs due to the Project, Freeborn Wind will work with the affected landowner to restore reception to pre-Project quality.

6.2.6 Aesthetics

There are electric transmission/distribution lines and the Glenworth Substation located in the Project area (see Figure 8), as well as tall communication towers and grain legs on grain storage bins. The proposed transmission line, as well as the proposed Freeborn Wind Farm, would be new features visible along the Proposed Route. The structures will be approximately 60 to 80 feet tall and will have an average span of 550 to 900 feet. The typical ROW required for 161 kV single circuit structures is 80 feet wide for the type of poles and conductor proposed for the Project. The finish of the proposed poles will be either wood, laminated wood, or galvanized steel. The proposed pole specifications are described in detail in Section 5.1.

The landscape in the Project area is primarily agricultural cropland with associated farmsteads and rural residences.

6.2.6.1 Impacts and Mitigation

The visual effect of the Project will depend largely on the perceptions of the observers across these landscapes. The visual contrast added by the transmission structures and lines may be perceived as a visual disruption or as visual interest. The electric transmission/distribution lines and substations that already exist in the Project area, as well as the communications towers and large grain facilities will limit the extent to which the construction of the new transmission line is viewed as a disruption to the area's scenic integrity. To minimize impacts to the aesthetics and visual character of the Project area, the Proposed Route avoids residences and non-residential structures to the extent practicable.

6.2.7 Socioeconomic

Population and economic characteristics based on the 2010 U.S. Census and 2015 American Community Survey are presented in Table 13 below.

Table 13: Population and Economic Characteristics

Location	Population[1]	Minority Population (Percent)[1]	Caucasian Population (Percent)[1]	Per Capita Income[2]	Percentage of Individuals Below Poverty Level (Bureau)[2]
State of Minnesota	5,303,925	14.7	85.3	$29,582	10.6
Freeborn County	31,255	6.8	93.2	$26,494	12.1
Shell Rock Township	427	2.6	97.4	$23,627	7.5
Glenville	643	2.0	98.0	$22,826	11.5

[1] Source: 2010 U.S. Census: General Demographic Characteristics
[2] Source: 2015 American Community Survey 5-year Estimates

6.2.7.1 Impacts and Mitigation

Approximately 25-30 workers will be required for transmission line construction over approximately six months. There will be short-term impacts to community services as a result of construction activity and an influx of contractor employees during construction of the various projects. Utility personnel or contractors will be used for all construction activities. The communities near the Project area should experience short-term positive economic impacts through the use of the hotels, restaurants, and other services by the various workers.

It is not expected that additional permanent jobs will be created by any of these actions. The construction activities will provide a seasonal influx of additional dollars into the communities during the construction phase, and materials such as utility poles and concrete may be purchased from local vendors where feasible. Long-term beneficial impacts from the proposed transmission

line include increased local tax base resulting from the incremental increase in revenues from utility property taxes.

Socioeconomic impacts resulting from the proposed Project will be primarily positive with an influx of wages and expenditures made at local businesses during Project construction, and increased tax revenue once the Project is operational. No negative impacts are anticipated and, therefore, no mitigative measures are proposed.

6.2.8 Cultural Values

Cultural values include those perceived community beliefs or attitudes in a given area, which provide a framework for community unity. Cultural values are learned community beliefs and attitudes originating in regional patterns of work and leisure pursuits. Freeborn County is home to Myre Big Island State Park, is noted as having one of Minnesota's largest downtown historic preservation districts (Albert Lea, Minnesota), and is home to sixteen lakes. Cultural values are also influenced by ethnic heritage. Residents of Freeborn County self-reported as having primarily Norwegian (33.8%) or German (33.2%) ancestry (US Census Bureau, 2015). Culturally, residents unite in the belief of good agricultural land and waterway stewardship and hold their area's roadway access to Interstates I-35 and I-90 in high regard. The local economy is dependent on agricultural, manufacturing production, and recreation. Corn and soybeans are the most prominent of row crops.

6.2.8.1 Impacts and Mitigation

Construction of the proposed transmission line Project is not expected to conflict with the cultural values along the Proposed Route as the community's cultural values remain intact despite the presence of other previously constructed transmission lines and infrastructure facilities in the Project area. No impacts to cultural values are anticipated, and therefore, no mitigative measures are proposed.

6.2.9 Recreation

Recreation opportunities in Freeborn County include hiking, biking, boating, fishing, camping, swimming, cross country skiing, snowmobiling, hunting, and nature viewing.

The Myre-Big Island State Park is located approximately 4.3 miles north of the Glenworth Substation. The park contains wet lowlands, oak savanna, grasslands, and a maple/basswood forest. Recreational opportunities include hiking, camping, canoeing, and bird watching.

There are two WMAs located within five miles of the Project. The Shell Rock WMA is located on the west side of US 65 west of the Project, approximately 0.3 mile south of the Glenworth Substation. This 49-acre WMA is located along the Shell Rock River. The WMA is managed for improvements of prairie grasslands and maintenance of diverse wetland communities. The Panicum WMA, located approximately 2.1 miles southwest of the Project, consists of four parcels totaling 855 acres.

Minnesota's WMAs are managed to provide wildlife habitat, improve wildlife production, and provide public hunting and trapping opportunities. These MnDNR lands were acquired and developed primarily with hunting license fees. WMAs are closed to all-terrain vehicles and horses. The WMAs are open to hunting, canoeing, fishing, trapping, and wildlife viewing. Upland game birds and small mammals are common in this area.

There are no U.S. Fish & Wildlife Service (USFWS) Waterfowl Production Areas (WPA) within the vicinity of the Project area. The nearest WPA is the Goose Creek WPA, located approximately 8 miles west of the Project area. WPAs are federally managed wetlands and surrounding uplands open to hunting and wildlife viewing.

Scientific and Natural Areas are areas designated to protect rare and endangered species habitat, unique plant communities, and significant geological features that possess exceptional scientific or educational values. There are no Scientific and Natural Areas within 10 miles of the Project area.

Minnesota has a snowmobile trail network with more than 22,000 miles of groomed trails. Approximately 21,000 miles of trails are maintained by local snowmobile clubs. The Project would cross one snowmobile trail which runs north-south between 830th and 840th Avenues.

The Blazing Star State Trail runs from Albert Lea Lake in Albert Lea through Myre-Big Island State Park. Currently, six miles are constructed between the City of Albert Lea and Myre-Big Island State Park. This trail also connects to Albert Lea's city trail system. Another 1.5 miles are built between the city of Hayward and Township Rd 290. Once the trail reaches Austin, it will connect to Austin's city trail system, as well as the Shooting Star State Trail. When completed, the Blazing Star State Trail will connect Albert Lea and Austin via Big Island State Park and Hayward approximately five miles north of the Glenworth Substation. This potential trail is now already crossed by an existing 161 kV transmission line.

State water trails provide recreation opportunities for canoeing, boating, fishing, and wildlife viewing. The Shell Rock River State Water Trail (approximately 100 feet wide at the Proposed Route centerline crossing) would be crossed by the Project and the Project will not impact the trail once constructed. Temporary construction impacts would be limited to short term closure of the water trail in this section while stringing between the two structures spanning the Shell Rock River occurs as a safety measure. Freeborn Wind will coordinate with the MnDNR to schedule this work. This water trail travels 20 miles through central Freeborn County to the Iowa border. The Cedar River State Water Trail is located approximately 9.3 miles east of the Project in Mower County and travels 20 miles from Lansing south to the Iowa border.

6.2.9.1 Impacts and Mitigation

Though not crossed by the Project, the Shell Rock WMA may be indirectly affected by noise and dust associated with construction activities on the east side of US 65. These impacts would be minor and temporary, limited in duration to Project installation. Construction of the Project may also result in a temporary increase in traffic on US 65, which may increase noise at the WMA. Poles will not be located within the snowmobile trail and therefore no impacts are anticipated. Similarly, poles will not be located within the Shell Rock River State Water Trail and therefore no

impacts are anticipated. Construction impacts to this trail are anticipated to be temporary and short term. As the Cedar River State Water Trail is located over 9 miles away from the Project, no impacts are anticipated.

Because impacts to the WMA will be indirect, temporary and limited, no mitigation is anticipated.

6.2.10 Public Services

Public services supporting rural residences and farmsteads within the Project area include transportation/roadways, electric, and telephone/telecommunications.

The largest city proximal to the Project area is the City of Albert Lea located approximately five miles west of the northwestern corner of the Project. The city has its own police and fire departments. Three additional cities are located near the Project area. Other cities with similar services provided by Freeborn County within five miles of the Project area include Glenville, Hayward, and Myrtle.

The Project is expected to have minimal effect on existing services and infrastructure of the area. 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. The Project is designed to have manageable temporary effects on the existing infrastructure during Project construction and operation. Because only minor impacts are expected, extensive mitigation measures are not anticipated. The following sections describe specific impacts that may occur to public services and infrastructure and how they will be mitigated.

6.2.10.1 Emergency Services

Any required temporary lane closures would be coordinated and closure protocols established with the local jurisdictions, and would provide for safe access of police, fire, and other rescue vehicles through alternate routes. The City of Glenville operates a small volunteer fire department which services the surrounding area, including the Glendale Substation.

6.2.10.2 Utilities

Homes and farmsteads in the Project area typically utilize on-site water wells and septic systems for individual household water and sanitary needs. Construction and operation of the Project is not anticipated to affect water supply or sanitary service of existing residents. There are also existing distribution lines in the Project area owned and operated by Freeborn-Mower Cooperative Services.

6.2.10.3 Transportation

Transportation infrastructure in the Project area includes roads and railroads. The Proposed Route runs parallel to and crosses roads, including township roads and county roads. The Proposed Route crosses six roadways; no poles will be located within road ROW and during construction the conductors will be strung overhead to cross the roads.

Operation of the transmission line is not expected to impact traffic along these roadways and pole placement and construction procedures will be developed in consultation with state, county, and local roadway authorities to meet requirements for clear zones and roadside obstructions. Roadways can potentially be impacted temporarily during construction activities and during maintenance of the transmission line. Access during construction and maintenance is expected to be primarily from existing roads and would only cause minor and temporary disruption to traffic due to construction and maintenance vehicle/equipment staging locations along roadways, access areas to Project facilities, and minor increased traffic. Comments were requested regarding the proposed Project from both Freeborn County and MnDOT (see Appendices D and E). In response to MnDOT inquiries, Freeborn Wind provided the requested information to MnDOT on July 27, 2017 (see Appendix E). Freeborn Wind will continue to work with MnDOT regarding their concerns.

The closest airport to the Project area is the Albert Lea Municipal Airport, which is located approximately nine miles north-northwest of the Project area in the City of Albert Lea. The Albert Lea Municipal Airport is a publicly owned airport with two runways. Tall high-voltage transmission lines can conflict with the safe operation of public and private airports and air strips. The Federal Aviation Administration (FAA) and MnDOT have each established development guidelines on the proximity of tall structures to public use airports. The FAA has also developed guidelines for the proximity of structures to Very-High-Frequency Omni-Directional Range navigation systems. A structure is considered to pose an adverse effect upon visual flight rules air navigation if its height is greater than 500 feet tall and within two miles of any regularly used visual flight rules route (FAA, 2011).

6.2.10.4 Impacts and Mitigation

The construction of the transmission line near existing distribution lines would create a new overhead electric line corridor. To avoid this impact, where the Project crosses or overtakes an existing distribution line, the distribution line will be placed underground. No service interruptions are anticipated. Construction along the Proposed Route is not anticipated to directly affect other public services. Temporary access for construction of the transmission line would be along the transmission line ROW. If necessary, temporary guard structures would be used to string conductor over the existing road. Temporary traffic impacts associated with equipment are material delivery and worker transportation. Pole placement and construction/safety procedures will be developed in consultation with state, county, and local roadway authorities to meet requirements for clear zones and roadside obstructions. Freeborn Wind will obtain and comply with applicable approvals from road authorities to conduct construction activities within the roadway. Freeborn Wind will continue to coordinate with applicable municipal and regulatory agencies concerning the Project and no significant conflicts are anticipated. Transmission line planning will also be coordinated with MnDOT and Freeborn County transportation policies. The transmission structures will be less than 100 feet tall and more than five miles from the Albert Lea Municipal Airport, therefore construction and operation of the line and substation will not impact safe operation and use of the airport.

6.3 Land Based Economics

6.3.1 Agriculture

The USDA 2012 Census of Agriculture found that Freeborn County has 382,018 acres of farmland with 93 percent of that acreage in cropland use. Corn (Zea mays) and soybean (Glycine max) are the predominant crops; vegetables, sweet corn, and forage lands (hay, grass silage, and greenchop) are also commonly produced. Hogs, turkeys, and cattle are the predominant livestock operations (USDA, 2012). Under current drainage conditions, approximately 128,503 acres in Freeborn County are considered prime farmland or farmland of statewide importance. Federal regulations define prime farmland 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." (7 Code of Federal Regulations § 657.5 (a)(1)). Important farmlands consist of prime farmland, unique farmland, and farmland of statewide or local importance (USDA, 2016). An additional 94,001 acres of the land in Freeborn County can be considered prime farmland if it is drained and/or protected from flooding.

Grain, oilseed, and dry bean and pea crops are grown throughout Freeborn County and represent 69 percent of the agricultural market for the County. Raising livestock and dairy farming are major sources of income, representing a combined 31 percent of the county agricultural market. Within the Project area, the trend has been toward fewer individual farms and an increase in farms of greater acreage (USDA, 2012). Converting cropland to the Conservation Reserve Program (CRP) and the Reinvest in Minnesota (RIM) programs is another source of farm income. CRP and RIM lands are cropland planted to conservation grasses and legumes to protect and improve the soil with limited harvesting or pasturing allowed on CRP land. CRP land is enrolled for 10-year periods, whereas RIM conservation easements are permanent.

Cultivated land comprises approximately 271.21 acres (78.6 percent) of the route width. Pasture land comprises approximately 1.86 acres (0.5 percent) of the route width. Approximately 39.9 percent of the soil within the route width is prime farmland.

6.3.1.1 Impacts and Mitigation

Construction activities associated with the Project will be a temporary impact of agricultural land. The acres impacted will be dependent on the final Route ordered by the Commission and final engineering and design. The acreage anticipated to be included in temporary construction access points is comprised of numerous small agricultural properties distributed throughout the Project area and is estimated to be approximately 12 acres. Construction of new transmission facilities may require repeated access to structure locations to install foundations, structures, and conductors. Equipment used in the construction process includes drill rigs, concrete trucks, backhoes, cranes, boom trucks, and assorted small vehicles. Operation of these vehicles on adjoining farm fields can cause rutting and compaction, particularly during springtime and otherwise wet conditions. After construction, agricultural activities can resume in areas temporarily disturbed for construction.

The permanent impacts to agricultural lands will be limited to the structure foundations and is estimated to be approximately 0.25 acre. Structures will be placed along field edges so as to allow farming operations.

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

6.3.2 Forestry

There are no commercially harvested forested areas or woodlots within 20 miles of the Project.

6.3.2.1 Impacts and Mitigation

No impacts are anticipated and therefore no mitigative measures are proposed.

6.3.3 Tourism

The main land use within the Project area is agriculture (field crops and pastures) and tourist attractions are not associated with the predominant agricultural use of the land. Section 6.2.9 discusses recreational and natural areas of interest, including WMAs, a WPA, a snowmobile trail, and a state water trail and potential Project impacts to these resources.

6.3.3.1 Impacts and Mitigation

The Project is not located near any tourist attractions (excluding recreational and natural areas discussed in Section 6.2.9) that would be impacted because construction and operation of the Project will not interfere with use of these areas for recreational or natural enjoyment purposes.

No impacts are anticipated and therefore no mitigative measures are proposed.

6.3.4 Mining

There are no active mining operations in the Project area.

6.3.4.1 Impacts and Mitigation

No impacts are anticipated and therefore no mitigative measures are proposed.

6.4 Archaeological and Historic Resources

The Minnesota State Historic Preservation Officer (SHPO) and the Office of the State Archaeologist (OSA) were contacted in March 2017 to initiate Project coordination. Freeborn Wind sent the SHPO and OSA a Project notice letter and request for comment on April 27, 2017. At this time, no response has been received from the SHPO or OSA. The Project is located within the Southeast Riverine (Region 3) archaeological sub-region, which includes Dodge, Fillmore, Goodhue, Houston, Mower, Olmsted, Wabasha, and Winona counties, and portions of Dakota, Freeborn, Rice, and Waseca counties. The region continues into the adjacent corners of Wisconsin and Iowa (Anfinson, 1990).

Cultural resource specialist staff at Merjent, Inc. (Merjent) conducted a background literature review of the Project area Route Width and a surrounding 1-mile buffer. 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.

The literature review revealed that no previously documented archaeological sites or inventoried architectural resources are located within the route width of the Proposed Route. Two previously reported architectural resources were identified within the 1-mile Study Area (Figure 7). The first property (FE-GLE-001) is the Glenville Creamery. The second property (FE-GLE-004) is the Glenville Methodist Episcopal Church. Neither of the properties has been evaluated for the National Register of Historic Places. Both structures are located within the City of Glenville, which is approximately 0.9 mile northwest of the northern terminus of the Project (Figure 7).

6.4.1.1 Impacts and Mitigation

The Project area has potential to contain archaeological resources. These archaeological resources would most likely be located on or near elevated landforms and areas near permanent water sources. For this Project, Freeborn Wind will conduct a Phase I archaeological resources inventory and work cooperatively with SHPO in concert with the field investigations proposed for the Freeborn Wind Farm Project.

The archaeological resources inventory will focus on areas proposed for Project construction, including transmission structure locations, associated construction access roads, and workspace areas. These investigations will be conducted by a professional archaeologist meeting the Secretary of the Interior's Standards for Archaeology as published in Title 36 Code of Federal Regulations Part 6. Survey strategies (pedestrian and/or shovel probing and/or deep testing) 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 in accordance with Minn. Stats. § 307.08. If the remains are determined to be archaeological, Freeborn Wind will coordinate with the SHPO. This additional investigation would be described and documented on a case by case basis. The results of the investigation will be compiled and documented in a report or reports and shared with the SHPO.

6.5 Natural Environment

6.5.1 Air Quality

Potential air quality effects related to transmission facilities include fugitive dust emissions during construction, exhaust emissions from construction equipment, and ozone generation during transmission line operation (Jackson et al., 1994). All of these potential effects are considered to be minor, and all but the ozone effects are short-term.

Corona consists of the breakdown or ionization of air within a few centimeters of conductors. Usually some imperfection such as scratch on the conductor or a water droplet is necessary to cause corona. Corona can produce ozone and oxides of nitrogen in the air surrounding the conductor. Ozone also forms in the lower atmosphere from lightning discharges, and from reactions between solar ultraviolet radiation and air pollutants, such as hydrocarbons from auto emissions. The natural production rate of ozone is directly proportional to temperature and sunlight, and inversely proportional to humidity. Thus, humidity or moisture, the same factor that increases corona discharges from transmission lines, inhibits the production of ozone. Ozone is a very reactive form of oxygen molecules and combines readily with other elements and compounds in the atmosphere. Because of its reactivity, it is relatively short lived.

6.5.1.1 Impacts and Mitigation

State and federal governments currently regulate permissible concentrations of ozone and nitrogen oxides. Ozone forms in the atmosphere when nitrogen oxides and volatile organic compounds react in the presence of heat and sunlight. Air pollution from cars, trucks, power plants, and solvents contribute to the concentration of ground-level ozone through these reactions. The national ozone standard is 0.075 parts-per-million (ppm) during an eight-hour averaging period. The state ozone standard is 0.08 ppm based upon the fourth-highest eight-hour daily maximum average in one year. Both averages must be compared to the national and state standards because of the different averaging periods. Calculations done for a 345 kV project showed that the maximum one hour concentration during foul weather (worst case) would be 0.0007 ppm (Minnesota Department of Commerce, 2013). This is well below both the federal and state standards. Lower voltage lines would have correspondingly lower concentrations. Most calculations of the production and concentration of ozone assume high humidity or rain, with no reduction in the amount of ozone due to oxidation or air movement. These calculations would therefore overestimate the amount of ozone that is produced and concentrated at ground level. Studies designed to monitor the

production of ozone under transmission lines have generally been unable to detect any increase due to the transmission line facility.

Minor temporary effects on air quality are anticipated during construction of the proposed line as a result of exhaust emissions from construction equipment and other vehicles, and from fugitive dust that becomes airborne during dry periods of construction activity.

The magnitude of air emissions during construction is influenced by weather conditions and the type of construction activity. Exhaust emissions, primarily from diesel equipment, will vary with the phase of construction. Adverse effects on the surrounding environment are expected to be negligible because of the short and intermittent nature of the emission and dust-producing construction phases.

Freeborn Wind will employ BMPs to minimize the amount of fugitive dust created by the construction process. Tracking control at access roads and wetting surfaces are examples of BMPs that will be used to minimize fugitive dust. With the implementation of BMPs, Freeborn Wind anticipates minimal impacts to air quality. Therefore, no other mitigative measures are proposed.

6.5.2 Water Resources

While BMPs will be used during construction of the Project, there is the possibility of minor amounts of sediment reaching surface waters as the ground is disturbed by excavation, grading, and construction traffic. Once the Project is complete, it will have no impact on surface water quality.

The water resources that could be directly affected by the construction of the Project include one wetland complex associated with the Shell Rock River in which structures may need to be placed (Figure 12). Permanent impacts to the wetland complex would occur from installation of the HVTL structures and limited to the area that would be disturbed for construction of the structure foundation (foundation diameters range from three to five feet; see Table 6). Temporary construction impacts would occur from installing a temporary access road to the structure location and workspace around the foundation location. The Shell Rock River is already impaired for fecal coliform, aquatic macroinvertebrate bioassessments, fishes bioassessments, dissolved oxygen, turbidity, and pH (MPCA, 2016). Any sediment reaching these streams has the potential to adversely affect water quality in an impaired water. In addition, the line would make five crossings mostly of small intermittent and perennial streams and the Shell Rock River.

6.5.2.1 Minnesota Public Waters Inventory

The Proposed Route crosses the Shell Rock River, which is listed on MnDNR Public Water Inventory (PWI) on the Public Waters Inventory Maps. The crossing is located just south of the Glenworth Substation on the east side of US 65 (see Figure 12). MnDNR Public Waters are designated to indicate those lakes, wetlands, and watercourses over which the MnDNR has regulatory jurisdiction. The statutory definition of public waters can be found in Minnesota Statutes section 103G.005, Subdivisions 15 and 15a.

Impacts and Mitigation

The Project design will incorporate spacing of structures to span the Shell Rock River. Temporary construction impacts would occur from installing a temporary access road to the structure locations and workspace around the foundation location for installation of the structures placed on either side of the Shell Rock River. Temporary impacts will be minimized by using construction matting to access the structure locations. Freeborn Wind will obtain a MnDNR License to Cross Public Waters for crossing the Shell Rock River. After the proposed transmission line is constructed, no permanent impacts are anticipated and no other mitigation is proposed.

6.5.2.2 Wetlands

Wetlands within the Project area were first analyzed using public databases, including several years of aerial photography: 1991, 2003, 2004, 2006, 2008, 2009, 2011, 2012, and 2015 (Google Earth, 2017); NWI (MnDNR, 2017; USFWS NWI, 2016), PWI (see Minn. Stat. Ch. 103G.201 2016), hydric soils data (USDA Natural Resource Conservation Service, 2016), topographic maps (U.S. Geological Survey [USGS], 2016), and USGS National Hydrography Dataset (USGS National Hydrography Dataset, 2016). These databases identify lakes, streams, rivers, and canals (Figure 12). Onsite assessments were also conducted in April 2015 and November 2016 to confirm the presence or absence of NWI- or NHD-mapped wetlands as well as the extent of wet or saturated features that were visible from public roads.

Impacts and Mitigation

As mentioned in Section 6.5.2 above, based on desktop review, the only wetlands in the route and that will be crossed by the Project are a wetland complex associated with the Shell Rock River. Wetlands in this complex include freshwater emergent wetland, forested wetland, shrub/scrub, and riverine.

The Project design will incorporate spacing of structures to span wetlands and streams to the extent practicable. It is likely that up to two structures will be placed in mapped wetlands. All mapped water features will be field-delineated prior to construction. Temporary construction impacts would occur from installing a temporary access road to the structure locations and workspace around the foundation location for installation of the structures. Temporary impacts will be minimized by using construction matting to access the structure locations.

Also, 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 (LGU) for Minnesota Water Conservation Act coverage, and the MPCA for Water Quality Certification under Section 401 of the Clean Water Act prior to construction.

6.5.2.3 Federal Emergency Management Agency Floodplains

The Route will cross a 100-year floodplain associated with the Shell Rock River (Figure 12). The transmission line will cross approximately 1,535 feet of floodplain and may include up to three structures.

Impacts and Mitigation

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 the Proposed Route has been approved and final, 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. With implementation of BMPs the Project is not expected to affect water quality (i.e., fecal coliform or Total Suspended Solids levels) within the watershed.

No permanent direct impacts to the surface water resources are anticipated.

6.5.3 Flora

The proposed transmission line is primarily located in rural, agricultural land uses. Table 14 below summarizes land cover within the route width of the Project (see Figure 11). Cultivated crops make up nearly 80 percent of the route, while developed lands make up nearly 20 percent. These developed lands represent the county roads and US 65 that are adjacent to the proposed alignment. As mentioned above, wetlands and water features are generally limited to the Shell Rock River crossing.

Table 14: Land Cover in the Proposed Route

Land Cover	Route Width Area (acres)	Percent of Route Width Area (%)
Cultivated Crops	271.21	78.66
Developed, Open Space	60.20	17.46
Emergent Herbaceous Wetlands	7.66	2.22
Developed, Low Intensity	3.17	0.92
Grassland/Herbaceous	1.86	0.54
Open Water	0.68	0.20
TOTAL	**344.78**	**100**

Source: USGS, National Land Database Cover (2014).

6.5.3.1 Impacts and Mitigation

MnDNR maps native prairie, native plant communities, and railroad ROW prairie. There are no MnDNR mapped native prairies, native plant communities, or railroad ROW prairies in the Proposed Route width. There is a mapped prairie that is also classified as a native plant community

and railroad ROW prairie adjacent to the route on the west side of US 65. The Project will not impact this mapped native prairie.

MnDNR maintains maps of native prairie, but not all native prairie 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 within the route width near the Glenworth Substation and north of the Shell Rock River. The route width in this portion of the Project is wider to allow flexibility for the design into the Glenworth Substation. As currently planned, the permanent ROW contains 2.6 acres of potential prairie and some transmission structures could be placed in this habitat. Permanent impacts to this habitat will be limited to the diameter of the structure foundations. Temporary impacts to this habitat will be associated with construction access.

MnDNR also maps sites of biodiversity significance. A site's biodiversity rank is based on the presence of rare species populations, the size and condition of native plant communities within the site, and the landscape context of the site. There are four biodiversity significance ranks: outstanding, high, moderate, and below:

- "Outstanding" sites contain the best occurrences of the rarest species, the most outstanding examples of the rarest native plant communities, and/or the largest, most ecologically intact or functional landscapes.
- "High" sites contain very good quality occurrences of the rarest species, high-quality examples of rare native plant communities, and/or important functional landscapes.
- "Moderate" sites contain occurrences of rare species, moderately disturbed native plan communities, and/or landscapes that have strong potential for recovery of native plant communities and characteristic ecological processes.
- "Below" sites lack occurrences of rare species and natural features or do not meet Minnesota Biological Survey standards for outstanding, high, or moderate rank. These sites may include areas of conservation value at the local level, such as habitat for native plants and animals, corridors for animal movement, buffers surrounding higher-quality natural areas, areas with high potential for restoration of native habitat, or open space.

There are no sites of biodiversity significance in the proposed route width. There is a moderate site of biodiversity significance adjacent to the route and associated with the MnDNR mapped prairie described above. The Project will not impact this site of biodiversity significance.

Transmission line construction impacts to trees and woodlands will be minimized because the area is primarily agricultural, the Proposed Route was designed to avoid and minimize these impacts, the transmission line will follow existing ROWs and construction will occur along existing roadways for some portions of the route. Areas where transmission line construction is planned are primarily agricultural and will require minimal tree removal. For a discussion on impacts to agriculture, see Section 6.3.1.

The Proposed Route was developed to avoid and minimize removal of trees necessary for construction and safe operations of the facilities. Approximately 0.8 acre of trees within the proposed ROW would be removed at three locations (Shell Rock River and two locations along

parcel boundaries). While crossing of native prairie is not anticipated, if impacts occur, Freeborn Wind will coordinate with the MnDNR and use a native seed mix for revegetation. See Sections 5.1.4 and 5.1.5 for a discussion on typical vegetation management.

6.5.4 Fauna

Xcel Energy, which will acquire Freeborn Wind, has been working with various state and federal agencies for over 20 years to address avian issues. 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 Avian Power Line Interaction Committee (APLIC, 2006) and the guidelines for developing APPs (APLIC and USFWS, 2005). 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 the MnDNR and the 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.

6.5.4.1 Impacts and Mitigation

Freeborn Wind has conducted a number of wildlife studies documenting avian and bat use of the Wind Farm Project area, which includes the proposed transmission line route. These include: raptor nest study, eagle nest monitoring, and follow-up eagle nest study, large bird use study, small-bird use study, wetland bird use study, and bat acoustic study. Based on these studies, the most commonly observed passerine species (i.e., European starling, common grackle, red-winged blackbird, house sparrow, American robin, horned lark, and song sparrow) are all common and abundant species. The most commonly recorded large-bird subtype was waterfowl, the majority of which were mallard and large corvids (i.e., American crow). The wetland birds most observed during wetland bird use studies were Canada goose, greater white-fronted goose, mallard, and blue-winged teal.

There are no raptor nests or bald eagle nests within the transmission line route. The closest bald eagle nest is located approximately 0.3 mile west of the Proposed Route centerline along the Shell Rock River (Figure 7). The eagle nest is also located approximately 130 feet from an existing 161 kV transmission line.

There are seven bat species present in Minnesota, four of which are listed as state special concern: big brown bat (*Eptesicus fuscus*), little brown bat (*Myotis lucifigus*), northern long-eared bat (*Myotis septentrionalis*), and tri-colored bat (*Perimyotis subflavus*). The northern long-eared bat is also federally listed as threatened. Freeborn Wind conducted a bat acoustic study from April 14 to November 14, 2015. Freeborn Wind completed a desktop northern long-eared bat habitat analysis to determine potential summer roosting habitat and commuting/travel habitat (see the Avian and Bat Protection Plan in Appendix F and Figure 7). Construction of the transmission line

Proposed Route will likely require some tree clearing within the ROW which totals approximately 0.8 acre that may occur in three locations: one near the Shell Rock River and two other locations along parcel boundaries. Note that this is a conservative estimate based on review of aerial photography.

Fallow farm fields, fencerows, and woodlots in cultivated areas also provide cover for organisms within the Proposed Route. Common mammals that are likely occur in the Project area include opossum, eastern cottontail, white-tailed deer, raccoon, and prairie mole. Common reptiles and amphibians likely occurring in the Project area include gopher snake, American toad, northern leopard frog, and snapping turtle.

During construction, there will be minimal displacement of wildlife, and construction of the Project would result in only small amounts of habitat impacted. Wildlife that inhabits trees that will be removed for the Project and organisms that inhabit agricultural areas may be displaced to nearby habitat. Comparable habitat is adjacent to the route for both habitat types, and it is likely that these organisms would only be displaced a short distance.

Raptors, waterfowl, and other bird species may be affected by the construction and placement of the transmission lines. Avian collisions are a possibility after the completion of the transmission line in areas where there are agricultural fields that serve as feeding areas, wetlands, and open water. The electrocution of large birds, such as raptors, is more commonly associated with distribution lines. Electrocution occurs when birds with large wingspans come in contact with two conductors or a conductor and a grounding device. Xcel Energy transmission line design standards provide adequate spacing to eliminate the risk of raptor electrocution, so there are no concerns about avian electrocution as a result of the proposed Project.

Displacement of fauna is anticipated to be temporary in nature. No long-term population-level effects are anticipated; therefore, no mitigation is proposed.

6.6 Rare and Unique Natural Resources

A request for a Natural Heritage Information System (NHIS) Database Search and comments regarding rare species and natural communities for the Proposed Route was submitted to the MnDNR on July 31, 2017. The results of the MnDNR NHIS Database Search were not received as of the date of this Application. In the interim, Freeborn Wind reviewed a licensed copy of the NHIS data, current as of July 11, 2017 (MnDNR, 2017). The following assessment is based on a review of the licensed data and will be confirmed after receipt of the formal agency response.

According to the NHIS data, there are two rare species records within one mile of the Project. There is one record of state-threatened edible valerian plant associated with a road ditch and one record of special concern suckermouth minnow associated with the Shell Rock River. The Project is not expected to impact either species. The plant record is outside the construction corridor and construction stormwater BMPs will be used in the vicinity of the Shell Rock River to minimize erosion and sedimentation. Additionally, Freeborn Wind will obtain a MnDNR License to Cross Public Waters to avoid direct impacts to the river.

Based on USFWS Information, Planning, and Consultation System results, there is one federally listed threatened or endangered species known to occur in Freeborn County: the northern long-eared bat.

On April 1, 2015, the USFWS listed the northern long-eared bat as threatened under the Endangered Species Act and simultaneously published an interim 4(d) rule; the final listing and interim 4(d) rule took effect as of May 4, 2015. On January 14, 2016, the USFWS published the final 4(d) rule identifying prohibitions that focus on protecting the bat's sensitive life stages in areas affected by White Nose Syndrome. (USFWS, 2016c). The 4(d) rule allows incidental take of the species resulting from otherwise lawful activities. The 4(d) rule and the associated Biological Opinion is intended for use by agencies to streamline consultation for northern long-eared bats. Under the provisions of the 4(d) rule, incidental take is not prohibited for projects more than 0.25 mile from known hibernacula and more than 150 feet from known roost trees within areas of the country affected by white nose syndrome. The Project falls within the White Nose Syndrome zone (see Section 6.5.4.2).

6.7 Irreversible and Irretrievable Commitments of Resources

The Project will require only minimal commitments of resources that are irreversible and irretrievable. Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the use of these resources have on future generations. Irreversible commitments of resources are those that result from the use or destruction of a specific resource that cannot be replaced within a reasonable timeframe. Irretrievable resource commitments are those that result from the loss in value of a resource that cannot be restored after the action. Those commitments that do exist are primarily related to construction. Construction resources include aggregate resources, concrete, steel, and hydrocarbon fuel. During construction, vehicles necessary for these activities would be deployed on site and would need to travel to and from the construction area, consuming hydrocarbon fuels. Other resources would be used in pole construction, pole placement, and other construction activities.

6.7.1 Impacts and Mitigation

The Project and construction process will be designed to avoid encroachment and effects on rare species and unique natural resources to the extent practicable. Minor tree removal will be required along the transmission line route. To reduce impacts to individual bats, all tree clearing activities will be conducted when the species is in hibernation and not present on the landscape (i.e., November 1 through March 31). If tree clearing cannot be limited to this period, Freeborn Wind would use a biological monitor to assess trees ahead of clearing. Tree clearing activities would not begin until all consultations for the species are complete. Freeborn Wind will use BMPs during construction in the vicinity of the Shell Rock River to reduce erosion and sedimentation. If rare species or unique natural resources will be affected, Freeborn Wind will coordinate with the MnDNR and consider modifying construction practices to minimize impacts.

Table 15: Summary of Routing Factors

Factor	Summary of Proposed Route
Effects on Human Settlement	
Displacement	No displacement will occur.
Aesthetics	Impacts to residences and non-residential buildings will be minimized. There are no residences within 300 feet of the route and two residences within 500 feet of the route. There is one non-residential building within 200 feet of the route and two non-residential buildings within 500 feet of the route.
Noise	Temporary localized increase in noise is anticipated during construction and corona may cause a crackling sound during inclement weather. The transmission line construction and operation will comply with MPCA noise limits and therefore no mitigation is proposed.
Cultural Values	No impacts on cultural values are anticipated.
Recreation	The Project crosses one state water trail that will be temporarily impacted by the Project during construction. There is one WMA adjacent to but not impacted by the Proposed Route. Impacts will be minimized through the use of BMPs during construction.
Public Services	Potential impacts to Freeborn County and Shell Rock Township emergency services, utilities, transportation systems, and rural septic systems during construction will be minimized through coordination with local authorities. No long-term impacts are anticipated.
Effects on Public Health and Safety	
Public Health and Safety	Freeborn Wind will avoid impacts to public health and safety and ensure that all safety requirements are met during the construction and operation of the Project. Freeborn Wind will also coordinate with local emergency services as needed during construction and operation of the Project.
Effects on Land-based Economics	
Agriculture	Permanent impacts to agriculture will be minimal. The Project crosses 58.5 acres of prime farmland within the Proposed Route ROW. The Project permanently impacts 0.24 acre of prime farmland from placement of poles, and an additional 0.009 acre of permanent impacts to non-prime farmland. This acreage will be taken out of agricultural production. Temporary

Table 15: Summary of Routing Factors

Factor	Summary of Proposed Route
	construction impacts to all farmland is approximately 12 acres. The land will be restored to agricultural production after the Project is complete.
Forestry	There will be no effect on forestry.
Tourism	There will be no effect on tourism.
Mining	There will be no effect on mining.
Effects on Archaeological and Historic Resources	
Archaeological Resources	Based upon a literature review of the Project area, no archaeological resources are located within 1.0 mile of the Proposed Route. No impacts are anticipated. If these resources are identified in later field review, Freeborn Wind will develop appropriate mitigation for the resource.
Historic Resources	No impacts are anticipated to the two historic structures that are located within 1.0 mile of the Proposed Route.
Effects on the Natural Environment	
Air Quality	Minor temporary and minimal effects on air quality are anticipated during construction of the proposed line as a result of exhaust emissions from construction equipment and other vehicles, and from fugitive dust that becomes airborne during dry periods of construction activity. BMPs will be used to minimize the amount of fugitive dust created by the construction process. Tracking control at access roads and wetting surfaces are examples of BMPs that will be used to minimize fugitive dust.
Water Quality	Water quality impacts are not anticipated. Standard erosion control measures will be used to minimize impacts to water resources implementation of BMPs.
Public Water Watercourses Crossed	One PWI crossing at Shell Rock River (and 4 non PWI streams). Impacts will be minimized through the use of BMPs during construction.
Wetlands	Permanent impacts to wetlands will be minimal. The Project crosses 2.6 acres of wetlands within the Proposed Route ROW. The Project permanently impacts 0.00294 acre of wetlands from placement of poles. Temporary construction impacts to wetlands crossed is approximately 0.49 acre and will be mitigated by the use of construction matting and other

Table 15: Summary of Routing Factors

Factor	Summary of Proposed Route
	BMPs. The land will be restored to pre-construction wetland type and function after the Project is complete. Freeborn Wind will obtain applicable permits and implement BMPs for construction activities across the Shell Rock River wetland complex to minimize impacts.
Floodplains	There is one location where the 100-year flood plain of the Shell Rock River will be crossed. Impacts will be minimized by spanning the river.
Flora	Minor tree removal or trimming will be necessary for construction and operation of the proposed transmission line. Approximately 0.8 acre of trees within the proposed ROW would be removed at three locations: one near the Shell Rock River and two other locations along parcel boundaries.
Fauna	Impacts to fauna are expected to be minor and temporary in nature.
Rare and Unique Natural Resources	
General	There are two rare species records within one mile of the route – a state threatened edible valerian plant and a special concern suckermouth minnow. No impacts are anticipated.
Application of Design Options that maximize energy efficiencies, mitigate adverse environmental effects, and could accommodate expansion of transmission or generating capacity	
General	Freeborn Wind worked with landowners to develop a route that considers factors set forth in Minn. Stats. § 216E.03, subd. 7 and Minnesota Rules 7850.4100 and minimizes impacts to landowners and the environment. The design of the Project will also support additional wind generation integration in Minnesota and Iowa.
Use or paralleling of existing ROW, survey lines, natural division lines and agricultural field boundaries	
Existing ROW, survey lines, natural division lines and agricultural field boundaries	The route does not share ROW with an existing transmission line route but parallels agricultural field boundaries for approximately 49% of the route.
Use of Existing Transportation, Pipeline, and Electrical Transmission Systems or ROWs	
Existing transportation, pipeline and electrical transmission systems or ROWs	Approximately 3.30 miles of the Proposed Route (40%) is adjacent to existing transmission lines, roads and railroad ROWs.

Table 15: Summary of Routing Factors

Factor	Summary of Proposed Route
Electrical System Reliability	
Electrical System Reliability	Project maintains electrical system reliability by providing necessary transmission support for new generation.
Cost of Constructing, Operating and Maintaining the Facility which are Dependent on Design and Route	
Costs	$3.7 million for all construction of Project along Proposed Route; $1,500 per mile per year for operation and maintenance.
Adverse Human and Natural Environmental Effects Which Cannot Be Avoided	
Unavoidable Impacts	Unavoidable adverse impacts include the construction impacts to the environment. Impacts that cannot be avoided will be minimized through the mitigation methods described in the environmental analysis.
Irreversible and Irretrievable Commitments of Resources	
General	There are few commitments of resources associated with this Project that are irreversible and irretrievable. There are irreversible and irretrievable construction resources that will be used to construct the Project, including aggregate resources, concrete, steel and hydrocarbon fuel.

7.0 Agency Involvement, Public Participation and Required Permits and Approvals

7.1 Agency Contacts

On April 27, 2017, Freeborn Wind sent a letter with a map of the Proposed Route to various governmental and regulatory agencies and authorities as notification of the Project and to request comments on the Project. A sample notice/request for comment letter with map and the mailing/contact list of authorities is included in Appendix D.

A letter with map of the Proposed Route was also sent to LGUs within the general vicinity of the Project giving LGUs notice of the Project, requesting comments, and allowing LGUs the opportunity to request a meeting to discuss the Project (see Appendix D). Responses received from these parties, as of the date of the Application, are summarized in the following sections.

7.1.1 United States Fish and Wildlife Service

Freeborn Wind sent the above-described notification/request for comment letter to Margaret Rheude, Biologist/Eagle Specialist, and Tony Sullins, Field Officer Supervisor, of the USFWS

requesting a review of the Proposed Route for federally listed threatened and endangered species. As of this date there have been no responses from USFWS contacts. Freeborn Wind has reviewed the Project area for federally listed species (see Sections 6.5 and 6.6) and will work with USFWS contacts regarding potential concerns that the Project may pose to applicable species.

7.1.2 U.S. Army Corps of Engineers

Freeborn Wind sent the above-described notification/request for comment letter to Ryan Malterud, Environmental Protection Technician, of the USACE requesting a review of the Proposed Route for federally regulated wetland and waterbody concerns for the Project. As discussed above, the proposed Project crosses wetland areas near the existing Glenworth Substation (north end of the Project) and the Shell Rock River, a navigable water of the United States subject to Section 10 of the Rivers and Harbors Act of 1899 (Section 10).

On May 22, 2017, Justin Berndt, Project Manager, USACE, sent Freeborn Wind a letter indicating that a Department of the Army permit may be required for the proposed Project and providing additional USACE general regulatory program information (Appendix E).

The USACE indicated that if the Project involves activity within navigable waters of the United States, USACE jurisdiction may apply under Section 10. The USACE also indicated that if the proposed Project involves discharge of dredged or fill materials into waters of the United States, it may be subject to USACE jurisdiction under Section 404 of the Clean Water Act. The USACE provided some additional information on the evaluation process to determine if USACE permitting is required and suggested that a pre-application consultation meeting occur between Freeborn Wind and the USACE.

Prior to applying for a Section 10 permit and any other necessary permits for impacts within USACE jurisdiction Freeborn Wind will arrange for a USACE pre-application consultation meeting to review the Project.

7.1.3 Minnesota Department of Natural Resources

Freeborn Wind sent the above-described notification/request for comment letter to Kevin Mixon, Regional Environmental Assessment Ecologist, and Cynthia Warzecha, Energy Project Planner, of the MnDNR requesting a review of the Proposed Route for state natural resource concerns for the Project. As discussed above, the proposed Project crosses wetland areas nearby the existing Glenworth Substation (north end of the Project) and the Shell Rock River.

On May 17, 2017, Mr. Mixon provided an email response regarding the Project (see Appendix E) indicating the Project will need a MnDNR utility license to cross the Shell Rock River and that the MnDNR will require avian flight diverters at this crossing. The MnDNR also indicated that south of the Glenworth Substation there is a moderate site of biodiversity significance and that the Freeborn Wind should submit a completed NHIS data request form to review for the occurrences of rare plants, animals, and native plant communities near the Project area.

On July 31, 2017, Freeborn Wind also prepared and submitted a MnDNR NHIS request for review of the Proposed Route for state threatened and endangered species and rare natural features

(Appendix C). As of this date, the MnDNR has not responded to this request. However, Freeborn Wind has reviewed available NHIS information for the Project area which is further discussed in Section 6.6. Freeborn Wind will continue to work with the MnDNR to address potential Project impacts to applicable natural resources.

7.1.4 Minnesota Department of Transportation

Freeborn Wind sent the above-described notification/request for comment letter to Marilyn Remer, Utilities Engineer, MnDOT, requesting a review of the Proposed Route for comments or concerns for the Project. As discussed above, the Proposed Route is located east of and adjacent to US 65 from the existing Glenworth Substation to 130th Street, where the transmission line route turns east. As indicated above, the proposed transmission line poles, davit arms and conductors would all be located outside of the MnDOT road ROW where the Proposed Route parallels US 65.

On July 6, 2017, Scott Johnson, Roadway Regulations Supervisor for District 6B, MnDOT, provide email response regarding the Project (see Appendix E). Mr. Johnson requested more detailed information from Freeborn Wind regarding the location of the transmission line relative to the MnDOT roadway ROW from the highway centerline where the transmission line parallels the road. Mr. Johnson also asked whether Freeborn Wind will need to enter MnDOT ROW for purposes other than the construction of the transmission line. Freeborn Wind prepared and submitted the requested information to MnDOT on July 28, 2017, and will continue working with MnDOT to answer their questions and determine acceptable transmission line and associated facilities routing and easement matters along US 65.

7.1.5 Minnesota State Historic Preservation Office

Freeborn Wind sent the above-described notification/request for comment letter to Mary Ann Heidemann, Manager of Government Programs and Compliance, MHS, Tom Cinadr, Survey and Inventory Manager, MHS, and Amanda Gronhovd, State Archaeologist, Minnesota OSA, requesting a review of the Proposed Route for cultural resource concerns for the Project. The Minnesota SHPO is an office within the MHS. As of this date there have been no responses from MHS/SHPO or OSA contacts. Freeborn Wind will continue to coordinate with these parties regarding cultural resources associated with the Project within the Proposed Route.

7.1.6 Freeborn County and Shell Rock Township

Freeborn Wind sent the above-described notification/request for comment letter to Freeborn County representatives of the County Administration, Environmental Services, Highway Department and Public Health offices, as well as to the Clerk of Shell Rock Township, requesting a review of the Proposed Route for Project concerns and comments. As of this date there have been no responses from these parties. Freeborn Wind has continued to coordinate with these parties regarding comments or concerns they may have associated with the Project within the Proposed Route.

7.2 Identification of Landowners

A list of the landowners within and adjacent to the Proposed Route is included in Appendix E. Addresses have been redacted from the list due to privacy concerns.

7.3 Public Participation

Freeborn Wind has been conducting public outreach for the overall Freeborn Wind Farm Project, including transmission line routing matters, since leasing began in 2008. Outreach efforts include meeting with individual landowners and landowner groups, regulatory agencies, local governmental units, and the general public to discuss the overall Freeborn Wind Farm Project, including the proposed transmission line, identifying support or constraints for the Project; and gathering comments to address in Project planning, design, permitting, and operation.

Freeborn Wind has been conducting outreach efforts for the Project intensively since fall 2016, including meeting with individual landowners, regulatory agencies, county and township governmental representatives, and the general public; identifying support or constraints for the Project; and gathering comments to address in Project planning, design, permitting, and operation. Additional resources were dedicated to the unique public outreach needs of the area through the engagement of a local public relations consultant in April 2017.

Landowners commented that they preferred longer spans between poles to minimize farming inconveniences.

Freeborn Wind has considered these public comments and will follow-up with specific structure design and route information as it becomes available. Freeborn Wind will continue to work with the public throughout the Project permitting process.

Additionally, as discussed above, on April 27, 2017, Freeborn Wind sent letters to state and local governments and regulatory agencies to describe the Project, request comments, and provide an update on permitting status (see Appendix D for the mailing lists and sample notice letter, and Appendix E for responses).

Freeborn Wind also maintains a Project website (see www.freeborncountywind.com) as well as a Facebook account (see https://www.facebook.com/FreebornWindFarm/), which provide additional information about the Project and the ability for stakeholders to provide comments regarding the Project.

Freeborn Wind is using information obtained with this outreach to optimize and refine Project design, identify and resolve issues, and address concerns brought forward by stakeholders prior to submitting this Route Permit Application.

7.4 Required Permits and Approvals

Federal, state, and local permits that could potentially be required for the Project are identified below in Table 16 and discussed below.

Table 16: Potential Permits Required

Permits	Jurisdiction
Federal Permits	
Clean Water Act Section 404 Permit	USACE
Section 10	USACE
State Permits	
Route Permit	MPUC
License to Cross Public Waters	MnDNR Division of Land and Minerals
Public Waters Work Permit	MnDNR
Utility Accommodation on Trunk Highway Right-of-Way	MnDOT
Utility Crossing Permit	MnDOT
Construction Stormwater Permit	MPCA
Local Permits	
Minnesota Wetland Conservation Act Certification	MnDNR/LGU (Freeborn County)
County Road Permit	Freeborn County
Highway Right-of-Way	Freeborn County
County Ditch Right-of-Way	Freeborn County

7.4.1 Federal Permits

7.4.1.1 U.S. Army Corps of Engineers

The USACE administers the regulatory programs of the federal Clean Water Act and the Rivers and Harbors Act. The USACE may require authorization of the Project under the utility line discharge provision of a Regional General Permit (RGP-3-MN) for Section 404 wetlands. A Section 10 permit from the USACE may be required for the Project depending upon whether work needs to be completed below the ordinary high water elevation of navigable waters of the United States. Once the final line design is completed, Freeborn Wind will work with the USACE to secure required Section 404 and Section 10 permits, as applicable.

7.4.2 State of Minnesota Permits

7.4.2.1 Minnesota Public Utilities Commission

Minnesota Statutes Section 216E.03, subd. 2. provides that no person may construct a HVTL without a Route Permit from the Commission. Freeborn Wind is seeking a Route Permit from the Commission with this Application.

7.4.2.2 Minnesota Department of Natural Resources

The MnDNR Division of Lands and Minerals regulates utility crossings on, over or under any state land or public water identified on the Public Waters and Wetlands Maps. A License to Cross Public Waters is required under Minnesota Statutes Section 84.415 and Minnesota Rules Chapter 6135. The MnDNR Division of Waters requires a Public Waters Work Permit for any alteration of the course, current, or cross-section below the ordinary high water level of a Public Water or

Watercourse. Freeborn Wind will work closely with the MnDNR and will obtain these permits, as necessary, once the final line design is complete.

7.4.2.3 Minnesota Department of Transportation

MnDOT requires the Application for Utility Permit on County Highways ROW form for the vast majority of utility placements and relocations. Utility owners use this form to request permission to place, construct, and reconstruct utilities within trunk highway ROW, whether longitudinal, oblique, or perpendicular to the centerline of the highway. Additionally, a Utility Accommodation on Trunk Highway ROW approval from the MnDOT may be needed for the Project depending upon final placement of poles, associated facilities and the Project ROW. Freeborn Wind is working with MnDOT to determine whether such permits are required and, if so, will obtain the necessary permits from MnDOT.

7.4.3 Local Permits

Once the MPUC issues a Route Permit, all zoning, building and land use rules, regulations, and ordinances promulgated by regional, county, and local governments are preempted under Minnesota Stats. § 216E.10, subd. 1. Applicable permits from Freeborn County concerning road access, road ROW use, and wetland impacts under Minnesota Wetland Conservation Act will be secured as needed for the Project. Freeborn Wind will assess if the exemption for transmission lines under Wetland Conservation Act is applicable to the proposed Project.

8.0 References

Anfinson, Scott F. 1990. Archaeological Regions in Minnesota and the Woodland Period. In The Woodland Tradition in the Western Great Lakes: Papers Presented to Elden Johnson, edited by G. E. Gibbon, pp. 135-166. University of Minnesota Publications in Anthropology No. 4. University of Minnesota, Minneapolis.

Avian Power Line Interaction Committee (APLIC) and U.S. Fish & Wildlife Service. 2005. Avian Protection Plan Guidelines. http://www.aplic.org/uploads/files/2634/APPguidelines_final-draft_Aprl2005.pdf. Accessed July 2017.

Bonneville Power Administration (BPA), *Formulas for Predicting Audible Noise from Overhead High Voltage AC and DC Lines.*

Chartier and Stearns. 1981. *Formulas for Predicting Audible Noise from Overhead High Voltage AC and DC Lines.* IEEE Transactions on Power Apparatus and Systems, Vol. PAS-100, Iss. 1, pp 121-130, DOI:10.1109/TPAS.1981.316894.

Generator Interconnection Agreement. 2017. Agreement between Freeborn Wind Energy LLC and ITC Midwest LLC and Midcontinent Independent Operator, Inc. dated April 3, 2017.

Gibbon, Guy E., C. M. Johnson and E. Hobbs. 2002 Minnesota's Environment and Native American Culture History. Electronic document available online at: http:www.mnmodel.dot.state.mn.us/chapters/chapter3.html.

Jackson, J., E. Pentecost, and J. Muzzarelli. 1994. *Transmission Line Environmental Assessment Document.* U.S. Department of Energy, Environmental Assessment Division, Argonne National Laboratory. ANL/EAD-TM-3/ https://www.osti.gov/scitech/biblio/10129180. Accessed May, 2017.

Minnesota Department of Commerce. 2013. Environmental Assessment MP 39 Line Relocation Transmission Project. https://mn.gov/commerce/energyfacilities/documents/32972/EA-FINAL%20(7-19-13).pdf. Accessed May 2017.

Minnesota Department of Natural Resources (MnDNR). 2009. Ecological Classification System Map. http://www.dnr.state.mn.us/ecs/index.html. (Accessed March 2017).

MnDNR. 2016. Minnesota Regions Prone to Surface Karst Feature Development. ftp://ftp.gisdata.mn.gov/pub/gdrs/data/pub/us_mn_state_dnr/geos_surface_karst_feature_devel/metadata/metadata.html. Accessed September 11, 2017.

MnDNR. 2017. Licensed Natural Heritage Information System data to Merjent (License Agreement 750), current as of July 11, 2017.

Minnesota Pollution Control Agency (MPCA). 2015. *A Guide to Noise Control in Minnesota*. Revised November, 2015. http://www.pca.state.mn.us/publications/p-gen6-01.pdf. Accessed May, 2017.

MPCA. 2016. Minnesota's Impaired Waters List, updated December 27, 2016. https://www.pca.state.mn.us/water/minnesotas-impaired-waters-list. Accessed July, 2017.

National Oceanic and Atmospheric Administration. National Climatic Data Center. *Storm Events Database*. 2013. http://www.ncdc.noaa.gov/stormevents/.

Quade, Henry and John Rongstad. 1991. Freeborn County Geologic Atlas. Water Resources Center, Mankato State University. Mankato, Minnesota.

U.S. Department of Agriculture (USDA), Natural Resource Conservation Service. 2016. Official Soil Series Descriptions. Soil Survey Staff. http://soils.usda.gov/technical/classification/osd/index.html. (Accessed March 2017).

USDA, Soil Conservation Service, January 1980. Soil Survey of Freeborn County, Minnesota.

U.S. Department of Transportation, Federal Aviation Administration. 2011. Procedures for Handling Airspace Matters. Order JO 7400.2H. http://tfmlearning.faa.gov/Publications/atpubs/AIR/TOC.html. Accessed June, 2017.

U.S. Fish & Wildlife Service - National Wetlands Inventory (NWI). 2016. NWI Data Mapper. Updated October 13, 2016. Fort Snelling, Minnesota. Wetlands Mapper: http://www.fws.gov/wetlands/Data/Mapper.html.

U.S. Geologic Survey. 2016. ArcGIS Rest Services Directory. Streaming data. The National Map, USGS. Last updated September 2016. Data from: https://basemap.nationalmap.gov/arcgis/rest/services.

U.S. Geologic Survey. 2014. National Land Cover Database.

9.0 Definitions

Avian	Of or relating to birds.
Breaker	Device for opening a circuit.
Bus	An electrical conductor that serves as a common connection for two or more electrical circuits; may be in the form of rigid bars or stranded conductors or cables.
Conductor	A material or object that permits an electric current to flow easily.
Corona	The breakdown or ionization of air in a few centimeters or less immediately surrounding conductors.
Disconnects	A power switch that can be shut off and then locked in the "off" position.
Electric (E) Field	The field of force that is produced as a result of a voltage charge on a conductor or antenna.
Electromagnetic	The term describing the relationship between electricity and magnetism; a quality that combines both magnetic and electric properties.
Electromagnetic Field	The combination of an electric (E) field and a magnetic (H) field.
Excavation	A cavity formed by cutting, digging, or scooping.
Fauna	The collective animals of any place or time that live in mutual association.
Flora	The collective plants of any place or time that live in mutual association.
Grading	To level off to a smooth horizontal or sloping surface.
Grounding	To connect electrically with a ground; to connect some point of an electrical circuit or some item of electrical equipment to earth or to the conducting medium used in lieu thereof.
Habitat	The place or environment where a plant or animal naturally or normally lives and grows.
High Voltage Transmission Lines (HVTL)	Overhead and underground conducting lines of either copper or aluminum used to transmit electric power over relatively long distances, usually from a central generating station to main substations. They are also used for electric power transmission from one central station to another for load sharing. High voltage transmission lines typically have a voltage of 115 kV or more.
Hydrocarbons	Compounds that contain carbon and hydrogen, found in fossil fuels.
Ionization	Removal of an electron from an atom or molecule. The process of producing ions. The electrically charged particles produced by high-energy radiation, such as light or ultraviolet rays, or by the collision of particles during thermal agitation.
Magnetic (H) Field	The region in which the magnetic forces created by a permanent magnet or by a current-carrying conductor or coil can be detected. The field that is produced when current flows through a conductor or antenna.
Mitigate	To lessen the severity of or alleviate the effects of.

Oxide	A compound of oxygen with one other more positive element or radical.
Ozone	A very reactive form of oxygen that combines readily with other elements and compounds in the atmosphere.
Raptor	A member of the order Falconiformes, which contains the diurnal birds of prey, such as the hawks, harriers, eagles and falcons.
Sediment	Material deposited by water, wind, or glaciers.
Stray Voltage	A condition that can occur on the electric service entrances to structures from distribution lines. More precisely, stray voltage is a voltage that exists between the neutral wire of the service entrance and grounded objects in buildings such as barns and milking parlors.
Substation	A substation is a high voltage electric system facility. It is used to switch generators, equipment, and circuits or lines in and out of a system. It also is used to change AC voltages from one level to another. Some substations are small with little more than a transformer and associated switches. Others are very large with several transformers and dozens of switches and other equipment.
Voltage	A unit of electrical pressure, electric potential or potential difference expressed in volts. The term used to signify electrical pressure. Voltage is a force that causes current to flow through an electrical conductor. The voltage of a circuit is the greatest effective difference of potential between any two conductors of the circuit.
Voltage Drop	The difference in voltage between two points; it is the result of the loss of electrical pressure as a current flows through a resistance.
Waterfowl	A bird that frequents water; especially a swimming game bird (as a duck or goose) as distinguished from an upland game bird or shorebird.
Waterfowl Production Area (WPA)	Waterfowl Production Areas preserve wetlands and grasslands critical to waterfowl and other wildlife. These public lands, managed by the U.S. Fish and Wildlife Service, were included in the National Wildlife Refuge System in 1966 through the National Wildlife Refuge Administration Act.
Wetland	Wetlands are areas that are periodically or permanently inundated by surface or ground water and support vegetation adapted for life in saturated soil. Wetlands include swamps, marshes, bogs and similar areas.
Wildlife Management Area (WMA)	Wildlife Management Areas are part of Minnesota's outdoor recreation system and 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.

10.0 Acronyms

AC	Alternating Current
ALJ	Administrative Law Judge
AM	Amplitude Modulation
APLIC	Avian Power Line Interaction Committee
APP	Avian Protection Plan
Application	Application for a Route Permit
BMP	Best Management Practice
BPA	Bonneville Power Administration
Ch.	Chapter
cm	Centimeter
Commission	Minnesota Public Utilities Commission
CRP	Conservation Reserve Program
dB	Decibel
dBA	A-weighted sound level in decibels
EF	Electric Field
ELF	Extremely low frequencies
EMF	Electric and Magnetic Fields
FAA	Federal Aviation Administration
FM	Frequency Modulation
Freeborn Wind	Freeborn Wind Energy LLC
HVTL	High Voltage Transmission Line
Invenergy	Invenergy LLC
ITC	ITC Midwest LLC
kV	Kilovolt
kV/m	Kilovolts Per Meter
L_{10}	dBA that may be exceeded 10 percent of the time within an hour
L_{50}	dBA that may be exceeded 50 percent of the time within an hour
LGU	Local Government Unit
Merjent	Merjent, Inc.
MF	Magnetic Field
mG	milliGauss
MHS	Minnesota Historical Society
Minn. R.	Minnesota Administrative Rules
Minn. Stat.	Minnesota Statutes
MISO	Midcontinent Independent System Operator
MnDNR	Minnesota Department of Natural Resources
MnDOT	Minnesota Department of Transportation
MPCA	Minnesota Pollution Control Agency

MPUC	Minnesota Public Utilities Commission
MW	Megawatt
NAC	Noise Area Classification
NESC	National Electric Safety Code
NHIS	National Heritage Information System
NWI	National Wetlands Inventory
OSA	Office of the State Archaeologist
PLS	Public Land Survey
POI	Point of Interconnection
ppm	Parts-per-million
PPSA	Power Plant Siting Act
Project	Freeborn Wind Farm to Glenworth Substation Transmission Line Project
PWI	Public Water Inventory
RIM	Reinvest In Minnesota
ROW	Right-of-way
Section 10	Section 10 of the Rivers and Harbors Act of 1899
SHPO	State Historic Preservation Office
subd.	Subdivision
UP	Union Pacific
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geologic Service
WHO	World Health Organization
Wind Farm Substation	Proposed Freeborn Wind Farm Substation
WMA	Wildlife Management Area
WPA	Waterfowl Production Area

Appendix A

Applicant Notification Letter to Commission

Fredrikson & BYRON, P.A.

June 15, 2017

Daniel Wolf
Minnesota Public Utilities Commission
121 Seventh Place East
Suite 350
St. Paul MN 55101-2147

Re: Notification of Pending Route Permit Application Under Alternative Permitting Process for the Proposed 161 kV Freeborn Wind Farm Transmission Line and Associated Facilities in Freeborn County, Minnesota
PUC Docket No. IP6946/TL-17-322

Dear Mr. Wolf:

Freeborn Wind Energy LLC ("Freeborn Wind"), an affiliate of Invenergy LLC, plans to file a route permit application for a 161 kilovolt ("kV") high voltage transmission line in Freeborn County, to interconnect the proposed Freeborn Wind Farm ("Project") being developed by Freeborn Wind.

Because the high voltage transmission line is between 100 and 200 kV, the transmission line and associated facilities are eligible for the alternative permitting process, as provided under Minn. R. 7850.2800, subp. 1(C). As required by Minn. R. 7850.2800, subp. 2, Freeborn Wind is hereby notifying the Minnesota Public Utilities Commission of its intent to submit a route permit application for the Project under the alternative permitting procedures of Minn. R. 7850.2800 - .3900.

Freeborn Wind anticipates filing the route permit application in July 2017.

Sincerely,

/s/ *Christina K. Brusven*

Christina K. Brusven
Direct Dial: 612.492.7412
Email: cbrusven@fredlaw.com

Appendix B

Freeborn Wind Farm Electric and Magnetic Field Study

Freeborn Wind Farm
Electric and Magnetic Field Study

Prepared for:

Invenergy LLC

Prepared By:

Electrical Consultants, Inc.

August 2017

"Engineering with Distinction"
ECI
ELECTRICAL CONSULTANTS, INC.

Table of Contents

APPENDIX

Task	***Responsible Individual***		***Date***
Prepared	*Project Engineer*	*T. Saunders*	*7/7/17*
Reviewed	*Project Manager*	*A.White*	*7/10/17*
Issued – 30% Review	*QA/QC*	*K. Schacht*	*8/10/17*

1.0 EXECUTIVE SUMMARY

ECI has completed an Electric and Magnetic Field (EMF) study of the 161 kV Freeborn Transmission Line and Substation. These transmission and substation facilities are required for integration of the proposed 200 MW Freeborn Wind Farm. A model of the transmission line was prepared in EPRI's Transmission Line Workstation (TLW Gen2) software based off preliminary structure drawings prepared by ECI. The electric and magnetic fields for the transmission line as well as the deadend structure within the substation were analyzed and compared to typical values. There are no federal or Minnesota state exposure standards for electric and magnetic fields. However, the Minnesota Public Utilities Commission ("MPUC") regularly imposes a permit condition on transmission projects limiting the electric field to no more than 8 kV/m on the edge of Right of Way (ROW). This transmission line has a maximum electric field at one meter above ground level of 1.59 kV/m which is below this guideline level. The maximum magnetic field of the transmission line at one meter above ground level is 69.53 (mG) which occurs mid span through the 22 foot right of way section.

2.0 MODEL CONSTRUCTION

The model was constructed based on typical structures TSP-161, TSVP-161, TS-161L-LA, and TDE-161L-J for the transmission line as well as single circuit steel substation deadend structure SUBDE-161S all of which are provided in the *Appendix* for reference. This line was designed using T2 477 kcmil ACSR "Hawk" conductor with a phase spacing of 11.0 feet. The right-of-way width for this line is 80 feet for most of the line; however, one span exists with a 22-foot right-of-way width. The TLW Gen2 software uses latitude and longitude values to determine the geographic placement of the line.

3.0 ELECTRIC AND MAGNETIC FIELD

The electric field for the proposed transmission line was calculated at a height of 1 meter above ground level. The maximum electric field density is 1.59 kV/m at the centerline and weakens considerably as the distance from the line is increased. This is below the MPUC guidelines of 8.0 kV/m. This can be seen from *Table 3-1, Table 3-2, and Table 3-3* shown below as well as the plot of the Electric and Magnetic fields shown in *Graph 3-1, Graph 3-2, and Graph 3-3* following this section. The maximum magnetic field of the transmission line was also calculated at a height of 1 meter above ground level and reached a peak value of 69.53 mG near the center of the ROW. Again, as the distance from the centerline is increased, the magnitude of the magnetic field is reduced. The electric and magnetic fields for this study were based on a maximum steady state name plate rating of 200 MW or 717 Amps at a maximum voltage of 161 kV.

Table 3-1 80 Ft ROW Offset

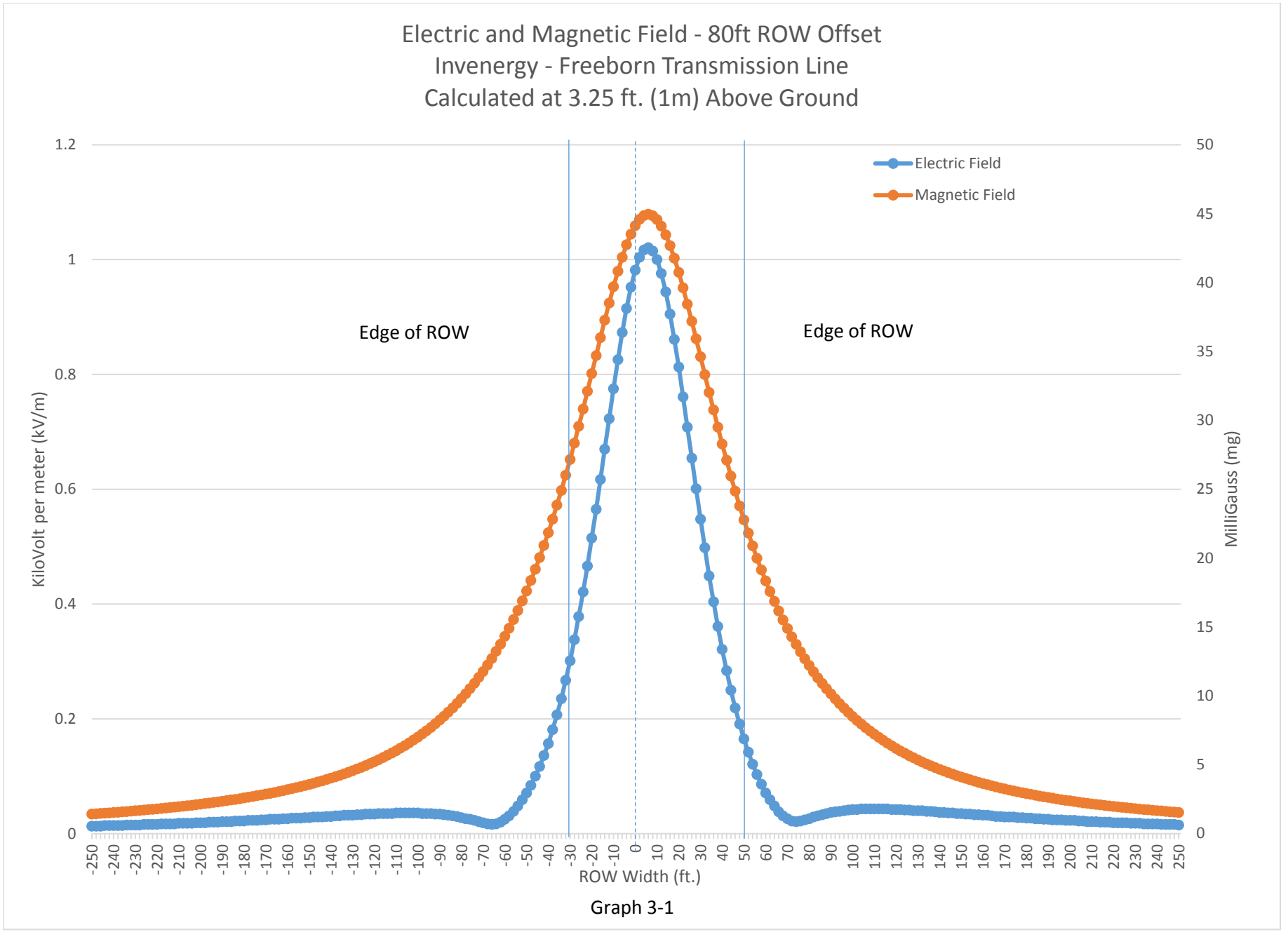
ROW Width (ft.)	-30	-20	-10	0	10	25	50
Electric Field (kV/m)	0.30	0.81	1.00	0.98	1.00	0.71	0.17
Magnetic Field (mG)	27.17	40.74	44.57	44.14	44.57	38.44	22.78

Table 3-2 22 Ft ROW

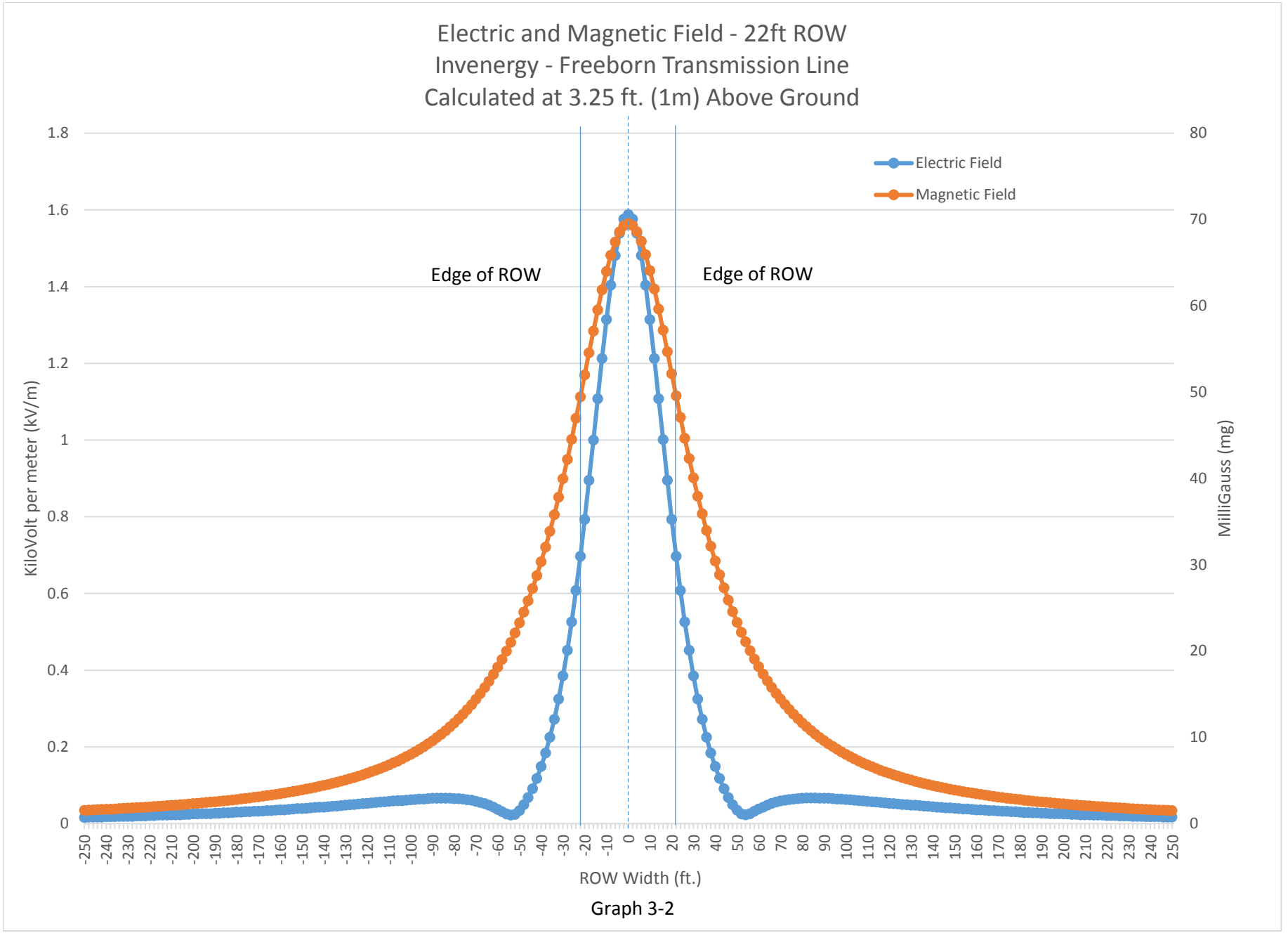
ROW Width (ft.)	-11	-9	-3	0	3	9	11
Electric Field (kV/m)	1.21	1.40	1.58	1.59	1.58	1.40	1.31
Magnetic Field (mG)	61.85	65.94	69.30	69.53	69.30	65.94	64.08

Table 3-3 80 Ft ROW Normal

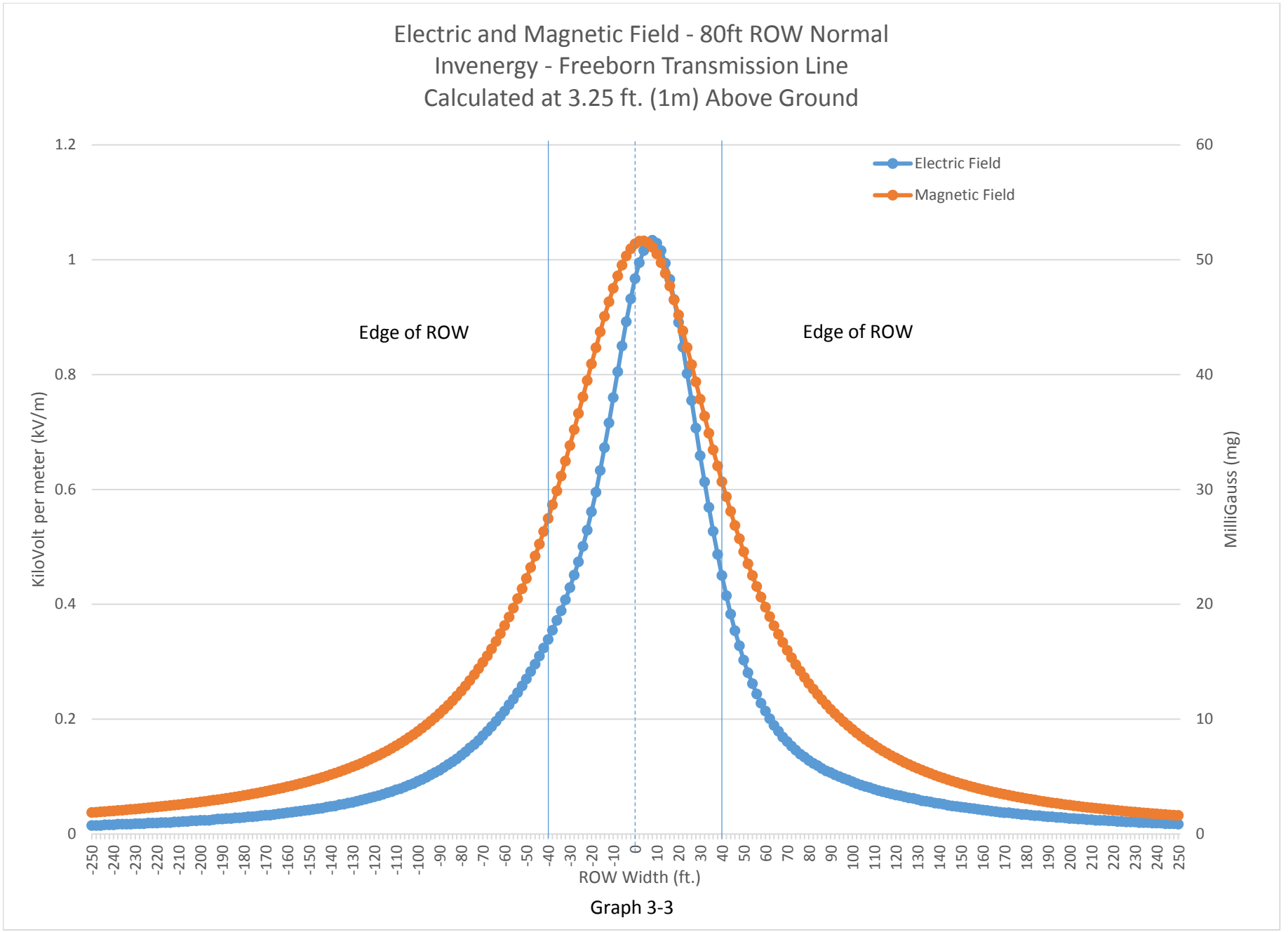
ROW Width (ft.)	-40	-25	-12	0	12	25	40
Electric Field (kV/m)	0.34	0.80	1.02	0.97	1.02	0.80	0.45
Magnetic Field (mG)	27.47	42.37	49.74	51.39	49.74	42.37	30.68


Electric and Magnetic Field - 80ft ROW Offset
Invenergy - Freeborn Transmission Line
Calculated at 3.25 ft. (1m) Above Ground
Electric Field
Magnetic Field
Edge of ROW
Edge of ROW
KiloVolt per meter (kV/m)
MilliGauss (mg)
ROW Width (ft.)
1.2
1
0.8
0.6
0.4
0.2
0
50
45
40
35
30
25
20
15
10
5
0
-250 -240 -230 -220 -210 -200 -190 -180 -170 -160 -150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250

Graph 3-1


Electric and Magnetic Field - 22ft ROW
Invenergy - Freeborn Transmission Line
Calculated at 3.25 ft. (1m) Above Ground
Electric Field
Magnetic Field
Edge of ROW
Edge of ROW
KiloVolt per meter (kV/m)
MilliGauss (mg)
ROW Width (ft.)

Graph 3-2

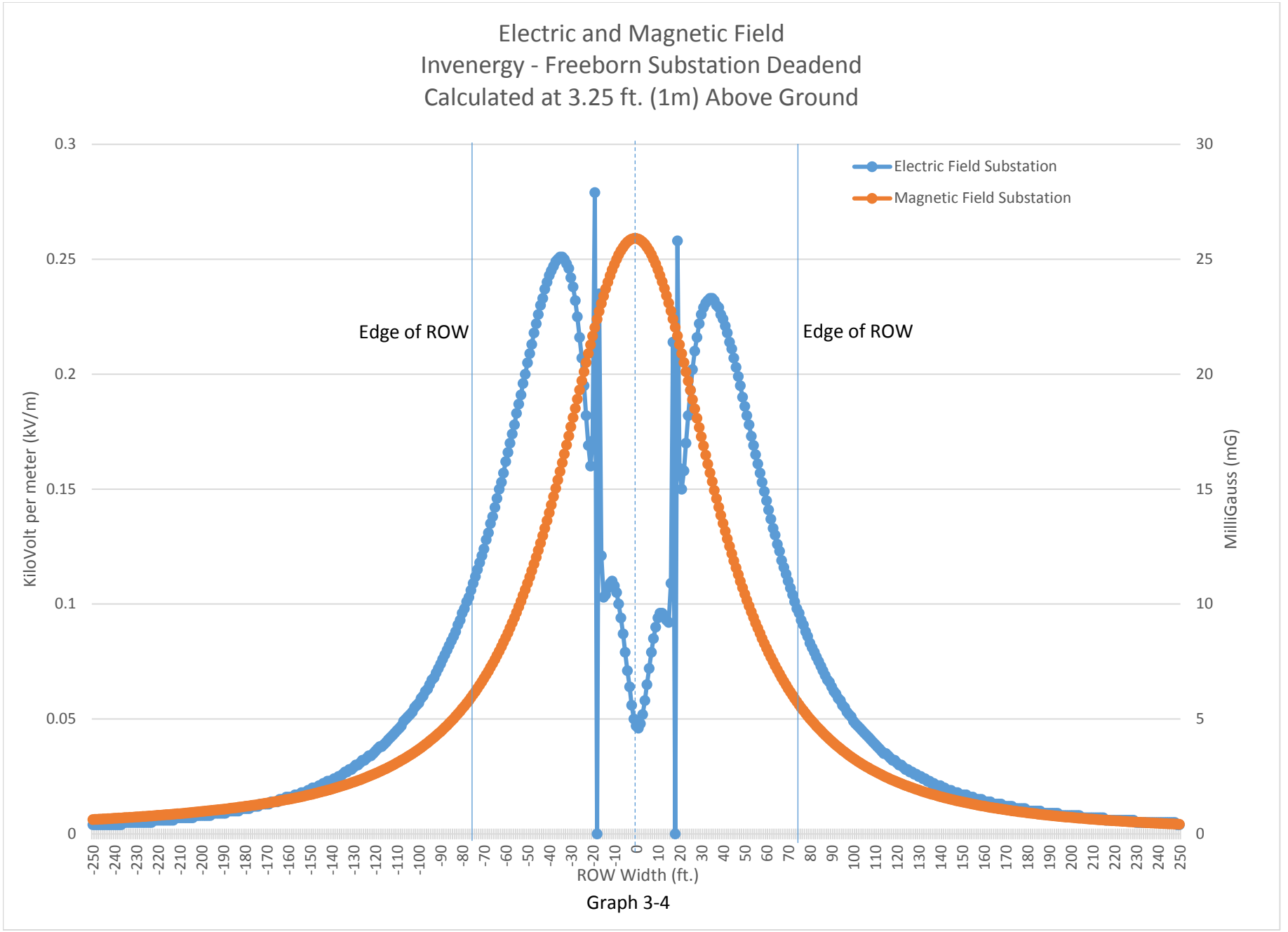

Electric and Magnetic Field - 80ft ROW Normal
Invenergy - Freeborn Transmission Line
Calculated at 3.25 ft. (1m) Above Ground
Electric Field
Magnetic Field
Edge of ROW
Edge of ROW
KiloVolt per meter (kV/m)
MilliGauss (mg)
ROW Width (ft.)
1.2
1
0.8
0.6
0.4
0.2
0
60
50
40
30
20
10
0
-250 -240 -230 -220 -210 -200 -190 -180 -170 -160 -150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250

Graph 3-3

The substation EMF was calculated based on the dead-end structure terminating at the substation. As described in Section 2.0, the structure analyzed for this study was the single circuit steel dead-end structure SUBDE-161S shown in the *Appendix.* The maximum electric field for this location is approximately 0.28 kV/m occurring at approximately 19 feet from the centerline. The magnetic field was calculated to be approximately 25.91 mG right near the centerline of the ROW. These values can be seen in *Table 3-4* below as well as the plot shown in *Graph 3-4* following this section.

Table 3-4 Sub Dead End

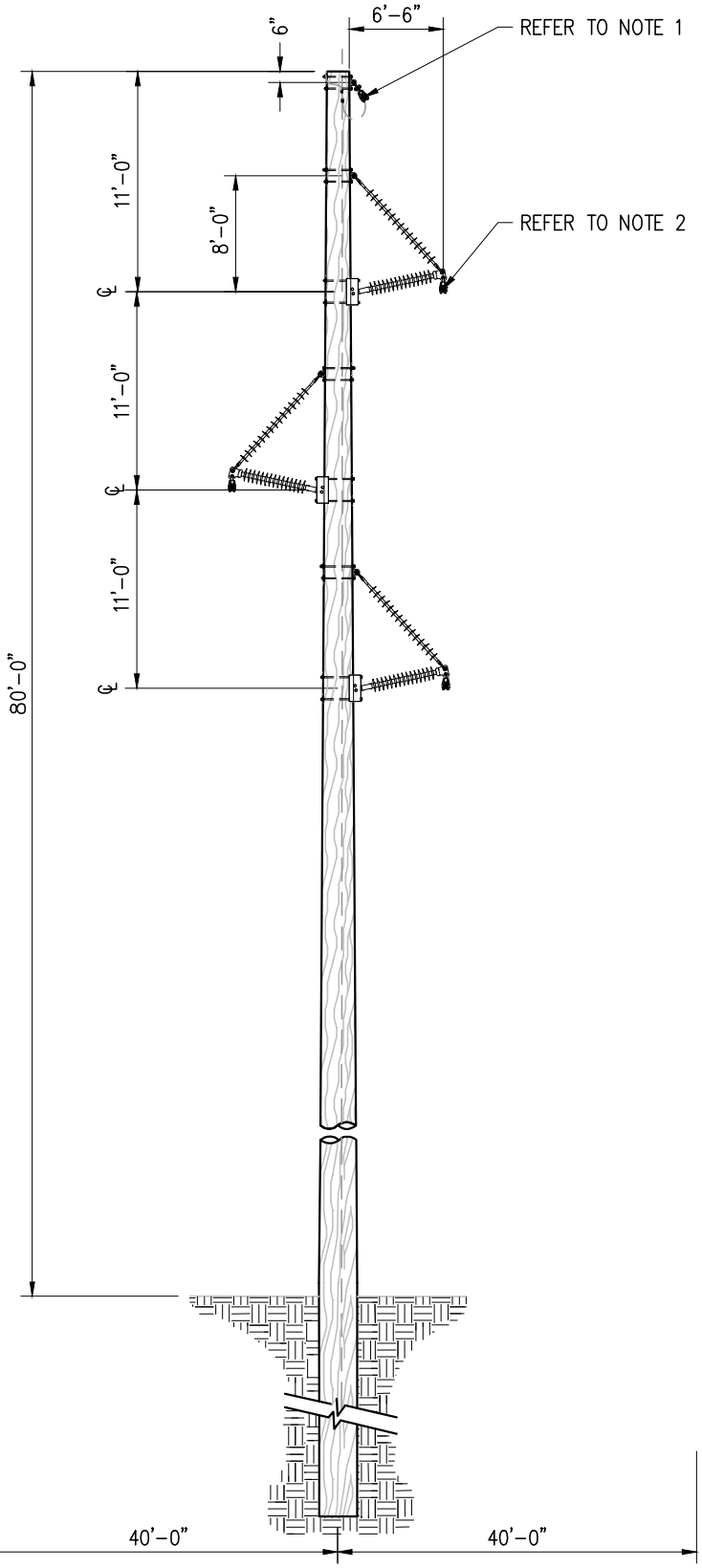
ROW Width (ft.)	-75	-50	-25	0	25	50	75
Electric Field (kV/m)	0.11	0.21	0.21	0.05	0.19	0.19	0.10
Magnetic Field (mG)	6.06	10.90	19.71	25.91	19.30	10.44	5.62


Electric and Magnetic Field
Invenergy - Freeborn Substation Deadend
Calculated at 3.25 ft. (1m) Above Ground
Electric Field Substation
Magnetic Field Substation
Edge of ROW
Edge of ROW
KiloVolt per meter (kV/m)
MilliGauss (mG)
ROW Width (ft.)
0.3
0.25
0.2
0.15
0.1
0.05
0
30
25
20
15
10
5
0
-250 -240 -230 -220 -210 -200 -190 -180 -170 -160 -150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250

Graph 3-4

APPENDIX

Single Circuit Braced Post Structure – TSP-161



NOTES:

1. OPGW TYPE: 48 FIBER AC-74/522 DNO 9009
2. CONDUCTOR TYPE: T2 477 kcmil 26/7 HAWK
3. LAT: 43.5253 LONG: -93.2351

ELECTRICAL CONSULTANTS, INC.

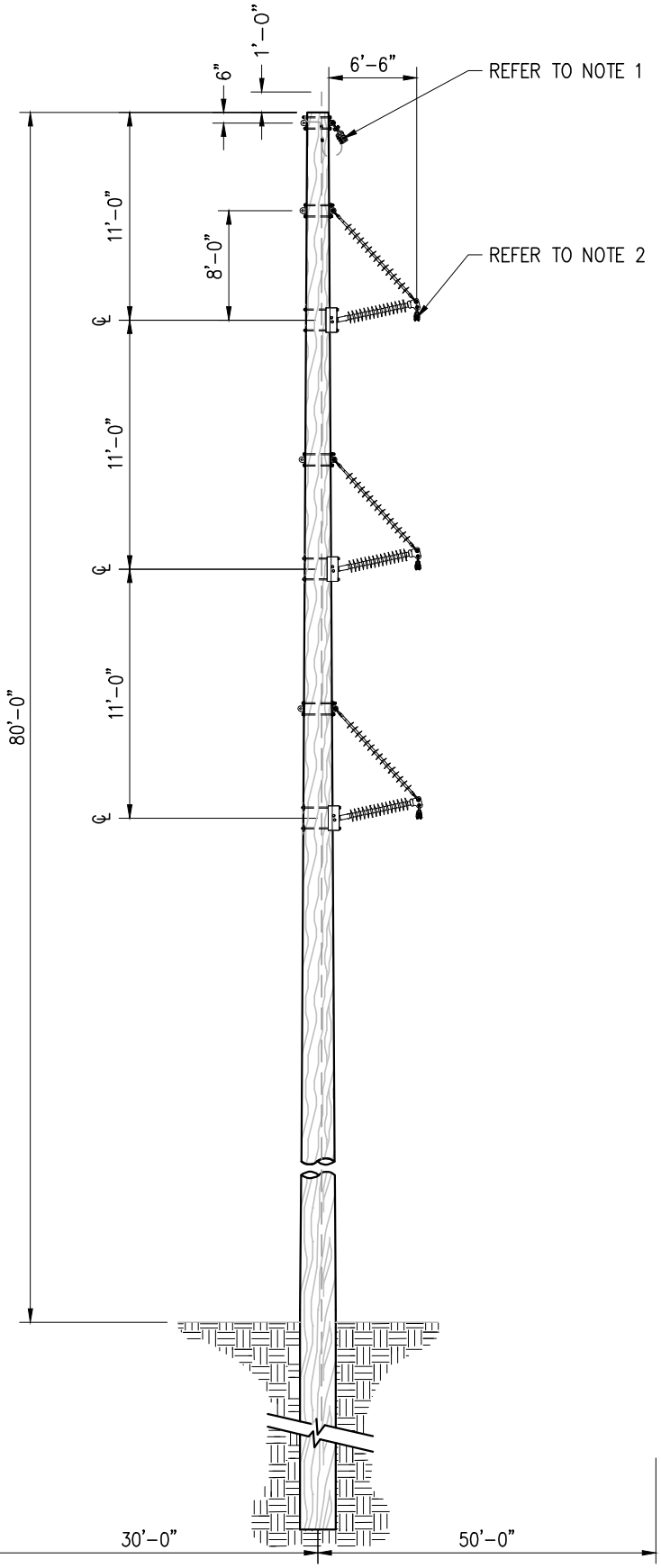
Invenergy

ENGINEERING RECORD		DATE
DRAWN	ECI	05/25/17
DESIGNED	ECI	05/25/17
CHECKED		
APPROVED		
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

INVENERGY TRANSMISSION EXHIBIT
SINGLE CIRCUIT BRACED POST STRUCTURE
TSP-161

DWG. NAME: FBW-A-T009-1 | REVISION NO : B

Single Circuit Braced Post Structure – TSVP-161



NOTES:

1. OPGW TYPE: 48 FIBER AC-74/522 DNO 9009
2. CONDUCTOR TYPE: T2 477 kcmil 26/7 HAWK
3. LAT: 43.5253 LONG: -93.2351

ELECTRICAL CONSULTANTS, INC.

Invenergy

ENGINEERING RECORD		DATE
DRAWN	ECI	XX/XX/XX
DESIGNED	ECI	XX/XX/XX
CHECKED		
APPROVED		
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

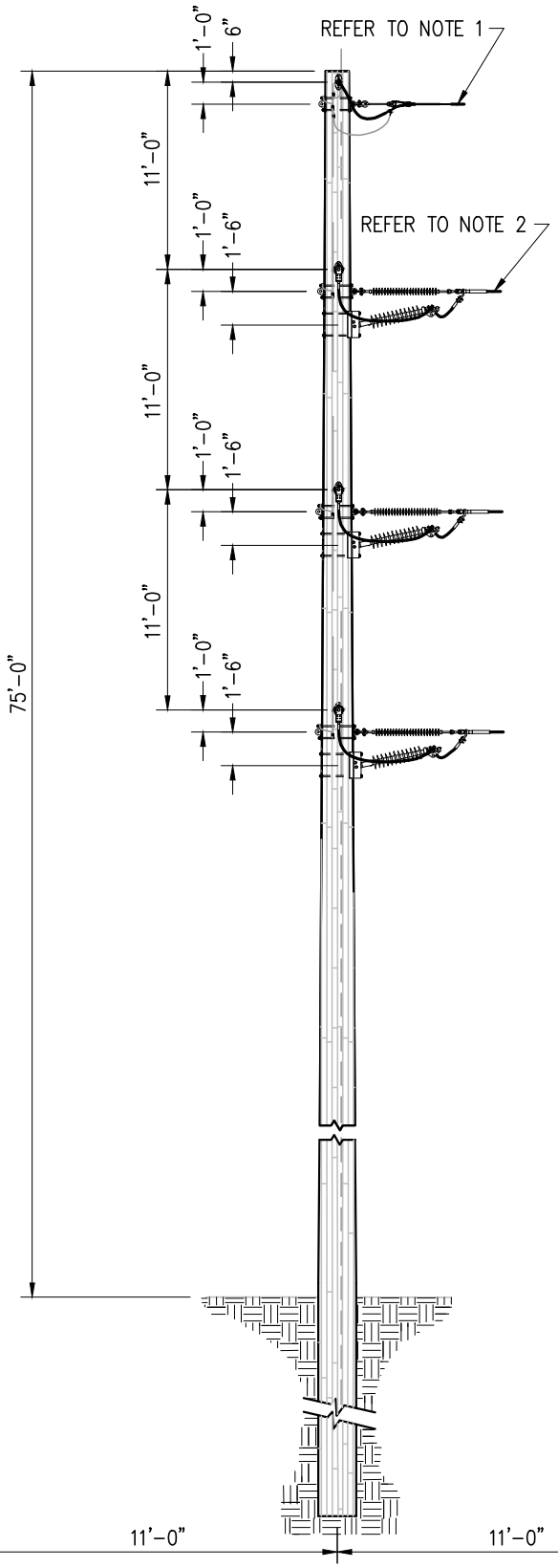
INVENERGY TRANSMISSION EXHIBIT

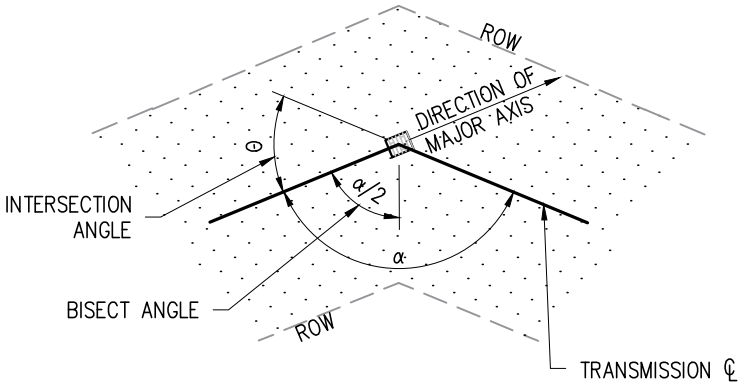
SINGLE CIRCUIT BRACED POST STRUCTURE

TSVP-161

DWG. NAME: FBW-A-T009-3 | REVISION NO : B

Single Circuit Lam Deadend Structure – TDE-161L-J





NOTES:

1. OPGW TYPE: 48 FIBER AC-74/522 DNO 9009
2. CONDUCTOR TYPE: T2 477 kcmil 26/7 HAWK
3. LAT: 43.5253 LONG: -93.2351

ELECTRICAL CONSULTANTS, INC.

Invenergy

ENGINEERING RECORD		DATE
DRAWN	ECI	06/26/17
DESIGNED	ECI	06/26/17
CHECKED		
APPROVED		
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

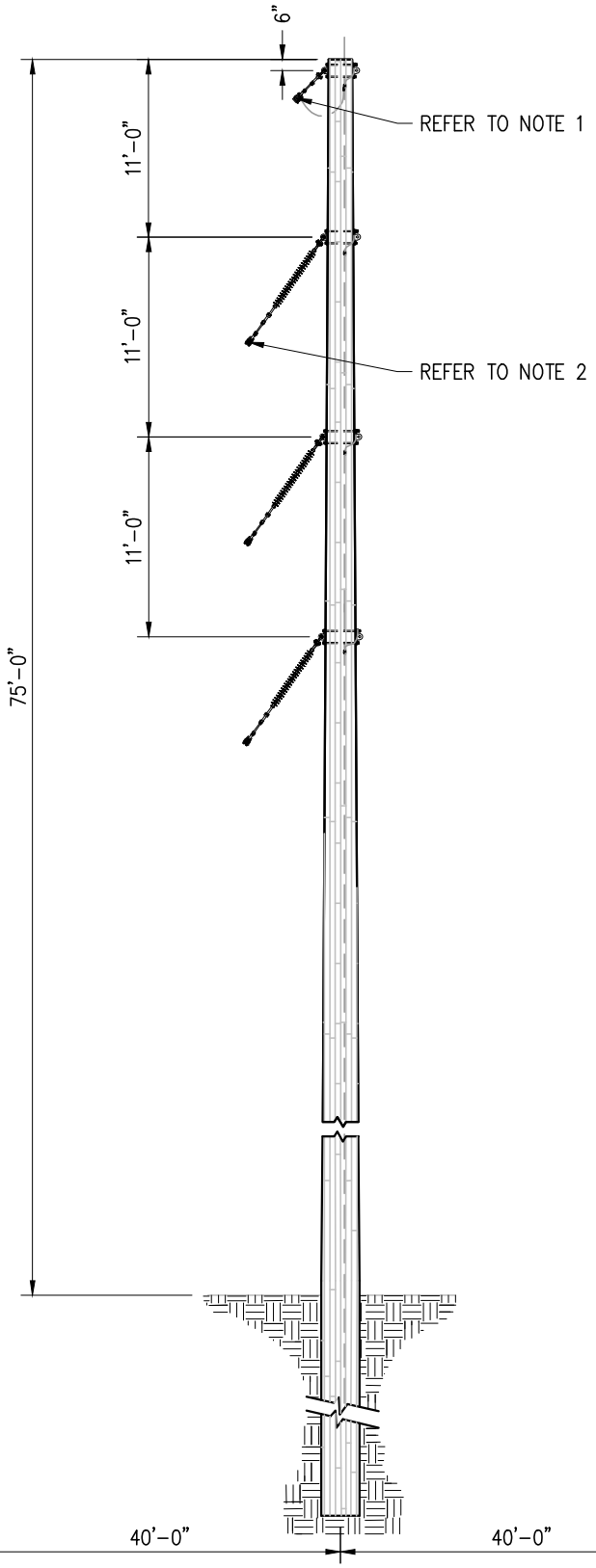
INVENERGY TRANSMISSION EXHIBIT

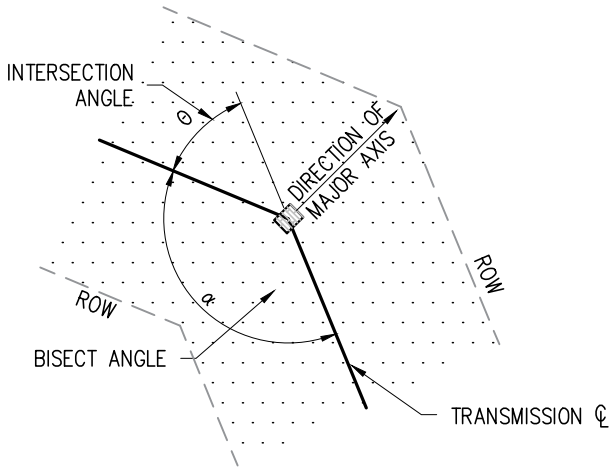
SINGLE CIRCUIT LAM DEADEND STRUCTURE

TDE-161L-J

DWG. NAME: FBW-A-T009-5 | REVISION NO : B

Single Circuit Lam Running Angle Structure – TS-161L-LA





NOTES:

1. OPGW TYPE: 48 FIBER AC-74/522 DNO 9009
2. CONDUCTOR TYPE: T2 477 kcmil 26/7 HAWK
3. LAT: 43.5253 LONG: -93.2351

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.

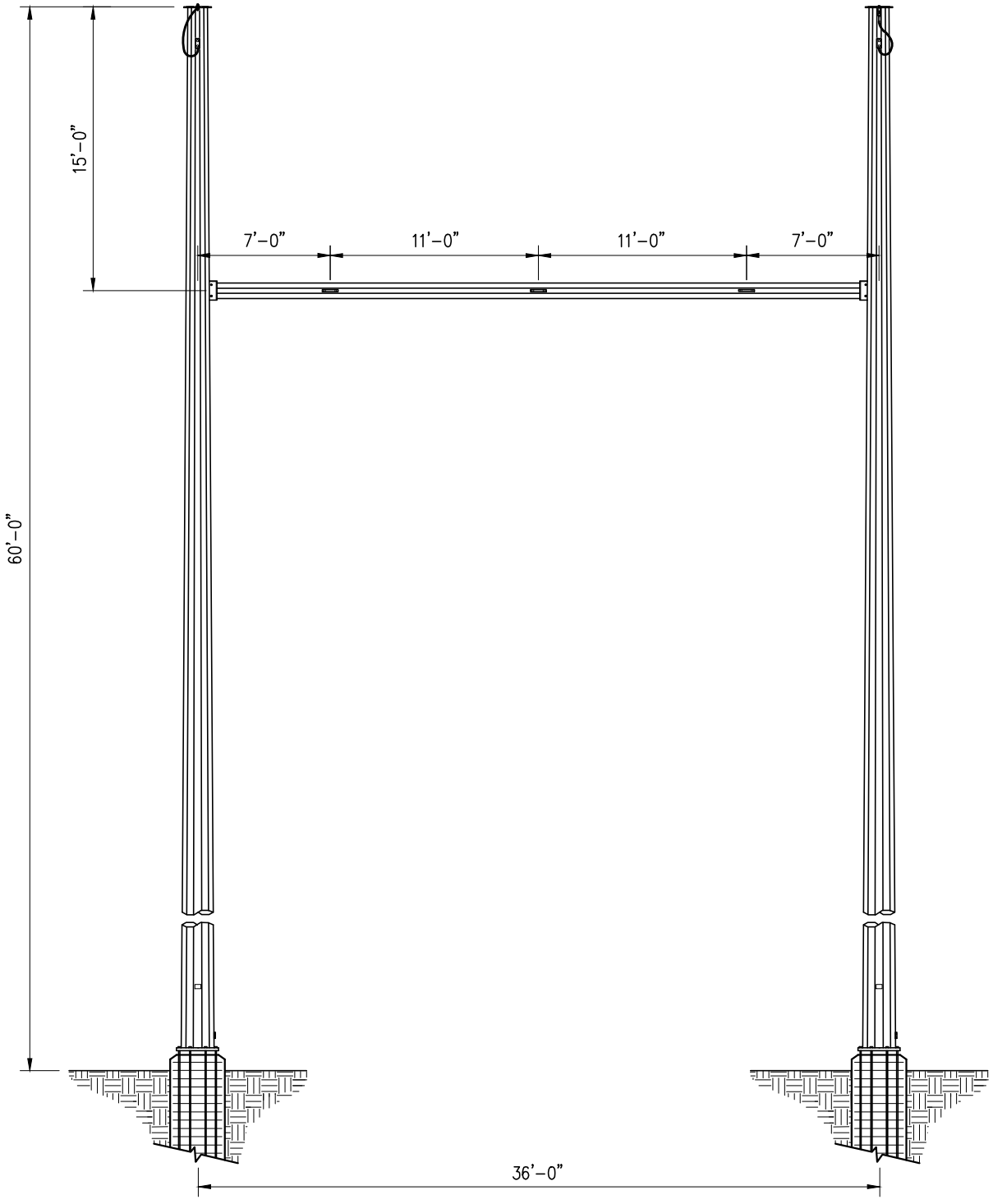
Invenergy

ENGINEERING RECORD		DATE
DRAWN	ECI	06/26/17
DESIGNED	ECI	06/26/17
CHECKED		
APPROVED		
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

INVENERGY TRANSMISSION EXHIBIT
SINGLE CIRCUIT LAM RUNNING ANGLE STRUCTURE
TS-161L-LA

DWG. NAME: FBW-A-T009-4 | REVISION NO : B

Single Circuit Steel Deadend Structure – SUBDE-161S



ENGINEERING RECORD		DATE
DRAWN	ECI	05/16
DESIGNED	ECI	05/16
CHECKED		
APPROVED		
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

ECI TRANSMISSION EXHIBIT

SUBSTATION DEADEND

SUBDE-161S

DWG. NAME: ECI-A-T009-54 | REVISION NO : A

Appendix C

Agency Notice Letters and NHIS Request

Agency/Local Government	Agency2	Full Name	First Name	Last Name	Job Title	Full Address	Address1	Address2	City	State	Zip
U.S. Fish & Wildlife Service		Margaret Rheude	Margaret	Rheude	Fish and Wildlife Biologist, Eagles	4104 American Boulevard East Bloomington, MN 55425	4104 American Boulevard East		Bloomington	MN	55425
U.S. Fish & Wildlife Service		Tony Sullins	Tony	Sullins	Field Office Supervisor	4101 East 80th Street Bloomington, MN 55425	4101 East 80th Street		Bloomington	MN	55425
U.S. Army Corps of Engineers		Ryan Malterud	Ryan	Malterud	Environmental Protection Technician	180 5th Street East, Suite 700 Saint Paul, MN 55101-1678	180 5th Street East	Suite 700	Saint Paul	MN	55101-1678
Department of Commerce- National Telecommunications Information Administration		Joyce Henry	Joyce	Henry	Administrator	jhenry@ntia.doc.gov					
Minnesota Department of Agriculture	Agriculture Marketing and Development Division	Bob Patton	Bob	Patton	Supervisor	625 Robert Street North North St Paul, MN 55155	625 Robert Street North		North St Paul	MN	55155
Minnesota Department of Employment and Economic Development		Kevin McKennon	Kevin	McKennon	Deputy Commissioner	1st National Bank Building 322 Minnesota Street, Suite E-200 Saint Paul, MN 55101-1351	1st National Bank Building	322 Minnesota Street, Suite E-200	Saint Paul	MN	55101-1351
Minnesota Department of Commerce	Energy Facility Permitting	John Wachtler	John	Wachtler	Energy Environmental Review Director	85 7th Place East, Suite 500 Saint Paul, MN 55101-2198	85 7th Place East	Suite 500	Saint Paul	MN	55101-2198
Minnesota Department of Health		Paul Allwood	Paul	Allwood	Assistant Commissioner	P.O. Box 64975 Saint Paul, MN 55164-4025	P.O. Box 64975		Saint Paul	MN	55164-4025
Minnesota Department of Natural Resources		Cynthia Warzecha	Cynthia	Warzecha	Energy Project Planner	500 Lafayette Road Saint Paul, MN 55155-4025	500 Lafayette Road		Saint Paul	MN	55155-4025
Minnesota Department of Natural Resources		Kevin Mixon	Kevin	Mixon	Regional Environmental Assessment Ecologist	261 Highway 15 S. New Ulm, MN 56073	261 Highway 15 S.		New Ulm	MN	56073
Minnesota Department of Transportation		Marilyn Remer	Marilyn	Remer	Utilities Engineer	395 John Ireland Blvd, MS 678 Saint Paul, MN 55155	395 John Ireland Blvd.	MS 678	Saint Paul	MN	55155
Minnesota Historical Society		Mary Ann Heidemann	Mary Ann	Heidemann	Manager of Government Programs and Compliance	345 Kellogg Boulevard West Saint Paul, MN 55102	345 Kellogg Boulevard West		Saint Paul	MN	55102
Minnesota Department of Public Safety		Attn: Commissioners	Commissioners		N/A	445 Minnesota Street, Suite 1000 Saint Paul, MN 55101	445 Minnesota Street	Suite 1000	Saint Paul	MN	55101
Minnesota Pollution Control Agency		Craig Affeldt	Craig	Affeldt	Supervisor, Environmental Review Unit	520 Lafayette Road N Saint Paul, MN 55155	520 Lafayette Road N		Saint Paul	MN	55155
Minnesota Office of the State Archaeologist		Scott Anfinson	Scott	Anfinson	State Archaeologist	200 Tower Avenue Saint Paul, MN 55111	200 Tower Avenue		Saint Paul	MN	55111
Minnesota Historical Society		Ton Cinadr	Ton	Cinadr	Survey and Inventory Manager	345 Kellogg Boulevard West Saint Paul, MN 55102	345 Kellogg Boulevard West		Saint Paul	MN	55102
Greater Minnesota Partnership		Dan Dorman	Dan	Dorman	Executive Director	525 Park Street, Suite 470 St. Paul, MN 55103	525 Park Street	Suite 470	Saint Paul	MN	55103
Albert Lea Economic Development Agency		Ryan Nolander	Ryan	Nolander	Executive Director	2610 Y.H. Hanson Avenue P.O. Box 370 Albert Lea, MN 56007	2610 Y.H. Hanson Avenue	P.O. Box 370	Albert Lea	MN	56007
Administration		John Kluever	John	Kluever	Administrator	411 S. Broadway P.O. Box 1147 Albert Lea, MN 56007	411 S. Broadway	P.O. Box 1147	Albert Lea	MN	56007
Environmental Services		Wayne Sorensen	Wayne	Sorensen	Planning and Zoning	411 S. Broadway P.O. Box 1147 Albert Lea, MN 56007	411 S. Broadway	P.O. Box 1147	Albert Lea	MN	56007
Highway Department		Susan G. Miller	Susan	Miller	Engineer	3300 Bridge Avenue Albert Lea, MN 56007	3300 Bridge Avenue		Albert Lea	MN	56007
Public Health		Sue Yost, RN/PHN	Sue	Yost	Public Health Director/Community Health Services Administrator	411 S. Broadway P.O. Box 1147 Albert Lea, MN 56007	411 S. Broadway	P.O. Box 1147	Albert Lea	MN	56007
Shell Rock Township		Donald Flatness	Donald	Flatness	Clerk	80747 River Road Glenville, MN 56036	80747 River Road		Glenville	MN	56036

FREEBORN
WIND FARM

VIA UPS

April 27, 2017

John Kluever, Administrator
Administration
411 S. Broadway
Albert Lea, MN, 56007

RE: Freeborn Wind Energy Proposed Transmission Line Project
Notice of Availability for Meeting

Dear John Kluever:

Freeborn Wind Energy LLC ("Freeborn Wind"), a wholly-owned subsidiary of Invenergy LLC ("Invenergy"), is proposing the Freeborn Wind Farm, a wind energy project in Freeborn County, Minnesota and Worth County, Iowa ("Project"). You should have recently received a letter from me requesting input regarding the Project for the purposes of its upcoming Minnesota Public Utilities Commission ("MPUC") Site Permit Application.

The Project will also include the construction of an approximately seven-mile long 161 kilovolt ("kV") transmission line from the Project Substation in Shell Rock Township to the interconnection point located at the existing Glenworth Substation just southeast of Glenville, Minnesota in Shell Rock Township as well. A map of the proposed route for the transmission line is included with this letter.

Freeborn Wind is currently gathering information in preparation for filing a Route Permit Application for a High Voltage Transmission Line ("Route Permit") to the MPUC under its alternative review procedures. This Route Permit process would be separate but more or less contemporaneous with the Project's Site Permit application, thus this separate letter seeking comment. We would appreciate any input you have regarding the proposed transmission line, and we would be happy to meet with you to discuss the transmission line if desired.

Please respond with any comments and/or questions to me at dlitchfield@invenergyllc.com, 773-318-1289, or Freeborn Wind Energy LLC, c/o Invenergy LLC, One South Wacker Drive, Suite 1800, Chicago, IL 60606.

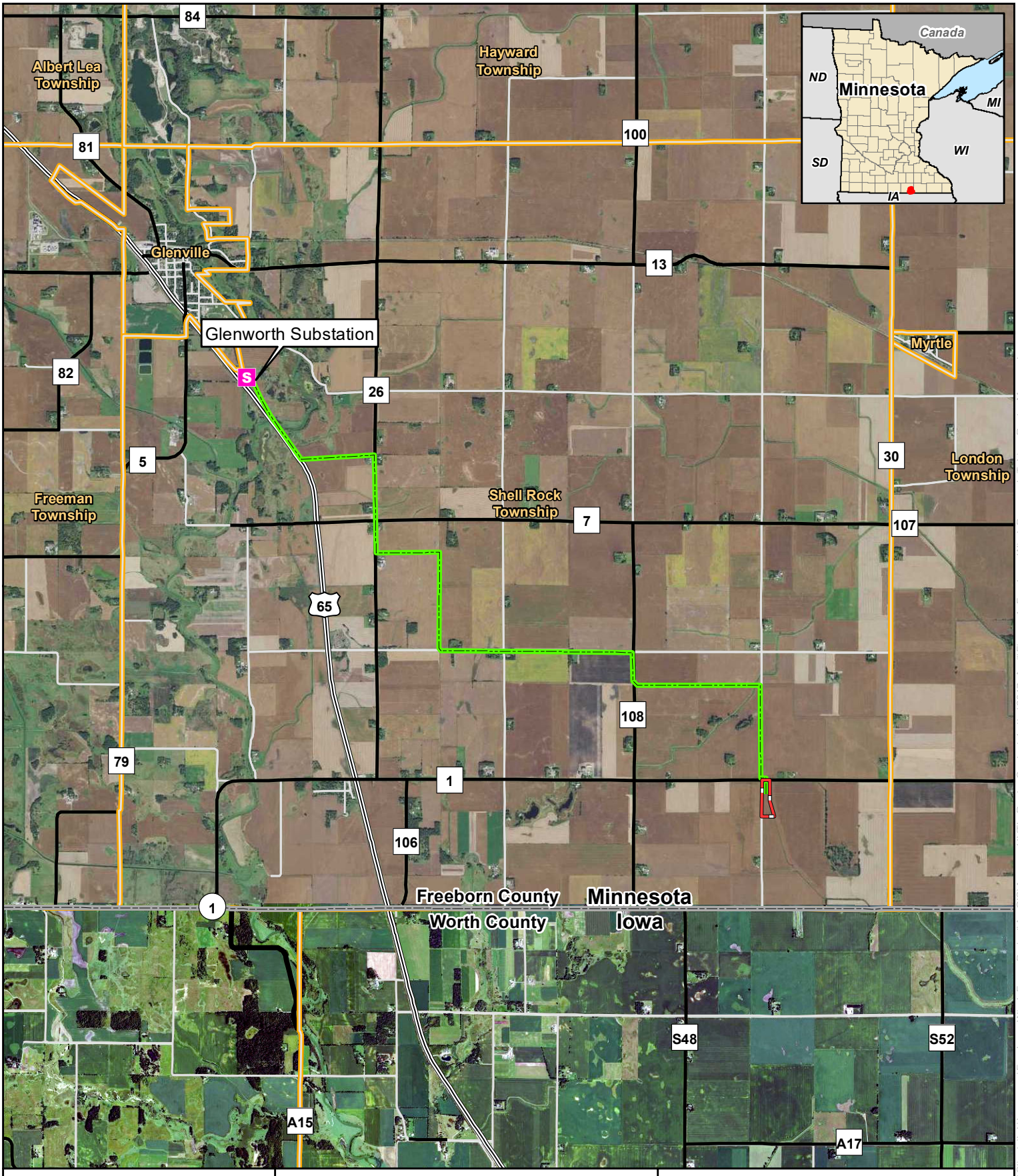
We would appreciate hearing from you by May 15, 2017 to ensure that we have adequate time to address questions or concerns in our Route Permit Application.

Sincerely,

Freeborn Wind Energy LLC

Dan Litchfield
Senior Manager, Project DevelopmentEnc. Freeborn Wind Proposed Transmission Line Route Map

Enc. Freeborn Wind Proposed Transmission Line Route Map



0 0.5 1 Miles

1 inch = 1 miles

For Environmental Review Purposes Only

Figure 1
Freeborn Wind
Proposed Transmission Line Route Map
Freeborn County, MN

- Existing Substation
- Proposed Transmission Line
- Proposed O&M and Project Substation
- City/Township Boundary

Source: Z:\Clients_LLI\nenergy\Freeborn_Wind_Farm_Project\ArcGIS\Agency_HVTL_Route_Contact_Letter\2017_April\Figure_1_Freeborn_Wind_Proposed_T_Line_Route_Map.mxd

Date: (4/27/2017)

FREEBORN
WIND FARM

VIA UPS

April 27, 2017

Wayne Sorensen, Planning and Zoning
Environmental Services
411 S. Broadway
Albert Lea, MN, 56007

RE: Freeborn Wind Energy Proposed Transmission Line Project
Notice of Availability for Meeting

Dear Wayne Sorensen:

Freeborn Wind Energy LLC ("Freeborn Wind"), a wholly-owned subsidiary of Invenergy LLC ("Invenergy"), is proposing the Freeborn Wind Farm, a wind energy project in Freeborn County, Minnesota and Worth County, Iowa ("Project"). You should have recently received a letter from me requesting input regarding the Project for the purposes of its upcoming Minnesota Public Utilities Commission ("MPUC") Site Permit Application.

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Freeborn Wind is currently gathering information in preparation for filing a Route Permit Application for a High Voltage Transmission Line ("Route Permit") to the MPUC under its alternative review procedures. This Route Permit process would be separate but more or less contemporaneous with the Project's Site Permit application, thus this separate letter seeking comment. We would appreciate any input you have regarding the proposed transmission line, and we would be happy to meet with you to discuss the transmission line if desired.

Please respond with any comments and/or questions to me at dlitchfield@invenergyllc.com, 773-318-1289, or Freeborn Wind Energy LLC, c/o Invenergy LLC, One South Wacker Drive, Suite 1800, Chicago, IL 60606.

We would appreciate hearing from you by May 15, 2017 to ensure that we have adequate time to address questions or concerns in our Route Permit Application.

Sincerely,

Freeborn Wind Energy LLC

Dan Litchfield
Senior Manager, Project DevelopmentEnc. Freeborn Wind Proposed Transmission Line Route Map

Enc. Freeborn Wind Proposed Transmission Line Route Map

FREEBORN
WIND FARM

VIA UPS

April 27, 2017

Susan G. Miller, Engineer
Highway Department
3300 Bridge Avenue
Albert Lea, MN, 56007

RE: Freeborn Wind Energy Proposed Transmission Line Project
Notice of Availability for Meeting

Dear Susan G. Miller:

Freeborn Wind Energy LLC ("Freeborn Wind"), a wholly-owned subsidiary of Invenergy LLC ("Invenergy"), is proposing the Freeborn Wind Farm, a wind energy project in Freeborn County, Minnesota and Worth County, Iowa ("Project"). You should have recently received a letter from me requesting input regarding the Project for the purposes of its upcoming Minnesota Public Utilities Commission ("MPUC") Site Permit Application.

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Sincerely,

Freeborn Wind Energy LLC

Dan Litchfield
Senior Manager, Project DevelopmentEnc. Freeborn Wind Proposed Transmission Line Route Map

Enc. Freeborn Wind Proposed Transmission Line Route Map

FREEBORN
WIND FARM

VIA UPS

April 27, 2017

Sue Yost, RN/PHN, Public Health Director/Community Health Services Administrator
Public Health
411 S. Broadway
Albert Lea, MN, 56007

RE: Freeborn Wind Energy Proposed Transmission Line Project
Notice of Availability for Meeting

Dear Sue Yost, RN/PHN:

Freeborn Wind Energy LLC ("Freeborn Wind"), a wholly-owned subsidiary of Invenergy LLC ("Invenergy"), is proposing the Freeborn Wind Farm, a wind energy project in Freeborn County, Minnesota and Worth County, Iowa ("Project"). You should have recently received a letter from me requesting input regarding the Project for the purposes of its upcoming Minnesota Public Utilities Commission ("MPUC") Site Permit Application.

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Sincerely,

Freeborn Wind Energy LLC

Dan Litchfield
Senior Manager, Project DevelopmentEnc. Freeborn Wind Proposed Transmission Line Route Map

Enc. Freeborn Wind Proposed Transmission Line Route Map

FREEBORN
WIND FARM

VIA UPS

April 27, 2017

Donald Flatness, Clerk
Shell Rock Township
80747 River Road
Glenville, MN, 56036

RE: Freeborn Wind Energy Proposed Transmission Line Project
Notice of Availability for Meeting

Dear Donald Flatness:

Freeborn Wind Energy LLC ("Freeborn Wind"), a wholly-owned subsidiary of Invenergy LLC ("Invenergy"), is proposing the Freeborn Wind Farm, a wind energy project in Freeborn County, Minnesota and Worth County, Iowa ("Project"). You should have recently received a letter from me requesting input regarding the Project for the purposes of its upcoming Minnesota Public Utilities Commission ("MPUC") Site Permit Application.

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Sincerely,

Freeborn Wind Energy LLC

Dan Litchfield
Senior Manager, Project DevelopmentEnc. Freeborn Wind Proposed Transmission Line Route Map

Enc. Freeborn Wind Proposed Transmission Line Route Map

FREEBORN
WIND FARM

VIA UPS

April 27, 2017

Margaret Rheude, Fish and Wildlife Biologist, Eagles
U.S. Fish & Wildlife Service
4104 American Boulevard East
Bloomington, MN, 55425

RE: Freeborn Wind Energy Proposed Transmission Line Project

Dear Margaret Rheude:

Freeborn Wind Energy LLC ("Freeborn Wind"), a wholly-owned subsidiary of Invenergy LLC ("Invenergy"), is proposing the Freeborn Wind Farm, a wind energy project in Freeborn County, Minnesota and Worth County, Iowa ("Project"). You should have recently received a letter from me requesting input regarding the Project for the purposes of its upcoming Minnesota Public Utilities Commission ("MPUC") Site Permit Application.

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Sincerely,

Freeborn Wind Energy LLC

Dan Litchfield
Senior Manager, Project Development

Enc. Freeborn Wind Proposed Transmission Line Route Map

FREEBORN
WIND FARM

VIA UPS

April 27, 2017

Tony Sullins, Field Office Supervisor
U.S. Fish & Wildlife Service
4101 East 80th Street
Bloomington, MN, 55425

RE: Freeborn Wind Energy Proposed Transmission Line Project

Dear Tony Sullins:

Freeborn Wind Energy LLC ("Freeborn Wind"), a wholly-owned subsidiary of Invenergy LLC ("Invenergy"), is proposing the Freeborn Wind Farm, a wind energy project in Freeborn County, Minnesota and Worth County, Iowa ("Project"). You should have recently received a letter from me requesting input regarding the Project for the purposes of its upcoming Minnesota Public Utilities Commission ("MPUC") Site Permit Application.

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Sincerely,

Freeborn Wind Energy LLC

Dan Litchfield
Senior Manager, Project Development

Enc. Freeborn Wind Proposed Transmission Line Route Map

FREEBORN
WIND FARM

VIA UPS

April 27, 2017

Ryan Malterud, Environmental Protection Technician
U.S. Army Corps of Engineers
180 5th Street East
Saint Paul, MN, 55101-1678

RE: Freeborn Wind Energy Proposed Transmission Line Project

Dear Ryan Malterud:

Freeborn Wind Energy LLC ("Freeborn Wind"), a wholly-owned subsidiary of Invenergy LLC ("Invenergy"), is proposing the Freeborn Wind Farm, a wind energy project in Freeborn County, Minnesota and Worth County, Iowa ("Project"). You should have recently received a letter from me requesting input regarding the Project for the purposes of its upcoming Minnesota Public Utilities Commission ("MPUC") Site Permit Application.

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Sincerely,

Freeborn Wind Energy LLC

Dan Litchfield
Senior Manager, Project Development

Enc. Freeborn Wind Proposed Transmission Line Route Map

FREEBORN
WIND FARM

VIA Email

April 27, 2017

Joyce Henry, Administrator
Department of Commerce- National Telecommunications Information Administration

RE: Freeborn Wind Energy Proposed Transmission Line Project

Dear Joyce Henry:

Freeborn Wind Energy LLC ("Freeborn Wind"), a wholly-owned subsidiary of Invenergy LLC ("Invenergy"), is proposing the Freeborn Wind Farm, a wind energy project in Freeborn County, Minnesota and Worth County, Iowa ("Project"). You should have recently received a letter from me requesting input regarding the Project for the purposes of its upcoming Minnesota Public Utilities Commission ("MPUC") Site Permit Application.

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Sincerely,

Freeborn Wind Energy LLC

Dan Litchfield
Senior Manager, Project Development

Enc. Freeborn Wind Proposed Transmission Line Route Map

FREEBORN
WIND FARM

VIA UPS

April 27, 2017

Bob Patton, Supervisor
Minnesota Department of Agriculture
625 Robert Street North
Agriculture Marketing and Development Division
North St Paul, MN, 55155

RE: Freeborn Wind Energy Proposed Transmission Line Project

Dear Bob Patton:

Freeborn Wind Energy LLC ("Freeborn Wind"), a wholly-owned subsidiary of Invenergy LLC ("Invenergy"), is proposing the Freeborn Wind Farm, a wind energy project in Freeborn County, Minnesota and Worth County, Iowa ("Project"). You should have recently received a letter from me requesting input regarding the Project for the purposes of its upcoming Minnesota Public Utilities Commission ("MPUC") Site Permit Application.

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Sincerely,

Freeborn Wind Energy LLC

Dan Litchfield
Senior Manager, Project Development

Enc. Freeborn Wind Proposed Transmission Line Route Map

FREEBORN
WIND FARM

VIA UPS

April 27, 2017

Kevin McKennon, Deputy Commissioner
Minnesota Department of Employment and Economic Development
1st National Bank Building
Saint Paul, MN, 55101-1351

RE: Freeborn Wind Energy Proposed Transmission Line Project

Dear Kevin McKennon:

Freeborn Wind Energy LLC ("Freeborn Wind"), a wholly-owned subsidiary of Invenergy LLC ("Invenergy"), is proposing the Freeborn Wind Farm, a wind energy project in Freeborn County, Minnesota and Worth County, Iowa ("Project"). You should have recently received a letter from me requesting input regarding the Project for the purposes of its upcoming Minnesota Public Utilities Commission ("MPUC") Site Permit Application.

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Sincerely,

Freeborn Wind Energy LLC

Dan Litchfield
Senior Manager, Project Development

Enc. Freeborn Wind Proposed Transmission Line Route Map

FREEBORN
WIND FARM

VIA UPS

April 27, 2017

John Wachtler, Energy Environmental Review Director
Minnesota Department of Commerce
85 7th Place East
Energy Facility Permitting
Saint Paul, MN, 55101-2198

RE: Freeborn Wind Energy Proposed Transmission Line Project

Dear John Wachtler:

Freeborn Wind Energy LLC ("Freeborn Wind"), a wholly-owned subsidiary of Invenergy LLC ("Invenergy"), is proposing the Freeborn Wind Farm, a wind energy project in Freeborn County, Minnesota and Worth County, Iowa ("Project"). You should have recently received a letter from me requesting input regarding the Project for the purposes of its upcoming Minnesota Public Utilities Commission ("MPUC") Site Permit Application.

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Sincerely,

Freeborn Wind Energy LLC

Dan Litchfield
Senior Manager, Project Development

Enc. Freeborn Wind Proposed Transmission Line Route Map

FREEBORN
WIND FARM

VIA UPS

April 27, 2017

Paul Allwood, Assistant Commissioner
Minnesota Department of Health
625 Robert Street North
Saint Paul, MN, 55155

RE: Freeborn Wind Energy Proposed Transmission Line Project

Dear Paul Allwood:

Freeborn Wind Energy LLC ("Freeborn Wind"), a wholly-owned subsidiary of Invenergy LLC ("Invenergy"), is proposing the Freeborn Wind Farm, a wind energy project in Freeborn County, Minnesota and Worth County, Iowa ("Project"). You should have recently received a letter from me requesting input regarding the Project for the purposes of its upcoming Minnesota Public Utilities Commission ("MPUC") Site Permit Application.

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Sincerely,

Freeborn Wind Energy LLC

Dan Litchfield
Senior Manager, Project Development

Enc. Freeborn Wind Proposed Transmission Line Route Map

FREEBORN
WIND FARM

VIA UPS

April 27, 2017

Cynthia Warzecha, Energy Project Planner
Minnesota Department of Natural Resources
500 Lafayette Road
Saint Paul, MN, 55155-4025

RE: Freeborn Wind Energy Proposed Transmission Line Project

Dear Cynthia Warzecha:

Freeborn Wind Energy LLC ("Freeborn Wind"), a wholly-owned subsidiary of Invenergy LLC ("Invenergy"), is proposing the Freeborn Wind Farm, a wind energy project in Freeborn County, Minnesota and Worth County, Iowa ("Project"). You should have recently received a letter from me requesting input regarding the Project for the purposes of its upcoming Minnesota Public Utilities Commission ("MPUC") Site Permit Application.

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Sincerely,

Freeborn Wind Energy LLC

Dan Litchfield
Senior Manager, Project Development

Enc. Freeborn Wind Proposed Transmission Line Route Map

FREEBORN
WIND FARM

VIA UPS

April 27, 2017

Kevin Mixon, Regional Environmental Assessment Ecologist
Minnesota Department of Natural Resources
261 Highway 15 S.
New Ulm, MN, 56073

RE: Freeborn Wind Energy Proposed Transmission Line Project

Dear Kevin Mixon:

Freeborn Wind Energy LLC ("Freeborn Wind"), a wholly-owned subsidiary of Invenergy LLC ("Invenergy"), is proposing the Freeborn Wind Farm, a wind energy project in Freeborn County, Minnesota and Worth County, Iowa ("Project"). You should have recently received a letter from me requesting input regarding the Project for the purposes of its upcoming Minnesota Public Utilities Commission ("MPUC") Site Permit Application.

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Sincerely,

Freeborn Wind Energy LLC

Dan Litchfield
Senior Manager, Project Development

Enc. Freeborn Wind Proposed Transmission Line Route Map

FREEBORN
WIND FARM

VIA UPS

April 27, 2017

Marilyn Remer, Utilities Engineer
Minnesota Department of Transportation
395 John Ireland Blvd.
Saint Paul, MN, 55155

RE: Freeborn Wind Energy Proposed Transmission Line Project

Dear Marilyn Remer:

Freeborn Wind Energy LLC ("Freeborn Wind"), a wholly-owned subsidiary of Invenergy LLC ("Invenergy"), is proposing the Freeborn Wind Farm, a wind energy project in Freeborn County, Minnesota and Worth County, Iowa ("Project"). You should have recently received a letter from me requesting input regarding the Project for the purposes of its upcoming Minnesota Public Utilities Commission ("MPUC") Site Permit Application.

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Sincerely,

Freeborn Wind Energy LLC

Dan Litchfield
Senior Manager, Project Development

Enc. Freeborn Wind Proposed Transmission Line Route Map

FREEBORN
WIND FARM

VIA UPS

April 27, 2017

Mary Ann Heidemann, Manager of Government Programs and Compliance
Minnesota Historical Society
345 Kellogg Boulevard West
Saint Paul, MN, 55102

RE: Freeborn Wind Energy Proposed Transmission Line Project

Dear Mary Ann Heidemann:

Freeborn Wind Energy LLC ("Freeborn Wind"), a wholly-owned subsidiary of Invenergy LLC ("Invenergy"), is proposing the Freeborn Wind Farm, a wind energy project in Freeborn County, Minnesota and Worth County, Iowa ("Project"). You should have recently received a letter from me requesting input regarding the Project for the purposes of its upcoming Minnesota Public Utilities Commission ("MPUC") Site Permit Application.

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Sincerely,

Freeborn Wind Energy LLC

Dan Litchfield
Senior Manager, Project Development

Enc. Freeborn Wind Proposed Transmission Line Route Map

FREEBORN
WIND FARM

VIA UPS

April 27, 2017

Attn: Commissioners
Minnesota Department of Public Safety
445 Minnesota Street
Saint Paul, MN, 55101

RE: Freeborn Wind Energy Proposed Transmission Line Project

Dear Commissioners:

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Sincerely,

Freeborn Wind Energy LLC

Dan Litchfield
Senior Manager, Project Development

Enc. Freeborn Wind Proposed Transmission Line Route Map

FREEBORN
WIND FARM

VIA UPS

April 27, 2017

Craig Affeldt, Supervisor, Environmental Review Unit
Minnesota Pollution Control Agency
520 Lafayette Road N
Saint Paul, MN, 55155

RE: Freeborn Wind Energy Proposed Transmission Line Project

Dear Craig Affeldt:

Freeborn Wind Energy LLC ("Freeborn Wind"), a wholly-owned subsidiary of Invenergy LLC ("Invenergy"), is proposing the Freeborn Wind Farm, a wind energy project in Freeborn County, Minnesota and Worth County, Iowa ("Project"). You should have recently received a letter from me requesting input regarding the Project for the purposes of its upcoming Minnesota Public Utilities Commission ("MPUC") Site Permit Application.

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Sincerely,

Freeborn Wind Energy LLC

Dan Litchfield
Senior Manager, Project Development

Enc. Freeborn Wind Proposed Transmission Line Route Map

FREEBORN
WIND FARM

VIA UPS

April 27, 2017

Amanda Gronhovd, State Archaeologist
Minnesota Office of the State Archaeologist
200 Tower Avenue
Fort Snelling, MN, 55111

RE: Freeborn Wind Energy Proposed Transmission Line Project

Dear Amanda Gronhovd:

Freeborn Wind Energy LLC ("Freeborn Wind"), a wholly-owned subsidiary of Invenergy LLC ("Invenergy"), is proposing the Freeborn Wind Farm, a wind energy project in Freeborn County, Minnesota and Worth County, Iowa ("Project"). You should have recently received a letter from me requesting input regarding the Project for the purposes of its upcoming Minnesota Public Utilities Commission ("MPUC") Site Permit Application.

The Project will also include the construction of an approximately seven-mile long 161 kilovolt ("kV") transmission line from the Project Substation in Shell Rock Township to the interconnection point located at the existing Glenworth Substation just southeast of Glenville, Minnesota in Shell Rock Township as well. A map of the proposed route for the transmission line is included with this letter.

Freeborn Wind is currently gathering information in preparation for filing a Route Permit Application for a High Voltage Transmission Line ("Route Permit") to the MPUC under its alternative review procedures. This Route Permit process would be separate but more or less contemporaneous with the Project's Site Permit application, thus this separate letter seeking comment. We would appreciate any input you have regarding the proposed transmission line.

Please respond with any comments and/or questions to me at dlitchfield@invenergyllc.com, 773-318-1289, or Freeborn Wind Energy LLC, c/o Invenergy LLC, One South Wacker Drive, Suite 1800, Chicago, IL 60606.

Sincerely,

Freeborn Wind Energy LLC

Dan Litchfield
Senior Manager, Project Development

Enc. Freeborn Wind Proposed Transmission Line Route Map

FREEBORN
WIND FARM

VIA UPS

April 27, 2017

Tom Cinadr, Survey and Inventory Manager
Minnesota Historical Society
345 Kellogg Boulevard West
Saint Paul, MN, 55102

RE: Freeborn Wind Energy Proposed Transmission Line Project

Dear Tom Cinadr:

Freeborn Wind Energy LLC ("Freeborn Wind"), a wholly-owned subsidiary of Invenergy LLC ("Invenergy"), is proposing the Freeborn Wind Farm, a wind energy project in Freeborn County, Minnesota and Worth County, Iowa ("Project"). You should have recently received a letter from me requesting input regarding the Project for the purposes of its upcoming Minnesota Public Utilities Commission ("MPUC") Site Permit Application.

The Project will also include the construction of an approximately seven-mile long 161 kilovolt ("kV") transmission line from the Project Substation in Shell Rock Township to the interconnection point located at the existing Glenworth Substation just southeast of Glenville, Minnesota in Shell Rock Township as well. A map of the proposed route for the transmission line is included with this letter.

Freeborn Wind is currently gathering information in preparation for filing a Route Permit Application for a High Voltage Transmission Line ("Route Permit") to the MPUC under its alternative review procedures. This Route Permit process would be separate but more or less contemporaneous with the Project's Site Permit application, thus this separate letter seeking comment. We would appreciate any input you have regarding the proposed transmission line.

Please respond with any comments and/or questions to me at dlitchfield@invenergyllc.com, 773-318-1289, or Freeborn Wind Energy LLC, c/o Invenergy LLC, One South Wacker Drive, Suite 1800, Chicago, IL 60606.

Sincerely,

Freeborn Wind Energy LLC

Dan Litchfield
Senior Manager, Project Development

Enc. Freeborn Wind Proposed Transmission Line Route Map

FREEBORN
WIND FARM

VIA UPS

April 27, 2017

Dan Dorman, Executive Director
Greater Minnesota Partnership
525 Park Street
Saint Paul, MN, 55103

RE: Freeborn Wind Energy Proposed Transmission Line Project

Dear Dan Dorman:

Freeborn Wind Energy LLC ("Freeborn Wind"), a wholly-owned subsidiary of Invenergy LLC ("Invenergy"), is proposing the Freeborn Wind Farm, a wind energy project in Freeborn County, Minnesota and Worth County, Iowa ("Project"). You should have recently received a letter from me requesting input regarding the Project for the purposes of its upcoming Minnesota Public Utilities Commission ("MPUC") Site Permit Application.

The Project will also include the construction of an approximately seven-mile long 161 kilovolt ("kV") transmission line from the Project Substation in Shell Rock Township to the interconnection point located at the existing Glenworth Substation just southeast of Glenville, Minnesota in Shell Rock Township as well. A map of the proposed route for the transmission line is included with this letter.

Freeborn Wind is currently gathering information in preparation for filing a Route Permit Application for a High Voltage Transmission Line ("Route Permit") to the MPUC under its alternative review procedures. This Route Permit process would be separate but more or less contemporaneous with the Project's Site Permit application, thus this separate letter seeking comment. We would appreciate any input you have regarding the proposed transmission line.

Please respond with any comments and/or questions to me at dlitchfield@invenergyllc.com, 773-318-1289, or Freeborn Wind Energy LLC, c/o Invenergy LLC, One South Wacker Drive, Suite 1800, Chicago, IL 60606.

Sincerely,

Freeborn Wind Energy LLC

Dan Litchfield
Senior Manager, Project Development

Enc. Freeborn Wind Proposed Transmission Line Route Map

FREEBORN
WIND FARM

VIA UPS

April 27, 2017

Ryan Nolander, Executive Director
Albert Lea Economic Development Agency
2610 Y.H. Hanson Avenue
Albert Lea, MN, 56007

RE: Freeborn Wind Energy Proposed Transmission Line Project

Dear Ryan Nolander:

Freeborn Wind Energy LLC ("Freeborn Wind"), a wholly-owned subsidiary of Invenergy LLC ("Invenergy"), is proposing the Freeborn Wind Farm, a wind energy project in Freeborn County, Minnesota and Worth County, Iowa ("Project"). You should have recently received a letter from me requesting input regarding the Project for the purposes of its upcoming Minnesota Public Utilities Commission ("MPUC") Site Permit Application.

The Project will also include the construction of an approximately seven-mile long 161 kilovolt ("kV") transmission line from the Project Substation in Shell Rock Township to the interconnection point located at the existing Glenworth Substation just southeast of Glenville, Minnesota in Shell Rock Township as well. A map of the proposed route for the transmission line is included with this letter.

Freeborn Wind is currently gathering information in preparation for filing a Route Permit Application for a High Voltage Transmission Line ("Route Permit") to the MPUC under its alternative review procedures. This Route Permit process would be separate but more or less contemporaneous with the Project's Site Permit application, thus this separate letter seeking comment. We would appreciate any input you have regarding the proposed transmission line.

Please respond with any comments and/or questions to me at dlitchfield@invenergyllc.com, 773-318-1289, or Freeborn Wind Energy LLC, c/o Invenergy LLC, One South Wacker Drive, Suite 1800, Chicago, IL 60606.

Sincerely,

Freeborn Wind Energy LLC

Dan Litchfield
Senior Manager, Project Development

Enc. Freeborn Wind Proposed Transmission Line Route Map

From:	Litchfield, Daniel
To:	Joyal, Lisa (DNR); Review.NHIS@state.mn.us
Cc:	Giampoli, Andrea
Subject:	Freeborn Wind Energy Transmission line review
Date:	Monday, July 31, 2017 10:49:51 AM
Attachments:	Freeborn_Route_for_NHI.ZIP Project_Overview_Map_for_NHIS_Request.pdf Freeborn NHIS request.pdf

---

Dear Ms. Joyal,

Please see attached NHIS request, map and shapefiles and contact me with any questions.

Sincerely,

Dan Litchfield | Senior Manager, Project Development
Invenergy | One South Wacker Drive, Suite 1800, Chicago, IL 60606
dlitchfield@invenergyllc.com | M 312-224-1400 | D 312-582-1057 | C 773-318-1289 |
@InvenergyLLC @danlitch

NO STAPLES PLEASE

Minnesota DEPARTMENT OF NATURAL RESOURCES

2012	For Agency Use Only:	
	Received _____ Due _____ Inv _____	#Sec _____ Contact Rqsted? _____
	Search Radius _____mi. L / I / D EM Map'd _____	#EOs _____ Survey Rqsted? _____
	NoR / NoF / NoE / Std / Sub Let _____ Log out _____	#Com _____
		Related ERDB# _____

NATURAL HERITAGE INFORMATION SYSTEM (NHIS) DATA REQUEST FORM

Please read the instructions on page 3 before filling out the form. Thank you!

WHO IS REQUESTING THE INFORMATION?

■ Mr. ☐ Ms.

Name and Title: Dan Litchfield, Senior Manager, Project Development

Agency/Company: Freeborn Wind Energy LLC

Mailing Address: One South Wacker Drive, Suite 1800, Chicago, IL 60606
(Street) (City) (State) (Zip Code)

Phone: 312-582-1057 e-mail: dlitchfield@invenergyllc.com

Responses will be sent via email. If you prefer US Mail check here: ☐

THIS INFORMATION IS BEING REQUESTED FOR A:

☐ Federal EA ☐ State EAW ☑ PUC Site or Route Application ☐ Watershed Plan ☐ BER
☐ Federal EIS ☐ State EIS ☐ Local Government Permit ☐ Research Project
☐ NEPA Checklist ☐ Other (describe) _____

☐ Check here if this project is funded through any of the following grant programs: Lessard-Sams Outdoor Heritage Council (L-SOHC), Conservation Partners Legacy (CPL), or Legislative-Citizen Commission on Minnesota Resources (LCCMR).

INFORMATION WE NEED FROM YOU:

1) **Enclose a map** of the project boundary/area of interest (topographic maps or aerial photos are preferred).
2) Please **provide a GIS shapefile*** (NAD 83, UTM Zone 15N) of the project boundary/area of interest.
3) List the following locational information* (attach additional sheets if necessary):

For Agency Use: TRS Confirmed ☐

For Agency Use: Region / MCBS Status	County	Township #	Range #	Section(s) (please list **all** sections)
	Freeborn	101N	20W	7,8,16,17,21,25,26,27,28,35,36

4) Please provide the following information (attach additional sheets if necessary):

Project Name: Freeborn Wind Farm to Glenworth Substation Project

Project Proposer: Freeborn Wind Energy LLC

Description of Project (including types of disturbance anticipated from the project):

The Project involves construction and operation of a new approximately seven-mile long 161 kilovolt (kV) high voltage transmission line (HVTL) and associated structures (poles) beginning at the proposed Freeborn Wind Farm Project Substation (Project Substation) located in Freeborn County, MN and extending northwest to the existing Glenworth Substation located just southeast of Glenville, MN, and modification of associated transmission interconnection facilities located within the existing Glenworth Substation. Types of potential Project disturbance include grading/ excavating to install transmission poles and to create temporary access roads (to pole locations), and overhead crossings over roads, the Shell Rock river, and existing resources (see map).

* Please see the instructions on page 3.

Describe the existing land use of the project site. What types of land cover / habitat will be impacted by the proposed project? The Project is located entirely within Freeborn County and Shell Rock Township and the Project area is predominately used for agricultural purposes. The Project Route width/ buffer (125 ft) includes cultivated crops (~95.58 ac); developed/open space (~39.46 ac); emergent herbaceous wetlands (~6.87 ac); developed, low intensity (~2.53 ac); grassland/herbaceous (~0.33 ac); and open water (~ 0.01 ac). However, the Project right-of-way is only proposed to be up to 80 feet in width, which is much less than the Route width/buffer used in the Route Permit Application for the Project, so not all resources in the vicinity of the project will be temporarily impacted, let alone permanently impacted.

List any waterbodies (e.g., rivers, intermittent streams, lakes, wetlands) that may be affected by the proposed project, and discuss how they may be impacted (e.g., dewatering, discharge, riverbed disturbance).

The Project will cross over the Shell Rock River and associated wetlands/floodplains. A few unnamed waterways and drainage ditches may also be crossed by the Project. A wetland delineation will be completed prior to construction to avoid impacts to waters to the greatest extent practicable by placing poles in uplands. If a feature cannot be avoided, the Applicant will obtain the applicable permits/approvals and use best management practices (BMPs) to minimize potential impacts.

Does the project have the potential to affect any groundwater resources (e.g., groundwater appropriation, change in recharge, or contamination)?

No.

To your knowledge, has the project undergone a previous Natural Heritage review? If so, please list the correspondence #: ERDB # NA. How does this request differ from the previous request (e.g., change in scope, change in boundary, project being revived, project expansion, different phase)?

No

To your knowledge, have any native plant community or rare species surveys been conducted within the site? If so, please list: Yes, on-site habitat and native prairie assessments, natural heritage database request from MNDNR, Minnesota county biological survey for Freeborn County.

List any DNR Permits or Licenses that you will be applying for or have already applied for as part of this project:

License to Cross Public Waters, Public Waters Work Permit (to be applied for in the future).

INFORMATION WE PROVIDE TO YOU:

1) The response will include a Natural Heritage letter. If applicable, the letter will discuss potential effects to rare features.

☐ Check here if you are interested in a list of rare features in the vicinity of the area of interest but you do **not** need a review of potential effects to rare features. Please list the reason a review is not needed:

2) Depending on the results of the query or review, the response may include an Index Report of known aggregation sites and known occurrences of federally and state-listed plants and animals* within an approximate one-mile radius of the project boundary/area of interest. The Index Report and Natural Heritage letter can be included in any public environmental review document.

3) A Detailed Report that contains more information on each occurrence may also be requested. Please note that the Detailed Report may contain specific location information that is protected under *Minnesota Statutes*, section 84.0872, subd. 2, and, as such, the Detailed Report may not be included in any public document (e.g., an EAW).

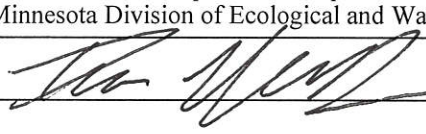
☑ Check here if you would like to request a Detailed Report. Please note that if the results of the review are 'No Effects' or a standard comment, a Detailed Report may not be available.

FEES / TURNAROUND TIME

There is a fee* for this service. Requests generally take **3-4 weeks** from date of receipt to process, and are processed in the order received.

I have read the entire form and instructions, and the information supplied above is complete and accurate. I understand that material supplied to me from the Natural Heritage Information System is copyrighted and that I am not permitted to reproduce or publish any of this copyrighted material without prior written permission from the DNR. Further, if permission to publish is given, I understand that I must credit the Minnesota Division of Ecological and Water Resources, Minnesota Department of Natural Resources, as the source of the material.

Signature (**required**)	Note: Digital signatures representing the name of a person shall be sufficient to show that such person has signed this document.



Mail or email completed form to:

Lisa Joyal, Endangered Species Review Coordinator
Division of Ecological and Water Resources
Minnesota Department of Natural Resources
500 Lafayette Road, Box 25
St. Paul, Minnesota 55155
Review.NHIS@state.mn.us

Form is available at
http://files.dnr.state.mn.us/eco/nhnrp/nhis_data_request.pdf

Revised March 2, 2012

* Please see the instructions on page 3.

Glenville
Glenworth Substation
T101 R20W SEC. 7
T101 R20W SEC. 8
T101 R20W SEC. 9
T101 R20W SEC. 10
T101 R20W SEC. 11
T101 R20W SEC. 12
RIVER RD
140TH ST
795TH AVE
T101 R20W SEC. 18
T101 R20W SEC. 17
T101 R20W SEC. 16
T101 R20W SEC. 15
T101 R20W SEC. 14
T101 R20W SEC. 13
130TH ST
T101 R20W SEC. 19
T101 R20W SEC. 20
T101 R20W SEC. 21
T101 R20W SEC. 22
T101 R20W SEC. 23
T101 R20W SEC. 24
65
810TH AVE
820TH AVE
Shell Rock Township
COUNTY ROAD 108/830TH AVE
840TH AVE
UNION PACIFIC RAILROAD
800TH AVE
120TH ST
T101 R20W SEC. 29
T101 R20W SEC. 28
T101 R20W SEC. 27
T101 R20W SEC. 26
T101 R20W SEC. 25
T101 R20W SEC. 30
110TH ST
T101 R20W SEC. 31
T101 R20W SEC. 32
T101 R20W SEC. 33
T101 R20W SEC. 34
T101 R20W SEC. 35
T101 R20W SEC. 36
Freeborn Wind Farm
O&M and Project Substation

0 1,000 2,000 Feet

1 inch = 2,000 feet

Imagery Source: 2015 Color FSA
Data Source: Invenergy, MN DOT, MN DNR, Census, Freeborn County

- Existing Substation
- Proposed Route Width
- Section Boundary
- City/Township Boundary

Existing Transmission Line

- 69 kV
- 161 kV

Project Overview

Freeborn Wind Farm to Glenworth Substation

Transmission Line Route Permit Application

Freeborn County, MN

FREEBORN WIND FARM

Emerjent

For Environmental Review Purposes Only

Source: Z:\Clients_LI\Invenergy\Freeborn_Wind_Farm_Project\Permitting\StateHVTL_Route_Permit\Mapping\Internal_Figures\Project_Overview_Map_for_NHIS_Request.mxd
Date: (7/27/2017)

From: MN_NHIS, Review (DNR) [mailto:Review.NHIS@state.mn.us]
Sent: Monday, July 31, 2017 10:50 AM
To: Litchfield, Daniel <DLitchfield@invenergyllc.com>
Subject: Automatic reply: Freeborn Wind Energy Transmission line review

We have received your NHIS Data Request Form. Please check that you have signed the form and have submitted a map. Incomplete requests will be delayed.

The response will go out approximately four weeks after we have received all of the required information. If you have not received a response after four weeks, please feel free to contact Samantha Bump (samantha.bump@state.mn.us or 651-259-5091). Do not send status inquiries to the Review.NHIS email address.

Thank you,

Lisa Joyal
NHIS Review Coordinator

Samantha Bump
NHIS Review Specialist

Melissa Doperalski
NHIS Review Specialist

Appendix D

Agency Responses

Joe Sedarski

From: Mixon, Kevin (DNR) <kevin.mixon@state.mn.us>
Sent: Wednesday, May 17, 2017 1:55 PM
To: Litchfield, Daniel
Subject: RE: Freeborn LWECS

Dan:

I took a quick look at the proposed transmission line route. You will need a MNDNR utility license to cross the Shell Rock River and we will require avian flight diverters at that crossing. Please contact Karla Ihns at 507-359-6072 if you have any questions about the license process.

South of the Glenwood Station there is a moderate site of biodiversity significance. To receive information regarding rare features and species in the vicinity of the proposed project, submit a completed NHIS data request form (http://files.dnr.state.mn.us/eco/nhnrp/nhis_data_request.pdf). The Natural Heritage review will identify known occurrences of rare plants, animals, and native plant communities in the vicinity of the project boundary. Please contact Lisa Joyal, Endangered Species Review Coordinator, at 651-259-5109 if you have questions about the NHIS review process.

Thanks

From: Litchfield, Daniel [mailto:DLitchfield@invenergyllc.com]
Sent: Wednesday, April 05, 2017 3:22 PM
To: Mixon, Kevin (DNR) <kevin.mixon@state.mn.us>; Warzecha, Cynthia (DNR) <cynthia.warzecha@state.mn.us>
Cc: Svedeman, Michael <MSvedeman@invenergyllc.com>; Joe Sedarski <jsedarski@merjent.com>; Coppinger, Karyn <KCoppinger@invenergyllc.com>
Subject: RE: Freeborn LWECS

Hi Kevin and Cynthia,

You both asked for shape files and I can get you the project boundary probably Monday and turbine and other facilities layouts in May. Yes we modified our boundary: we shrunk it. I hope this isn't a problem and expect, from your perspective, less impact is better. Andrea is out of the country at the moment but she can get in touch with you upon her return and I'll see about getting you shapefiles sooner.

Dan Litchfield | Senior Manager, Project Development
Invenergy | One South Wacker Drive, Suite 1800, Chicago, IL 60606
dlitchfield@invenergyllc.com | M 312-224-1400 | D 312-582-1057 | C 773-318-1289 | @InvenergyLLC
@danlitch

From: Mixon, Kevin (DNR) [mailto:kevin.mixon@state.mn.us]
Sent: Wednesday, April 05, 2017 10:49 AM
To: Litchfield, Daniel <DLitchfield@invenergyllc.com>
Subject: Freeborn LWECS

Dan:

I received your letter dated March 31, 2017 concerning the Freeborn LWECS. The project boundary is significantly different than what we commented on in our February 21, 2017 letter. Please send the shapefiles for the new project boundary along with the turbine layout, crane paths, collector lines etc., if available. We will review the revised project boundary and provide comments in the near future.

Thanks!

DEPARTMENT OF THE ARMY
ST. PAUL DISTRICT, CORPS OF ENGINEERS
180 FIFTH STREET EAST, SUITE 700
ST. PAUL, MN 55101-1678

REPLY TO ATTENTION OF
REGULATORY BRANCH

MAY 22 2017

Regulatory File No. MVP-2017-01437-JTB

Dan Litchfield
Freeborn Wind Energy LLC
c/o Invenergy LLC
One South Wacker Drive, Suite 1800
Chicago, Illinois 60606

Dear Mr. Litchfield:

We have received the document entitled "Freeborn Wind Energy Proposed Transmission Line Project" dated April 27, 2017, seeking input for the construction of an seven-mile long 161 kilovolt transmission line. The purpose of this letter is to inform you that based on available information a Department of the Army (DA) permit may be required for your proposed activity. This letter also provides general information regarding the U.S. Army Corps of Engineers (Corps) regulatory program.

If the proposal involves activity in navigable waters of the United States, it may be subject to the Corps of Engineers' jurisdiction under Section 10 of the Rivers and Harbors Act of 1899 (Section 10). Section 10 prohibits the construction, excavation, or deposition of materials in, over, or under navigable waters of the United States, or any work that would affect the course, location, condition, or capacity of those waters, unless the work has been authorized by a Department of the Army permit.

If the proposal involves discharge of dredged or fill material into waters of the United States, it may be subject to the Corps of Engineers' jurisdiction under Section 404 of the Clean Water Act (CWA Section 404). Waters of the United States include navigable waters, their tributaries, and adjacent wetlands (33 CFR § 328.3). CWA Section 301(a) prohibits discharges of dredged or fill material into waters of the United States, unless the work has been authorized by a Department of the Army permit under Section 404. Information about the Corps permitting process can be obtained online at http://www.mvp.usace.army.mil/regulatory.

The Corps evaluation of a Section 10 and/or a Section 404 permit application involves multiple analyses, including (1) evaluating the proposal's impacts in accordance with the National Environmental Policy Act (NEPA) (33 CFR part 325), (2) determining whether the proposal is contrary to the public interest (33 CFR § 320.4), and (3) in the case of a Section 404 permit, determining whether the proposal complies with the Section 404(b)(1) Guidelines (Guidelines) (40 CFR part 230).

If the proposal requires a Section 404 permit application, the Guidelines specifically require that "no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences" (40 CFR § 230.10(a)). Time and money spent on the proposal prior to applying for a Section 404 permit cannot be factored into the Corps' decision whether there is a less damaging practicable alternative to the proposal.

If an application for a Corps permit has not yet been submitted, the project proposer may request a pre-application consultation meeting with the Corps to obtain information regarding the data, studies or other information that will be necessary for the permit evaluation process. A pre-application consultation meeting is strongly recommended if the proposal has substantial impacts to waters of the United States, or if it is a large or controversial project.

If you have any questions, please contact me in our St. Paul office by phone at (651) 290-5446 or by email at Justin.T.Berndt@usace.army.mil. In any correspondence or inquiries, please refer to the Regulatory file number shown above.

Sincerely,

Justin Berndt
Project Manager

Minnesota Historical Society

Using the Power of History to Transform Lives
PRESERVING › SHARING › CONNECTING

MINNESOTA HISTORIC PRESERVATION OFFICE

May 26, 2017

Mr. Dan Litchfield
Freeborn Wind Energy
c/o Invenergy LLC
One South Wacker Dr, Suite 1800'
Chicago, IL 60606

RE: Freeborn Wind Energy (Invenergy) to construct a 7-mile 161 kV transmission line from the project substation in Shell Rock Township to Glenworth Substation
Shell Rock Twp., Freeborn County
SHPO Number: 2017-1835

Dear Mr. Litchfield:

Thank you for the opportunity to review and comment on the above project. It has been reviewed pursuant to the responsibilities given the Minnesota Historical Society by the Minnesota Historic Sites Act and the Minnesota Field Archaeology Act.

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 affected by this project.

Please note that this comment letter does not address the requirements of Section 106 of the National Historic Preservation Act of 1966 and 36 CFR § 800. If this project is considered for federal financial assistance, or requires a federal permit or license, then review and consultation with our office will need to be initiated by the lead federal agency. Be advised that comments and recommendations provided by our office for this state-level review may differ from findings and determinations made by the federal agency as part of review and consultation under Section 106.

Please contact our Compliance Section at (651) 259-3455 if you have any questions regarding our review of this project.

Sincerely,

Sarah J. Beimers

Sarah J. Beimers, Manager
Government Programs and Compliance

From: Johnson, Scott M (DOT)
To: Litchfield, Daniel
Cc: Kotch Egstad, Stacy (DOT)
Subject: Freeborn Wind Energy Proposed Transmission Line Project
Date: Thursday, July 6, 2017 8:48:26 AM

Dan:

Good morning. My name is Scott Johnson with the Minnesota Department of Transportation in the Owatonna office. I am the Roadway Regulations Supervisor for the District 6B area of which Rochester is the main office.

I am contacting you today in regards to the proposed transmission line from the Freeborn Wind Farm. Would there happen to be more detailed information regarding the location of the transmission line as to our roadway right of way that indicates distance from our centerline of TH 65 along with the distance of paralleling the TH 65 roadway? Will there be a need to enter our right of way for purposes other than the construction of the transmission line?

Dan, thank you for your time and information.

Sincerely,

Scott M. Johnson
Roadway Regulations Supervisor
MnDOT, District 6B / Permits
1010 21st Avenue NW Owatonna, MN 55060
Office: 507-446-5505
Cell : 507-456-5347
Fax : 507-455-5848
scott.m.johnson@state.mn.us

From:	Joe Sedarski
To:	Diana Richards
Subject:	FW: Freeborn Wind Energy Proposed Transmission Line Project
Date:	Friday, July 28, 2017 1:25:55 PM
Attachments:	FREEBORN_DATA_FOR_MNDOT_20170728.zip Freeborn_Wind_Response_to_MNDOT.PDF

From: Litchfield, Daniel [mailto:DLitchfield@invenergyllc.com]
Sent: Friday, July 28, 2017 11:26 AM
To: Johnson, Scott M (DOT) <scott.m.johnson@state.mn.us>
Subject: RE: Freeborn Wind Energy Proposed Transmission Line Project

Good morning Scott,

We appreciate your review of the Freeborn Wind Transmission Project. Attached to this email is additional detailed information regarding the proposed transmission line centerline, right-of-way, route width and preliminary pole locations for your further review and comment (shapefiles and pdf). This also includes the TH 65 ROW we had surveyed on the east side of the road. We've also include some measurements from the TH 65 centerline to the proposed transmission line centerline.

Depending upon final placement of poles and conductors, and besides construction access, there may be a potential need to access MnDOT right-of-way for operation and maintenance purposes in the future.

Please let us know if any questions or comments on the attached information and this response. We look forward to continuing to work with MnDOT on this Project.

Sincerely,
Dan

Dan Litchfield | Senior Manager, Project Development
Invenergy | One South Wacker Drive, Suite 1800, Chicago, IL 60606
dlitchfield@invenergyllc.com | M 312-224-1400 | D 312-582-1057 | C 773-318-1289 |
@InvenergyLLC @danlitch

From: Johnson, Scott M (DOT) [mailto:scott.m.johnson@state.mn.us]
Sent: Monday, July 10, 2017 10:16 AM
To: Litchfield, Daniel <DLitchfield@invenergyllc.com>
Subject: RE: Freeborn Wind Energy Proposed Transmission Line Project

Dan:

Good morning. The TH stands for Trunk Highway. I have attached in this e-mail the location of our right of way maps with some guidance on how to maneuver in this link. Hopefully I will not get you lost.

http://www.dot.state.mn.us/maps/gisweb/row/ is the ROW link.

Go to Access to map. Click the box that states " I accept these conditions". Click on Right of Way Mapping and Monitoring Application under Launch Right of Way Mapping and Monitoring Application. Then click on Access the Site. Zoom in on the Highway you are looking for and go to the tool bar on top and hit the Link box and right click your mouse over the area the right of way map section you want and the right of way map number will pop up. Click on the View ROW in AutoVue.

Please contact me with any questions that you may have.

Sincerely,

Scott M. Johnson
Roadway Regulations Supervisor
MnDOT, District 6B / Permits
1010 21st Avenue NW Owatonna, MN 55060
Office: 507-446-5505
Cell : 507-456-5347
Fax : 507-455-5848
scott.m.johnson@state.mn.us

From: Litchfield, Daniel [mailto:DLitchfield@invenergyllc.com]
Sent: Friday, July 07, 2017 9:06 AM
To: Johnson, Scott M (DOT) <scott.m.johnson@state.mn.us>
Cc: Kotch Egstad, Stacy (DOT) <stacy.kotch@state.mn.us>
Subject: RE: Freeborn Wind Energy Proposed Transmission Line Project

Good morning Mr. Johnson,

We are still finalizing the design for the portion of the transmission line along Highway 65. The plan for now is to avoid the ROW completely, as we have private easements east of the ROW. At the moment we are trying to complete our survey of exactly where that ROW is, so we can complete the design of the transmission line for permitting purposes. Would you happen to have shape files or other electronic files we might use for our design? The segment in question is sections 7, 8 and 17 (mostly 8 and 17) of Shell Rock Township, T101N, R20W.

For my future information, what does the abbreviation "TH" mean in "TH 65?"

Sincerely,

Dan Litchfield | Senior Manager, Project Development
Invenergy | One South Wacker Drive, Suite 1800, Chicago, IL 60606
dlitchfield@invenergyllc.com | M 312-224-1400 | D 312-582-1057 | C 773-318-1289 |
@InvenergyLLC @danlitch

From: Johnson, Scott M (DOT) [mailto:scott.m.johnson@state.mn.us]
Sent: Thursday, July 06, 2017 8:48 AM
To: Litchfield, Daniel <DLitchfield@invenergyllc.com>
Cc: Kotch Egstad, Stacy (DOT) <stacy.kotch@state.mn.us>
Subject: Freeborn Wind Energy Proposed Transmission Line Project

Dan:

Good morning. My name is Scott Johnson with the Minnesota Department of Transportation in the Owatonna office. I am the Roadway Regulations Supervisor for the District 6B area of which Rochester is the main office.

I am contacting you today in regards to the proposed transmission line from the Freeborn Wind Farm. Would there happen to be more detailed information regarding the location of the transmission line as to our roadway right of way that indicates distance from our centerline of TH 65 along with the distance of paralleling the TH 65 roadway? Will there be a need to enter our right of way for purposes other than the construction of the transmission line?

Dan, thank you for your time and information.

Sincerely,

Scott M. Johnson
Roadway Regulations Supervisor
MnDOT, District 6B / Permits
1010 21st Avenue NW Owatonna, MN 55060
Office: 507-446-5505
Cell : 507-456-5347
Fax : 507-455-5848
scott.m.johnson@state.mn.us

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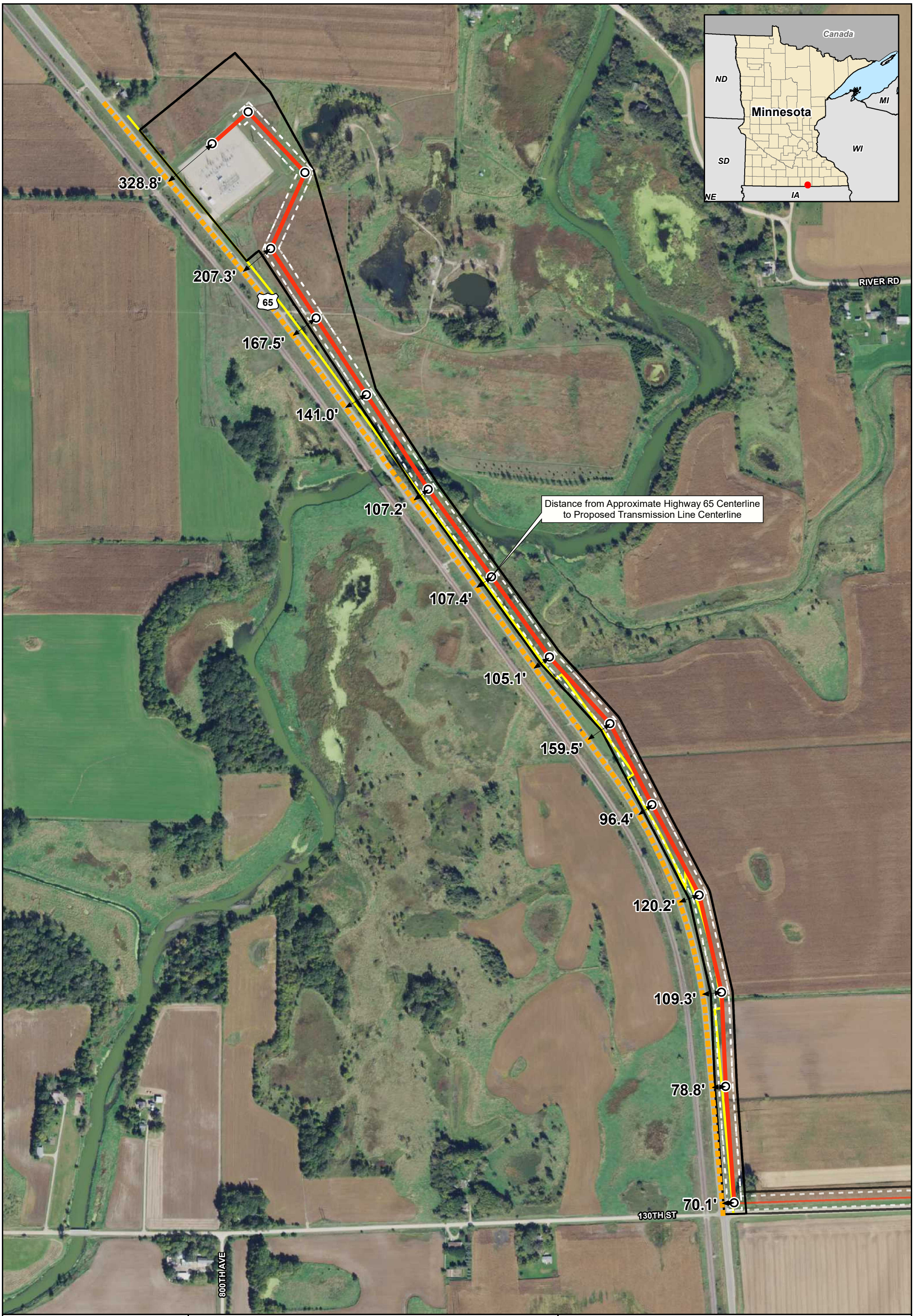

FREEBORN WIND FARM

merjent

0 250 500 Feet

1 inch = 500 feet

Imagery Source: 2015 Color FSA
Data Source: Invenergy, Olsson and Associates, Census

For Environmental Review Purposes Only

Freeborn Wind Response to MNDOT

Freeborn Wind Farm to Glenworth Substation

Freeborn County, Minnesota

July 28, 2017

- Preliminary Proposed Structure Location
- Proposed 161kV Transmission Line Centerline
- TH 65 Survey Boundary (Olsson and Associates 7/14/2017)
- Approximate Highway 65 Centerline
- Proposed Right-of-Way
- Proposed Route Width

Source: Z:\Clients\I_LI\Invenergy\Freeborn_Wind_Farm_Project\Permitting\StateHVTL_Route_Permit\Mapping\Response_to_MN_DOT\Freeborn_Wind_Response_to_MNDOT.mxd

Date: (7/28/2017)

Appendix E

Landowner List

Parcel No	Owner Name
020270030	Thomas F & Linda E Lorenzen, Thomas F. Lorenzen Trust, Linda E. Lorenzen Trust
020360030	Kevin D. Linn Decsendant Trust
020360031	Chad M. Anderson
020260060	Marvin R. Anderson Discl Trust, c/o Arlynn E. Anderson
020260030	Steven P. & Leann Anderson
020270011	Paul S. Anderson
020350010	Valerie J. Cipra
020260010	Paul S. Anderson
020250020	Raymond W. & Lydia J. Mittag
020280010	Marjory A. Hamersly Trust
020250050	Steven P. & Leann Anderson
020270040	Thomas F & Linda E Lorenzen, Thomas F. Lorenzen Trust, Linda E. Lorenzen Trust
020250051	Paul S. Anderson
020270070	Marvin R. Anderson Discl Trust and Arlynn E. Anderson Revocable Trust c/o Arlynn E. Anderson
020270080	Marvin R. Anderson Discl Trust and Arlynn E. Anderson Revocable Trust c/o Arlynn E. Anderson
020270010	Chad M. Anderson
020260012	Paul S. Anderson
020250040	Steven P. & Leann Anderson
020280021	Mellinger Farms
020270020	Dale & Irma Wallin Trust
020170060	Marion A Follmuth Family Trust c/o Patricia Crane
020200010	H. Elvin Erdahl
020160061	Rodger J. & Lisa A. Baseman
020210010	Diane Jacobson Knutson Trust
020170020	Valerie J. Cipra
020210090	Wesley L. Webb
020260090	Robert F. & Donna L. Baley
020210030	Winston C. Hamersly Trust
020160050	Marion A. Follmuth Family Trust c/o Patricia Crane
020210040	Harry W. Attig Rev Living Trust and Louise Attig Rev Liv Trust
020210080	Harry W. Attig Rev Living Trust and Louise Attig Rev Liv Trust
020210050	John P. Attig and Jodi S. Attig
020210021	Edward G. Hannssen Trust
020210041	Paul D. and Imogene L. Woodhouse
020270021	Lawrence Peter Schroer Jr. & Tracey E. Schroer
020170071	Timothy D. Hauge and Kimberly A. Hengesteg
020260080	Adams Grain Co
020070043	ITC Midwest, LLC
020080072	ITC Midwest, LLC
020080070	Michael & Jacqueline Bjorklund
020170012	Michael & Jacqueline Bjorklund
020070041	Michael & Jacqueline Bjorklund
020170010	Lowell Nelson
020260020	Paul S. Anderson
020170040	State Of Minnesota, DNR Div of Lands & Minerals
276000520	Terrence L. & Laurie J. Nelson
020070070	Terrence L. & Laurie J. Nelson
276000530	Terrence L. & Laurie J. Nelson
020080130	Terrence L. & Laurie J. Nelson
020080080	Daniel J. & Kristy A Minear
020250052	Steven P. & Leann Anderson
020270041	Douglas Downs Jr. & Vanese Kenaston
020260011	Dennis R. Oquist and Brenda S Bangs
020270031	Mark A. Hanson & Jeannie Allen
020200013	Jason K. Schumaker And Sarah Schumaker
020070080	Dustin J. and Amy M. Schwering
020070020	Roni D. Vanriper
020070010	Linda F. Wallin
020170050	Brenda N Tews et al. c/o Brenda Christianson
020180010	Allen Knack
020070042	Allen Knack
020170011	Allen Knack
020200120	Judy Christensen
020200110	William K. and Judith K. Miller□
020210020	Edward G. Hannssen Trust
020210011	Diane Jacobson Knutson Trust

Appendix F

Draft Avian and Bat Protection Plan

Avian and Bat Protection Plan
Freeborn Wind Farm
Freeborn County, Minnesota and Worth County, Iowa

Draft Report

Prepared for

Freeborn Wind Energy LLC

One South Wacker Dr, Ste 1800
Chicago, IL 60606

Prepared by:

Western EcoSystems Technology, Inc.

1710 Douglas Drive, Suite 283
Golden Valley, Minnesota 55422

May 10, 2017

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1 INTRODUCTION

Freeborn Wind Energy LLC (Freeborn) is proposing to develop, construct and operate the 200-megawatt (MW) Freeborn Wind Farm (Project) in Freeborn County, Minnesota and Worth County, Iowa (Figure 1.1). The Project area is approximately 19,127 hectares (ha; 47,263 acres [ac]). The proposed Project consists of several components, including up to 100 Vestas V116 and V110 2.0-MW wind turbines, access roads, transmission and communication equipment, storage areas, and control facilities. Construction of the Project is scheduled to begin in 2020.

Environmental surveys of the Project area commenced in December 2014. An area larger than the final Project area was studied to give the developer the flexibility to site the Project facilities away from high value environmental areas. The total area studied (Study area) is 38,602 ha (95,387 ac) (Figure 1.2). The first round of studies was conducted in Freeborn County, Minnesota from December 2014 - March 2016 (first year study area). Due to interest in expanding the Project area to the east and south, studies were continued in an expanded area from October 2016 - September 2017 (second year study area) (Figure 1.3).

1.1 Background

The Project is being developed under a purchase and sale agreement. Freeborn, a subsidiary of Invenergy LLC is the Project developer and will turn the project over to Northern States Power Company – Minnesota, dba Xcel Energy (NSPM) to construct and operate the Project.

Freeborn completed Tier 1, 2, and 3 wildlife studies consistent with the 2012 Land-Based Wind Energy Guidelines (WEG; U.S. Fish and Wildlife Service [USFWS] 2012), which correspond to stages 1 and 2 of the 2013 Eagle Conservation Plan Guidance (ECPG; USFWS 2013), and the Minnesota Department of Natural Resources (MNDNR) Guidance for Commercial Wind Energy Projects (MNDNR Guidance, MNDNR 2011) and MNDNR Avian and Bat Survey Protocols for Large Wind Energy Conversion Systems in Minnesota (MNDNR Protocols, Mixon et al. 2014). Freeborn will conduct Tier 4 WEG studies (corresponding to stage 5 of the ECPG, the MNDNR Guidance, and the MNDNR Protocols) in the Project area once the Project is operational.

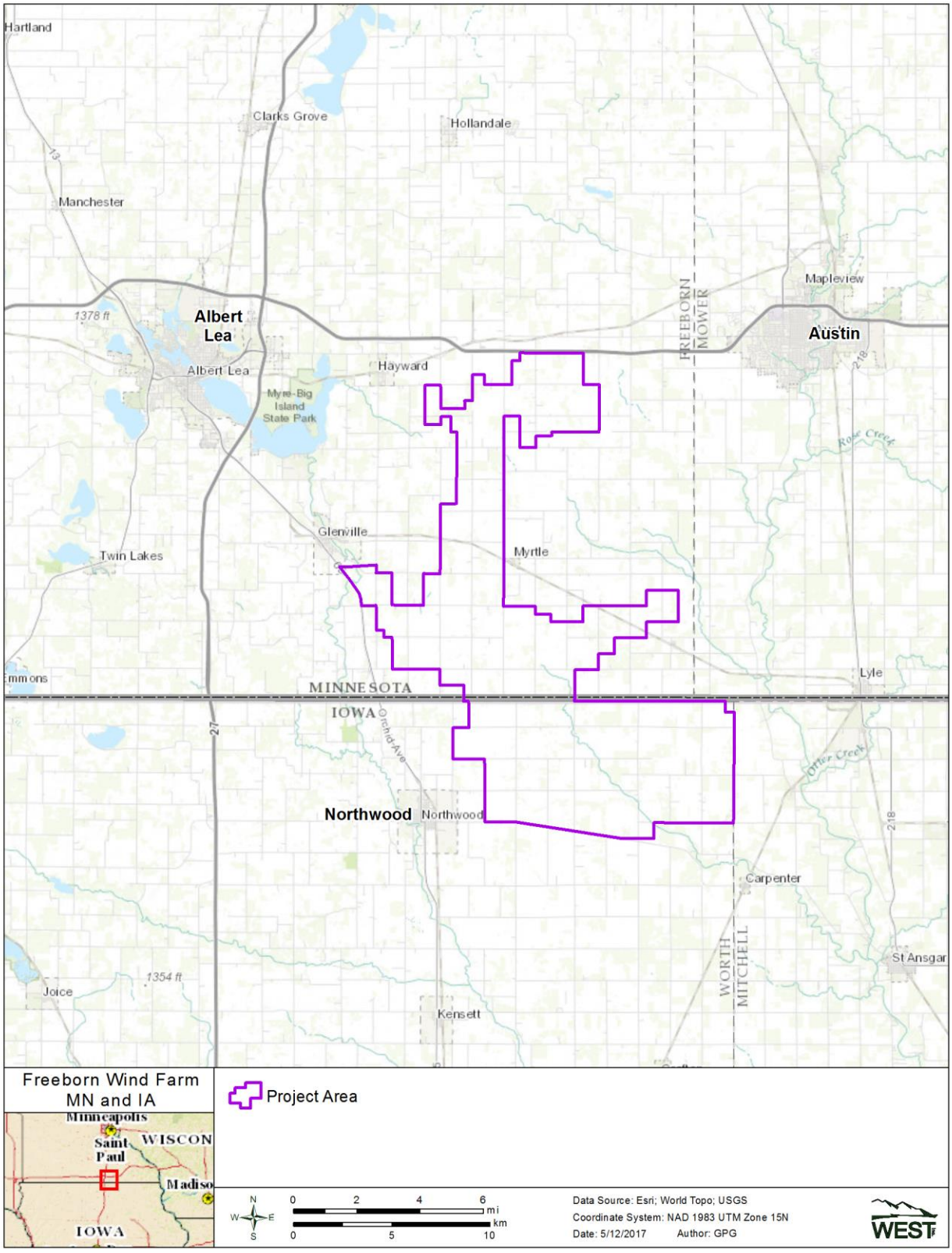


Figure 1.1 Freeborn Wind Farm Project area in Freeborn County, Minnesota and Worth County, Iowa.

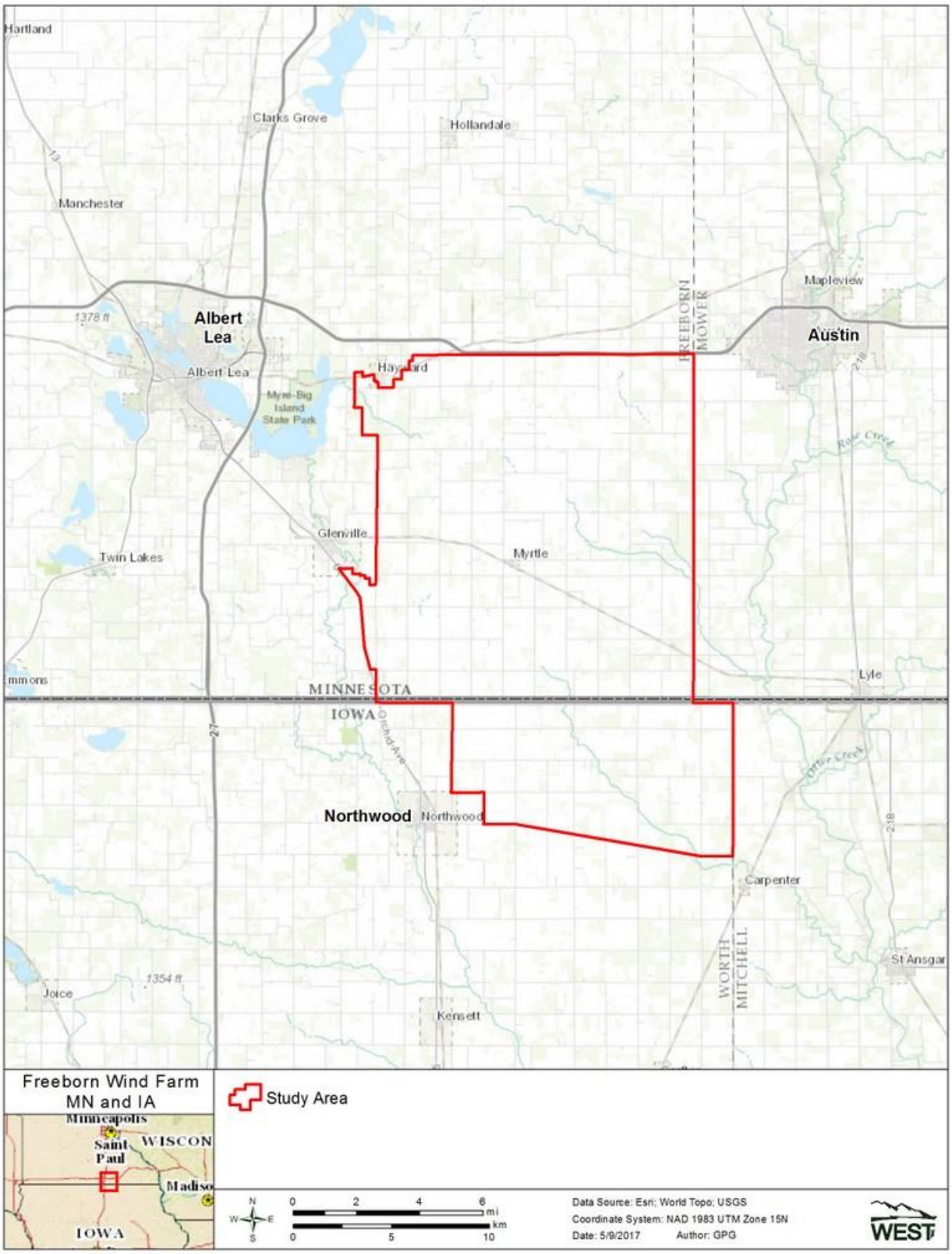


Figure 1.2 Freeborn Wind Farm Study area in Freeborn County, Minnesota and Worth County, Iowa.

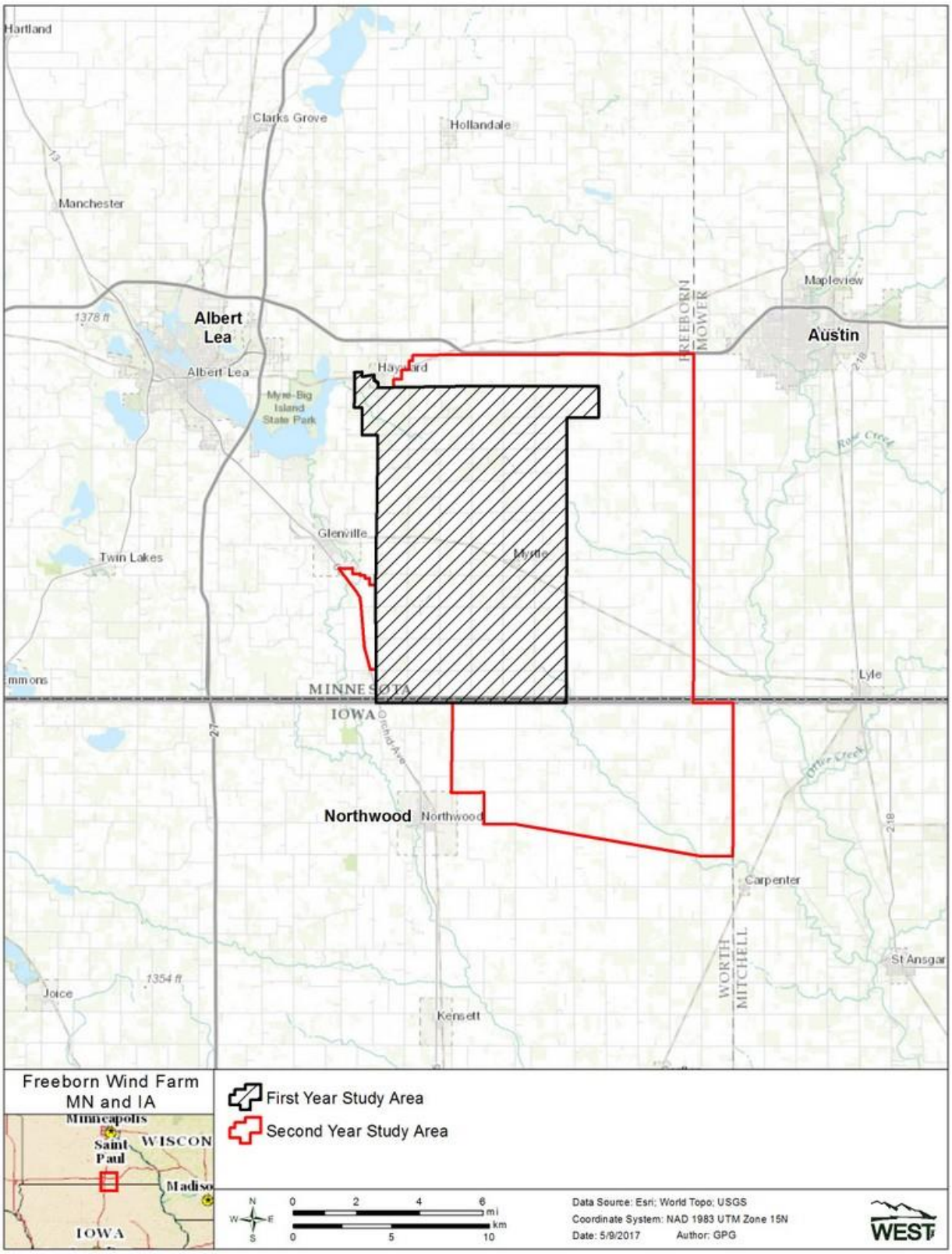


Figure 1.3 Freeborn Wind Farm first year study area and second year study area in Freeborn County, Minnesota and Worth County, Iowa.

1.2 Purpose and Objectives

The objectives of the Freeborn ABPP are as follows:

1) Document the results of the Project's habitat evaluation and wildlife surveys and its progression through the WEG assessments, ECPG assessments, and agency consultation.
2) Identify measures that, when implemented during construction, operation, maintenance, and decommissioning of the Project, will avoid and minimize potential impacts to birds and bats.
3) Describe post-construction monitoring and adaptive management procedures.

This ABPP is a living document that will evolve throughout the life of the Project as needed in response to changing conditions. The document is also labeled as a draft because once all pre-construction wildlife surveys are completed in fall 2017, it will be updated with survey results.

1.3 Project Facilities

The 200-MW Project will consist of up to 100 Vestas V116 and V110 wind turbines and associated facilities. The wind turbine generators will be supported by 80-meter (m; 262-foot [ft]), three-section tubular towers with 110-m-diamater (361-ft-diameter) or 116-m–diameter (381-ft-diameter) rotors. Support facilities will include step-up transformers, underground communication cables and 34.5-kilovolt (kV) electric power collection lines, permanent meteorological (met) towers, a 11- to 14.5- kilometer (km; 7- to 9.0- mile [mi]) 161 kV overhead transmission line, a 34.5/161-kV substation, a switchyard, an operations and maintenance (O&M) building, and other ancillary facilities or structures.

1.4 Regulatory Framework

1.4.1 Endangered Species Act

The federal Endangered Species Act (ESA) of 1973 (16 U.S. Code [U.S.C.] §§ 1531 *et seq*.) provides for the listing, conservation, and recovery of endangered and threatened species. The USFWS implements the ESA to conserve terrestrial species and resident fish species. Section 9 of the ESA prohibits the unauthorized take of listed species. Under the ESA, "take" is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" a listed species (ESA § 3(19), 16 U.S.C 1532(19)). The term "harm" has been further defined in agency regulations to mean habitat modification that actually kills or injures a federally listed species.

Northern long-eared bat (*Myotis septentrionalis*) is the only ESA-listed species reported by the USFWS as potentially occurring in the Study area (USFWS 2015b). The final 4(d) rule published

January 14, 2016 (81 FR 1900)[1], exempts all incidental take of northern long-eared bats from otherwise lawful activities, including operation of wind turbines, from take prohibitions under Section 9 of the ESA.

1.4.2 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA; 16 U.S.C. §§ 703-711) prohibits the take of migratory birds, their eggs, parts, and nests, except when specifically permitted by regulations. Under the MBTA, "take" is defined as "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect" (50 Code of Federal Regulations [CFR] § 10.12). The USFWS maintains a list of all species protected by the MBTA at 50 CFR § 10.13. This list includes over 1,000 species of migratory birds including eagles and other raptors, waterfowl, shorebirds, seabirds, wading birds, and passerines. At present, there is no MBTA permit authorizing the incidental or non-purposeful take of an MBTA-protected species.

1.4.3 Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (BGEPA; 16 U.S.C. §§ 668-668d) prohibits the take of bald (*Haliaeetus leucocephalus*) and golden (*Aquila chrysaetos*) eagles unless authorized by a permit. Under the BGEPA, take is defined as "…to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, or molest or disturb" (50 CFR § 22.3). The term "disturb" is defined as "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available: (1) injury to an eagle; (2) a decrease in its productivity by substantially interfering with normal breeding, feeding, or sheltering behavior; or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior" (50 CFR § 22.3).

BGEPA authorizes the Secretary of the Interior to permit the take of bald or golden eagles for several defined purposes, including when "necessary to permit the taking of such eagles for the protection of wildlife […] or other interests in any particular locality." Based on this authority, the USFWS published a final rule (Eagle Permit Rule) on September 11, 2009 (50 CFR § 22.26), authorizing permits for the take of bald eagles and golden eagles where take: (1) is compatible with the preservation of the bald and golden eagle; (2) is associated with and not the purpose of an otherwise lawful activity; and (3) cannot practicably be avoided.

[1] The final 4(d) rule published January 14, 2016 (81 FR 1900), exempts all incidental take of northern long-eared bats from otherwise lawful activities from take prohibitions under Section 9 of the ESA, except: take of northern long-eared bats in their hibernacula in areas affected by white-nose syndrome, take resulting from tree removal within 0.4 km (0.25 mi) of a known northern long-eared bat hibernaculum, and take resulting from removal of a known northern long-eared bat maternity roost tree or tree removal within a 45-meter [m] (150-foot [ft]) radius of a known northern long-eared bat maternity roost tree during the pup season (from June 1–July 31). Incidental take resulting from hazard tree removal for protection of human life and property is exempt from take prohibitions, regardless of where and when it occurs.

On May 2, 2013, the USFWS published the ECPG to assist wind energy developers in avoiding, minimizing, and mitigating risks to eagles during the construction and operation of a wind energy facility. The ECPG interpreted and clarified the permit requirements in the regulations at 50 CFR 22.26 and 22.27, but it did not impose any binding requirements beyond those specified in the regulations.

Effective January 17, 2017, the 2009 Eagle Rule was replaced by a new rule governing eagle take permits (81 FR 91495 [December 16, 2016]). The new rule adjusted the standards, maximum duration, and requirements for eagle take permits.

1.4.4 MNDNR Guidance for Commercial Wind Energy Projects and MNDNR Avian and Bat Survey Protocols for Large Wind Energy Conversion Systems in Minnesota

The MNDNR Guidance (MNDNR 2011) complements the WEG and provides recommendations specific to Minnesota species and habitats, and considers existing processes used in Minnesota. The MNDNR Guidance provides recommendations for identification of high value resources and descriptions of various pre- and post-construction wildlife survey protocols that may be recommended by the MNDNR for wind energy projects. In addition, the MNDNR Protocols (Mixon et al. 2014) provide technical guidance for recommended wildlife survey protocols and is intended to be used in conjunction with the WEG and the MNDNR Guidance.

1.5 Agency Consultation

Freeborn coordinated with the USFWS and state agencies as part of the Project planning and development process. Freeborn submitted a Natural Heritage Information System (NHIS) data request to the MNDNR on February 17, 2015, for information on state- and federally listed species and sensitive natural resources within the first year study area. The MNDNR responded to the NHIS request in a letter dated March 26, 2015. The MNDNR's March 26, 2015, response stated that there are no NHIS records for bats in the vicinity of the first year study area, but all seven of Minnesota's bat species can be found throughout the state. No other NHIS records of rare species or significant natural features were noted in the vicinity of the first year study area. This information was incorporated into the Freeborn Site Characterization Study (SCS; Simon and Mattson 2016a), developed in accordance with Tier 1 and Tier 2 of the WEG (USFWS 2012), for the first year study area (Section 2).

On March 3, 2015, Freeborn met with the USFWS Twin Cities Field Office, the MNDNR, and the Minnesota Department of Commerce (DOC) to discuss the findings of the SCS and avian and bat survey protocols for the first year study area. Regarding bats, the USFWS noted there are no documented occurrences of the northern long-eared bat in Freeborn County, but the Project is located within 80 km (50 mi) of several large caves in Iowa; the USFWS did not provide information on northern long-eared bat presence in these caves. The MNDNR suggested spreading out the acoustic detectors (Freeborn proposed using four acoustic detectors on two met towers) to improve the characterization of bat activity within the first year study area. Freeborn responded to this suggestion by adding four additional ground-based acoustic detectors throughout the first year study area (Section 3.2.1).

In the March 3, 2015, meeting, the USFWS also noted eagle surveys had not been conducted by USFWS or MNDNR in Minnesota since 2005 due to increasing bald eagle populations in the state. USFWS noted that there were historic bald eagle nest sites located on the north side of Albert Lea Lake, one historic bald eagle nest was located across the state border in Iowa, and an unknown number of historic bald eagle nests occurred in the vicinity of the Minnesota and Cedar rivers, with bald eagle spring migration activity along the border between Minnesota and Iowa. The DOC added that there is frequent bald eagle movement along the Shell Rock River. The USFWS stated no known bald eagle carcasses had been found at wind energy facilities in Minnesota to date, but the agency would be concerned about turbine placement in areas that may interfere with bald eagle activity (e.g., between a nest and an active foraging area).

The USFWS also mentioned that there are waterfowl production areas near the Study area along the Shell Rock River. However, in a March 18, 2015, follow-up letter, the MNDNR did not recommend specific wetland or grassland bird surveys based on the size and isolated nature of wetland and grassland habitats within the first year study area, but noted such surveys could provide background avian use data to supplement the avian point counts and eagle surveys that Freeborn was conducting. Freeborn complied with the MNDNR's suggestion and conducted wetland bird surveys. Lastly, the MNDNR recommended Freeborn develop several alternative turbine locations to provide an opportunity to avoid or minimize potential impacts to natural resources and to work around potential issues that may arise during Project development. Freeborn studied a much larger area so that it would have the opportunity to responsibly site its turbines. Turbines have not been sited in the high value environmental areas identified by MNDNR throughout development.

Freeborn contacted the Minnesota and Iowa Natural Resources Conservation Service districts and the Freeborn Soil and Wetland Conservation District (SWCD) manager responded on April 13, 2015, suggesting that wetlands and conservation areas and construction impacts that may cause erosion should be avoided. Freeborn is avoiding conservation areas and wetlands to the greatest extent practicable, and will use responsible construction practices to avoid erosion impacts.

In coordination with the USFWS and the MNDNR, Freeborn developed the Tier 3 study protocols described in Section 2.6.3. These study protocols were discussed in detail with the MNDNR and DOC on May 12, 2015. The agencies approved of the protocols and discussed avoidance strategies for native prairie habitat.

On January 13, 2016, Freeborn met with MNDNR, DOC, and USFWS in Minnesota to share results from the first year of pre-construction studies. On May 5, 2016, Freeborn met with USFWS in Minnesota to specifically share its eagle use and raptor nest survey results and to discuss eagle conservation strategies. The USFWS recommended setbacks of 1.6 km (1 mi) from Albert Lea Lake and 0.8 km (0.5 mi; no more than four turbines) and 1.6 km (1 mi; all remaining turbines) from the Shell Rock River. Freeborn complied with these setbacks. Additionally, post-construction monitoring was discussed at the May 5, 2016, meeting including standardized carcass monitoring

to include plot searches at 30% of turbines, and operational staff monitoring training. The Project's post-construction monitoring program (Section 5) was designed in accordance with the MNDNR Protocols (Mixon et al. 2014).

Freeborn submitted a second NHIS data request to the MNDNR and an Environmental Review for Natural Resources request to the Iowa Department of Natural Resources (Iowa DNR) on December 14, 2016, for information on federally and state-listed species and sensitive natural resources within the second year study area. The MNDNR provided an NHIS report for the second year study area on January 18, 2017. The NHIS report documented one colonial waterbird nesting area, at Helmer Myre State Park, but no other sensitive bird or bat resources were identified within the second year study area or a 1.6-km (1.0-mi) buffer.

The Iowa DNR responded in a letter dated January 9, 2017, recommending setbacks from several natural resource areas within the second year study area. Freeborn complied by siting facilities away from the Deer Creek Wildlife Area and Deer Creek Forest. The Iowa DNR stated that it did not identify any site-specific records of rare species or significant natural communities. The Iowa DNR recommended setting back from forested riparian corridors to protect bat species. Freeborn applied 305-m (1,000-ft) setbacks from suitable bat foraging habitat. The Iowa DNR recommended a turbine setback from bald eagle nests, should any be found to exist within the second year study area. No bald eagle nests were found in the second year study area during the raptor nest survey in April 2017 (Section 3.1.1). The Iowa DNR also provided recommendations for post-construction monitoring at the Project. These recommendations were incorporated in the Project's turbine siting (Section 4.1.1), adaptive management (Section 6), and post-construction monitoring (Section 5.4). No Iowa Natural Areas Inventory records of rare species or significant natural communities were identified for the second year study area.

In January 2017, Freeborn contacted the USFWS Wetlands Management District managers in Minnesota and Iowa to determine whether there are any USFWS conservation easements within the Study area. Both the Minnesota and Iowa representatives responded that there were no easements within the Study area.

Freeborn met with the MNDNR on January 24, 2017, to review the wildlife and natural resources studies conducted to date and the ongoing and proposed surveys for the second year study area. Freeborn also invited USFWS to attend the meeting, but they were unavailable to participate. Freeborn proposed conducting the following pre-construction surveys in the second year study area: the SCS, the native prairie evaluation, the water resources evaluation, the large-bird use study, the small-bird use study, the wetland bird use study, and the raptor nest study, and the MNDNR approved of the protocols.

MNDNR and Freeborn also discussed whether additional bat acoustic surveys would be useful to understanding bat activity in the Study area given that the bat detectors in the first year of surveys were so spatially distributed on the landscape. Freeborn had two additional calls with the MNDNR on February 28, 2017 and April 11, 2017, to further discuss whether to conduct a 2017 bat acoustic survey. Based on the studies conducted in the first year study area, and turbine siting

avoidance measures for potential bat habitat (Section 4.1.1), the MNDNR agreed no additional bat surveys were needed in the second year study area.

On January 25, 2017, Freeborn shared baseline reports from the first year study area with the MNDNR and DOC, including: the SCS, the avian use report, the bat acoustic report, the native prairie report, the water resources report, the 2015 raptor nest report, and the 2016 raptor nest report.

The MNDNR followed up from the January 24, 2017, meeting in a letter dated February 21, 2017. The MNDNR identified two areas within the second year study area that have a higher potential for bird and bat use and recommended that turbines be sited outside of these "Avoidance Areas." Freeborn complied with this setback and did not site turbines in those areas.

On February 17, 2017, Freeborn met with the USFWS Rock Island Field Office to discuss the Iowa portion that was added to the second year study area. Freeborn shared the results of wildlife studies within the Study area to date and discussed its plan for ongoing surveys in 2017. The USFWS approved of the ongoing study protocols.

On March 31, 2017, Freeborn wrote a letter to the USFWS, MNDNR, and DOC to share a final Project area and request feedback on the Project. No feedback was received by May 2017. Through development, construction, and operation, Freeborn will continue to coordinate with the USFWS, the MNDNR and the Iowa DNR, as appropriate.

2 TIER 1 AND TIER 2 – SITE CHARACTERIZATION

2.1 Land Cover Types and Habitat within the Study Area

The Project is located within the Western Corn Belt Plains Ecoregion, which encompasses southern Minnesota and consists of glaciated till plains and undulating loess plains that were historically dominated by tallgrass prairie, oak-prairie savannas, and woody/herbaceous wetlands (Auch 2014). The ecoregion has since been cleared for farms producing corn (*Zea mays*), soybeans (*Glycine max*), and livestock (Auch 2014). Many smaller streams in the Study area have been tilled, ditched, and connected to existing drainage systems resulting in a loss of aquatic habitat in this ecoregion (Auch 2014).

Crop cultivation is the dominant land cover type (90%) within the Study area (Table 2.1 and Figure 2.1, NLCD 2011, Homer et al. 2015). Developed open space (associated with livestock production and homesteads) is the second most common land cover type (5%). Herbaceous and deciduous forest land cover types are the third and fourth most common and comprise approximately 2% and 1% of the Study area respectively. Other land cover types each compose less than 1% of the Study area (Simon and Mattson 2016a, Simon et al. 2017a).

Table 2.1 National Land Cover Database land cover types within the Freeborn Wind Farm.

Habitat	Hectares	Acres[a]	% Composition
First Year Study Area			
Cultivated Crops	14,701	36,328	91
Developed, Open Space	850	2,100	5
Herbaceous[b]	162	400	1
Hay/Pasture[b]	133	329	1
Deciduous Forest[b]	131	324	1
Developed, Low Intensity	56	139	<1
Emergent Herbaceous Wetlands[b]	40	99	<1
Developed, Medium Intensity	22	53	<1
Woody Wetlands[b]	8	20	<1
Open Water[b]	6	16	<1
Barren Land[c]	5	13	<1
Evergreen Forest[b]	3	7	<1
Developed, High Intensity	2	5	<1
Mixed Forest[b]	0	0	0
Shrub/Scrub[b]	0	0	0
First Year Study Area Total	**16,120**	**39,834**	**100**
Second Year Study Area			
Cultivated Crops	20,176	49,855	90
Developed, Open Space	1,230	3,041	6
Herbaceous[b]	431	1,066	2
Deciduous Forest[b]	227	561	1
Hay/Pasture[b]	142	352	<1
Developed, Low Intensity	100	248	<1
Emergent Herbaceous Wetlands[b]	86	212	<1
Woody Wetlands[b]	46	113	<1
Developed, Medium Intensity	28	70	<1
Open Water[b]	8	20	<1
Evergreen Forest[b]	3	6	<1
Developed, High Intensity	2	6	<1
Barren Land[c]	1	3	<1
Mixed Forest[b]	0	0	0
Shrub/Scrub[b]	0	0	0
Second Year Study Area Total	**22,482**	**55,553**	**100**
Study Area			
Cultivated Crops	34,877	86,183	90
Developed, Open Space	2,080	5,141	5
Herbaceous[b]	593	1,466	2
Hay/Pasture[b]	275	681	1
Deciduous Forest[b]	358	885	1
Developed, Low Intensity	156	387	<1
Emergent Herbaceous Wetlands[b]	126	311	<1
Developed, Medium Intensity	50	123	<1
Woody Wetlands[b]	54	133	<1
Open Water[b]	14	36	<1
Barren Land[c]	6	16	<1
Evergreen Forest[b]	6	13	<1
Developed, High Intensity	4	11	<1
Mixed Forest[b]	0	0	0
Shrub/Scrub[b]	0	0	0
Study Area Total	**38,602**	**95,387**	**-**

Table 2.1 National Land Cover Database land cover types within the Freeborn Wind Farm.

Habitat	Hectares	Acres[a]	% Composition

[a] These land cover data are from the U.S. Geological Survey 2011 National Land Cover Database (NLCD 2011, Homer et al. 2015) for the Study area; shapefiles dated April 8, 2015. Sum of values may not add to total value shown, due to rounding.
[b] Land cover types constituting native wildlife habitat (untilled and undeveloped).
[c] Barren land likely represents strip mines, gravel pits, and/or other accumulations of earthen material.

Desktop evaluations and partial ground-truthing field evaluations were conducted for the first year study area and the second year study area (together comprising the Study area) to confirm or correct the presence or absence of landscape features to the extent possible by viewing from public roads and other accessible areas. Native prairie and water resources within the first year study area and the second year study area were evaluated using these two methods.

2.1.1 Native Prairie Evaluation

The combined desktop evaluation and partial ground-truthing of potential native prairie estimated 85 ha (211 ac) of grasslands (herbaceous and hay/pasture) within the first year study area had been previously tilled (i.e., would not be considered native prairie per the MNDNR's definition). The MNDNR identified a very small (0.1 ha [0.2 ac]) native prairie plant community along a railroad verge at the southwest corner of the first year study area. In addition, two un-grazed prairies (in the northwest and northeast parts of the first year study area) had some floristic qualities associated with native prairie habitat and did not appear to be previously tilled. Railroad verge and other areas that could not be accessed by public lands within the first year study area also may support native prairie (Simon and Mattson 2016e).

The combined desktop evaluation and partial ground-truthing of potential native prairie estimated 145 ha (359 ac) of grasslands within the second year study area had been previously tilled. Conversely, an estimated 476 ha (1,176 ac) of grasslands within the second year study area may not have been previously tilled and could potentially contain remnant prairie plant communities (per the MNDNR's definition). The MNDNR identified two native prairie plant communities (2 ha [5ac] total) along the railroad verge on the western section of the second year study area (Simon et al. 2017b). The native prairie evaluation will be updated to cover any previously unevaluated areas and areas potentially harboring native prairie once the Project layout has been finalized. If construction will occur in areas that have floristic qualities of native prairie, land access will be coordinated for a focused evaluation prior to the start of construction in those areas. Any areas confirmed as native prairie during the evaluation will be avoided by construction activities.

2.1.2 Water Resource Evaluation

The combined desktop evaluation and partial ground-truthing of water resources estimated approximately 89 ha (220 ac) of the first year study area is comprised of wetlands. Wetland types documented within the first year study area included freshwater emergent wetlands (61 ha [150 ac]), emergent herbaceous wetlands), freshwater forested/shrub wetlands (20 ha [49 ac], woody wetlands), and freshwater ponds (9 ha [21 ac], open water).

These wetlands were found to be primarily situated as fringe wetlands along the riparian corridors of waterbodies (i.e., Peter Lund Creek, Deer Creek, and Mud Lake Creek) within the first year

study area. The ponds were primarily documented in the southwest and northwest corners of the first year study area, with the ponds in the southwest corner having substantial open water components. A few streams and several smaller drainage areas (open water) were confirmed within the first year study area, including Woodbury Creek in the northeast, Mud Lake Creek in the east, Deer Creek and tributaries in the south, Peter Lund Creek in the northwest, and other tributaries of the Shell Rock River in the west (Figure 2.2). Of these streams, Peter Lund Creek appeared to be the largest (Simon and Mattson 2016f).

The combined desktop evaluation and partial ground-truthing of water resources estimated approximately 290 ha (718 ac) of the second year study area is comprised of wetlands. Wetland types documented within the second year study area included freshwater emergent/shrub/forested wetlands (132 ha [326 ac], emergent herbaceous wetlands and woody wetlands), freshwater emergent wetlands (95 ha [235 ac]), freshwater emergent/shrub wetlands (27 ha [67 ac], emergent herbaceous wetlands and woody wetlands), freshwater emergent/forested wetlands (27 ha [67 ac], emergent herbaceous wetlands and woody wetlands), freshwater open water/emergent wetlands (8 ha [19 ac], emergent herbaceous wetlands and open water), freshwater ponds (1 ha [3 ac]), and freshwater shrub wetlands (1 ha [3 ac], woody wetlands).

Most of these wetlands were found to be located along the riparian corridors of waterbodies (i.e., Shell Rock River, Mud Lake Creek, Woodbury Creek, and Orchard Creek) within the second year study area. In particular, a large wetland complex (emergent/shrub/forested wetland) was documented along Mud Lake Creek in the northern section of the second year study area. The portion of this wetland complex located west of 890th Avenue and north of 145th Street has been designated as a Site of Biodiversity Significance (low quality) by the MNDNR (MNDNR 2015a). There also are large wetland areas along the Shell Rock River in the western section of the second year study area. Two ponds were documented in the western section of the second year study area and a few open water areas were located within some of the wetland complexes. Several rivers and streams were confirmed within the second year study area, including Shell Rock River in the west, Mud Lake Creek through the center, Woodbury Creek in the north, Orchard Creek in the northeast, and Deer Creek in the south (Figure 2.2, Simon et al. 2017c).

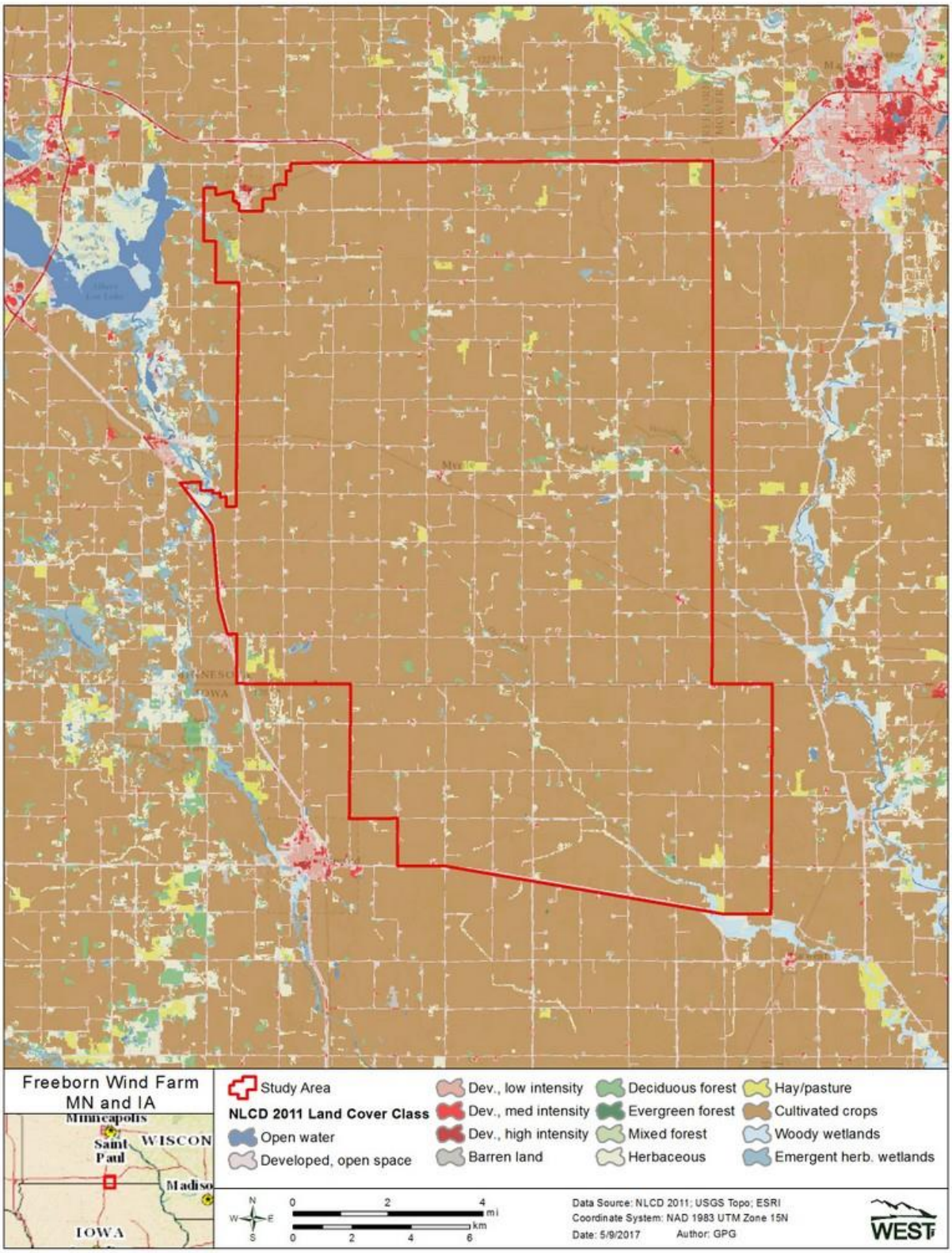


Figure 2.1 National Land Cover Database (NLCD) land cover types within and adjacent to the Freeborn Wind Farm in Freeborn County, Minnesota and Worth County, Iowa (USGS NLCD 2011, Homer et al. 2015).

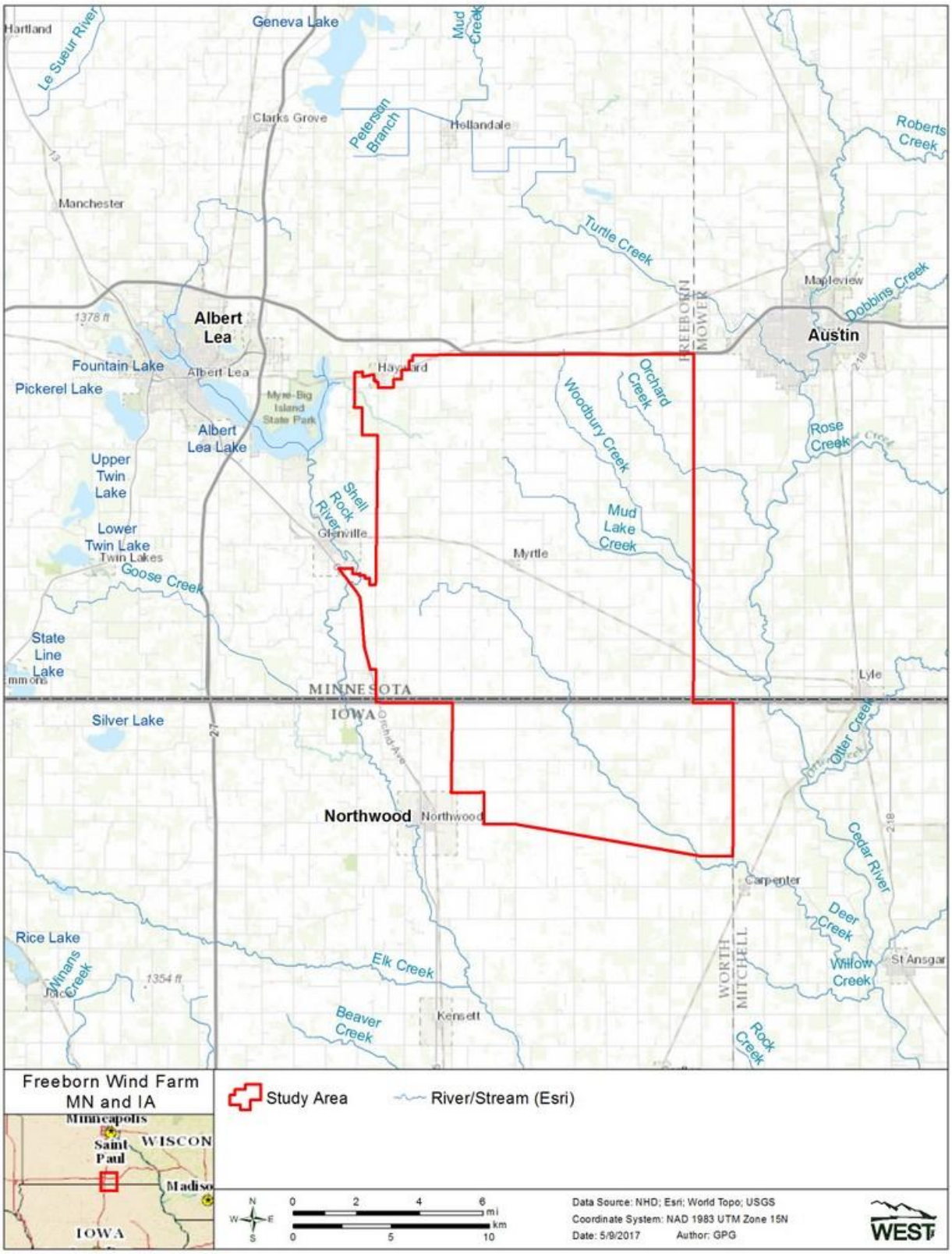


Figure 2.2 Water resources within and adjacent to the Freeborn Wind Farm in Freeborn County, Minnesota and Worth County, Iowa.

2.2 Wildlife Resources within the Study Area

2.2.1 Avian Resources

Avian habitat within the Study area is dominated by cultivated crops (90%); native avian habitat is limited to small, fragmented grasslands and hayfields/pastures, small groves of trees and fencerows near homesteads, and the riparian corridors and their associated wetlands. The western side of the Study area is located in close proximity to Albert Lea Lake and Shell Rock River, which are important aquatic habitat features on the landscape used by birds during migration, and possibly by some sensitive bird species. Myre-Big Island State Park is located adjacent to Albert Lea Lake and is recognized for bald eagle use throughout the year (see Sullivan et al. 2009).

Four Prairie Scientific and Natural Areas are located 10–40 km (6–25 mi) from the Study area (MNDNR 2015a). Five MNDNR-managed Wildlife Management Areas (WMA), consisting of 10 land parcels and several Reinvest in Minnesota conservation easement parcels are located <1–13 km (<1–8 mi) from the Study area (MNDNR 2015a). Three small WMA managed by the Worth County (Iowa) Conservation Board are located in the eastern side of the Study area. Two Waterfowl Production Areas (WPA) in Minnesota are located approximately 6 km (4 mi) and 5 km (3 mi) from the Study area; another WPA in Iowa is located approximately 12 km (8 mi) from the Study area (MNDNR 2016a). These areas provide native habitat that may support sensitive species. Two Game Refuges, which are managed for game hunting and waterfowl protection, also are located near the Study area; one Game Refuge is approximately 0.8 km (0.5 mi) from the northwest corner of the Study area and the other is located approximately 3 km (2 mi) north of the Study area (6). The closest registered Important Bird Area (IBA) to the Study area is the Blufflands-Root River IBA, located 52 km (32 mi) east of the Study area (Audubon 2014).

The Study area is located within the Mississippi Flyway and may be used as stopover habitat in spring and fall by migrating birds. If depressions within croplands in the Study area are saturated and/or pond water during the wet season, these areas may provide stopover habitat for shorebirds and waterfowl during spring migration. Wetlands and recently harvested croplands may provide stopover habitat and foraging opportunities for birds during fall migration. The presence of Albert Lea Lake and Shell Rock River, and the emergent wetlands associated with these waterbodies, approximately 1.6 km (1.0 mi) west of the northwest corner of the Study area, has the potential to increase waterfowl use in the Study area (Simon and Mattson 2016a, Simon et al. 2017a). However, waterfowl migration in the region generally follows a broad-front pattern (U.S. Geological Survey [USGS] 2013), meaning that migrating waterfowl are dispersed across the region rather than concentrated in migration corridors.

Raptors may fly over or move through the Study area during migration; although, because raptors are more likely to travel along north-south oriented large water bodies during migration (Liguori 2005), they are more likely to travel along the Shell Rock River, Cedar River, their tributaries, and Albert Lea Lake. These features may serve as a migration corridor and stopover habitat for migrating raptors, as well as other bird groups. Although migrating raptors may forage within the

Study area, given the predominance of cultivated croplands and the limited amount of native grassland and pasture habitats that may concentrate prey species (Rosenzweig 1989, Preston 1990), prey densities are unlikely to be higher within the Study area than surrounding areas (Simon and Mattson 2016a, Simon et al. 2017a).

The most common bird species recorded along the two USGS Breeding Bird Survey (BBS) routes closest to the Project (the Hartland Route and Austin Route, located approximately 19 km [12 mi] and 4 km [3 mi] north of the Study area, respectively) have been widespread, abundant, and disturbance-tolerant species: European starling (*Sturnus vularis*), common grackle (*Quiscalus quiscula*), red-winged blackbird (*Agelaius phoeniceus*), house sparrow (*Passer domesticus*), American robin (*Turdus migratorius*), horned lark (*Eremophila alpestris*), and song sparrow (*Melospiza melodia*; Pardieck et al. 2014).

2.2.2 Bat Resources

The Project is within the range of seven[2] bat species: hoary bat (*Lasiurus cinereus*), big brown bat, little brown bat, eastern red bat (*Lasiurus borealis*), silver-haired bat (*Lasionycteris noctivagans*), northern long-eared bat, and tri-colored bat (Bat Conservation International 2015). A desktop habitat assessment using NLCD data (NLCD 2011, Homer et al. 2015) and a review of aerial imagery were conducted for the Study area to confirm or correct the presence or absence of landscape features to the extent possible. Approximately 714 ha (1,762 ac) of forested habitat (deciduous forest) that may provide foraging and roosting opportunities for tree-roosting bats was estimated to be present within the Study area. The majority of this forested habitat is located on the periphery of the Study area along semi-forested corridors of the Shell Rock River and Cedar River and their tributaries (e.g., Peter Lund Creek and Woodbury Creek, respectively), as well as along Mud Lake Creek. Forested habitats associated with Albert Lea Lake to the west and northwest of the Study area also may provide roosting and foraging habitat. The presence of wetlands, ponds, and cultivated cropland within the Study area may provide additional foraging and drinking opportunities for bats. The nearest known bat hibernaculum is Mystery Cave, located approximately 58 km (36 mi) east of the Study area.

2.3 Endangered, Threatened, and Sensitive Species

2.3.1 Birds

No federally listed bird species have been documented as potentially occurring within Freeborn or Worth counties. Although piping plover (*Charadrius melodus*) has not been documented in Freeborn or Worth counties, birds from the federally endangered Great Lakes population or birds from the federally threatened northern Great Plains population (USFWS 2015c) may move

[2] In July 2016, an evening bat (*Nycticeius humeralis*) was found for the first time in Minnesota (MNDNR 2016b). Captured in Arden Hills, it is currently unclear if this was an isolated individual or if this species has expanded its range into Minnesota.

through the Project Expansion Area during migration (Simon and Mattson 2016a, Simon et al. 2017a). Piping plover stopover sites include shorelines of reservoirs, industrial ponds, natural lakes, wetlands with open water, and rivers with sand or mixed sand or mud substrate; selection is highly influenced by local water levels and water management practices of these resources (Pompei and Cuthbert 2004). Additionally, piping plovers also will use wetlands with open water body components and fish hatcheries as stopover sites (Elliott-Smith and Haig 2004). Although there is potential for piping plovers to opportunistically utilize various wetland and waterbody features in the Study area, depending on annual hydroperiods (i.e., percentage of time a wetland is inundated), suitable piping plover habitat within the Study area is limited. Albert Lea Lake and the associated wetland complex approximately 1.6 km (1.0 mi) west of the northwest corner of the Study area are more likely to attract plovers during migration. Further, no piping plovers have been observed during the first or second year or avian use surveys. Data from sightings of migrating plovers also indicate that the species does not concentrate in large numbers at inland stopover sites; rather, individuals stop opportunistically (Pompei and Cuthbert 2004).

One state-listed bird species, the loggerhead shrike (*Lanius ludovicianus*; Minnesota state endangered) has been documented as occurring within Freeborn County, and has been recorded along both of the BBS routes north of the Study area (Pardieck et al. 2014). Although suitable nesting habitat is limited, most of the 11 Minnesota state-listed bird species and most of the nine Iowa state-listed bird species (four of which are also Minnesota state-listed species) have the potential to migrate through or stopover within the Study area (Simon and Mattson 2016a, Simon et al. 2017a).

Bald eagles use Albert Lea Lake and Myre-Big Island State Park throughout the year (Sullivan et al. 2009). An aeration system installed in Albert Lea Lake and the moving waters of Shell Rock River sustain areas of open water and thin ice during the winter, providing foraging opportunities for eagles. Bald eagles also use Albert Lea Lake as nesting habitat. The Study area and surrounding vicinity includes tributaries of Shell Rock River and Cedar River (i.e., Deer Creek, Orchard Creek, Woodbury Creek, Mud Lake Creek) that may provide foraging opportunities for eagles in spring, summer, and fall, but likely freeze in the winter. Bald eagles may, therefore, occur within the Study area year-round. Bald eagles also have been documented along both of the BBS routes north of the Study area (Pardieck et al. 2014).

Golden eagles do not breed in Minnesota, but they migrate through or winter in the southern part of the state (Kochert et al. 2002). There is a small population of approximately 130 golden eagles that winters in the bluff country of southeastern Minnesota, western Wisconsin, northern Illinois, and northeastern Iowa (Goetzman 2014). Birds from this population are more typically found to the east of Freeborn and Worth counties, and no non-breeding/migrant observations of golden eagles have been documented along the BBS routes north of the Study area (Pardieck et al. 2014) or have been incidentally recorded in Freeborn and Worth counties on the eBird system (Sullivan et al. 2009). Winter habitat for golden eagles in the Midwest includes reservoirs and wildlife refuges, which provide foraging opportunities; golden eagles also may use riparian corridors associated with wetland complexes east of the Mississippi River (Kochert et al. 2002). Therefore, the potential for golden eagle occurrence within the Study area is likely low, primarily

based on historic winter and migration movements, habitat use, and known occurrences within the state (Simon and Mattson 2016a, Simon et al. 2017a).

2.3.2 Bats

The northern long-eared bat is the only federally listed bat species with the potential to occur in the Study area; the northern long-eared bat is also a Minnesota state species of special concern. As previously noted, the final 4(d) rule published January 14, 2016 (81 FR 1900), exempts from Section 9 take prohibitions the incidental take of northern long-eared bats resulting from most otherwise lawful activities, including incidental take of northern long-eared bats due to the operation of wind turbines (see footnote in Section 1.4.1 for more information). The big brown bat, little brown bat, and tri-colored bat are also state species of special concern.

Northern long-eared bats have been documented in Mystery Cave, located approximately 58 km (36 mi) east of the Study area. The Project is located outside of the hibernaculum's 8-km (5-mi) fall swarming radius for northern long-eared bats (USFWS 2014). Although northern long-eared bats may migrate through the Study area, the amount of roosting and foraging habitat for the species within most of the Study area is limited. Northern long-eared bats are more likely to use the larger tracts of forested habitat associated with Albert Lea Lake and Shell Rock River west of the Study area as roosting and foraging habitat in the summer. Preliminary desktop habitat mapping indicated that most patches of forested habitat within the Study area are relatively small (i.e., less than 6 ha [15 ac]; Figures 2.3 and 2.4).

Although a minimum patch size has not been defined for suitable northern long-eared bat roosting habitat, studies of northern long-eared bats on agricultural landscapes have found that northern long-eared bats may use woodlots and riparian areas with as little as approximately 6–20 ha (15–49 ac) of forest cover (Foster and Kurta 1999, Henderson and Broders 2008). Many of the forested patches, particularly in the center of the first year study area and in the southern part of the second year study area, appear to be isolated (i.e., more than 305 m (1,000 ft) from large contiguous tracts of forest, as defined in the Northern Long-Eared Bat Interim Conference and Planning Guidance [USFWS 2014]). However, a few woodlots and forested riparian corridors in the western part of the Study area are connected to forested habitat adjacent to Albert Lea Lake and Shell Rock River. Additionally, forested riparian corridors in the eastern part of the first year study area and running through the center of the second year study area are connected to forested habitat adjacent to Cedar River (Simon and Mattson 2016a, Simon et al. 2017a). Thus, summer roosting and foraging habitat for northern long-eared bats from maternity colonies, if present, may exist in the larger contiguous woodlots and forested riparian corridors. Northern long-eared bats also may move through the Study area when migrating from these forested tracts west of the Project to Mystery Cave, located east of the Study area, or to other, undocumented hibernacula in the region.

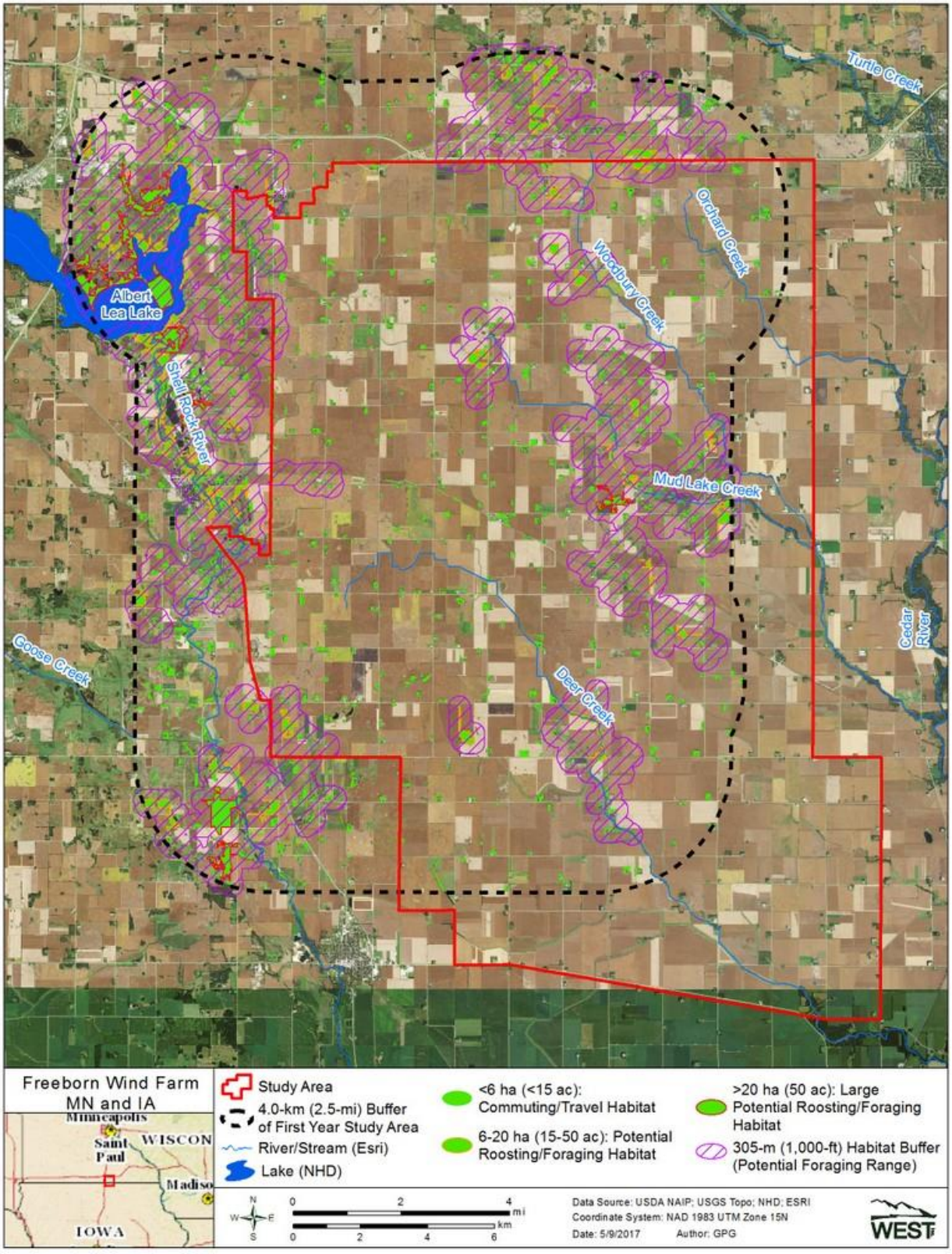


Figure 2.3 Results of the desktop habitat assessment for northern long-eared bats within the Freeborn Wind Farm first year study area and 4-kilometer buffer.

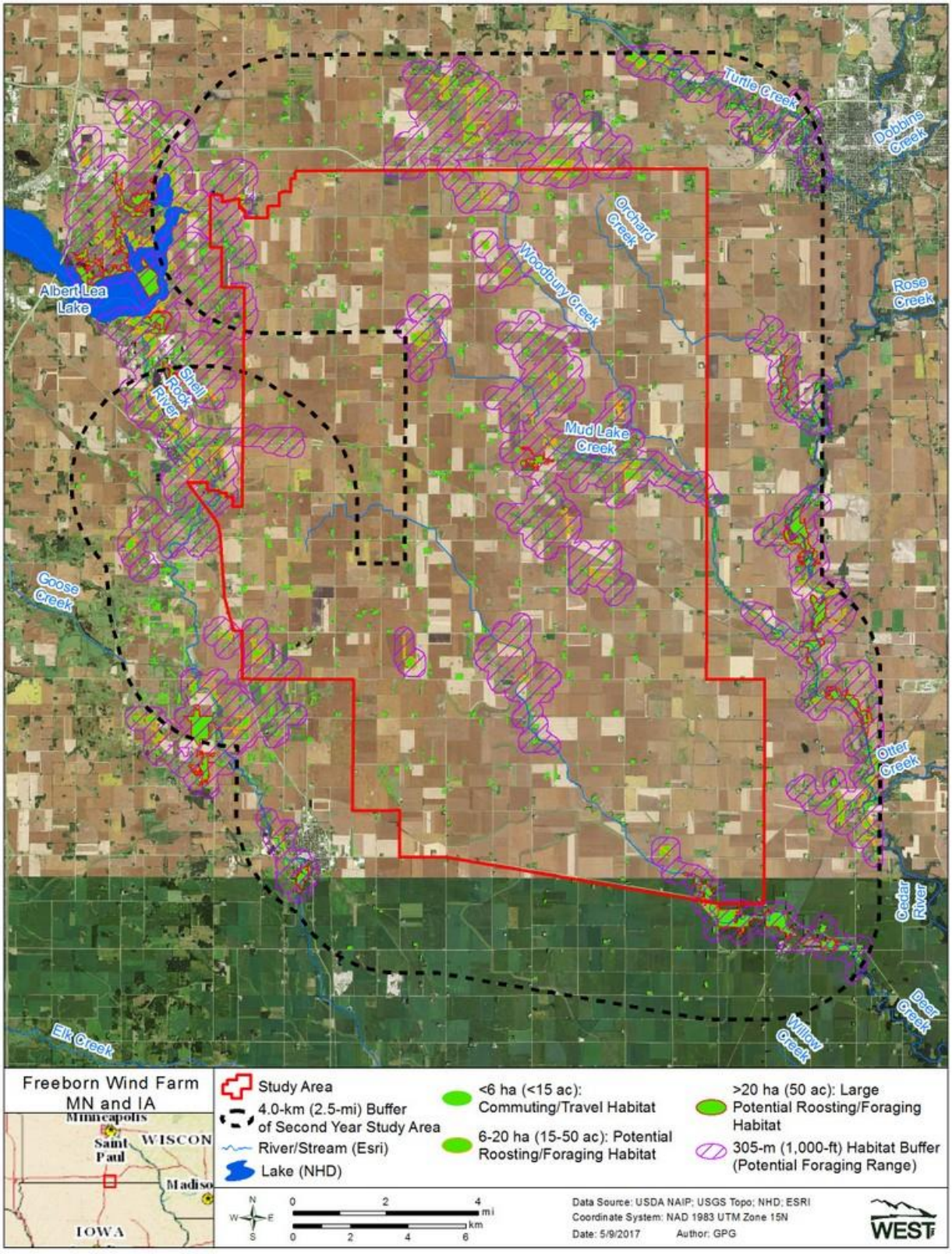


Figure 2.4 Results of the desktop habitat assessment for northern long-eared bats within the Freeborn Wind Farm second year study area and 4-kilometer buffer.

3 TIER 3 – FIELD STUDIES

To evaluate avian resources and bat activity within the Study area and assess potential impacts from the Project, several Tier 3 studies were conducted and others are ongoing.

Tier 3 studies completed in the first year study area include:

- Raptor nest study and eagle nest monitoring (Mattson et al. 2015) and follow-up eagle nest study (Simon and Mattson 2016b)
- Large-bird use study (Simon and Mattson 2016c)
- Small-bird use study (Simon and Mattson 2016c)
- Wetland bird use study (Simon and Mattson 2016c)
- Bat acoustic study (Simon and Mattson 2016d)

Ongoing Tier 3 studies in the second year study area include:

- Raptor nest study (fieldwork completed April 2017)
- Large-bird use study (fieldwork completion anticipated September 2017)
- Small-bird use study (fieldwork completion anticipated June 2017)
- Wetland bird use study (fieldwork completion anticipated June 2017)

3.1 Birds

3.1.1 Raptor Nest Study, Eagle Nest Monitoring, and Follow-up Eagle Nest Study

3.1.1.1 Methods

An aerial raptor nest study was conducted from March 20–21, 2015, within the first year study area and 3- and 16-km (2- and 10-mi) buffers of the study area for all raptor nests and eagle nests, respectively (Mattson et al. 2015). Within the first year study area, transects were flown approximately 0.4 and 0.8 km (0.2 and 0.5 mi) apart for complete coverage of construction disturbance areas. Within the 3- and 16-km (2- and 10-mi) buffers, a survey route was planned using aerial imagery and the USGS National Land Cover Dataset (NLCD 2011, Homer et al. 2015) to examine suitable bald eagle and other raptor nesting habitat within the buffer areas. Suitable nesting habitat included forested areas, riparian corridors, and forested margins of waterbodies.

Eagle nest monitoring was conducted through six ground-based surveys at all active eagle nests located within 3 km (2 mi) of the first year study area from April 29–August 13, 2015. The eagle nest monitoring surveys consisted of one 1,600-m (5,249-ft) radius fixed point established on public roads for each occupied bald eagle nest, following methods similar to Reynolds et al. (1980), and consistent with recommendations outlined in the ECPG (USFWS 2013). Each eagle nest monitoring point was located approximately 0.8 km (0.5 mi) from each bald eagle nest. The eagle nest monitoring points were established to document flight paths of the bald eagles in an

effort to determine the nesting territory and surrounding use areas, and particularly if these use areas overlapped the first year study area (Mattson et al. 2015).

A follow-up ground-based eagle nest study was conducted from March 29–31, 2016, within the first year study area and the 3-km (2-mi) buffer. The objectives of the study were to check the status of occupied and potential eagle nests documented during the 2015 study and to document any new potential eagle nests. The study encompassed driving all public roads within the first year study area and 3-km (2-mi) buffer and scanning woodlots, shelterbelts, riparian areas, and other treed habitats (Simon and Mattson 2016b).

3.1.1.2 Results

Within the first year study area, two occupied red-tailed hawk (*Buteo jamaicensis*) nests and six unoccupied nests of unknown species (Figure 3.1) were documented during the raptor nest study. No occupied or potential bald eagle nests were located within the first year study area or in the rest of the Study area. Within the 3-km (2-mi) buffer, two occupied bald eagle nests, five occupied great horned owl (*Bubo virginianus*) nests, three occupied red-tailed hawk nests, and 24 unoccupied nests of unknown species were documented. Two of the great-horned owl nests and one red-tailed hawk nest were located in the Study area east of the first year study area. Both of the bald eagle nests were located west of the southern end of the Study area. One of the occupied great-horned owl nests, located just northwest of the Study area, was consistent with the size and structure of a bald eagle nest. Within the 16-km (10-mi) buffer, one occupied great blue heron (*Ardea herodias*) nest was documented at a lake located west of the northern end of the Study area and two occupied bald eagle nests were documented near the edge of the buffer at lakes located north and west of the Study area. One occupied red-tailed hawk nest and one unoccupied nest of an unknown species were also documented within the 16-km (10-mi) buffer. Additionally, four bald eagle observations were recorded incidentally during the nest study on March 20 and 21, 2015 between the 3- and 16-km (2- and 10-mi) buffers. These observations were distributed west, north, northeast, and southeast of the Study area. No federally or state-listed threatened or endangered raptor species were observed during the study.

During the eagle nest monitoring, two bald eagle chicks and two bald eagle adults were documented at the southern nest (located less than 3 km [2 mi] west of the Study area) and one bald eagle chick and two bald eagle adults were documented at the northern nest (located less than 0.8 km [0.5 mi] west of the Study area). During April and May, typical bald eagle behavior consisted of one adult foraging away from the nest while the other adult remained in or near the nest. Fledglings were first observed out of the northern nest at the end of May and out of the southern nest in June. During June, typical adult bald eagle behavior consisted of staying near the nest and making occasional, short (less than 800-m [2,625–ft]) flights. During July, fledgling bald eagles made short (less than 400-m [1,313–ft]) flights around the nest, and adult bald eagles left fledglings alone for longer periods of time and took longer flights, a couple of which were observed to or from the Study area direction. In August, only juveniles were observed, making flights up to 800 m (2,625 ft), mostly to, from, and along the Shell Rock River corridor.

The majority of observed adult eagle flights at the southern nest occurred north of the nest, with a general north-south movement pattern. The majority of observed adult flights at the northern nest were to and from the Shell Rock River corridor. Occasional flights by adult bald eagles to and from the direction of the Study area were observed at both nests in July (Mattson et al. 2015).

During the follow-up eagle nest study in 2016, no new bald eagle nests were documented (Figure 3.2). The two bald eagle nests occupied in 2015 were also occupied during the 2016 survey. During avian use surveys in mid-March 2016 (Section 3.1.2), an adult bald eagle was observed in the nest previously occupied by great horned owls in 2015 that had been classified as a potential bald eagle nest. However, during the follow-up eagle nest study conducted in late March 2016, this potential eagle nest was unoccupied, with no bald eagles observed in or near the nest (Simon and Mattson 2016b).

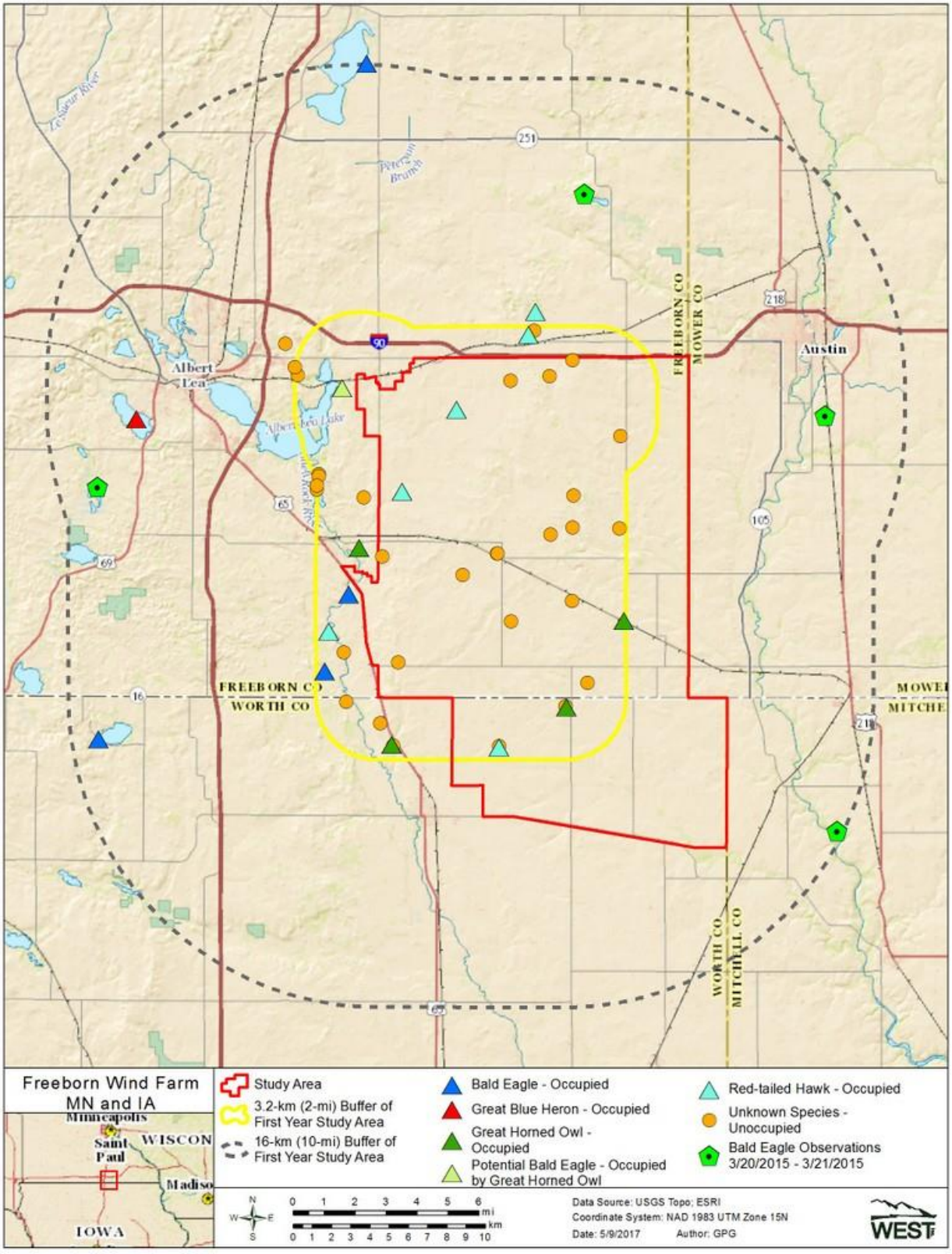


Figure 3.1 Results of a raptor nest study conducted from March 20–21, 2015 within the Freeborn Wind Farm first year study area and 3- and 16-kilometer buffers.

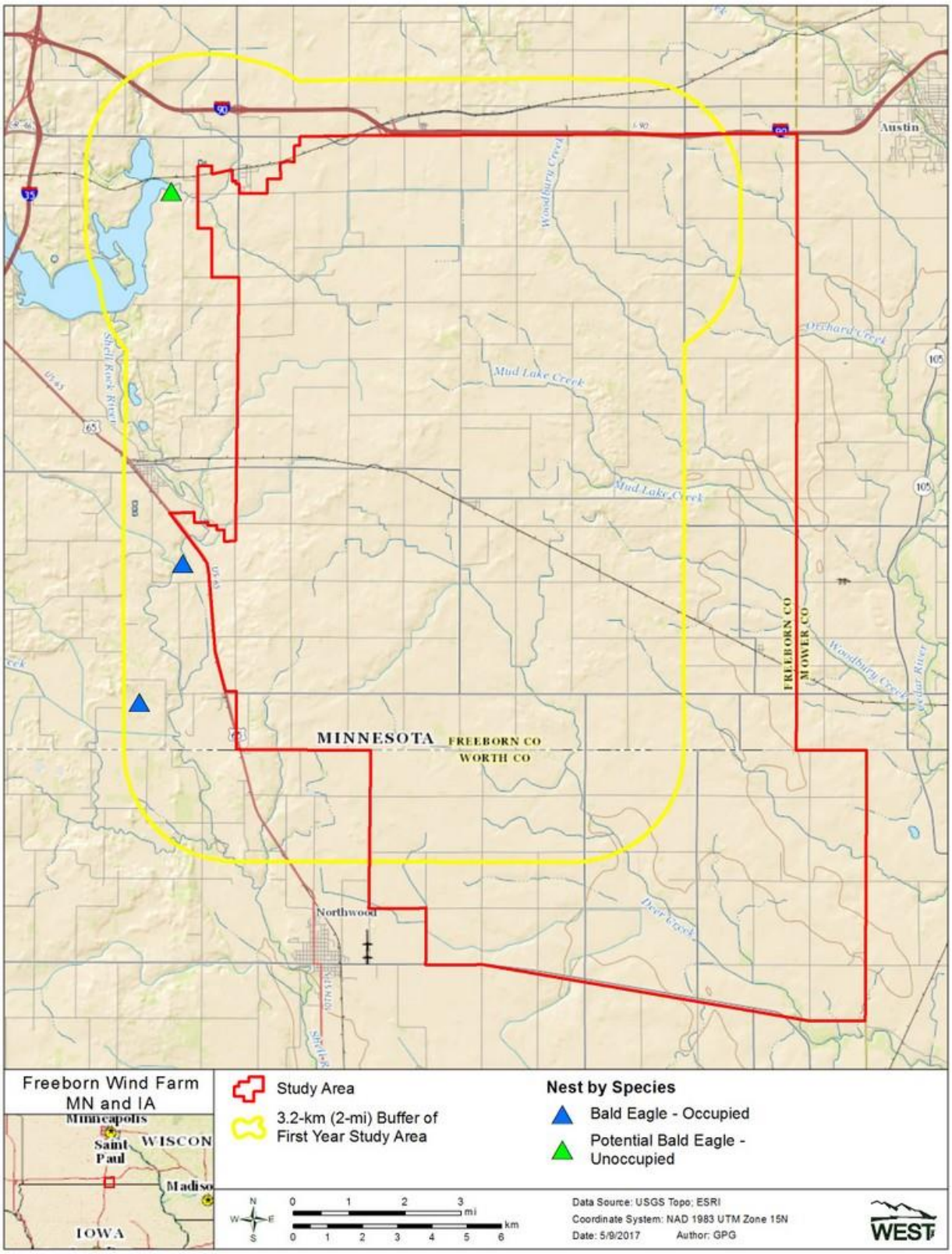


Figure 3.2 Results of an eagle nest study conducted from March 29–31, 2016 within the Freeborn Wind Farm first year study area and 3-kilometer buffer.

3.1.2 Large-bird Use Study

3.1.2.1 Methods

The large-bird use study consisted of surveys conducted at 18 point count locations within the first year study area. The objective of the large-bird use study was to evaluate (1) species composition, relative abundance, and diversity; (2) overall use, percent of use, and frequency of occurrence; (3) flight height; and (4) spatial use by large birds. Additional objectives were to document potential use of the first year study area by threatened, endangered, and sensitive avian species and eagles. This study effort was conducted using methods described by Reynolds et al. (1980). Data for eagle observations were recorded according to the ECPG (USFWS 2013).

Surveys were conducted once monthly for 60 minutes (min) at each point from January 17, 2015–March 22, 2016. Surveys were conducted during daylight hours, with varying survey periods to approximately cover all daylight hours within a season. All large-bird species observed were recorded, regardless of distance. Large birds observed within a 800-m (2,625-ft) plot at each point count location were included in statistical analyses, while large birds observed beyond this distance were recorded as incidental observations and not included in analyses (Simon and Mattson 2016c).

3.1.2.2 Results

During a total of 270 large-bird use surveys, 7,057 large-bird observations within 1,160 groups were recorded. The observations consisted of 54 bird species.

The most commonly recorded large-bird subtype was waterfowl (59.7% of large-bird observations), the majority of which were mallard (*Anas platyrhynchos*; 2,440 observations in 67 groups). Large corvids were the second most commonly recorded large-bird subtype (11.8%). Nine raptor species were observed, accounting for 3.1% of the large-bird observations. Bald and golden eagles (88 combined observations) accounted for 40.6% of all raptor observations and 1.2% of all large-bird observations.

The highest large-bird use occurred in the second winter (24.1 observations/plot/60-min survey), followed by fall (17.2), spring (10.2), the first winter (8.3), and summer (4.4). Raptor use was highest in the spring (0.7 observation/plot/60-min survey), followed by the second winter (0.5) and the first winter (0.5), fall (0.4), and summer (0.3). Eagle use was highest in the second winter (0.3 observation/plot/60-min survey), followed by the first winter (0.2), fall (0.1) and spring (0.1), and summer (< 0.1).

Overall, 44.8% of the large birds that were observed flying were within the estimated rotor-swept area (RSA) (25–150 m [82–492ft+] above ground level), while 49.7% were flying below the RSA and 5.5% were flying above the RSA. Most (53.6%) raptors observed flying were recorded within the RSA, 34.8% were below the RSA, and 11.6% were above it. Waterbirds had the highest percentage of flying birds within the RSA (95.2%), followed by gulls/terns (69.6%), eagles (69.0%), and Buteos (58.8%).

During the large-bird use surveys, 87 bald eagle observations and one golden eagle observation were recorded. Most (69.0%) of the eagles observed flying were within the RSA, 16.7% were below the RSA, and 14.3% were above the RSA. Eagle activity recorded within the first year study area amounted to 84 bald eagle min and 3 golden eagle min, for a total of 87 eagle min. More eagle min were recorded during March 2016 (42 eagle min) and February 2016 (14 eagle min) than during any of the other 13 months of the study (ranging from 0 to 8 eagle min). Mapped bald eagle flight paths revealed that bald eagle flight patterns were relatively dispersed throughout the first year study area, with the greatest area of concentrated activity at the survey point located to the northeast, between the Study area and Albert Lea Lake. The southern portion of the first year study area also showed greater flight activity of bald eagles at a survey point located adjacent to two ponds and a surrounding wetland complex and another survey point located adjacent to Deer Creek (Simon and Mattson 2016c).

3.1.3 Small-bird Use Study

3.1.3.1 Methods

The small-bird use study consisted of surveys conducted at nine point count locations established adjacent to forested areas (i.e., woodlots, shrubby areas, shelterbelts) along public roads within the first year study area. The objective of the small-bird use study was to evaluate: (1) species composition, relative abundance, and diversity; (2) overall use, percent of use, and frequency of occurrence; (3) flight height; and (4) spatial use by small birds. Additional objectives were to document use of the first year study area by threatened, endangered, and sensitive avian species and eagles.

Surveys were conducted twice monthly for eight min per point from March 21–May 21, 2015. Surveys were conducted between, approximately 0.5 hour before sunrise to four hours after sunrise. All small-bird species observed within a 100-m (328-ft) plot at each point count location were recorded. Small birds observed beyond the 100-m (328-ft) radius were recorded as incidental but not included in the statistical analyses (Simon and Mattson 2016c).

3.1.3.2 Results

During 45 small-bird surveys, 640 small-bird observations within 278 groups were recorded. The observations consisted of 38 bird species. The most-observed species were red-winged blackbird (30.8% of small-bird observations; 31.9% of passerine observations), common grackle (15.9% of small-bird observations; 16.5% of passerine observations), American robin (9.1% of both), and unidentified blackbird (8.1% of both). No federally or state-listed small-bird species were observed during the small-bird migration study (Simon and Mattson 2016c).

Small-bird use averaged 12.4 observations/plot/8-min survey. Passerine use averaged 12.0 observations/plot/8-min survey, mostly comprised of the blackbird/oriole subtype use, which averaged 7.2 observations/plot/8-min survey, and the sparrow and thrush subtypes use, both of which averaged 1.3 observations/plot/8-min survey. Use for all other bird groups averaged less than 1.0 observation/plot/8-min survey.

The height of bird flights were compared to the estimated RSA. Overall, 1.1% of the small birds observed flying were within the RSA, 98.9% were below the RSA, and 0% were above the RSA.

3.1.4 Wetland Bird Use Study

3.1.4.1 Methods

Although the MNDNR did not require wetland or grassland bird surveys, based on the limited amount of wetland and grassland habitats located within the first year study area, a wetland bird use study was conducted, which comprised surveys at three point count locations for 60 min per point within the first year study area. The point count locations were established within the first year study area adjacent or in close proximity to wetlands and/or waterbodies. The objective of the wetland bird use study was to evaluate (1) species composition, relative abundance, and diversity; (2) overall use, percent of use, and frequency of occurrence; (3) flight height; and (4) spatial use by wetland birds (i.e., waterbirds, waterfowl, shorebirds, rails/coots, loons/grebes). Additional objectives were to document use of the first year study area by threatened, endangered, and sensitive avian species and eagles.

Surveys were conducted three times from March 19–May 27, 2015, with approximately four weeks between surveys, to document bird use during spring migration and the early nesting season for wetland bird species[3], with at least one survey conducted to coincide with ice out (i.e., when the majority of waterbodies are free of ice) and peak waterfowl migration (Mixon et al. 2014). All large-bird species observed within a 800-m (2,625-ft) plot at each point count location were recorded. Observations of large birds beyond the 800-m (2,625-ft) radius were recorded as incidentals but not included in statistical analyses (Simon and Mattson 2016c).

3.1.4.2 Results

During nine wetland bird use surveys, 456 bird observations within 89 groups were recorded, consisting of 25 species. The most- observed species were Canada goose (*Branta canadensis;* 34.6% of bird observations; 39.1% of waterfowl observations), greater white-fronted goose (*Anser albifrons*; 29.4% of bird observations; 33.2% of waterfowl observations), mallard (6.8% of bird observations; 7.7% of waterfowl observations), and blue-winged teal (*Anas discors*; 3.3% of bird observations; 3.7% or waterfowl observations). Bald eagles accounted for 2.0% of all observations. No federally or state-listed bird species were observed during the wetland bird use study (Simon and Mattson 2016c).

Bird use at the wetlands averaged 39.2 observations/plot/60-min survey. Waterfowl use averaged 35.3 observations/plot/60-min survey, shorebird use averaged 1.4 observations/plot/60-min

[3] The wetland bird use surveys were conducted to establish avian use around lakes or wetlands with an open water component. Although these surveys were designed to emphasize use by waterfowl and shorebirds, the wetland bird use surveys are not limited to these groups of birds.

survey, raptor use averaged 1.0 observation/plot/60-min survey; use for all other bird groups averaged less than 1.0 observation/plot/60-min survey.

Overall, 64.1% of the birds observed flying at the wetlands were within the RSA, while 34.1% were below the RSA and 1.7% were above the RSA. The majority of waterfowl (69.4%), *Buteos* (100.0%, although note only one flying observation), and eagles (100.0%, although note only two flying observations) observed flying at the wetlands were within the RSA.

3.2 Bat Acoustic Study

3.2.1 Methods

A bat acoustic study was conducted from April 14–November 14, 2015. Study objectives were to: (1) estimate levels of bat activity at met towers and ground locations within the first year study area; (2) estimate activity levels for bats with high-frequency (HF) and low-frequency (LF) calls; and (3) analyze potential correlations between bat activity and the following weather variables: wind speed, temperature, and humidity. Four acoustic detectors (AnaBat™ SD I and SD 2 [Titley Scientific™, Columbia, Missouri]) were deployed at two met towers (raised and ground detectors at each tower) located in the center of the first year study area, and four detectors were deployed singly at four ground locations throughout the first year study area at representative potential turbine locations (i.e., in or adjacent to agricultural land). Detectors recorded bat calls from approximately 0.5 hour before sunset to 0.5 hour after sunrise nightly. Bat calls were categorized by frequency group, with calls higher than 30 kilohertz (kHz) considered HF and calls lower than 30 kHz considered LF. Bat species with ranges overlapping the Study area that produce HF calls include: eastern red bat, little brown bat, northern long-eared bat, and tri-colored bat. Bat species with ranges overlapping the Project that produce LF calls include: big brown bat, silver-haired bat, and hoary bat (Simon and Mattson 2016d).

3.2.2 Results

At the eight acoustic detectors, 15,276 bat passes were recorded over 1,431 detector-nights for an average bat activity rate of 10.4 $\pm$ 0.9 bat passes per detector-night. Bat activity was higher at the ground detectors (13.0 $\pm$ 1.3 bat passes/detector-night) than at the raised detectors (2.6 $\pm$ 0.3 bat passes/detector-night).

Bat activity was highest in the summer (June 1–July 15; 20.1 $\pm$ 2.2 bat passes/detector-night), followed by the fall migration period (July 30–October 14; 9.0 $\pm$ 1.1), fall (July 16–November 14; 7.5 $\pm$ 0.9), and spring (April 14–May 31; 6.6 $\pm$ 1.0). These seasonal patterns were the same for HF and LF bat activity, although the weeks with the highest activity rates differed among the frequency groups. High-frequency bat activity peaked at 31.1 bat passes per detector-night from June 20–June 26, 2015. Low-frequency bat activity peaked at 20.0 bat passes per detector-night from August 2–August 8, 2015. Overall bat activity gradually decreased from early September to late October and decreased substantially near the end of the study in November.

Bat activity decreased (both frequency groups) as wind speeds increased. The majority of nights fell within the 4–6 m/s (9–13 mph) wind speed category, with 92 nights total and 12.0 passes per detector-night for all bats. However, bat passes per detector-night were highest (21.7) on the five nights with wind speeds ranging from 0–2 m/s (0–5 mph). The number of bat passes per detector-night decreased for all bats as wind speeds increased, to 0.1 passes per detector-night in the 12–14 m/s (27–31 mph) category. The peak dates for all bat activity (June 20–June 26) coincided with the approximate 2-week window (mid-June–late June) where average wind speeds were lowest for a sustained period. Bat passes per detector-night and wind speed were negatively correlated (Pearson product-moment correlation coefficient = -0.32, $p<0.001$), indicating a negative association between bat activity and wind speed.

Bat activity also decreased (both frequency groups) as temperatures decreased. The majority of nights were within the 15–20° Celsius (°C; 59–68° Fahrenheit [°F]) temperature category, with 70 nights total and 20.4 passes per detector-night for all bats. The number of bat passes per detector-night decreased for all bats as temperatures decreased, with 0.1 bat passes per detector-night recorded in the -5–0 °C (23–32 °F) category. Higher temperatures from mid- to late June coincided with the period of highest bat pass rates, with the peak of all bat activity occurring around June 23 and little temperature variability in the week before and after this increase. Correlation analysis confirmed this positive relationship between temperature and bat activity (Pearson product-moment correlation coefficient = 0.46, $p < 0.001$). Bat activity decreased at the highest temperature category.

Finally, bat activity was assessed relative to humidity category (percent relative humidity). The majority of nights were within the 80–90% relative humidity category, with 71 nights total and 11.8 passes per detector-night for all bats. Bat passes per detector-night for all bats decreased to 2.5 bat passes per detector-night when relative humidity was between 40–50%. The peak of all bat activity, beginning approximately June 20, occurred during a sustained period of higher relative humidity, from around the second week in June to the third week in July. Relative humidity and bat activity were significantly correlated (Pearson's correlation coefficient = 0.16, $p = 0.02$). However, bat activity and relative humidity were not as strongly correlated as were the bat activity and the wind speed and temperature variables (Simon and Mattson 2016d).

3.3 Sensitive Species Observations

During the large-bird use study, the small-bird use study, the wetland bird use study, and recording of incidental observations, seven sensitive bird species were documented. Four state species of special concern were observed: trumpeter swan (*Cygnus buccinator*; four observations in two groups), peregrine falcon (also a USFWS Bird of Conservation Concern; *Falco peregrinus*; four observations in four groups), Franklin's gull (*Leucophaeus pipixcan*; 66 observations in seven groups), and American white pelican (884 observations in 33 groups). Three other sensitive species also were observed: bald eagle (BGEPA, USFWS Bird of Conservation Concern; 102 observations in 102 groups), American golden-plover (federal watch list species; *Pluvialis dominica*; 93 observations in three groups), and golden eagle (BGEPA; one observation). No state-listed threatened or endangered species or federally listed species were observed during the large-bird use, small-bird use, or wetland bird use surveys or incidentally (Simon and Mattson

2016c). Bat calls were not identified to species in the bat acoustic study (Simon and Mattson 2016d).

3.4 Summary of Concerns Identified During Research and Analysis

3.4.1 Birds

The potential for habitat fragmentation impacts is low because the Project is sited on a previously disturbed landscape. Agriculture is the dominant land cover type within the Study area, particularly where turbines and facilities will be located.

The Project has the potential to cause displacement of some bird species from the Study area due to increased human activity or the presence of tall structures. Many of the most-observed bird species within the first year study area were common, disturbance-tolerant species (Sections 3.1.1-3.1.4), similar to the species observed on the USGS BBS survey routes nearest the Study area (Section 2.2.1). However, shorebirds and waterfowl using saturated depressions within croplands in the Study area as stopover habitat during spring migration may be more sensitive to displacement by Project turbines, as displacement of these bird types has been reported at wind facilities in Europe (Winkelman 1990, Pedersen and Poulsen 1991, Spaans et al. 1998, Fernley et al. 2006).

Many of the bird displacement studies conducted to date have been inconclusive and inconsistent. The results of these studies indicate that both the spatial and temporal extent of displacement impacts vary greatly by species and land cover and possibly other, as yet undefined, factors influencing avoidance behavior (e.g., Shaffer and Johnson 2008, Shaffer et al. 2012). For these reasons, adequate data do not currently exist to support accurate determination of the potential spatial and temporal extent of the displacement impacts specific to certain species. If displacement effects were to occur, it is unclear whether they will persist for the life of the Project, given that certain species adapt to the presence of turbines (The Ornithological Council 2007). Given that most lands within the Study area are already disturbed and subject to human activity related to farming, and because most of the birds observed were common, disturbance-tolerant species, displacement effects are expected to be minimal.

Project operation may result in avian mortality from collision with the Project's turbines or other structures. Based on the results of post-construction monitoring at similar facilities located on agricultural landscapes in southern Minnesota and northern Iowa and given the lack of unique ecological features within the Study area that would attract birds, estimated bird carcass rates at the Project would be expected to be within the range or lower than those reported from studies at other wind facilities in the region (Table 3.1). These studies have reported carcasses of a variety of bird species, mostly passerines, and most carcasses were found during the spring, summer, and fall when passerines are migrating or on their summer range. At Freeborn, no single species is expected to experience a disproportionate amount of estimated mortality or impacts of a magnitude to affect the local or migratory population, as reflected in studies completed by Erickson et al. (2014). Additionally, the passerine species most-observed during the pre-construction surveys and on the USGS BBS survey routes nearest the Project (i.e., European

starling, common grackle, red-winged blackbird, house sparrow, American robin, horned lark, and song sparrow) are all common and abundant species (Simon and Mattson 2016a, Simon and Mattson 2016c).

The Project is located east of Albert Lea Lake and Shell Rock River, which are important aquatic habitat features on the landscape and concentrate use by waterfowl and shorebird species, potentially including some sensitive species, during migration and winter. Waterfowl constituted the most commonly recorded large-bird subtype during the large-bird use study (Section 3.1.2). However, waterfowl and shorebird carcass rates at wind energy projects have been low, even in areas of high use. Generally, waterfowl and shorebird carcass rates have shown to be insignificant at wind facilities, as compared to the rate of use or incidence of these groups (Erickson et al. 2002). Relatively low percentages of waterfowl and shorebird carcasses have been consistently recorded in carcass monitoring studies at wind energy facilities over the past several years. For example, at nine wind energy facilities in the Midwest and western U.S., waterfowl comprised 2.5% and shorebirds comprised 0.2% of the 1,033 carcasses (Erickson et al. 2001). The National Research Council (NRC) analyzed data from 14 studies (including four also used in Erickson et al. 2001) throughout the U.S. and found that waterfowl comprised about 2% and shorebirds comprised less than 1% of carcasses (NRC 2007). Therefore, based on available evidence, waterfowl and shorebirds do not seem especially vulnerable to turbine collisions and significant impacts are not likely.

Table 3.1 Annual bird carcass rate results from post-construction monitoring studies in southern Minnesota and northern Iowa.

Project Name	State	Estimated Bird Carcasses/Megawatt/Year	Source
Barton I and II	IA	5.50	Derby et al. 2011
Buffalo Ridge (Phase I; 1996)	MN	4.14	Johnson et al. 2000
Buffalo Ridge (Phase I; 1997)	MN	2.51	Johnson et al. 2000
Buffalo Ridge (Phase I; 1998)	MN	3.14	Johnson et al. 2000
Buffalo Ridge (Phase I; 1999)	MN	1.43	Johnson et al. 2000
Buffalo Ridge (Phase II; 1998)	MN	2.47	Johnson et al. 2000
Buffalo Ridge (Phase II; 1999)	MN	3.57	Johnson et al. 2000
Buffalo Ridge (Phase III; 1999)	MN	5.93	Johnson et al. 2000
Elm Creek	MN	1.55	Derby et al. 2010b
Elm Creek II	MN	3.64	Derby et al. 2012
Moraine II	MN	5.59	Derby et al. 2010c
Pioneer Prairie I (Phase II)	IA	0.27	Chodachek et al. 2012
Top of Iowa 2003	IA	0.42	Jain 2005
Top of Iowa 2004	IA	0.81	Jain 2005
Winnebago	IA	3.88	Derby et al. 2010d

The proximity to Albert Lea Lake and Shell Rock River may increase the potential for bald eagles to use the Study area, particularly during winter. The presence of bald eagle nests within 16 km (10 mi) of the Study area may increase the potential for bald eagles to use the Study area during the nesting season. However, eagle nest monitoring indicated most bald eagle activity is focused along the Shell Rock River corridor and flights to and from the direction of the Project are not common during the nesting season (Section 3.1.1). Avian use studies found that eagle use of the Project was highest in winter (and more eagle minutes were recorded in February and March than

in any other month) and the greatest concentration of eagle activity occurred between the first year study area and Albert Lea Lake (Section 3.1.2). Since eagle use was higher near Albert Lea Lake, wind turbines were sited more than four miles east of the lake. Golden eagles are expected to occur only as infrequent migrants through the Study area (Section 2.2.1).

No federally threatened or endangered bird species were observed during pre-construction surveys within the first year study area, and it is very unlikely that the Project would impact a federally listed bird species.

3.4.2 Bats

Limited information is available regarding the disturbance or displacement of bats at wind facilities (Kunz et al. 2007a). Any bats roosting in the Study area may be temporarily disturbed by human activities, although roosting habitat is limited within the Study area and activities would largely be focused away from drainages and human structures that could serve as bat roosts. Construction and decommissioning activities are not expected to require the removal of trees or old buildings, making it unlikely that roosting bats would be disturbed or incur mortalities. Turbines have been sited more than 1,000 feet from roosting and foraging habitat, minimizing impacts to bats during operation. Therefore, it is unlikely that operation of the Project turbines would disturb or displace bats from use of the Project.

All seven bat species known to occur in Minnesota may migrate through the Study area and the Project turbines are likely to result in some amount of bat mortality. However, bat habitat within the Study area is limited to small groves of trees and fencerows near homesteads and the riparian corridors along a few small streams with fringe wetlands. Outbuildings and other anthropogenic structures may be used as roosting habitat by some species. Cultivated crops also may provide marginal foraging habitat for bat species adapted to use such habitat. Therefore, estimated bat carcass rates at the Project would be expected to be within the range or lower than those reported from studies at other wind facilities in the region (Table 3.2).

Bat carcasses at wind energy facilities in the U.S. have mostly occurred in the swarming and migration seasons, typically between mid-July and mid-September (Howe et al. 2002, Johnson et al. 2003, Kerlinger et al. 2007, BHE Environmental 2010). Post-construction monitoring studies at other wind facilities in southern Minnesota also have reported a similar pattern, with most bat carcasses occurring during the fall migration season and consisting primarily of eastern red bats and hoary bats, both migratory tree bat species (Chodachek et al. 2014).

The pre-construction acoustic study at the Project (Section 3.2.1) recorded activity by LF bats (which include hoary bats) and HF bats (which include eastern red bats) at all detectors. Activity of both groups was highest in summer (June 1–July 15), followed by the fall migration period (July 30-October 14). Activity of both groups decreased as wind speeds at the Project increased, and as temperatures at the Project decreased.

Based on these regional post-construction monitoring results and the Project's pre-construction acoustic study results, bat mortality risk from Project operations is expected to primarily affect

migratory tree bats that are migrating through the Study area during the late summer or early fall. Turbines are sited away from wooded and riparian corridors to limit impacts to bats foraging or traveling along corridors. Additionally, certain weather conditions, including colder temperatures, low cloud ceilings, and high wind speeds, when turbines are most active, are likely to decrease the risk of bat carcasses (Kunz et al. 2007b, Gruver et al. 2009).

The Project is located within the range of the federally listed northern long-eared bat, and individuals may occur within the Study area during spring, summer, and fall (Section 3.3). Based on the Project's location relative to the nearest known northern long-eared bat hibernaculum (Section 2.3.2), no impacts to northern long-eared bats are expected to occur during the fall swarming period or during the winter when they are hibernating. As previously noted, the final 4(d) rule published January 14, 2016 (81 FR 1900), exempts from Section 9 take prohibitions the incidental take of northern long-eared bats resulting from most otherwise lawful activities, including incidental take of northern long-eared bats due to the operation of wind turbines (see footnote in Section 1.4.1 for more information).

Table 3.2 Annual bat carcass rate results from post-construction monitoring studies in southern Minnesota and northern Iowa.

Project Name	State	Estimated Bat Carcasses/Megawatt/Year	Source
Barton I and II	IA	1.85	Derby et al. 2011
Big Blue	MN	6.33	Chodachek et al. 2014
Buffalo Ridge (Phase I; 1999)	MN	0.74	Johnson et al. 2000
Buffalo Ridge (Phase II; 1998)	MN	2.16	Johnson et al. 2000
Buffalo Ridge (Phase II; 1999)	MN	2.59	Johnson et al. 2000
Buffalo Ridge (Phase III; 1999)	MN	2.72	Johnson et al. 2000
Buffalo Ridge (Phase II; 2001/Lake Benton I)	MN	4.35	Johnson et al. 2004
Buffalo Ridge (Phase II; 2002/Lake Benton I)	MN	1.64	Johnson et al. 2004
Buffalo Ridge (Phase III; 2001/Lake Benton II)	MN	3.71	Johnson et al. 2004
Buffalo Ridge (Phase III; 2002/Lake Benton II)	MN	1.81	Johnson et al. 2004
Crystal Lake II	IA	7.42	Derby et al. 2010a
Elm Creek	MN	1.49	Derby et al. 2010b
Elm Creek II	MN	2.81	Derby et al. 2012
Grand Meadow	MN	3.11	Chodachek et al. 2014
Moraine II	MN	2.42	Derby et al. 2010c
Oak Glen	MN	3.09	Chodachek et al. 2014
Pioneer Prairie I (Phase II)	IA	10.06	Chodachek et al. 2012
Top of Iowa 2003	IA	7.16	Jain 2005
Top of Iowa 2004	IA	10.27	Jain 2005
Winnebago	IA	4.54	Derby et al. 2010d

4 AVOIDANCE AND MINIMIZATION MEASURES

4.1 Preconstruction Siting and Design

4.1.1 Turbine Siting

- As recommended in the USFWS' Northern Long-Eared Bat Interim Guidance (USFWS 2014), all turbines will be sited more than 305 m (1,000 ft) from the edge of connected patches of forested habitat (Section 2.3.2) to avoid potential impacts to bats, including northern long-eared bats, during the summer
- The Project's location in a previously disturbed landscape avoids the following habitat features: (1) habitats associated with any federally listed wildlife or plant species, (2) bird movement corridors, (3) landscape features that attract raptors, (4) bat hibernacula or maternity/nursery colonies, and (5) concentrated bird and/or bat use areas
- The Project substation will be sited in a new location away from the original proposed site in Hayward due to higher observed bird activity near the original site
- Native habitat (including native prairie, forested habitat, and wetlands) will be avoided and previously disturbed lands (including existing roadways) will be used, where practical, to avoid wildlife habitat fragmentation
- At the recommendation of the MNDNR, several alternative turbine locations were developed to provide an opportunity to avoid or minimize potential impacts to natural resources and to work around potential issues that may arise during Project development
- All turbines will be sited away from the Shell Rock River: the nearest turbine is 1.0 km (0.62 mi) from the river, the next closest turbine is 1.44 km (0.89 mi) from the river, and all other turbines are more than 1.6 km (1 mi) from the river
- All turbines will be sited away from Albert Lea Lake: the nearest turbine is 6.4 km (4.0 mi) from the lake and all other turbines are more than 7.4 km (4.6 mi) from the lake
- All turbines will be sited away from the "Avoidance Areas" identified by the MNDNR
- All turbines will be sited away from the Deer Creek Wildlife Area and Forest at the recommendation of the Iowa DNR: the nearest turbine is 396 m (1,300 ft) from the wildlife area and 610 m (2,000 ft) from the forest
- All turbines will be sited more than 305 m (1,000 ft) from riparian corridors in Iowa, at the recommendation of the Iowa DNR
- All turbines will be sited more than 305 m (1,000 ft) from Type 3 and Type 4 wetlands (classified in the Circular 29 system as shallow marshes and deep marshes; Shaw and Fredine 1956) in Minnesota
- All other wetlands will be avoided during turbine siting

4.1.2 Turbine Design

- Turbine towers will be designed and constructed to discourage bird nesting and wildlife attraction
- The Project will employ unguyed, tubular towers with slow-rotating, upwind rotors

4.1.3 Lighting

- Aviation hazard lighting will be minimized to Federal Aviation Administration (FAA) requirements and strobed, minimum-intensity red lights will be installed on Project turbines, as recommended by the FAA and in the WEG (USFWS 2012) to avoid attracting birds or bats
- Hoods/shields will be installed on exterior lights at the O&M building and substation to minimize skyward light
- Turbine doors will not have exterior lights installed at the entrance

4.1.4 Collection and Transmission Lines

- The underground communication cables and power collection system will be buried along the access roads or in straight lines from one turbine to another in trenches extending to the Project's 34.5/161-kV substation; lines will be buried along both private and public rights-of-way
- In the event that the 34.5-kV electrical collection lines require overhead construction, the structures will be designed and constructed in accordance with the Avian Power Line Interaction Committee's (APLIC) suggested practices to minimize potential electrocution risk to perching birds (APLIC 2006)
- No electrocution risk is anticipated for the Project's 161-kV transmission line, given the clearances required for a line of this size (APLIC 2006)

4.2 Construction

- Freeborn will comply with all applicable federal, state, and local environmental laws, orders, and regulations
- Prior to construction, all supervisory construction personnel will be instructed on the ABPP and wildlife resource protection measures, including: (1) applicable federal and state laws (e.g., those that prohibit animal collection or removal) and (2) the importance of these resources and the purpose and necessity of protecting them, and ensure this information is disseminated to applicable contractor personnel, including the correct reporting procedures
- Prior to construction, field surveys will be conducted to determine the presence of any jurisdictional wetlands or streams within the footprint of each turbine location and ancillary facilities; during construction, Freeborn will comply with applicable federal regulations protecting waters of the U.S., as listed in Title 33 CFR Part 323
- A Storm Water Pollution Prevention Plan will be prepared and implemented, as required by the U.S. Environmental Protection Agency (USEPA); the plan will include standard sediment control devices (e.g., silt fences, straw bales, netting, soil stabilizers, check dams) to minimize soil erosion during and after construction
- Storm water management practices will be implemented to minimize open water resources that may attract birds and bats
- During construction, existing trees, vegetation, water resources, and wildlife habitat will be protected and preserved to a practical extent
- Traffic will be restricted to Project-specific roads; use of unimproved roads will be restricted to emergency situations

- Speed limits will be set to ensure safe and efficient traffic flow; signs will be placed along roads, as necessary, to identify speed limits, travel restrictions, and other standard traffic control information
- Following construction, temporary work areas will be graded to the approximate original contour, and the areas will be revegetated with approved seed mixtures; Freeborn will consult with the Natural Resources Conservation Service and landowners on appropriate reclamation methods and seed mixtures
- Noxious weeds will be controlled in all surface-disturbed areas using mowing and herbicides
- All herbicide and pesticide mixing and applications will be conducted in accordance with all federal, state, and local laws and regulations and the specific product's label; herbicide and pesticide application will be directly applied to a localized spot and will not be applied by broadcasting techniques

4.3 Operation and Maintenance

4.3.1 Operational Procedures

- Freeborn will comply with all applicable federal, state, and local environmental laws, orders, and regulations
- Traffic will be restricted to Project-specific roads; use of unimproved roads will be restricted to emergency situations
- Speed limits will be set to ensure safe and efficient traffic flow; signs will be placed along roads, as necessary, to identify speed limits, travel restrictions, and other standard traffic control information
- If an avian collision risk is identified along the Project's 161-kV transmission line during line operation, applicable measures to minimize the potential for bird collisions will be implemented in accordance with APLIC's suggested measures to increase the visibility of the smaller-diameter shield wire (APLIC 2012)
- All carrion (with the exception of birds and bats) discovered on site during regular maintenance activities will be removed and disposed of in an appropriate manner to avoid attracting eagles and other raptors; birds and bats discovered on site will be addressed in conformance with the Project's incidental reporting process and the post-construction monitoring protocol in Section 5
- In addition to carrion removal, Freeborn will encourage landowners with livestock operations in and adjacent to the Project area to clear livestock carcasses regularly and expediently to avoid attracting eagles and other raptors to the Project area
- Project turbines will be feathered below cut-in, 3.0 m per second (m/s; 6.7 mph) from sunset to sunrise April 1 – October 31 to reduce impacts to all bat species, including the northern long-eared bat
- Monitoring and adaptive management will be implemented in accordance with Sections 5 and 6 to ensure the effectiveness of the avoidance, minimization, and mitigation strategies incorporated into the Project, including the turbine operational protocol

4.3.2 Training

- All operations personnel will be provided training on the ABPP and practices to be used to avoid and to minimize impacts to wildlife; this training will include identification of potential wildlife conflicts and the proper response, sensitivity to birds and other wildlife, and education on wildlife laws
- An incidental reporting process will be developed for operations personnel ensuring they can document bird or bat casualties during routine maintenance work and at other times that they are within the Project area; incidentally found wildlife will be documented for the life of the Project to identify wildlife concerns, should they arise
- All operations personnel will be directed to extinguish nighttime exterior lights at the collector station and at the substation when not in use, and operations personnel will be briefed on the importance of minimizing nighttime light use at the Project

5 TIER 4 – POST-CONSTRUCTION AVIAN AND BAT MONITORING

5.1 Monitoring Goals

The goals of post-construction monitoring are to estimate bird and bat carcass rates for the Project, evaluate the circumstances under which carcasses occur, and provide an efficient, long-term survey protocol for detecting large-bird (i.e., large raptor, vulture, eagle) carcasses that may occur over the life of the Project. Post-construction monitoring results also provide the triggers for adaptive management, described in Section 6. In accordance with the WEG (USFWS 2012), the Project will analyze bird and bat carcass monitoring data to accomplish the following:

- Estimate bird and bat mortality rates for the Project
- Estimate mortality rates for species of concern
- Compare estimated mortality rates to predicted mortality rates
- Evaluate bird and bat carcasses within the Project site in relation to site characteristics
- Compare estimated mortality rates at the Project site to mortality rates from existing projects in similar landscapes with similar species composition and use
- Determine the composition of carcasses in relation to migrating and resident birds and bats at the site.
- Assess whether carcass data suggest the need for measures to reduce impacts

5.2 Species to be Monitored

The post-construction monitoring plan will address all bird and bat carcasses detected within the Project area. The monitoring plan is designed to detect carcasses and estimate all bird and bat carcass rates with enough precision to determine if the operational conservation measures are effective in reducing the estimated bird and bat carcass rate for the Project, compared to bird and bat carcass rates for other operating projects.

5.3 Permits and Wildlife Handling Procedures

5.3.1 Permits

Any carcasses found during monitoring will be documented as described in Section 5.4.2.2. Freeborn may elect to obtain federal and state collection permits; carcasses will be left in place and not handled unless permits are obtained, in which case carcasses will be handled in accordance with these permits.

5.3.2 Wildlife Handling Procedures

All carcasses found will be documented as described in Section 5.4.2.2 and left in place (not handled) or handled in accordance with federal and state permits. In the event that a carcass of a federally or state-listed species or eagle is found, Freeborn will cover the carcass with a container and contact the appropriate authorities. If an injured bird or bat is found, Freeborn will contact the appropriate authorities and/or wildlife rehabilitator.

5.4 Monitoring

5.4.1 Study Design

There are several sources of bias that may impact the results of post-construction monitoring at wind facilities. The wind industry, consultants, and various federal and state agencies have developed field and analytical methodology to correct for these sources of bias. In particular, post-construction monitoring practices account for sources of field-sampling bias, including: (1) variable carcass rates, (2) carcass removal by scavengers, (3) searcher efficiency, and (4) limited search area within nominal full plot area (e.g., road and pad surveys). Freeborn's post-construction carcass monitoring methodology is designed to account for these sources of bias and adapt to preliminary results, such that effectiveness, efficiency, and accuracy of the study are optimized.

Standardized carcass searches will be conducted at Project turbines from March 15 to November 15 of the first full year of Project operations by a qualified consultant. The monitoring study design is meant to be intensive during the first year of monitoring to estimate bird and bat carcass rates, while also capturing important information about the distribution of carcasses around turbines. Collecting a robust data set through this design will provide important baseline information, which can be used to assess the impacts to birds and bats from the Project. Data will be used to determine how search parameters (e.g., number of turbines searched, search interval, necessity/size of cleared plots) can be adjusted if additional monitoring is required. Freeborn will consider a second year of monitoring if the results from the first year suggest a high degree of uncertainty on the level of bird and bat impacts (e.g., results show low searcher efficiency and/or high carcass removal rates that increase the level of uncertainty of actual impact). This decision will be made based on discussions with MNDNR, Iowa DNR, and/or DOC after the final report for the first year of monitoring is complete.

5.4.1.1 Standardized Carcass Searches

Standardized carcass searches will be conducted using two types of surveys:

1) Road-and-pad surveys along access roads and on turbine pads within 60 m (197 ft) of approximately 90% of the turbines[4].
2) Cleared-plot surveys at approximately 10% of the turbines, or at least 10 turbines, along transects within cleared plots measuring 120 x 120-m (394 x 394-ft). These plots will be cleared of all vision-obstructing vegetation.

Surveying the roads and turbine pads generally ensures the highest probability of detection, with the added benefit of obviating crop clearing. Although these searches cover only a portion of the potential carcass deposition area underneath turbines, analytical methods for correcting carcass detection for unsearched area have progressed considerably (Hull and Muir 2010, Huso and Dalthorp 2014). Accurate and relatively precise estimates can be achieved by surveying easily searched areas with a high probability of detection, and using analytical methods to adjust for unsearched area (Huso and Dalthorp 2014). Furthermore, a larger sample of roads and pads (or in this case, the entire facility) can be surveyed for a fixed unit of effort. A larger survey or full census provides additional information about spatial patterns within the facility and evaluation of landscape level variables that might affect carcass rate trends (e.g. distance to water features, relative composition of land cover within a fixed distance). The 60-m (197-ft) road-and-pad search radius should facilitate an efficient road-and-pad survey design, which minimizes the number of bat carcasses that go undetected due to falling (or being moved) outside of the plot radius.

Data collected through cleared-plot surveys will enable the development of a site-specific area correction to adjust estimated carcass rates calculated from carcasses found during road-and-pad searches. The 120 x 120-m (394 x 394-ft) area of cleared plots is expected to capture at least 89% of bat carcasses, based on carcass location data from eight post-construction carcass studies in the Midwest (Barton I and II, BSGF, Elm Creek, Fowler I, II, III [2011], Fowler I, II, III [2012], Grand Ridge I, Moraine II, and Winnebago). Studies used to inform the bat distribution analysis were chosen based on availability of public bat carcass location data. Furthermore, models of bird-fall distributions suggest at least 80% of small-bird carcasses, and 50% of large raptor carcasses may fall within 120 x 120-m (394 x 394-ft) cleared plots (Hull and Muir 2010).

5.4.1.2 Search Intervals

The WEG recommend that “carcass search intervals should be adequate to answer applicable questions at an appropriate level of precision to make general conclusions about the project” (USFWS 2012). The WEG (USFWS 2012) further recommend that carcass search intervals should be adequate for the study’s target species. A weekly search interval is recommended for low risk sites in the MNDNR Protocol (Mixon et al. 2014).

[4] The radius of the largest circle that fits inside a 120-m (394 x 394 ft) square is 60 m (197 ft). Therefore, 100-m (328-ft) radius road-and-pad plots cover more than the greatest extent of a 120-m (394 x 394 ft) cleared plot (out to about 85 m [279 ft] at the corners).

The turbine search schedule and order will be randomized so each turbine's search plot will be sampled at differing periods during the day. If more or less intensive monitoring is deemed necessary following initial data collection (carcass searches and carcass removal trials), the search intervals will be modified, accordingly.

Given the information presented above, road-and-pad searches and cleared-plot searches will be conducted weekly during spring, fall, and summer (March 15-November 15) to estimate all-bird and all-bat carcass rates during the period of highest use. Search intervals will be adjusted if carcass removal data suggest faster removal times during some seasons after the initial data collection.

5.4.2 Field Methods

5.4.2.1 Carcass Search Protocol

During road-and-pad searches, a searcher will walk along the road and around the turbine pad, focusing search efforts for carcasses only on roads and pads. For cleared-plot searches, searchers will walk transects placed 6 m (20 ft) apart within the plot and scan the area on both sides of each transect out to 3 m (10 ft) for carcasses. Searchers will walk at a rate of approximately 45–60 meters per minute (m/min; 2 miles per hour [mph]).

5.4.2.2 Data Collection and Processing

All standardized carcass searches will be conducted by a biologist experienced in conducting carcass searches, including proper assessment and reporting of carcasses. Searchers will be familiar with and able to accurately identify bird and bat species likely to be found at the Project. Any unknown birds and bats or suspected northern long-eared bats discovered during carcass searches will be picked up by an appropriate authority and sent to a qualified expert for positive identification.

For all carcasses found during standardized carcass searches, data recorded will include:

1) Date and time.
2) Initial species identification.
3) Sex, age, and reproductive condition (when identifiable).
4) Global positioning system location.
5) Distance and bearing to turbine.
6) Substrate/ground cover conditions.
7) Condition (intact, scavenged).
8) Any notes on presumed cause of death.
9) Wind speeds and direction and general weather conditions for nights preceding search.

At least one digital picture of each detected carcass will be taken. Bird and bat carcasses will be marked with spray paint and their location will be flagged with a short pin flag so searchers are aware the carcass has already been counted. Carcasses will either be left in place or collected in accordance with federal and state permits (Section 5.3).

Bird and bat carcasses found in non-search areas will be coded as "incidental finds" and otherwise documented in a similar fashion to those found during standard searches. The O&M personnel will be informed of the timing of standardized searches and, in the event that O&M personnel find a carcass or injured animal, they will report it (Section 5.5). Any carcasses found by O&M personnel also will be considered incidental finds. Incidental finds by O&M personnel within search areas will be included in survey summary totals and incorporated in the carcass rate estimates under the assumption that the carcass would have been found during the next search. Incidental finds by O&M personnel in non-search areas will be included in survey summary totals, but will not be included in the carcass rate estimates.

5.4.3 Bias Trials

5.4.3.1 Searcher Efficiency Trials

The objective of the searcher efficiency trials is to estimate the percentage of carcasses that are found by searchers. Searcher efficiency trials will be conducted in the same areas carcass searches occur. Searcher efficiency trials will begin when carcass searches begin. Personnel conducting carcass searches will not know when trials are conducted or the location of the carcasses.

Trials will be conducted to cover all seasons. Searcher efficiency rates will be estimated for each search type (e.g., turbine road and pad, tilled ground and cleared crops), size of carcass (large bird, small bird, and bat), and season (spring, summer, and fall). Estimates of searcher efficiency rates will be used to adjust the total number of carcasses found to account for those expected to be missed by searchers.

To estimate searcher efficiency rates during the road-and-pad and cleared-plot surveys, approximately 15 carcasses of small birds and 10 carcasses of large birds will be placed in search areas during each search season (i.e., spring, summer, and fall), for a total of 75 carcasses. Bird carcasses used for searcher efficiency trials may consist of non-native/non-protected or commercially available species; examples include house sparrows (*Passer domesticus*) and juvenile coturnix quail (*Coturnix coturnix*) representing likely small birds, and rock pigeons (*Columba livia*), mallards (*Anas platyrhynchos*), pheasants (*Phasianus colchicus*), and adult coturnix quail representing large birds. Additional species may be utilized if they are more readily available than examples provided above. To measure detection bias for bats, up to 15 surrogate brown/black mice will be used during each of spring, summer, and fall, for a total of 45 "bat" searcher efficiency trials.

All carcasses will be placed at locations within areas being searched prior to the carcass search, but on the same day. Carcasses will be dropped from shoulder height and allowed to land in a random posture. Each trial carcass will be discreetly marked with a black zip-tie around the leg for birds or around the upper arm for bats (front leg for bat surrogates) prior to dropping so that it can be identified as a study carcass after it is found. The number and location of the detection carcasses found during the carcass search will be recorded. The number of carcasses available for detection during each trial will be determined immediately after the trial by the person responsible for distributing the carcasses.

5.4.3.2 Carcass Removal Trials

The objective of carcass removal trials is to estimate the likelihood a carcass is available to be found as a function of the number of days it has been on the ground. Carcass removal includes removal by predation/scavenging or removal by other means, such as being plowed into a field. Carcass removal trials will be conducted approximately monthly to adequately cover all seasons and crop cover conditions. Estimates of carcass removal rates will be used to adjust the total number of carcasses found for those removed from the search area, correcting for removal bias.

Carcass removal trials will begin when carcass search studies begin. Trials will be placed on representative habitat within the facility, but at a great enough distance from turbines to avoid increasing risk to eagles and scavenging raptors, and avoid carcass swamping at searched turbines. To estimate carcass removal rates during the road-and-pad and cleared-plot surveys, approximately 15 carcasses of small birds and 10 of large birds will be placed along access roads within the facility, but outside of the search areas during each search season (i.e., spring, summer, and fall), for a total of 75 bird trial carcasses. Bird carcasses will consist of species similar to searcher efficiency trial specimens. In addition to birds, up to 10 carcass removal trials for bats will be performed during the spring, summer, and fall seasons, for a total of up to 30 trials. As for the searcher efficiency trials, bat carcass removal trials will be conducted using brown/black mice carcasses as a surrogate for bats.

As for the searcher efficiency trials, carcasses will be dropped from shoulder height and allowed to land in a random posture. Each trial carcass will be discreetly marked with a black zip-tie around the leg for birds or around the upper arm for bats (front leg for bat surrogates) prior to dropping so that it can be identified as a study carcass if it is found by other searchers or wind facility personnel.

Personnel conducting carcass searches will monitor the trial birds over a 30-day period according to the following schedule, as possible. Carcasses will be checked every day for the first four days, then on days 7, day 10, day 14, day 20, and day 30. This schedule may vary depending on weather and coordination with the other survey work. Experimental carcasses will be left at the location until the end of the carcass removal trial. At the end of the 30-day period, any evidence of the carcasses that remain will be removed from the search plot.

5.5 Incidental Monitoring

An incidental reporting process will be developed for operations personnel ensuring they can document bird or bat casualties during routine maintenance work and at other times they are within the Project area. Freeborn will provide operations personnel with materials (e.g., posters) describing the incidental reporting process and reporting resources. Incidentally found wildlife will be documented for the life of the Project to identify wildlife concerns, should they arise.

5.6 Statistical Methods for Estimating Carcass Rates

Carcass rate estimation is a complex task due to a number of variables present in every study. Animal fatalities occur at an unknown rate, carcasses persist for variable amounts of time, and carcass detection is variable, based on carcass characteristics and ground cover. Fortunately, methods have been developed to account for these auxiliary variables in the estimation of carcass rates.

Estimates of facility-related carcass rates are based on:

1) Observed number of carcasses found during standardized searches during the monitoring year for which the cause of death is either unknown or is potentially facility-related.
2) Non-removal rates expressed as the estimated average probability a carcass is expected to remain in the search area and be available for detection by the searchers during scavenger removal trials.
3) Searcher efficiency expressed as the proportion of planted carcasses found by searchers during searcher efficiency trials.
4) Search area adjustment based on the plot size and carcass density.

Carcass rate estimates will be provided for the following groups, as appropriate, based on the results of the standardized carcass searches: (1) all birds, (2) small birds, (3) large birds, (4) raptors, (5) eagles, and (6) bats. The total number of carcasses found during standardized road-and-pad and cleared-plot searches will be tallied for each of the groups listed above. For each group, carcass rate estimates will be calculated by adjusting for carcass removal rates, searcher efficiency rates, and (when appropriate) the proportion of carcasses expected to fall on roads and pads. In general, bias-adjusted carcass rate estimates are calculated via an equation of the form (Huso 2010, Korner-Nievergelt et. al 2011):

$$F = \frac{C}{r * p * A}$$

where F is the adjusted carcass rate estimate, C is the number of carcasses detected, r is the probability a carcass is available to be found, p is the probability a carcass is detected, and A is density-weighted area correction for road and pad plots ($A = 1$ for cleared plots).

There are several carcass rate estimators that can be used for post-construction monitoring studies at wind energy facilities (e.g., Shoenfeld 2004, Huso 2010, Korner-Nievergelt et. al 2011). Some estimators are more appropriate under particular field conditions (e.g., removal time, search interval, detection probability) due to inherent biases in all estimators. The Huso (2010) estimator was demonstrated to be relatively robust under a wide range of field condition. Therefore, the Huso estimator will be used to estimate carcass rates for the Project; however, if a more appropriate carcass rate estimator is available at the time of analysis, and its implementation is agreed upon by all parties involved, then it may be implemented in lieu of the Huso estimator.

The estimates and 90% confidence intervals will be calculated using bootstrapping (Manly 1997). Bootstrapping is a computer simulation technique that is useful for calculating point estimates, variances, and confidence intervals for complicated test statistics. A total of 1,000 bootstrap replicates will be used. The lower 5th and upper 95th percentiles of the 1,000 bootstrap estimates will provide estimates of the lower limit and upper limit of an approximate 90% confidence interval on all estimates.

To account for unsearched area, a carcass density-weighted proportion of area approach is used to adjust carcass rate estimates found in searched areas (Huso and Dalthorp 2014). Separate estimates are calculated for birds and bats. A density-weighted approach assigns more weight to areas nearer the turbine (where carcass density is higher), and less weight to areas farther from the turbine (where carcass density is low). The result is an estimate of the proportion of carcasses expected to land within searched and unsearched areas around a turbine. Data collected from searched areas at the Project will be used to derive density models for birds and bats. If carcass counts are low, the carcass density distribution will be estimated using a Bayesian approach (Gelman et al. 2013), and publicly available prior data on bird and bat distances from turbines in the U.S. will be used in conjunction with the Project's data.

5.7 Data Analysis and Reporting

5.7.1 Quality Assurance and Quality Control

Quality assurance and quality control (QA/QC) measures will be implemented at all stages of the study, including in the field, during data entry and analysis, and report writing. Following field surveys, observers will be responsible for inspecting data forms for completeness, accuracy, and legibility. A sample of records from an electronic database will be compared to the raw data forms and any errors detected will be corrected. Irregular codes or data suspected as questionable will be discussed with the observer and/or project manager. Errors, omissions, or problems identified in later stages of analysis will be tracked back to the raw data forms, and appropriate changes for all steps or stages will be made.

5.7.2 Data Compilation and Storage

A database will be developed to store, organize, and retrieve survey data. Data will be keyed into the electronic database using a pre-defined format to facilitate subsequent QA/QC and data analysis. All data forms, field notebooks, and electronic data files will be retained for reference.

5.7.3 Data Analysis

Analysis of data collected during the post-construction monitoring study will include spring, summer, and fall season carcass rate estimates for bats and spring, summer, and fall carcass rate estimates of birds. Data analysis will be performed to assess carcass estimates by turbine location. Data also may be analyzed to determine the influence of factors such as date and location on bird and bat carcass rates.

A variety of statistical tests may be applied to the data to analyze the patterns of estimated carcass rates in relationship to species/genera/taxa, season, and location. Data will be analyzed using

appropriate statistical procedures. Tests will be selected based on the parameter(s) under analysis, the ability of the data to meet test assumptions, and the suitability of tests for different forms of data. While statistical tests will not be used to correlate carcasses with weather variables, Freeborn will qualitatively evaluate carcass events with regards to notable weather events.

5.7.4 Reporting

Freeborn will prepare an internal annual carcass monitoring report following the completion of post-construction monitoring. The report will include carcass rate estimates and data summaries. Estimated carcass rates will be expressed both in terms of carcasses/turbine/year and carcasses/megawatt/year, as recommended by the WEG (USFWS 2012). This approach will facilitate comparison with other studies. The reports will include data analyses, including overall carcass rate estimates and a discussion of monitoring results and their implications.

If federal and state collection permits are obtained, Freeborn will report carcasses in accordance with the permit requirements. Freeborn will report any federally listed species or eagle carcasses found to the USFWS within one business day after species' identification confirmation.

6 ADAPTIVE MANAGEMENT

6.1 Adaptive Management Goals

The goals of the adaptive management plan are to enable the incorporation of results from the post-construction monitoring, O&M incidental reporting, industry research, and new regulatory developments into the Project's bird and bat avoidance and minimization strategy. Certain trigger events and potential subsequent changes to the avoidance and minimization strategy have been defined as a part of the adaptive management plan to guide the adaptive management process. If the avoidance and minimization measures are not producing the desired results, adjustments will be made, as necessary, to reduce impacts to birds and bats.

6.2 Adaptive Management Triggers and Responses

Adaptive management measures for the Project will be triggered by the following events, which are further defined below:

- Greater-than-expected bird or bat carcass rates (Section 3.4)
- Mass casualty event (five or more carcasses documented at the Project in a five-day period)
- Discovery of a federally listed species carcass or eagle carcass
- Discovery of a new and/or active eagle nest

Freeborn understands that unanticipated events beyond these adaptive management triggers may arise, and Freeborn will report and coordinate with the USFWS and MNDNR or Iowa DNR as necessary and appropriate to address any unanticipated issues. If appropriate, Freeborn will conduct additional specific, targeted monitoring to determine if adaptive management measures are necessary and/or effective.

6.2.1 Greater-than-predicted Bird or Bat Carcass Rates or Mass Casualty Event

Avian and bat carcass rates at the Project are expected to be within the range or lower than those reported for similar facilities in southern Minnesota and northern Iowa. The adaptive management triggers, based on the maximum bird and bat carcass rates from wind facilities in the region or a mass casualty event, will be structured to indicate whether the initial risk characterization was accurate and identify whether certain factors have changed from the pre-construction conditions. Consequently, these triggers will communicate when risk re-evaluation from Project operation may be necessary.

If carcass rates are greater than the expected range (Section 3.4) and are likely to exceed certain thresholds by species, or a mass casualty event is documented, Freeborn will meet and confer with the USFWS, MNDNR, Iowa DNR, and/or DOC, as appropriate. If a particular cause can be identified, Freeborn will develop specific mitigation measures in consultation with appropriate agencies to address the occurrence. Examples of potential adaptive management responses may include:

- Remove/modify the source of bird attraction
- Implement turbine operational protocols designed to reduce bird or bat carcass discoveries and target the particular issue identified during monitoring
- Implement technological solutions if new techniques or technology become available that are cost-effective and feasible to implement

6.2.2 Discovery of a Federally Listed Species' Carcass or Eagle Carcass

If a federally listed species' carcass or eagle carcass is found at the Project, Freeborn will take the following actions:

- Identify and secure the carcass at the place of its discovery in the field until USFWS Office of Law Enforcement (OLE) personnel can be reached and provide further instruction for carcass storage or pickup
- Notify the USFWS OLE within one business day of the discovery and positive species identification confirmation
- Notify the MNDNR and/or Iowa DNR in accordance with any state collection permits obtained
- Work with the USFWS to evaluate available data related to the carcass discovery and, as appropriate, identify and implement avoidance or minimization measures to reduce the risk of future fatalities; such measures may include adjusting the operational protocol at specific turbines during specific weather conditions or seasonal periods, followed by a year of carcass monitoring to assess whether the avoidance or minimization measures are sufficient
- Assess the need to obtain take authorization under the ESA or BGEPA in light of the new information

6.2.3 Discovery of a New and/or Active Eagle Nest

Freeborn will notify the USFWS if a new and/or active bald eagle nest is identified within 800 m (2,625 ft) of an operating turbine. If appropriate, Freeborn may elect to monitor eagle activity in and around the eagle nest. In coordination with USFWS, Freeborn may implement operational measures, such as turbine curtailment, to reduce collision risk to eagles. Additionally, after the nesting season, Freeborn will consider seeking a permit to remove the eagle nest in coordination with the USFWS and MNDNR or Iowa DNR.

7 KEY RESOURCES

Resource	Phone Number
Black Hawk County Rehab Tammy Lea Wood Box 172/106 Hampton Street Rudd, IA 50471	641-220-1957
Black Hawk Wildlife Refuge Connie Devries 501 18th Ave Charles City, IA 50616	614-220-1129
Wildlife Rehabilitation Jim Mason 900 Main Street Janesville, IA 50647	319-987-8232
U.S. Fish and Wildlife Service, Minnesota Twin Cities Field Office	952-252-0092
U.S. Fish and Wildlife Service, Iowa Rock Island Field Office	309-757-5800
Minnesota Department of Natural Resources	651-296-6157
Iowa Department of Natural Resources	515-725-8200
Freeborn Wind Farm Operations & Maintenance	TBD

8 LITERATURE CITED

8.1 Laws, Acts, and Regulations

16 United States Code (USC) §§ 1531-1599. 1973. Title 16 - Conservation; Chapter 35 - Endangered Species; Sections (§§) 1531-1599. Endanged Species Act. 16 USC 1531-1599. P.L. 93-205, 84 Stat. 884 (codified as amended).

16 United States Code (USC) §§ 668 - 668d. 1940. Title 16 - Conservation; Chapter 5a - Protection and Conservation of Wildlife; Subchapter Ii - Protection of Bald and Golden Eagles; Sections (§§) 668-668d - Bald and Golden Eagles. 16 USC 668-668d. (June 8, 1940, Chapter [Ch.] 278, § 1,54 Statute [Stat.] 250; Public Law [Pub. L.] 86–70, Section [§] 14, June 25, 1959, 73 Stat. 143; Pub. L. 87–884, October 24, 1962, 76 Stat. 1246; Pub. L. 92–535, § 1,October 23, 1972, 86 Stat. 1064).

16 United States Code (USC) 703-711. 1973. Title 16 - Conservation; Chapter 7 - Protection of Migratory Game and Insectivorous Birds; Subchapter Ii - Migratory Bird Treaty; Sections (§§) 703-711. 16 Usc 703-711. Available online at: http://www.gpo.gov/fdsys/pkg/USCODE-2010-title16/pdf/USCODE-2010-title16-chap7-subchapII.pdf

33 Code of Federal Regulations (CFR) 323. 1999. Title 33 - Navigation and Navigable Waters; Part 323 - Water Pollution Control; Waterways.

50 Code of Federal Regulations (CFR) § 10.12. 2010. Title 50 - Wildlife and Fisheries; Chapter I -United States Fish and Wildlife Service, Department of the Interior; Subchapter B Taking, Possession, Transportation, Sale, Purchase, Barter, Exportation, and Importation of Wildlife and Plants; Part 10 - General Provisions; Subpart B - Definitions; Section (§)10.12. Definitions. 50 CFR 10.12. [38 Federal Register (FR) 22015, Augugust 15, 1973, as amended at 42 FR 32377, June 24, 1977; 42 FR 59358, November 16, 1977; 45 FR 56673, August 25, 1980; 50 FR 52889, December 26, 1985; 72 FR 48445, August 23, 2007].

50 Code of Federal Regulations (CFR) § 10.13. 1973. Title 50 - Wildlife and Fisheries; Chapter I -United States Fish and Wildlife Service, Department of the Interior; Subchapter B Taking, Possession, Transportation, Sale, Purchase, Barter, Exportation, and Importation of Wildlife and Plants; Part 10 - General Provisions; Subpart B - Definitions; Section (§)10.13. List of Migratory Birds. 50 CFR 10.13; 38 Federal Register (FR) 22015, August 15, 1973, as amended 50 FR 52889, December 26, 1985.

50 Code of Federal Regulations (CFR) 22.26. 2009. Title 50 - Wildlife and Fisheries; Chapter I -United States Fish and Wildlife Service, Department of the Interior; Subchapter B - Taking, Possession, Transportation, Sale, Purchase, Barter, Exportation, and Importation of Wildlife and Plants; Part 22 - Eagle Permits; Subpart C - Eagle Permits; Section (§) 22.26 - Permits for Eagle Take That Is Associated with, but Not the Purpose of, an Activity. 50 CFR 22.26. [74 Federal Register (FR) 46877, September 11, 2009, as amended at 79 FR 73725, December 9, 2013].

50 Code of Federal Regulations (CFR) 22.27. 2009. Title 50 - Wildlife and Fisheries; Chapter I - United States Fish and Wildlife Service, Department of the Interior; Subchapter B - Taking, Possession, Transportation, Sale, Purchase, Barter, Exportation, and Importation of Wildlife and Plants; Part 22 - Eagle Permits; Subpart C - Eagle Permits; Section (§) 22.26 - Removal of Eagle Nests. 50 CFR 22.26. [74 FR 46877, September 11, 2009; 79 FR 46877 October 1, 2012.

50 Code of Federal Regulations (CFR) 22.3. 1974. Title 50 - Wildlife and Fisheries; Chapter I -United States Fish and Wildlife Service, Department of the Interior; Subchapter B - Taking, Possession, Transportation, Sale, Purchase, Barter, Exportation, and Importation of Wildlife and Plants; Part 22 - Eagle Permits; Subpart a - Introduction; Section (§) 22.3 - Definitions. 50 CFR 22.3. [39 Federal Register (FR) 1183, January 4, 1974, as amended at 48 FR 57300, December 29, 1983; 64 FR 50472, September 17, 1999; 72 FR 31139, June 5, 2007; 74 FR 46876, September 11, 2009].

77 Federal Register (FR) 58: 17496-17498. 2012. United States Fish and Wildlife Service, Department of the Interior. Fisheries and Habitat Conservation and Migratory Birds Programs; Final Land-Based Wind Energy Guidelines. March 26, 2012.

80 Federal Register (FR) 63: 17974-18033. 2015. 50 Cfr 17. Endangered and Threatened Wildlife and Plants; Threatened Species Status for the Northern Long-Eared Bat with 4(D) Rule. Final rule, and interim rule with request for comments. Department of the Interior Fish and Wildlife Service. 80 FR 63: 17974-18033. April 2, 2015. Available online at: http://www.fws.gov/midwest/endangered/mammals/nleb/pdf/FRnlebFinalListing02April2015.pdf

81 Federal Register (FR) 9: 1900-1922. 2016. 50 Cfr 17. Endangered and Threatened Wildlife and Plants; 4(D) Rule for the Northern Long-Eared Bat. Final rule. Department of the Interior Fish and Wildlife Service. 81 FR 9: 1900-1922. January 14, 2016. Available online at: http://www.fws.gov/Midwest/endangered/mammals/nleb/pdf/FRnlebFinal4dRule14Jan2016.pdf

8.2 Literature

Auch, R. F. 2014. Western Corn Belt Plains Ecoregion Summary. U.S. Geological Survey (USGS) Land Cover Trends Project. USGS Center for Earth Resources Observation and Science, Sioux Falls, South Dakota. Available online at: http://landcovertrends.usgs.gov/gp/eco47Report.html#_ftn1

Avian Power Line Interaction Committee (APLIC). 2006. Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006. Public Interest Energy Research Program (PIER) Final Project Report CEC-500-2006-022. Edison Electric Institute, APLIC, and the California Energy Commission. Washington D.C. and Sacramento, California.

Avian Power Line Interaction Committee (APLIC). 2012. Reducing Avian Collisions with Power Lines: The State of the Art in 2012. Edison Electric Institute and APLIC, Washington D.C.

Bat Conservation International (BCI). 2015. Bat Species: Us Bats. BCI website. BCI, Inc., Austin, Texas. Range GIS data from 2009. Homepage: http://www.batcon.org; Species profiles available online at: http://batcon.org/index.php/all-about-bats/species-profiles.html

BHE Environmental, Inc. (BHE). 2010. Post-Construction Bird and Bat Mortality Study: Cedar Ridge Wind Farm, Fond Du Lac County, Wisconsin. Interim Report prepared for Wisconsin Power and Light, Madison, Wisconsin. Prepared by BHE Environmental, Inc. Cincinnati, Ohio. February 2010.

Chodachek, K., C. Derby, D. Bruns Stockrahm, P. Rabie, K. Adachi, and T. Thorn. 2014. Bat Fatality Rates and Effects of Changes in Operational Cut-in Speeds at Commercial Wind Farms in Southern Minnesota - Year 1: July 9 - October 31, 2013. Prepared for Minnesota Department of Commerce, St. Paul, Minnesota. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota, and Minnesota State University Moorhead, Moorhead, Minnesota. May 23, 2014. Available online at: http://mn.gov/commerce/energyfacilities/documents/MNDOC,%20Bat%20Fatality%20Study%20Year%201,%205.23.14.pdf

Chodachek, K., C. Derby, M. Sonnenberg, and T. Thorn. 2012. Post-Construction Fatality Surveys for the Pioneer Prairie Wind Farm I Llc Phase Ii, Mitchell County, Iowa: April 4, 2011 – March 31, 2012. Prepared for EDP Renewables, North America LLC, Houston, Texas. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. August 27, 2012.

Cryan, P. M. 2008. Mating Behavior as a Possible Cause of Bat Fatalities at Wind Turbines. Journal of Wildlife Management 72(3): 845-849. doi: 10.2193/2007-371.

Cryan, P. M. and A. C. Brown. 2007. Migration of Bats Past a Remote Island Offers Clues toward the Problem of Bat Fatalities at Wind Turbines. Biological Conservation 139: 1-11. doi:10.1016/j.biocon.2007.05.019.

Derby, C., K. Chodachek, and K. Bay. 2010a. Post-Construction Bat and Bird Fatality Study Crystal Lake Ii Wind Energy Center, Hancock and Winnebago Counties, Iowa. Final Report: April 2009- October 2009. Prepared for NextEra Energy Resources, Juno Beach, Florida. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. June 2, 2010.

Derby, C., K. Chodachek, K. Bay, and A. Merrill. 2010b. Post-Construction Fatality Surveys for the Elm Creek Wind Project: March 2009- February 2010. Prepared for Iberdrola Renewables, Inc. (IRI), Portland, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota.

Derby, C., K. Chodachek, K. Bay, and A. Merrill. 2010c. Post-Construction Fatality Surveys for the Moraine Ii Wind Project: March - December 2009. Prepared for Iberdrola Renewables, Inc. (IRI), Portland, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota.

Derby, C., K. Chodachek, K. Bay, and A. Merrill. 2010d. Post-Construction Fatality Surveys for the Winnebago Wind Project: March 2009 - February 2010. Prepared for Iberdrola Renewables, Inc. (IRI), Portland, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota.

Derby, C., K. Chodachek, K. Bay, and S. Nomani. 2011. Post-Construction Fatality Surveys for the Barton I and Ii Wind Project: Iri. March 2010 - February 2011. Prepared for Iberdrola Renewables, Inc. (IRI), Portland, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. Version: September 28, 2011.

Derby, C., K. Chodachek, and M. Sonnenberg. 2012. Post-Construction Fatality Surveys for the Elm Creek Ii Wind Project. Iberdrola Renewables: March 2011-February 2012. Prepared for Iberdrola Renewables, LLC, Portland, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. October 8, 2012.

Elliott-Smith, E. and S. M. Haig. 2004. Piping Plover (*Charadrius Melodus*). A. Poole, ed. The Birds of North America Online. Cornell Lab of Ornithology. Ithaca, New York. http://bna.birds.cornell.edu/bna/species/002; doi: 10.2173/bna.2

Erickson, W. P., G. D. Johnson, D. P. Young, D. Strickland, R. Good, M. Bourassa, K. Bay, and K. Sernka. 2002. Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed and Existing Wind Developments. Technical report prepared for Bonneville Power Administration, Portland, Oregon by WEST, Inc., Cheyenne, Wyoming. December 2002. http://www.bpa.gov/Power/pgc/wind/Avian_and_Bat_Study_12-2002.pdf

Erickson, W. P., G. D. Johnson, M. D. Strickland, D. P. Young, Jr., K. J. Sernka, and R. E. Good. 2001. Avian Collisions with Wind Turbines: A Summary of Existing Studies and Comparisons to Other Sources of Bird Collision Mortality in the United States. National Wind Coordinating Collaborative (NWCC) Publication and Resource Document. Prepared for the NWCC by WEST, Inc., Cheyenne, Wyoming. August 2001.

Erickson, W. P., M. M. Wolfe, K. J. Bay, D. H. Johnson, and J. L. Gehring. 2014. A Comprehensive Analysis of Small Passerine Fatalities from Collisions with Turbines at Wind Energy Facilities. PLoS ONE 9(9): e107491. doi: 10.1371/journal.pone.0107491.

ESRI. 2016. World Imagery and Aerial Photos. ArcGIS Resource Center. ESRI, producers of ArcGIS software. Redlands, California.

Federal Aviation Administration (FAA). 2000. Obstruction Marking and Lighting. AC 70/7460-1K. Available online at http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/b993dcdfc37fcdc486257251005c4e21

Federal Aviation Administration (FAA). 2007. Obstruction Marking and Lighting. Advisory Circular. AC 70/7460-1K. US Department of Transportation, FAA. Effective February 1, 2007. Available online at: http://www.faa.gov/documentLibrary/media/Advisory_Circular/AC%2070%207460-1K.pdf

Fernley, J., S. Lowther, and P. Whitfield. 2006. A Review of Goose Collisions at Operating Wind Farms and Estimation of the Goose Avoidance Rate. Unpublished report. West Coast Energy, Hyder Consulting and Natural Research.

Foster, R. W. and A. Kurta. 1999. Roosting Ecology of the Northern Bat (*Myotis septentrionalis*) and Comparisons with the Endangered Indiana Bat (*Myotis sodalis*). Journal of Mammalogy 80: 659-672.

Gelman, A., J. B. Carlin, H. S. Stern, D. B. Dunson, A. Vehtari, and D. B. Rubin. 2013. Bayesian Data Analysis. CRC Press, London.

Goetzman, K. 2014. Our Golden Eagles. Minnesota Conservation Volunteer January-February 2014: 8-21.

Gruver, J., M. Sonnenberg, K. Bay, and W. Erickson. 2009. Post-Construction Bat and Bird Fatality Study at the Blue Sky Green Field Wind Energy Center, Fond Du Lac County, Wisconsin July 21 - October 31, 2008 and March 15 - June 4, 2009. Unpublished report prepared by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. December 17, 2009.

Henderson, L. E. and H. G. Broders. 2008. Movements and Resource Selection of the Northern Long-Eared Myotis (*Myotis septentrionalis*) in a Forest-Agriculture Landscape. Journal of Mammalogy 89: 952-963.

Homer, C. G., J. A. Dewitz, L. Yang, S. Jin, P. Danielson, G. Xian, J. Coulston, N. D. Herold, J. D. Wickham, and K. Megown. 2015. Completion of the 2011 National Land Cover Database for the Conterminous United States-Representing a Decade of Land Cover Change Information. Photogrammetric Engineering and Remote Sensing 81(5): 345-354. Available online from: http://www.mrlc.gov/nlcd2011.php

Howe, R. W., W. Evans, and A. T. Wolf. 2002. Effects of Wind Turbines on Birds and Bats in Northeastern Wisconsin. Prepared by University of Wisconsin-Green Bay, for Wisconsin Public Service Corporation and Madison Gas and Electric Company, Madison, Wisconsin. November 21, 2002. 104 pp.

Hull, C. and S. Muir. 2010. Search Area for Monitoring Bird and Bat Carcasses at Wind Farms Using a Monte-Carlo Model. Australian Journal of Environmental Management 17:77-87.

Huso, M. 2010. An Estimator of Wildlife Fatality from Observed Carcasses. Environmetrics 22(3): 318–329. doi: 10.1002/env.1052.

Huso, M. M. P. and D. Dalthorp. 2014. Accounting for Unsearched Areas in Estimating Wind Turbine-Caused Fatality. Journal of Wildlife Management 78(2): 347-358. doi: 10.1002/jwmg.663.

Jain, A. 2005. Bird and Bat Behavior and Mortality at a Northern Iowa Windfarm. M.S. Thesis. Iowa State University, Ames, Iowa.

Johnson, G. D., W. P. Erickson, M. D. Strickland, M. F. Shepherd, and D. A. Shepherd. 2000. Final Report: Avian Monitoring Studies at the Buffalo Ridge Wind Resource Area, Minnesota: Results of a 4-Year Study. Final report prepared for Northern States Power Company, Minneapolis, Minnesota, by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. September 22, 2000. 212 pp. http://www.west-inc.com

Johnson, G. D., W. P. Erickson, M. D. Strickland, M. F. Shepherd, D. A. Shepherd, and S. A. Sarappo. 2003. Mortality of Bats at a Large-Scale Wind Power Development at Buffalo Ridge, Minnesota. The American Midland Naturalist 150: 332-342.

Johnson, G. D., M. K. Perlik, W. P. Erickson, and M. D. Strickland. 2004. Bat Activity, Composition and Collision Mortality at a Large Wind Plant in Minnesota. Wildlife Society Bulletin 32(4): 1278-1288.

Kerlinger, P., R. Curry, A. Hasch, and J. Guarnaccia. 2007. Migratory Bird and Bat Monitoring Study at the Crescent Ridge Wind Power Project, Bureau County, Illinois: September 2005 - August 2006. Final draft prepared for Orrick Herrington and Sutcliffe, LLP. May 2007.

Kochert, M. N., K. Steenhof, C. L. Mcintyre, and E. H. Craig. 2002. Golden Eagle (*Aquila Chrysaetos*). A. Poole, ed. The Birds of North America Online. Cornell Lab of Ornithology. Ithaca, New York. Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/684; doi: 10.2173/bna.684

Korner-Nievergelt, F., P. Korner-Nievergelt, O. Behr, I. Niermann, R. Brinkmann, and B. Hellriegel. 2011. A New Method to Determine Bird and Bat Fatality at Wind Energy Turbines from Carcass Searches. Wildlife Biology 17: 350-363.

Kunz, T. H., E. B. Arnett, B. M. Cooper, W. P. Erickson, R. P. Larkin, T. Mabee, M. L. Morrison, M. D. Strickland, and J. M. Szewczak. 2007a. Assessing Impacts of Wind-Energy Development on Nocturnally Active Birds and Bats: A Guidance Document. Journal of Wildlife Management 71(8): 2449-2486. Available online at: http://www.batsandwind.org/pdf/Assessing%20Impacts%20of%20wind-energy%20development%20on%20bats%20and%20birds.pdf

Kunz, T. H., E. B. Arnett, W. P. Erickson, A. R. Hoar, G. D. Johnson, R. P. Larkin, M. D. Strickland, R. W. Thresher, and M. D. Tuttle. 2007b. Ecological Impacts of Wind Energy Development on Bats: Questions, Research Needs, and Hypotheses. Frontiers in Ecology and the Environment 5(6): 315-324. Available online at: https://www.bu.edu/cecb/files/2009/12/kunzbats-wind07.pdf

Liguori, J. 2005. Hawks from Every Angle: How to Identify Raptors in Flight. Princeton University Press, Princeton, New Jersey.

Manly, B. F. J. 1997. Randomization, Bootstrap, and Monte Carlo Methods in Biology. second Edition. Chapman and Hall, London.

Mattson, T., K. Chodachek, S. Hamilton, and S. Agudelo. 2015. Raptor Nest Survey Results for the Rock Creek Wind Project, Atchison and Nodaway Counties, Missouri. Final Report: July 27, 2015. . Prepared for Rock Creek Wind Project, LLC. Prepared by Western EcoSystems Technology, Inc. (WEST), Golden Valley, Minnesota.

Minnesota Department of Natural Resources (MNDNR). 2011. Minnesota Department of Natural Resources Guidance for Commercial Wind Energy Projects. October 1, 2011. Available online at: http://files.dnr.state.mn.us/publications/ewr/dnr_wind_energy_project_guidance_2011.pdf

Minnesota Department of Natural Resources (MNDNR). 2015a. Areas of Biodiversity Significance in Minnesota. MBS Site Biodiversity Significance Ranks, Minnesota Biological Survey (MBS). MNDNR, St. Paul, Minnesota. Accessed February 2015. Information available online at: http://www.dnr.state.mn.us/eco/mcbs/biodiversity_guidelines.html

Minnesota Department of Natural Resources (MNDNR). 2015b. Waterfowl refuges and sanctuaries. Accessed February 2015. Information available online at: http://www.dnr.state.mn.us/wildlife/shallowlakes/refuges.html

Minnesota Department of Natural Resources (MNDNR). 2016a. Recreation Compass. Accessed September 2016. Information available online at: http://www.dnr.state.mn.us/maps/compass.html

Minnesota Department of Natural Resources (MNDNR). 2016b. First new bat species discovered in Minnesota in more than a century. MNDNR News Release (August 1). Available online at: http://news.dnr.state.mn.us/2016/08/01/first-new-bat-species-discovered-in-minnesota-in-more-than-a-century/

Mixon, K. L., J. Schrenzel, D. Pile, R. Davis, R. Doneen, L. Joyal, N. Kestner, M. Doperalski, and J. Schladweiler. 2014. Avian and Bat Survey Protocols for Large Wind Energy Conversion Systems in Minnesota. Minnesota Department of Natural Resources. New Ulm, Minnesota. 41 pp.

National Audubon Society (Audubon). 2014. The Important Bird Areas. Updated June 2014. IBAs by state available online at: http://www.audubon.org/bird/iba

National Research Council (NRC). 2007. Environmental Impacts of Wind-Energy Projects. National Academies Press. Washington, D.C. www.nap.edu

North American Datum (NAD). 1983. NAD83 Geodetic Datum.

Ornithological Council, The. 2007. Critical Literature Review: Impact of Wind Energy and Related Human Activities on Grassland and Shrub-Steppe Birds. Prepared for the National Wind Consulting Council. Literature Review by S. Mabey and E. Paul. October 2007.

Pardieck, K. L., D. J. Z. Jr., and M.-A. R. Hudson. 2014. North American Breeding Bird Survey Dataset 1966 - 2013. Version 2013.0. US Geological Survey [USGS] Patuxent Wildlife Research Center. Laurel, Maryland. Raw data retrieval available online at: www.pwrc.usgs.gov/BBS/RawData/

Pedersen, M. B. and E. Poulsen. 1991. Impact of a 90m/2mw Wind Turbine on Birds - Avian Responses to the Implementation of the Tjaereborg Wind Turbine at the Danish Wadden Sea. Dansek Vildundersogelser 47: 1-44. Miljoministeriet & Danmarks Miljoundersogelser.

Pompei, V. D. and F. J. Cuthbert. 2004. Spring and Fall Distribution of Piping Plovers in North America: Implications for Migration Stopover Conservation. Unpublished report submitted to US Army Corps of Engineers.

Preston, C. R. 1990. Distribution of Raptor Foraging in Relation to Prey Biomass and Habitat Structure. Condor 92: 107-112.

Reynolds, R. T., J. M. Scott, and R. A. Nussbaum. 1980. A Variable Circular-Plot Method for Estimating Bird Numbers. Condor 82(3): 309-313.

Rosenzweig, M. L. 1989. Habitat Selection, Community Organization, and Small Mammal Studies. Pp. 5-21. *In*: D. W. Morris, Z. Abramsky, B. J. Fox, and M. R. Willig, eds. Patterns in the Structure of Mammalian Communities. Texas Tech University Press, Lubbock, Texas.

Shaffer, J. A. and D. H. Johnson. 2008. Displacement Effects of Wind Developments on Grassland Birds in the Northern Great Plains. Presented at the Wind Wildlife Research Meeting VII, Milwaukee, Wisconsin. Wind Wildlife Research Meeting VII Plenary. October 28-29, 2008.

Shaffer, J. A., D. H. Johnson, and D. A. Buhl. 2012. Avoidance of Wind Generators by Breeding Grassland Birds. Poster presented at the 5th North American Ornithological Conference, August 14 - 18, Vancouver, Canada.

Shaw, S. and C.G. Fredine. 1956. Wetlands of the United States: Their Extent and Their Value to Waterfowl and Other Wildlife. Washington D.C. Department of the Interior, Fish and Wildlife Service, Office of the River Basin Studies. Circular 39.

Shoenfeld, P. 2004. Suggestions Regarding Avian Mortality Extrapolation. Technical memo provided to FPL Energy. West Virginia Highlands Conservancy, HC70, Box 553, Davis, West Virginia, 26260. Available online at: https://www.nationalwind.org/wp-content/uploads/2013/05/Shoenfeld-2004-Suggestions-Regarding-Avian-Mortality-Extrapolation.pdf

Simon, S. and T. Mattson. 2016a. Site Characterization Study Report for the Freeborn Wind Energy Project, Freeborn County, Minnesota. Final Report. Prepared for Freeborn Wind Energy LLC, Chicago, Illinois. Prepared by Western EcoSystems Technology, Inc. (WEST), Golden Valley, Minnesota. 32 pages.

Simon, S. and T. Mattson. 2016b. Eagle Nest Survey for the Freeborn Wind Project, Freeborn County, Minnesota. Final Report: March 29 – 31, 2016. Prepared for Freeborn Wind Energy LLC, Chicago, Illinois. Prepared by Western EcoSystems Technology, Inc. (WEST), Golden Valley, Minnesota. 6 pages.

Simon, S. and T. Mattson. 2016c. Avian Studies for the Freeborn Wind Energy Project, Freeborn County, Minnesota. Final Report: January 2015 – March 2016. Prepared for Freeborn Wind Energy LLC, Chicago, Illinois. Prepared by Western EcoSystems Technology, Inc. (WEST), Golden Valley, Minnesota. 44 pages + appendices.

Simon, S. and T. Mattson. 2016d. Bat Acoustic Study for the Freeborn Wind Energy Project, Freeborn County, Minnesota. Final Report: April 14 – November 14, 2015. Prepared for Freeborn Wind Energy LLC, Chicago, Illinois. Prepared by Western EcoSystems Technology, Inc. (WEST), Golden Valley, Minnesota. 24 pages.

Simon, S. and T. Mattson. 2016e. Native Prairie Evaluation, Freeborn Wind Energy Project, Freeborn County, Minnesota. Final Report: September 2015. Prepared for Freeborn Wind Energy LLC, Chicago, Illinois. Prepared by Western EcoSystems Technology, Inc. (WEST), Golden Valley, Minnesota. August 26, 2016. 6 pages + appendix.

Simon, S. and T. Mattson. 2016f. Preliminary Water Resource Evaluation, Freeborn Wind Energy Project, Freeborn County, Minnesota. April 9, 2015. Prepared for Freeborn Wind Energy LLC. Prepared by Western EcoSystems Technology, Inc. (WEST), Golden Valley, Minnesota. August 26, 2016. 9 pages.

Simon, S., R. Duncan, and T. Mattson. 2017a. Site Characterization Study Report, Freeborn Wind Energy Project Expansion Area, Freeborn County, Minnesota, and Worth County, Iowa. Final Report. Prepared for Freeborn Wind Energy LLC, Chicago, Illinois. Prepared by Western EcoSystems Technology, Inc. (WEST), Golden Valley, Minnesota. 46 pages.

Simon, S., R. Duncan, and T. Mattson. 2017b. Native Prairie Evaluation, Freeborn Wind Energy Project Expansion Area, Freeborn County, Minnesota, and Worth County, Iowa. Final Report. Prepared for Freeborn Wind Energy LLC, Chicago, Illinois. Prepared by Western EcoSystems Technology, Inc. (WEST), Golden Valley, Minnesota. 10 pages + appendix.

Simon, S., R. Duncan, and T. Mattson. 2017c. Water Resource Evaluation, Freeborn Wind Energy Project Expansion Area, Freeborn County, Minnesota, and Worth County, Iowa. Final Report. Prepared for Freeborn Wind Energy LLC, Chicago, Illinois. Prepared by Western EcoSystems Technology, Inc. (WEST), Golden Valley, Minnesota. 9 pages.

Spaans, A., L. van der Bergh, S. Dirksen, and J. van der Winden. 1998. Windturbines En Volgles: Hoe Hiermee Om Te Gaan? (Wind Turbines and Birds: Can They Co-Exist?). De Levende Naturr 99(3): 115-121.

Sullivan, B.L., C.L. Wood, M.J. Iliff, R.E. Bonney, D. Fink, and S. Kelling. 2009. eBird: a citizen-based bird observation network in the biological sciences. Biological Conservation 142:2282-2292.

U.S. Department of Agriculture (USDA). 2014. Imagery Programs - National Agriculture Imagery Program (Naip). USDA - Farm Service Agency (FSA). Aerial Photography Field Office (APFO), Salt Lake City, Utah. Last updated September 2014. Information available online at: http://www.fsa.usda.gov/programs-and-services/aerial-photography/imagery-programs/index

U.S. Environmental Protection Agency (USEPA). 2014. National Pollutant Discharge Elimination System (Npdes). Last updated July 21, 2014. Information online at: http://water.epa.gov/polwaste/npdes/

U.S. Fish and Wildlife Service (USFWS). 2011. Indiana Bat Section 7 and Section 10 Guidance for Wind Energy Projects. Revised October 26, 2011. Available online at: http://www.fws.gov/midwest/endangered/mammals/inba/pdf/inbaS7and10WindGuidanceFinal26Oct2011.pdf

U.S. Fish and Wildlife Service (USFWS). 2012. Land-Based Wind Energy Guidelines. March 23, 2012. 82 pp. Available online at: http://www.fws.gov/cno/pdf/Energy/2012_Wind_Energy_Guidelines_final.pdf

U.S. Fish and Wildlife Service (USFWS). 2013. Eagle Conservation Plan Guidance: Module 1 - Land-Based Wind Energy, Version 2. US Department of the Interior, Fish and Wildlife Service, Division of Migratory Bird Management. April 2013. Executive Summary and frontmatter + 103 pp. Available online at: https://www.fws.gov/migratorybirds/pdf/management/eagleconservationplanguidance.pdf

U.S. Fish and Wildlife Service (USFWS). 2014. Northern Long-Eared Bat Interim Conference and Planning Guidance. USFWS Regions 2, 3, 4, 5, and 6. January 6, 2014. Available online at: http://www.fws.gov/northeast/virginiafield/pdf/NLEBinterimGuidance6Jan2014.pdf

U.S. Fish and Wildlife Service (USFWS). 2015a. Endangered and Threatened Wildlife and Plants; Threatened Species Status for the Northern Long-Eared Bat with 4(D) Rule; Final Rule and Interim Rule. Department of the Interior, Fish and Wildlife Service, 50 CFR Part 17. 80 Federal Register (FR) 63: 17974-18033. April 2, 2015. Available online at: http://www.fws.gov/midwest/endangered/mammals/nleb/pdf/FRnlebFinalListing02April2015.pdf

U.S. Fish and Wildlife Service (USFWS). 2015b. Initial Project Scoping: Ipac - Information, Planning, and Conservation System. IPaC, Environmental Conservation Online System (ECOS), USFWS. Last updated March 2015. USFWS Endangered Species Program homepage: http://www.fws.gov/endangered/; Environmental Conservation Online System (ECOS): http://ecos.fws.gov/ecos/indexPublic.do; IPaC: http://ecos.fws.gov/ipac/; IPaC Initial Poject Scoping: http://ecos.fws.gov/ipac/wizard/chooseLocation!prepare.action;jsessionid=C7EFBBD36C261B68BA38B5CD30A7584C

U.S. Fish and Wildlife Service (USFWS). 2015c. Piping Plover (*Charadrius Melodus*). USFWS Environmental Conservation Online System (ECOS) Species Profile. Accessed February 2015. ECOS available at: http://ecos.fws.gov/ecos/indexPublic.do; Piping plover species profile available online at: http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B079

U.S. Geological Survey (USGS) National Land Cover Database (NLCD). 2011. National Land Cover Database 2011 (Nlcd 2011). Multi-Resolution Land Characteristics Consortium (MRLC), National Land Cover Database (NLCD). USGS Earth Resources Observation and Science (EROS) Center, Sioux Falls, South Dakota. Information available online at: http://www.mrlc.gov/nlcd2011.php; Legend information available at: http://www.mrlc.gov/nlcd11_leg.php

U.S. Geological Survey (USGS). 2013. Migration of Birds: Routes of Migration. Northern Prairie Wildlife Research Center, Jamestown, North Dakota. Accessed February 2015. Available online at: http://www.sandiegocounty.gov/content/dam/sdc/pds/ceqa/Soitec-Documents/Final-EIR-Files/references/rtcref/ch2.3/2014-12-19_USGS2013_MigrationofBirds.pdf

U.S. Geological Survey (USGS). 2016. National Hydrography Dataset (Nhd). USGS NHD Extracts: North Dakota. Last accessed February 2016. Information available online at: http://nhd.usgs.gov/; State data available online at: ftp://nhdftp.usgs.gov/DataSets/Staged/States/FileGDB/HighResolution/

U.S. Geological Survey (USGS). 2016. Version 10.22. ArcGIS Rest Services Directory. Streaming data. The National Map, USGS. Last updated September 2016. Data from: https://basemap.nationalmap.gov/arcgis/rest/services

Winkelman, E. 1990. Impact of the Wind Park near Urk, Netherlands, on Birds: Bird Collision Victims and Disturbance of Wintering Fowl. International Ornithological Congress 20: 402-403.

8.3 Studies Used to Estimate Midwest Bat Distance Distribution

Barton I and II

Western EcoSystems Technology, Inc. (WEST). 2011. Post-Construction Fatality Surveys for the Barton Chapel Wind Project: Iberdrola Renewables. Version: July 2011. Iberdrola Renewables, Portland, Oregon.

BSGF

Gruver, J., M. Sonnenberg, K. Bay, and W. Erickson. 2009. Post-Construction Bat and Bird Fatality Study at the Blue Sky Green Field Wind Energy Center, Fond Du Lac County, Wisconsin July 21 - October 31, 2008 and March 15 - June 4, 2009. Unpublished report prepared by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. December 17, 2009.

Elm Creek

Derby, C., K. Chodachek, K. Bay, and A. Merrill. 2010. Post-Construction Fatality Surveys for the Elm Creek Wind Project: March 2009- February 2010. Prepared for Iberdrola Renewables, Inc. (IRI), Portland, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota.

Fowler I, II, III (2011)

Good, R. E., A. Merrill, S. Simon, K. Murray, and K. Bay. 2012. Bat Monitoring Studies at the Fowler Ridge Wind Farm, Benton County, Indiana: April 1 - October 31, 2011. Prepared for the Fowler Ridge Wind Farm. Prepared by Western EcoSystems Technology, Inc. (WEST), Bloomington, Indiana. January 31, 2012.

Fowler I, II, III (2012)

Good, R. E., M. Sonnenburg, and S. Simon. 2013. Bat Evaluation Monitoring Studies at the Fowler Ridge Wind Farm, Benton County, Indiana: August 1 - October 15, 2012. Prepared for the Fowler Ridge Wind Farm. Prepared by Western EcoSystems Technology, Inc. (WEST), Bloomington, Indiana. January 31, 2013.

Grand Ridge I

Derby, C., J. Ritzert, and K. Bay. 2010. Bird and Bat Fatality Study, Grand Ridge Wind Resource Area, Lasalle County, Illinois. January 2009 - January 2010. Prepared for Grand Ridge Energy LLC, Chicago, Illinois. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. July 13, 2010. Revised January 2011.

Moraine II

Derby, C., K. Chodachek, K. Bay, and A. Merrill. 2010. Post-Construction Fatality Surveys for the Moraine II Wind Project: March - December 2009. Prepared for Iberdrola Renewables, Inc. (IRI), Portland, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota.

Winnebago

Derby, C., K. Chodachek, K. Bay, and A. Merrill. 2010. Post-Construction Fatality Surveys for the Winnebago Wind Project: March 2009- February 2010. Prepared for Iberdrola Renewables, Inc. (IRI), Portland, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota.

Glenville
Glenworth Substation
T101 R20W SEC. 7
T101 R20W SEC. 8
T101 R20W SEC. 9
T101 R20W SEC. 10
T101 R20W SEC. 11
T101 R20W SEC. 12
RIVER RD
140TH ST
795TH AVE
T101 R20W SEC. 18
T101 R20W SEC. 17
T101 R20W SEC. 16
T101 R20W SEC. 15
T101 R20W SEC. 14
T101 R20W SEC. 13
130TH ST
T101 R20W SEC. 19
T101 R20W SEC. 20
T101 R20W SEC. 21
T101 R20W SEC. 22
T101 R20W SEC. 23
T101 R20W SEC. 24
65
810TH AVE
820TH AVE
Shell Rock Township
COUNTY ROAD 108/830TH AVE
840TH AVE
UNION PACIFIC RAILROAD
800TH AVE
120TH ST
T101 R20W SEC. 30
T101 R20W SEC. 29
T101 R20W SEC. 28
T101 R20W SEC. 27
T101 R20W SEC. 26
T101 R20W SEC. 25
110TH ST
T101 R20W SEC. 31
T101 R20W SEC. 32
T101 R20W SEC. 33
T101 R20W SEC. 34
T101 R20W SEC. 35
T101 R20W SEC. 36
Freeborn Wind Farm
O&M and Project Substation

0 1,000 2,000 Feet

1 inch = 2,000 feet

Imagery Source: 2015 Color FSA
Data Source: Invenergy, MN DOT, MN DNR, Census, Freeborn County

- Existing Substation
- Proposed 161kV Transmission Line
- Proposed Route Width
- Proposed Freeborn Wind Farm O&M and Project Substation Site
- Proposed Freeborn Wind Farm O&M Building
- Proposed Freeborn Wind Farm Collector Substation
- City/Township Boundary
- Section Boundary

Existing Transmission Line

- 69 kV
- 161 kV

Figure 1
Project Overview

Freeborn Wind Farm to Glenworth Substation

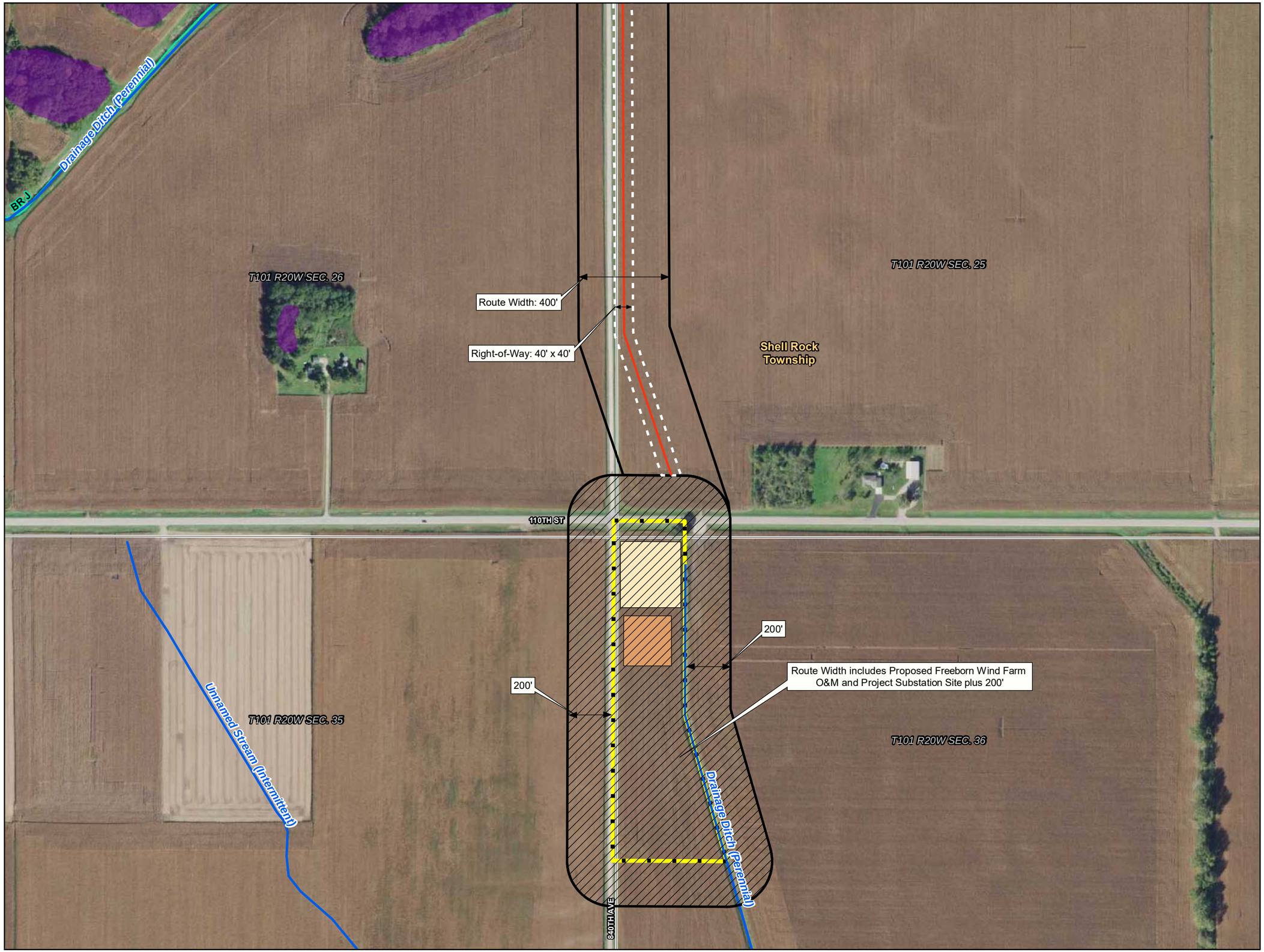
Transmission Line Route Permit Application

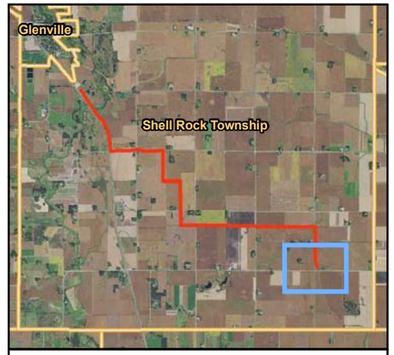
Freeborn County, MN

FREEBORN WIND FARM
merjent

For Environmental Review Purposes Only

Source: Z:\Clients_L\Invenergy\Freeborn_Wind_Farm_Project\Permitting\State\HVTL_Route_Permit\Mapping\RPA_Figures\Figure_1_Project_Overview.mxd
Date: (8/9/2017)





0 200 400 Feet

1 inch = 400 feet

Imagery Source: 2015 Color FSA
Data Source: Invenergy, Olsson and Associates, MN DOT, MN DNR, Census, USFWS, Freeborn County

- Existing Substation
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- Proposed 161kV Transmission Line
- Proposed Right-of-Way
- Route Width
- Proposed Transmission Line Alignment to be Determined within this Route Width
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- Proposed Freeborn Wind Farm O&M Building
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- City/Township Boundary
- Section Boundary
- County and Judicial Ditch
- River/Stream
- NWI Wetland

Existing Transmission Line

- 69 kV
- 161 kV

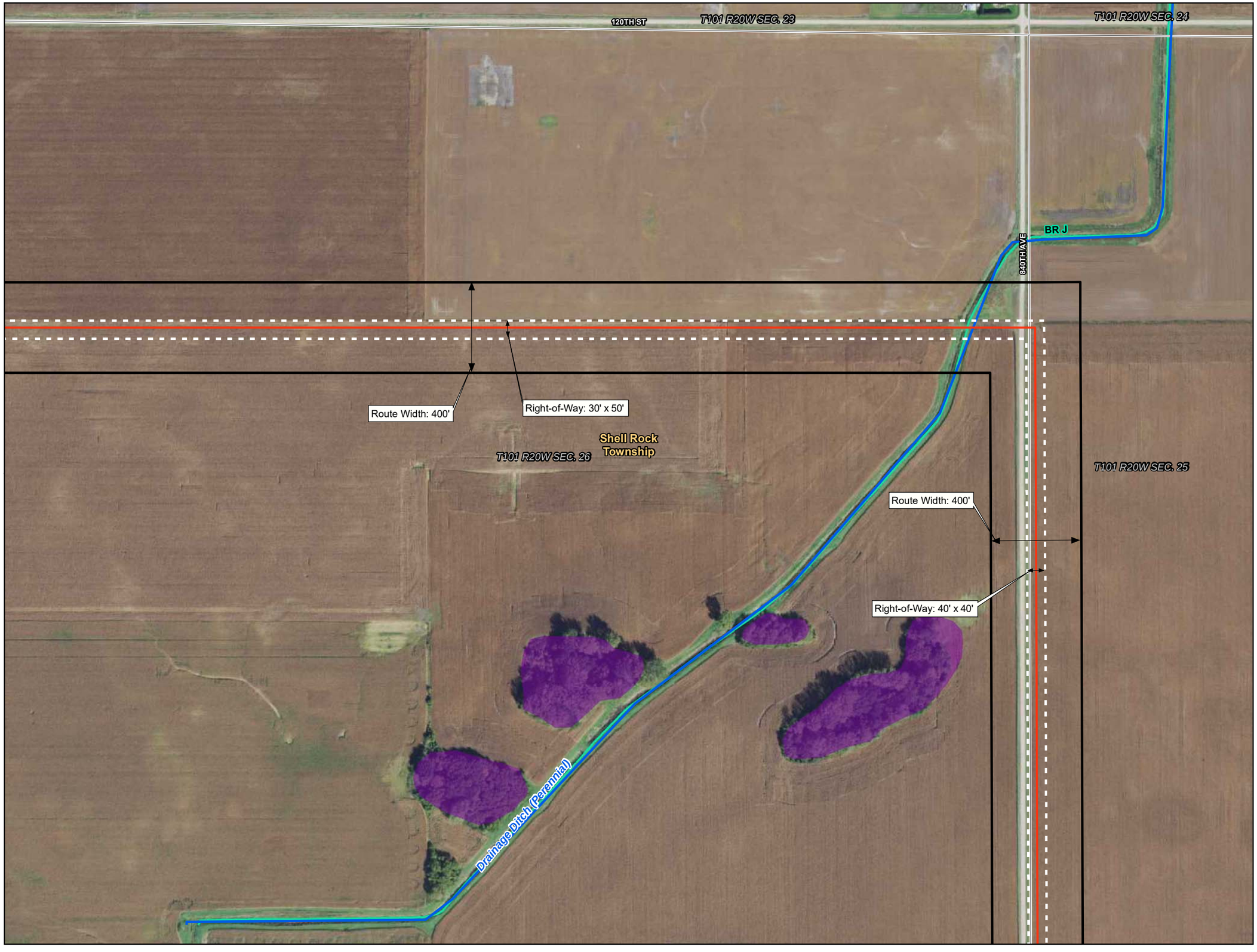
Figure 2
Proposed Route Centerline, Right-of-Way, and Route Width

Freeborn Wind Farm to Glenworth Substation

Transmission Line Route Permit Application

Freeborn County, MN

For Environmental Review Purposes Only



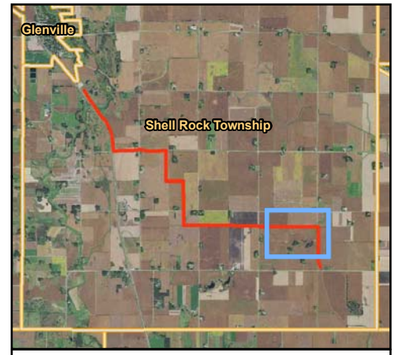


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Figure 2
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Freeborn Wind Farm to Glenworth Substation

Transmission Line Route Permit Application

Freeborn County, MN

For Environmental Review Purposes Only

Source: Z:\Clients_I_Lin\venergy\Freeborn_Wind_Farm_Project\Permitting\State\HVTL_Route_Permit\Mapping\RPA_Figures\Figure_2_Proposed_Project_Facilities.mxd
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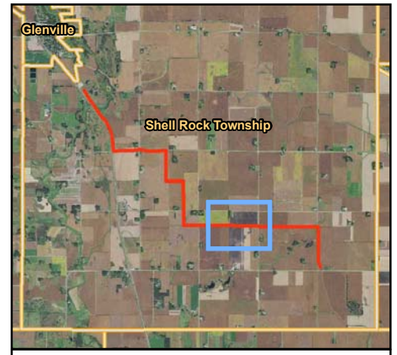

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- 161 kV

Figure 2
Proposed Route Centerline, Right-of-Way, and Route Width

Freeborn Wind Farm to Glenworth Substation

Transmission Line Route Permit Application

Freeborn County, MN

For Environmental Review Purposes Only

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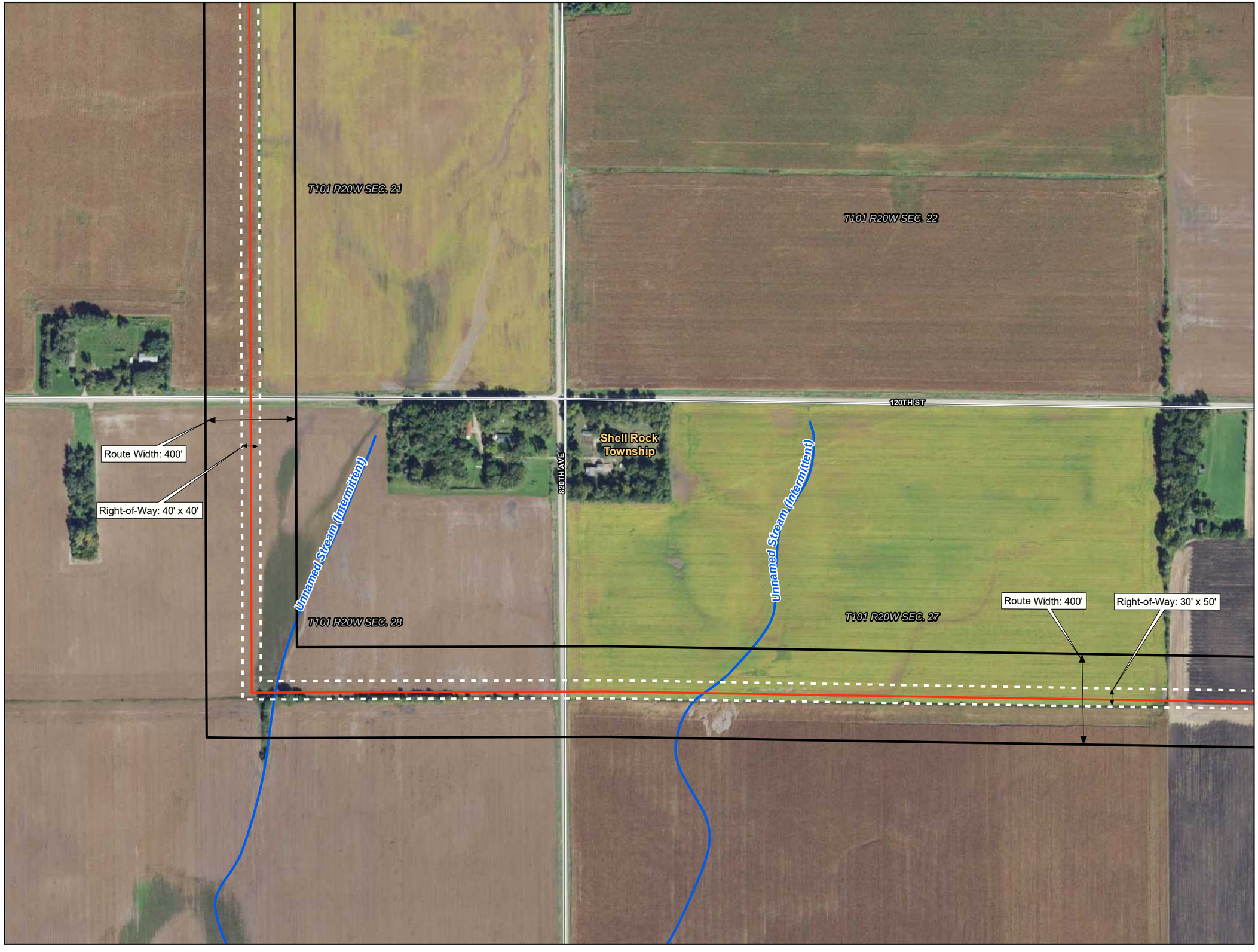

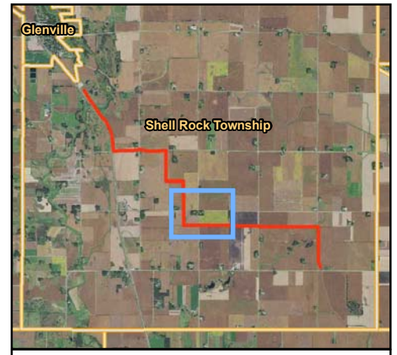

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Figure 2
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Freeborn Wind Farm to Glenworth Substation

Transmission Line Route Permit Application

Freeborn County, MN

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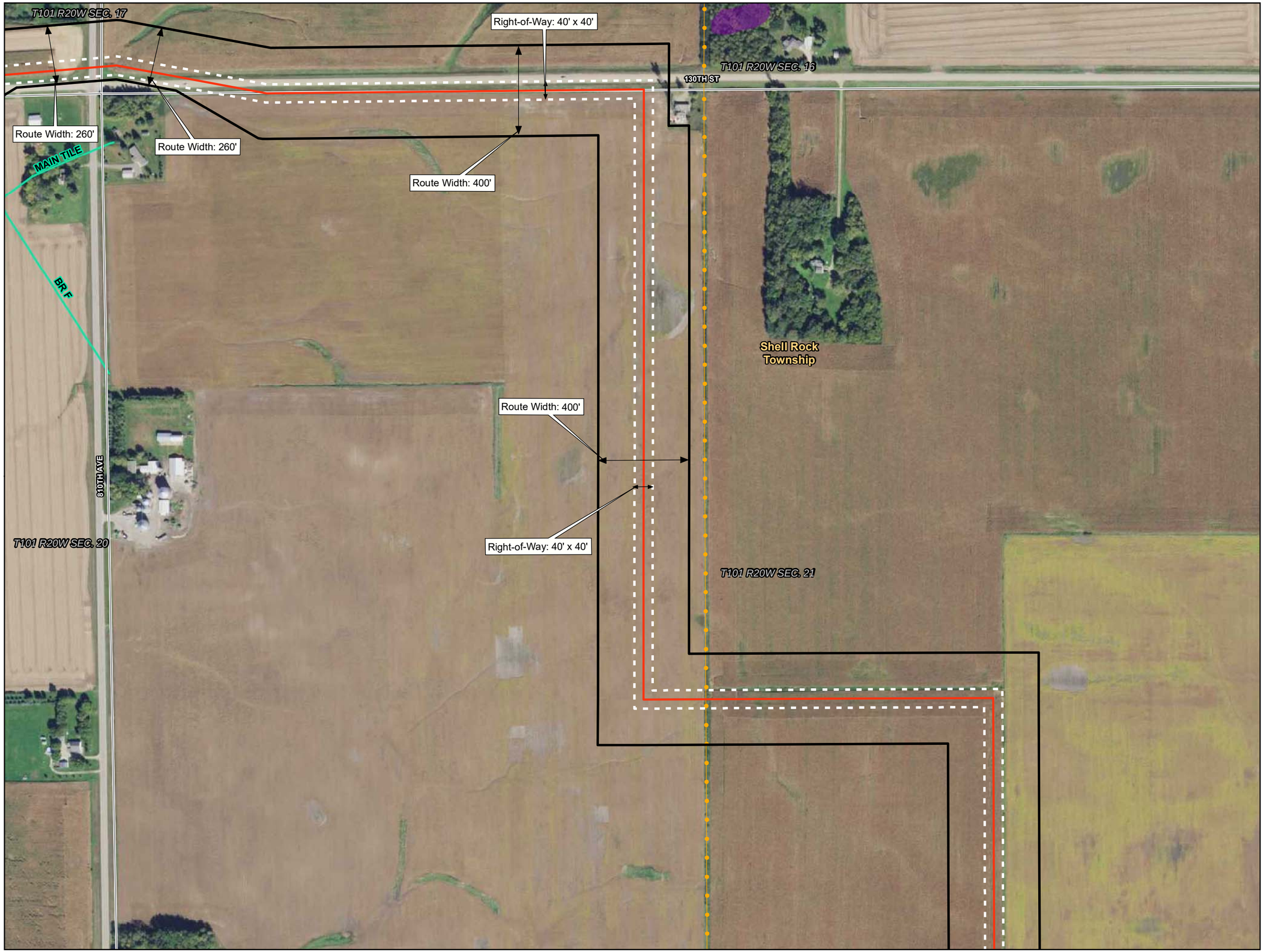

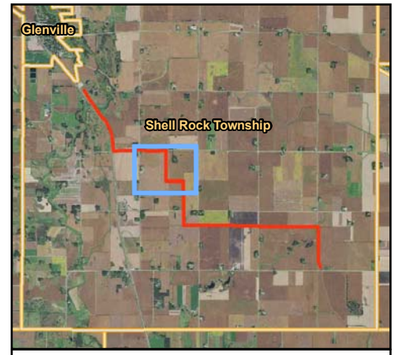

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Figure 2
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Freeborn Wind Farm to Glenworth Substation

Transmission Line Route Permit Application

Freeborn County, MN

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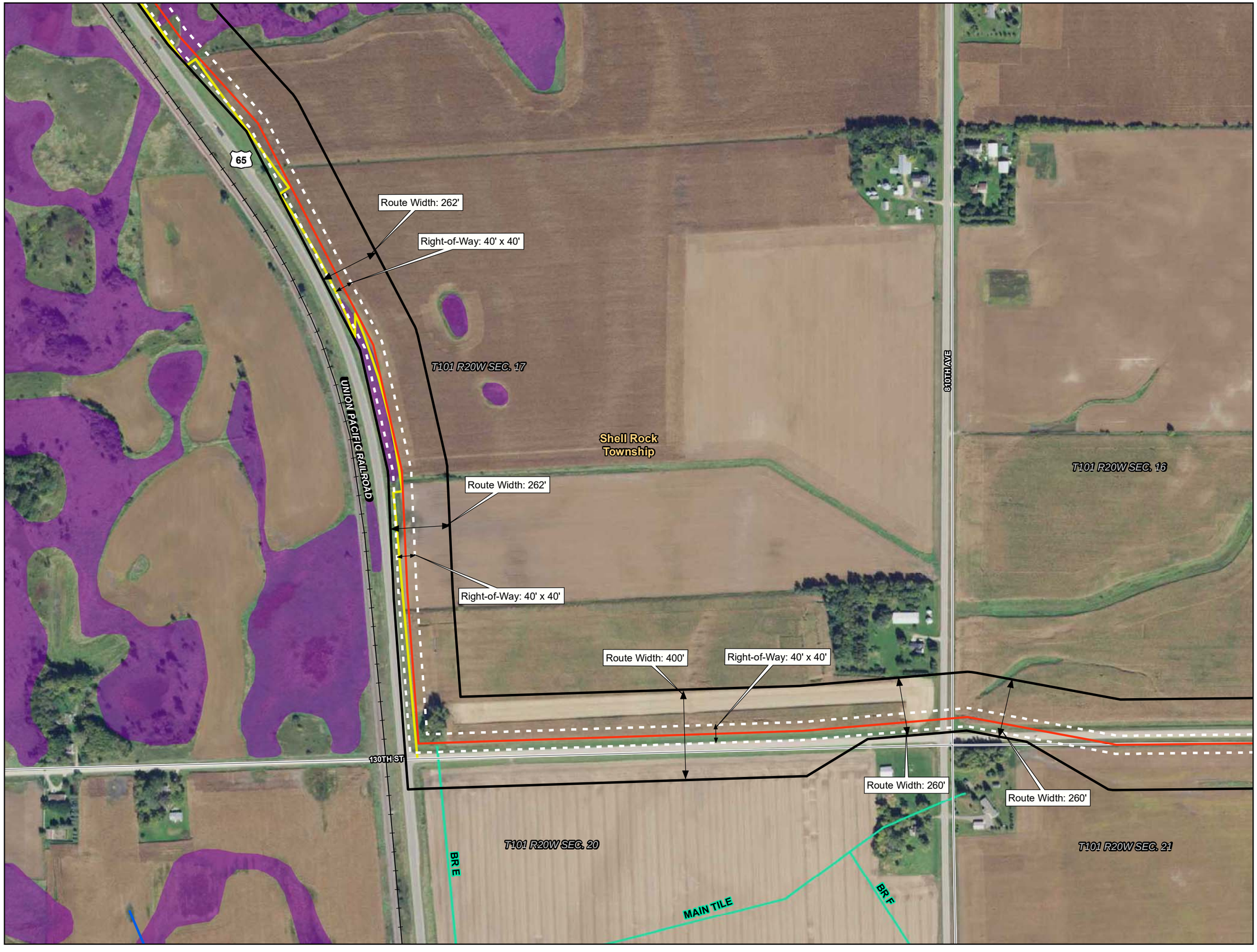

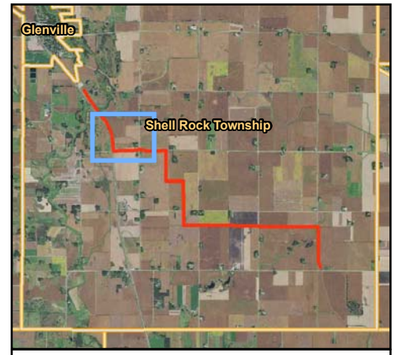

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Data Source: Invenergy, Olsson and Associates, MN DOT, MN DNR, Census, USFWS, Freeborn County

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- 161 kV

Figure 2
Proposed Route Centerline, Right-of-Way, and Route Width

Freeborn Wind Farm to Glenworth Substation

Transmission Line Route Permit Application

Freeborn County, MN

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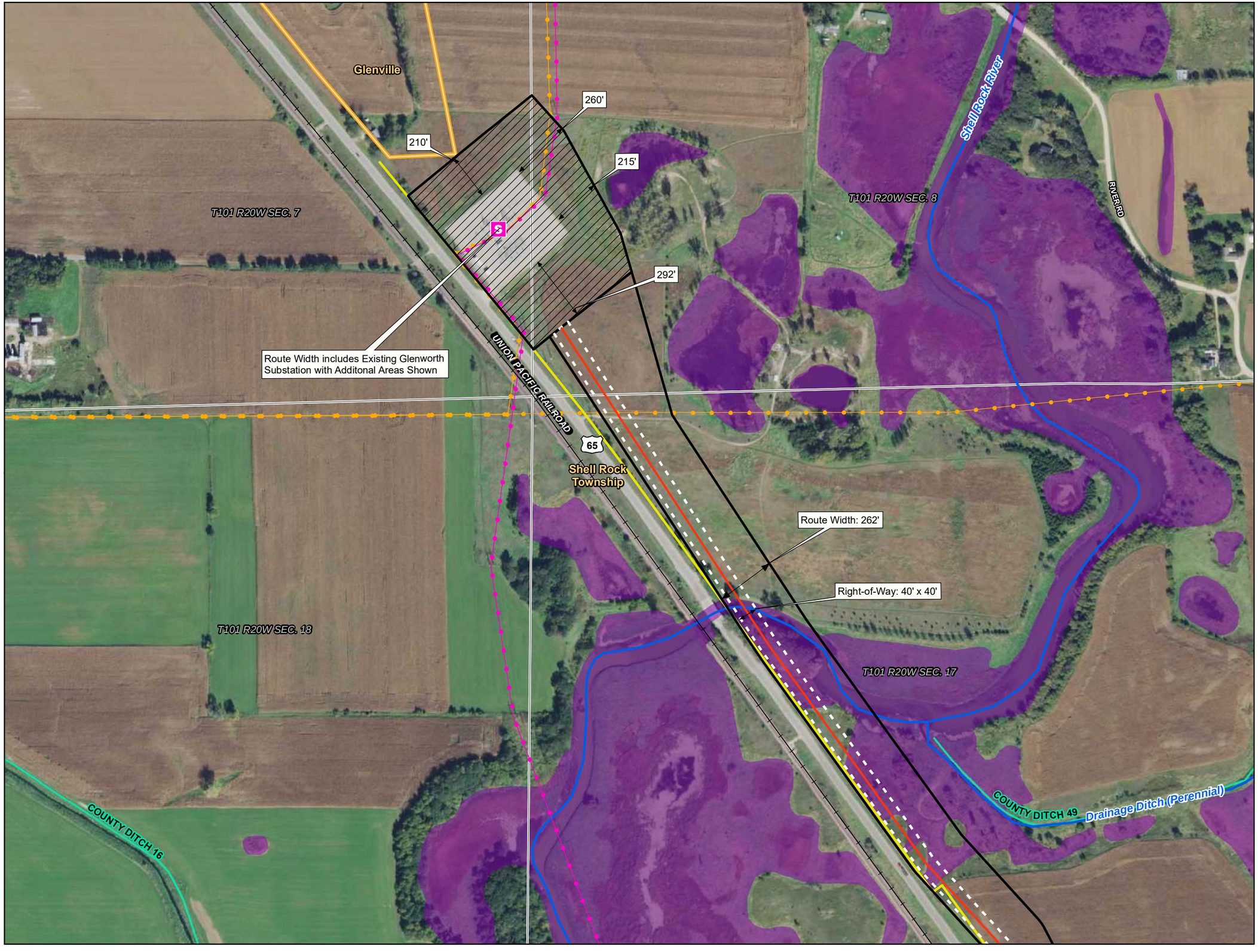

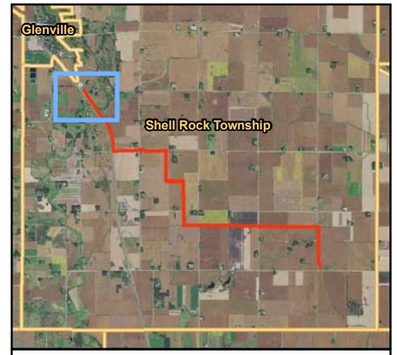

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- NWI Wetland

Existing Transmission Line

- 69 kV
- 161 kV

Figure 2
Proposed Route Centerline, Right-of-Way, and Route Width

Freeborn Wind Farm to Glenworth Substation

Transmission Line Route Permit Application

Freeborn County, MN

FREEBORN WIND FARM

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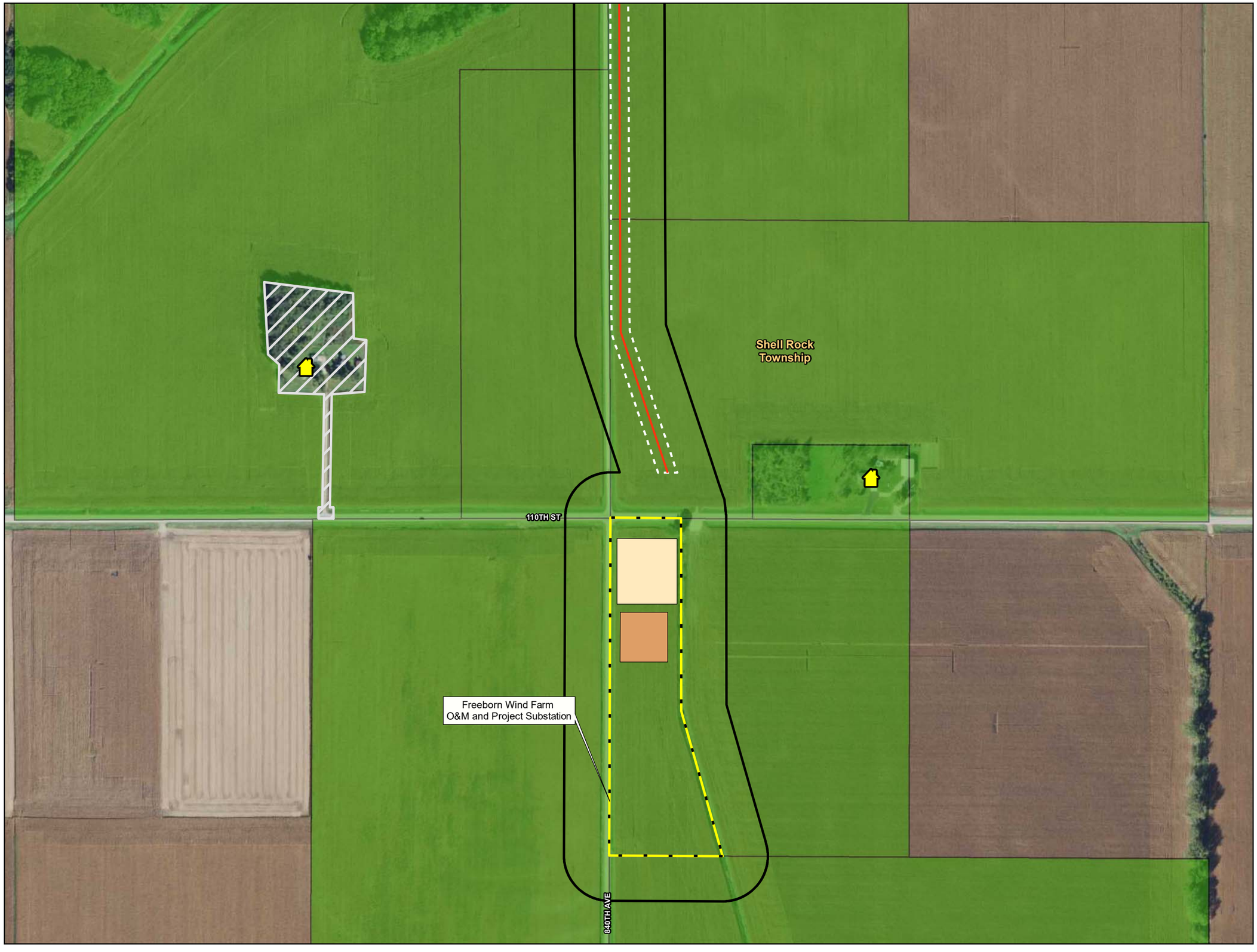

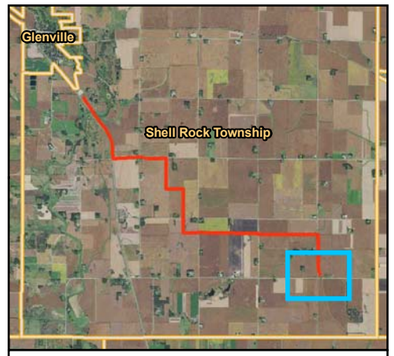

0 200 400 Feet

1 inch = 400 feet

N

Imagery Source: 2015 Color FSA
Data Source: Invenergy, MN DOT, Census
Freeborn County, Olsson and Associates

- Existing Substation
- Residence/Farmstead Within and/or Adjacent to the Route Width
- Non-Residential Structure Within and/or Adjacent to the Route Width
- Proposed 161kV Transmission Line
- Proposed Right-of-Way
- Proposed Route Width
- Proposed Freeborn Wind Farm O&M and Project Substation Site
- Proposed Freeborn Wind Farm O&M Building
- Proposed Freeborn Wind Farm Collector Substation
- City/Township Boundary

Parcel Boundary Within or Adjacent to the Route Width

- Participant
- Non-Participant

Existing Transmission Line

- 69 kV
- 161 kV

Figure 3
Location of Residences and Farmsteads Within and Adjacent to the Route Width

Freeborn Wind Farm to Glenworth Substation

Transmission Line Route Permit Application

Freeborn County, MN

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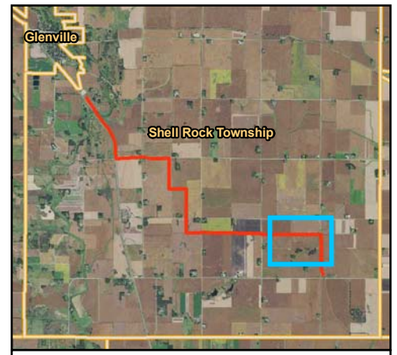

0 200 400 Feet

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N

Imagery Source: 2015 Color FSA
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Freeborn County, Olsson and Associates

- Existing Substation
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- Non-Residential Structure Within and/or Adjacent to the Route Width
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- City/Township Boundary

Parcel Boundary Within or Adjacent to the Route Width

- Participant
- Non-Participant

Existing Transmission Line

- 69 kV
- 161 kV

Figure 3
Location of Residences and Farmsteads Within and Adjacent to the Route Width

Freeborn Wind Farm to Glenworth Substation

Transmission Line Route Permit Application

Freeborn County, MN

FREEBORN WIND FARM

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Source: Z:\Clients\Llinvenergy\Freeborn_Wind_Farm_Project\Permitting\State\HVTL_Route_Permit\Mapping\RPA_Figures\Figure_3_Location_of_Residences_Farmsteads.mxd
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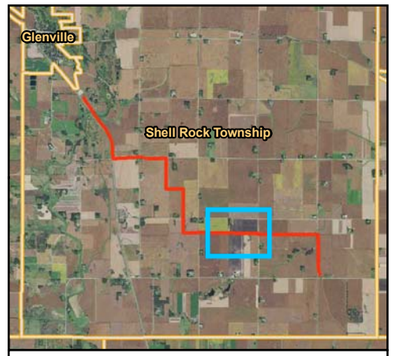

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- Non-Participant

Existing Transmission Line

- 69 kV
- 161 kV

Figure 3
Location of Residences and Farmsteads Within and Adjacent to the Route Width

Freeborn Wind Farm to Glenworth Substation

Transmission Line Route Permit Application

Freeborn County, MN

FREEBORN WIND FARM

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Source: Z:\Clients\T_Ulnvenergy\Freeborn_Wind_Farm_Project\Permitting\State\HVTL_Route_Permit\Mapping\RPA_Figures\Figure_3_Location_of_Residences_Farmsteads.mxd
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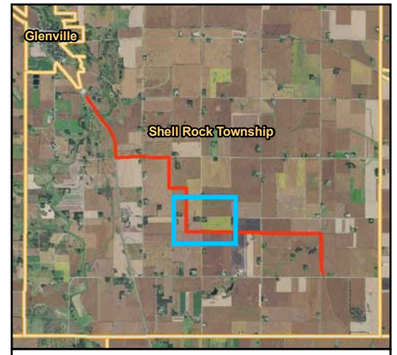

0 200 400 Feet

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Imagery Source: 2015 Color FSA
Data Source: Invenergy, MN DOT, Census
Freeborn County, Olsson and Associates

- Existing Substation
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Existing Transmission Line

- 69 kV
- 161 kV

Figure 3
Location of Residences and Farmsteads Within and Adjacent to the Route Width

Freeborn Wind Farm to Glenworth Substation

Transmission Line Route Permit Application

Freeborn County, MN

FREEBORN WIND FARM

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Source: Z:\Clients_L\Invenergy\Freeborn_Wind_Farm_Project\Permitting\State\HVTL_Route_Permit\Mapping\RPA_Figures\Figure_3_Location_of_Residences_Farmsteads.mxd
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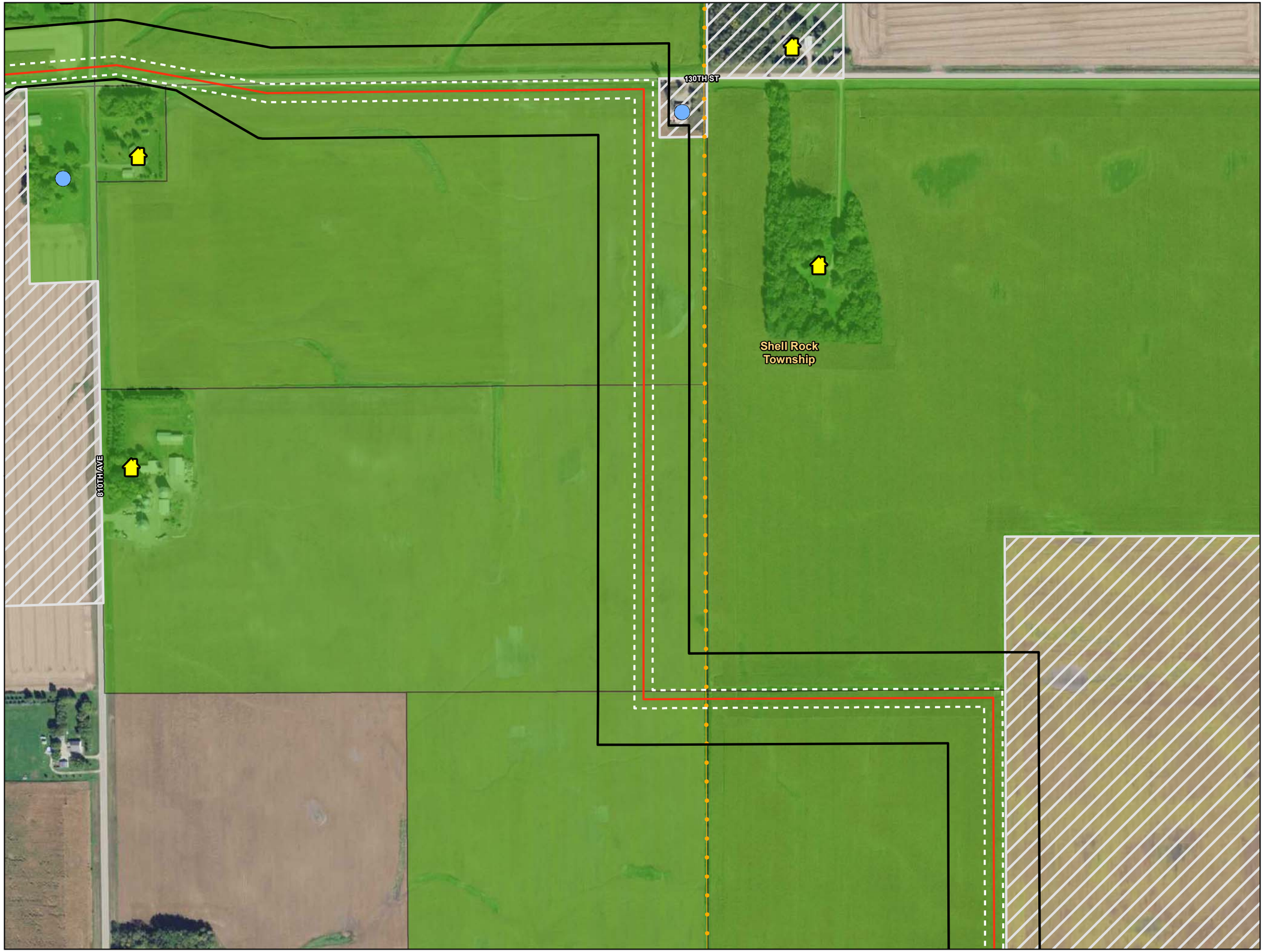

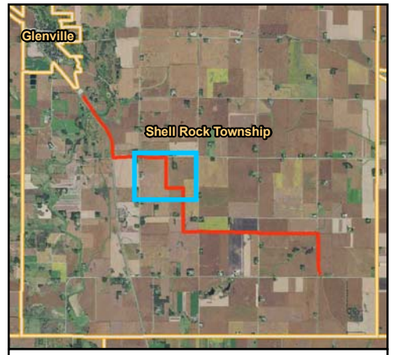

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Imagery Source: 2015 Color FSA
Data Source: Invenergy, MN DOT, Census
Freeborn County, Olsson and Associates

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- Residence/Farmstead Within and/or Adjacent to the Route Width
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- Proposed Route Width
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- City/Township Boundary

Parcel Boundary Within or Adjacent to the Route Width

- Participant
- Non-Participant

Existing Transmission Line

- 69 kV
- 161 kV

Figure 3
Location of Residences and Farmsteads Within and Adjacent to the Route Width

Freeborn Wind Farm to Glenworth Substation

Transmission Line Route Permit Application

Freeborn County, MN

FREEBORN WIND FARM

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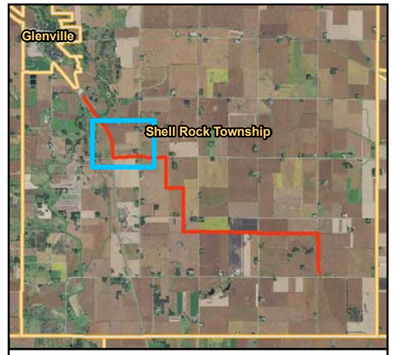

0 200 400 Feet

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Imagery Source: 2015 Color FSA
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Freeborn County, Olsson and Associates

- Existing Substation
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- Non-Residential Structure Within and/or Adjacent to the Route Width
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- Proposed Right-of-Way
- Proposed Route Width
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- Proposed Freeborn Wind Farm Collector Substation
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Parcel Boundary Within or Adjacent to the Route Width

- Participant
- Non-Participant

Existing Transmission Line

- 69 kV
- 161 kV

Figure 3
Location of Residences and Farmsteads Within and Adjacent to the Route Width

Freeborn Wind Farm to Glenworth Substation

Transmission Line Route Permit Application

Freeborn County, MN

FREEBORN WIND FARM

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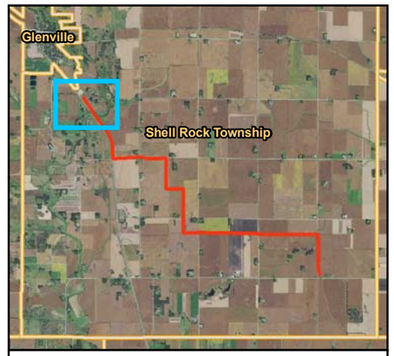

0 200 400 Feet

1 inch = 400 feet

Imagery Source: 2015 Color FSA
Data Source: Invenergy, MN DOT, Census Freeborn County, Olsson and Associates

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- Non-Residential Structure Within and/or Adjacent to the Route Width
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Parcel Boundary Within or Adjacent to the Route Width

- Participant
- Non-Participant

Existing Transmission Line

- 69 kV
- 161 kV

Figure 3
Location of Residences and Farmsteads Within and Adjacent to the Route Width

Freeborn Wind Farm to Glenworth Substation

Transmission Line Route Permit Application

Freeborn County, MN

FREEBORN WIND FARM

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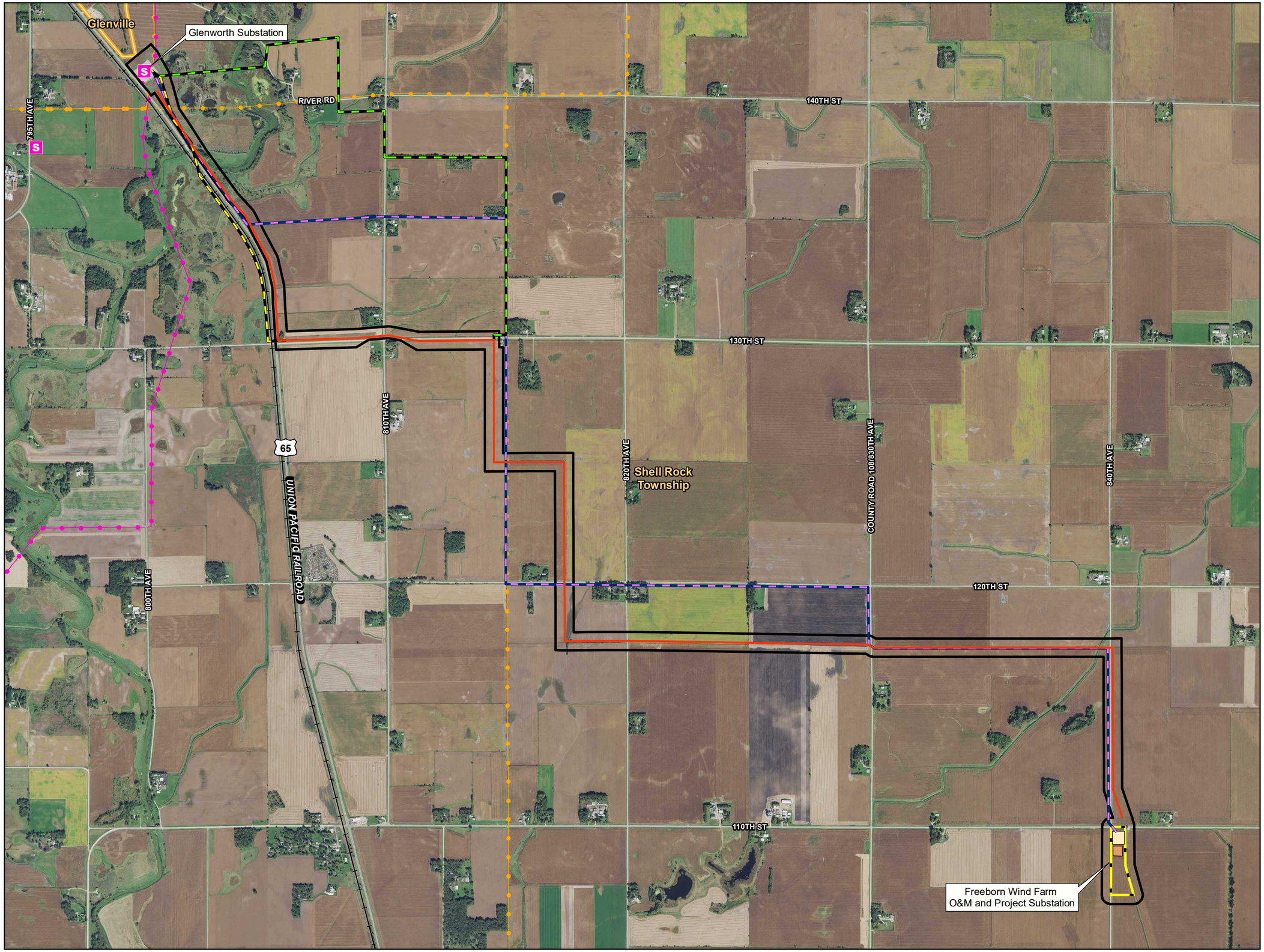

0 1,000 2,000 Feet

1 inch = 2,000 feet

Imagery Source: 2015 Color FSA
Data Source: Invenergy, MN DOT, Census, Freeborn County

- Existing Substation
- Proposed 161kV Transmission Line
- Alternative Route Segment A
- Alternative Route Segment B
- Alternative Route C
- Proposed Route Width
- Proposed Freeborn Wind Farm O&M and Project Substation Site
- Proposed Freeborn Wind Farm O&M Building
- Proposed Freeborn Wind Farm Collector Substation
- City/Township Boundary

Existing Transmission Line

- 69 kV
- 161 kV

Figure 4
Alternative Routes Considered but Rejected

Freeborn Wind Farm to Glenworth Substation

Transmission Line Route Permit Application

Freeborn County, MN

FREEBORN WIND FARM

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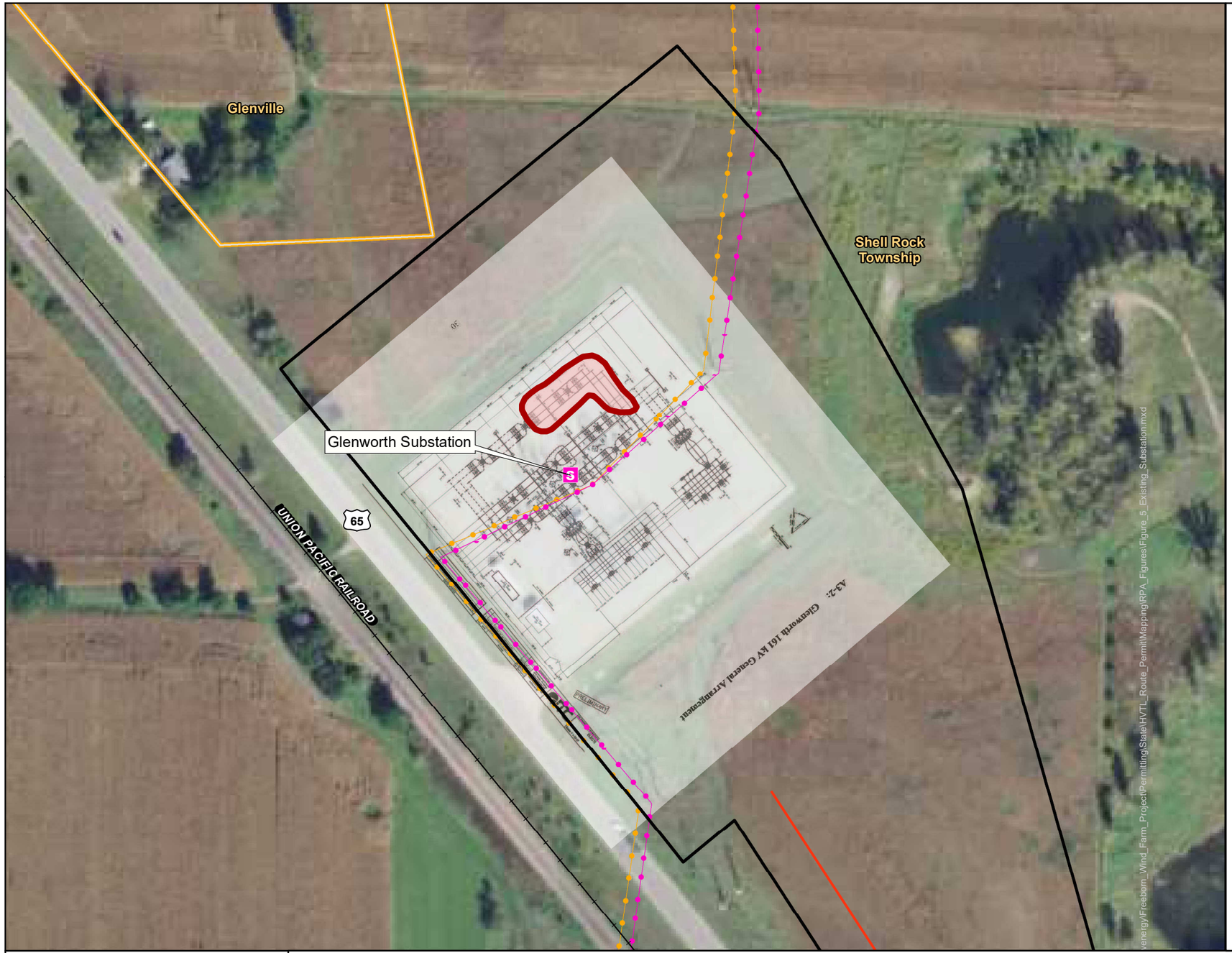
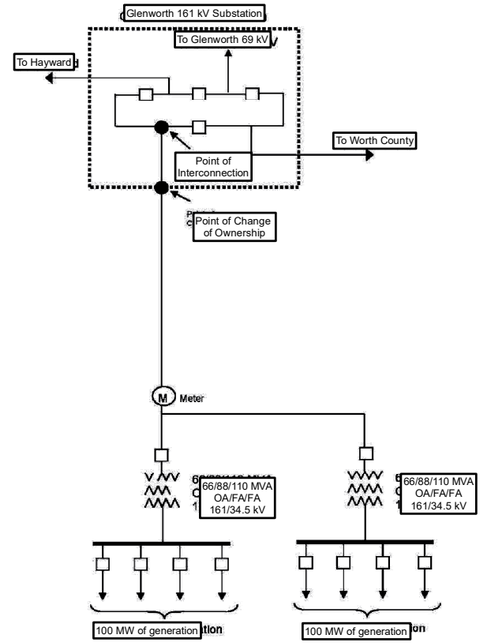
Source: Z:\Clients_L\Invenergy\Freeborn_Wind_Farm_Project\Permitting\State\HVTL_Route_Permit\Mapping\RPA_Figures\Figure_4_Alternative_Routes_Considered_but_Rejected.mxd
Date: (9/11/2017)



A1: Interconnection Customer One-Line and Site Map

A1-1: One-Line Diagram



FREEBORN WIND FARM

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0 75 150 Feet

1 inch = 150 feet

N

Imagery Source: 2015 USDA FSA
Data Source: Invenergy, MN DOT, Census, Freeborn County, Generator Interconnection Agreement (April 2017)

For Environmental Review Purposes Only

Figure 5
Existing Glenworth Substation Modifications

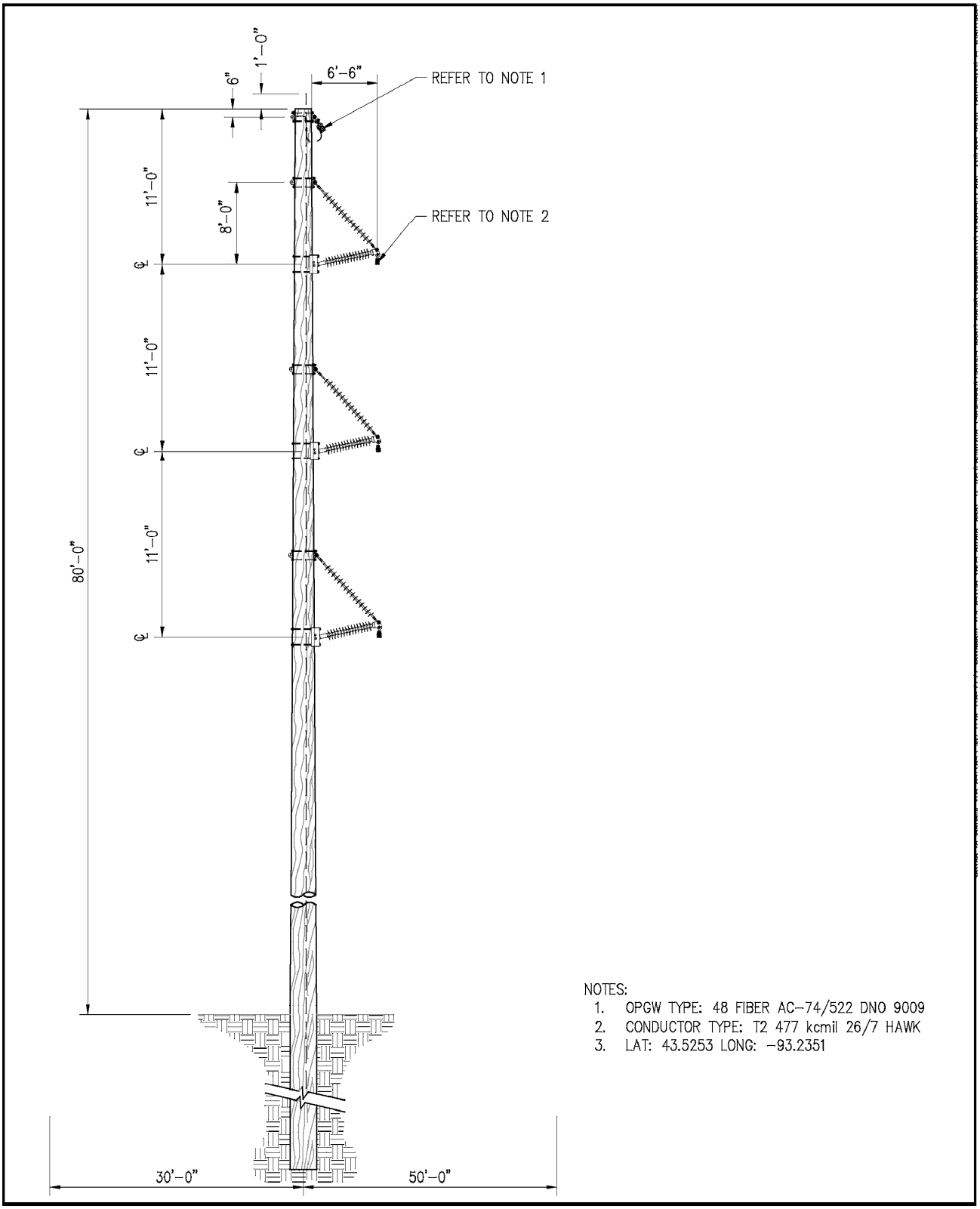
Freeborn Wind Farm to Glenworth Substation Transmission Line Route Permit Application

Freeborn County, MN

- S Existing Substation
- Proposed 161kV Transmission Line
- Proposed Route Width
- Proposed Modification Area
- City/Township Boundary

Existing Transmission Line

- 69 kV
- 161 kV



ELECTRICAL CONSULTANTS, INC.

Invenergy

ENGINEERING RECORD		DATE
DRAWN	ECI	XX/XX/XX
DESIGNED	ECI	XX/XX/XX
CHECKED		
APPROVED		
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

INVENERGY TRANSMISSION EXHIBIT
SINGLE CIRCUIT BRACED POST STRUCTURE
TSVP-161

DWG. NAME: FBW-A-T009-3 | REVISION NO : B

FREEBORN WIND FARM

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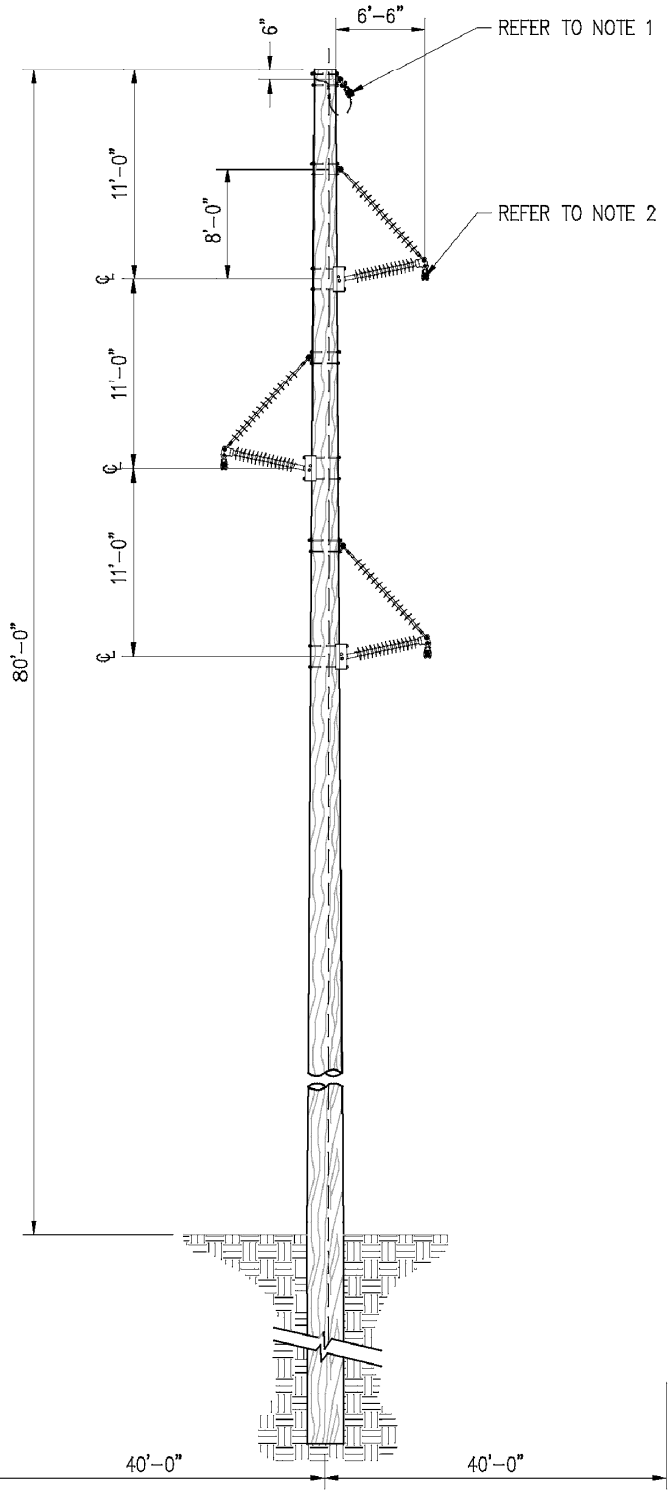
Figure 6
Schematic of Proposed Structures
Single Circuit Braced Post Structure TSVP-161
Freeborn Wind Farm to Glenworth Substation Transmission Line Route Permit Application
Freeborn County, MN

Source: Z:\Clients_I\Invenergy\Freeborn_Wind_Farm_Project\Permitting\State\HVTL_Route_Permit\Mapping\RPA_Figures\Figure_6_1_Schematic_of_Proposed_Structures.mxd
Date: (6/10/2017)



NOTES:
1. OPGW TYPE: 48 FIBER AC–74/522 DNO 9009
2. CONDUCTOR TYPE: T2 477 kcmil 26/7 HAWK
3. LAT: 43.5253 LONG: –93.2351

ELECTRICAL CONSULTANTS, INC.

Invenergy

ENGINEERING RECORD		DATE
DRAWN	ECI	05/25/17
DESIGNED	ECI	05/25/17
CHECKED		
APPROVED		
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

INVENERGY TRANSMISSION EXHIBIT
SINGLE CIRCUIT BRACED POST STRUCTURE
TSP–161

DWG. NAME: FBW–A–TD09–1 REVISION NO : B

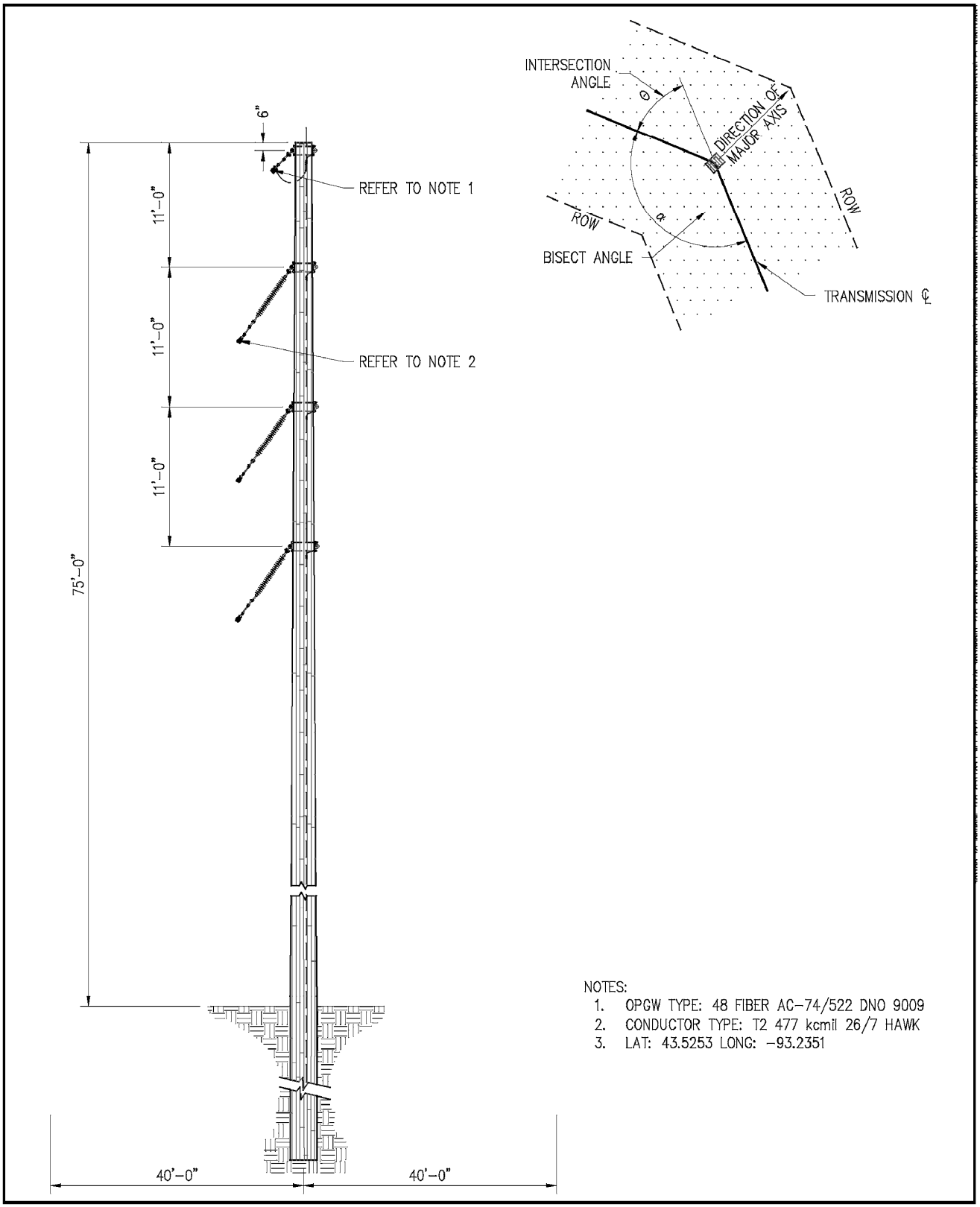
FREEBORN WIND FARM

merjent

For Environmental Review Purposes Only

Figure 6
Schematic of Proposed Structures
Single Circuit Braced Post Structure TSP-161
Freeborn Wind Farm to Glenworth Substation Transmission Line Route Permit Application
Freeborn County, MN

Source: Z:\Clients_L\Invenergy\Freeborn_Wind_Farm_Project\Permitting\State\HVTL_Route_Permit\Mapping\RPA_Figures\Figure_6_2_Schematic_of_Proposed_Structures.mxd
Date: (6/10/2017)



NOTES:

1. OPGW TYPE: 48 FIBER AC-74/522 DNO 9009
2. CONDUCTOR TYPE: T2 477 kcmil 26/7 HAWK
3. LAT: 43.5253 LONG: -93.2351

ELECTRICAL CONSULTANTS, INC. BILLINGS MONTANA

Invenergy

ENGINEERING RECORD		DATE
DRAWN	ECI	06/26/17
DESIGNED	ECI	06/26/17
CHECKED		
APPROVED		
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

INVENERGY TRANSMISSION EXHIBIT
SINGLE CIRCUIT LAM RUNNING ANGLE STRUCTURE
TS-161L-LA

DWG. NAME: FBW-A-T009-4 | REVISION NO : B

FREEBORN WIND FARM

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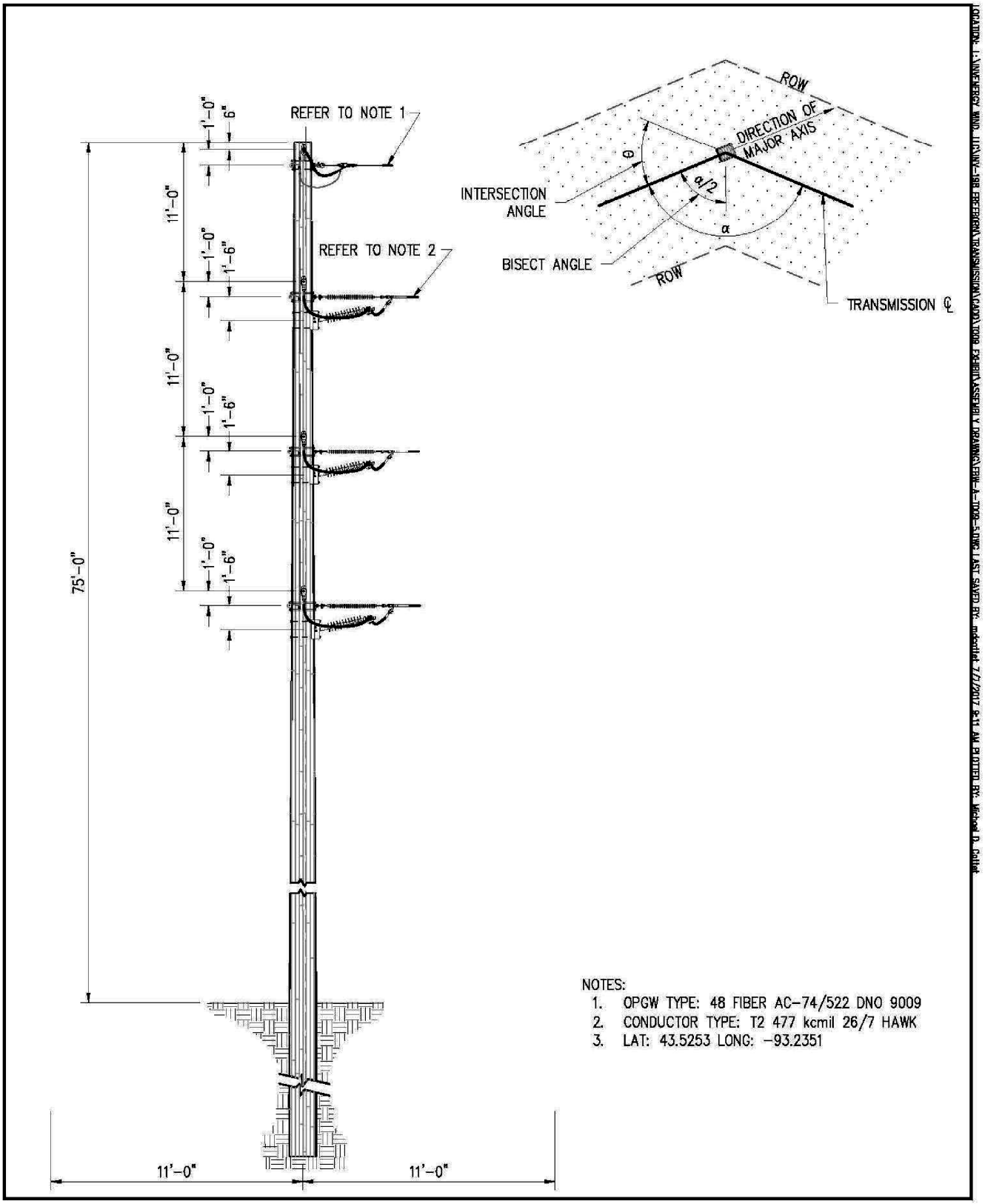
Figure 6
Schematic of Proposed Structures
Single Circuit Laminated Running Angle Structure TS-161L-LA
Freeborn Wind Farm to Glenworth Substation Transmission Line Route Permit Application
Freeborn County, MN

Source: Z:\Clients_L\Invenergy\Freeborn_Wind_Farm_Project\Permitting\State\HVTL_Route_Permit\Mapping\RPA_Figures\Figure_6_3_Schematic_of_Proposed_Structures.mxd
Date: (6/10/2017)



FREEBORN WIND FARM

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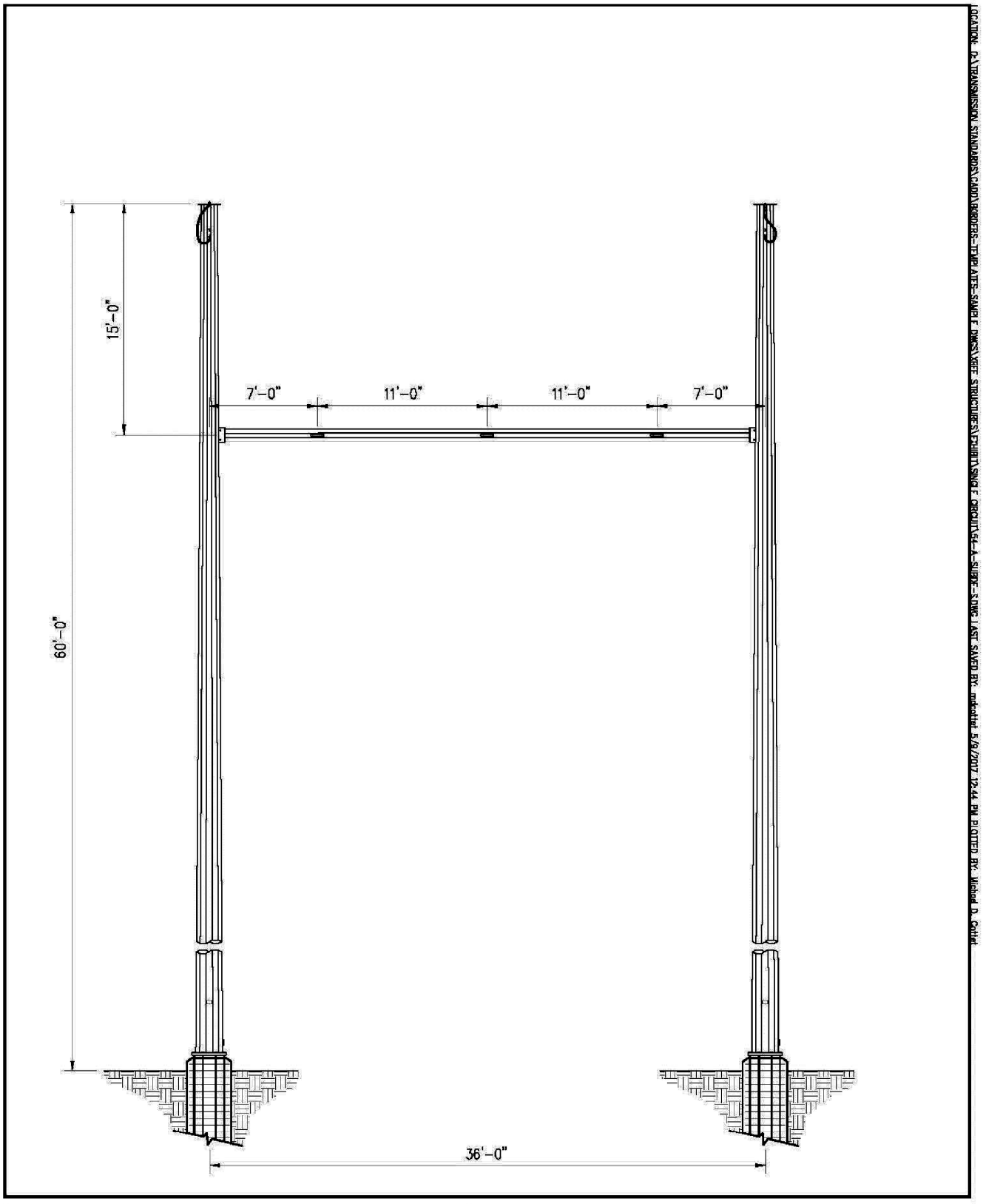
Figure 6
Schematic of Proposed Structures
Single Circuit Braced Post Structure TDE-161L-J
Freeborn Wind Farm to Glenworth Substation Transmission Line Route Permit Application
Freeborn County, MN

Source: Z:\Clients_I\Invenergy\Freeborn_Wind_Farm_Project\Permitting\State\HVTL_Route_Permit\Mapping\RPA_Figures\Figure_6_4_Schematic_of_Proposed_Structures.mxd
Date: (6/10/2017)

LOCATION: I:\INVENERGY WIND, LLC\INV-198 FREEBORN TRANSMISSION\CAD\LT009 EXHIBIT\ASSEMBLY DRAWING\FBW-A-T009-5.DWG LAST SAVED BY: mdeutlet 7/7/2017 9:11 AM PLOTTED BY: Michael D. Deitlet

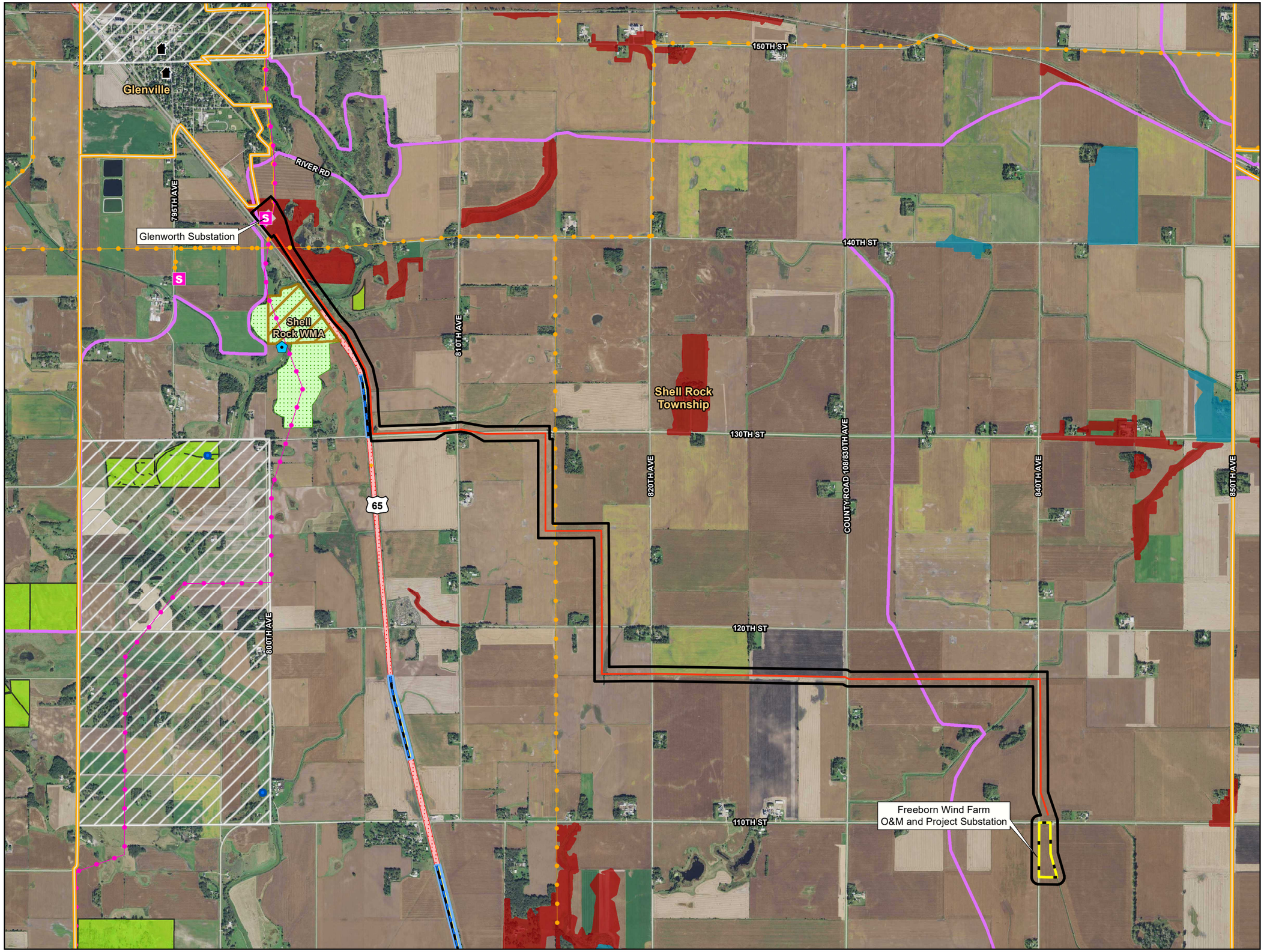


ELECTRICAL CONSULTANTS, INC.	Invenergy	ENGINEERING RECORD / DRAWN JCCX 05/16 / DESIGNED JCCX 05/16 / CHECKED / APPROVED / DWG SCALE: AS NOTED / PLT SCALE: 1:1	ECI TRANSMISSION EXHIBIT SUBSTATION DEADEND SUBDE-161S DWG. NAME: ECI-A-T009-54 REVISION NO: A

Figure 6
Schematic of Proposed Structures
Substation Deadend SUBDE-161S
Freeborn Wind Farm to Glenworth Substation Transmission Line Route Permit Application
Freeborn County, MN

For Environmental Review Purposes Only

Source: Z:\Clients_L\Invenergy\Freeborn_Wind_Farm_Project\Permitting\State\HVTL_Route_Permit\Mapping\RPA_Figures\Figure_6_5_Schematic_of_Proposed_Structures.mxd
Date: (6/10/2017)



0 1,250 2,500 Feet

1 inch = 2,500 feet

Imagery Source: 2015 Color FSA
Data Source: Invenergy, MN DOT, Census, MN DNR, SHPO

- Existing Substation
- Proposed 161kV Transmission Line
- Proposed Route Width
- Proposed Freeborn Wind Farm O&M and Project Substation Site
- City/Township Boundary
- Bald Eagle Nest
- Architectural/Historic Resource
- Archaeological Site in Section
- MN DNR Railroad ROW Prairies
- Snowmobile Trail
- Reinvest in Minnesota (RIM)
- MN DNR Native Prairie
- MN DNR Native Plant Community
- Wildlife Management Area (WMA)

Delineated Native Prairie

- Potentially Native Prairie (Not Previously Plowed)
- Potentially Not Native Prairie (Previously Plowed)

Natural Heritage Inventory System (NHIS)

- Threatened
- Special Concern

Sites of Biodiversity Significance

- Moderate
- Below

Existing Transmission Line

- 69 kV
- 161 kV

Figure 7
Environmental Features

Freeborn Wind Farm to Glenworth Substation

Transmission Line Route Permit Application

Freeborn County, MN

FREEBORN WIND FARM

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Source: Z:\Clients_D\Invenergy\Freeborn_Wind_Farm_Project\Permitting\State\HVTL_Route_Permit\Mapping\RPA_Figures\Figure_7_Environmental_Features.mxd

Date: (8/9/2017)

Glenville
Glenworth Substation
T101 R20W SEC. 7
T101 R20W SEC. 8
T101 R20W SEC. 9
T101 R20W SEC. 10
T101 R20W SEC. 11
T101 R20W SEC. 12
Gravel Pits
RIVER RD
140TH ST
785TH AVE
T101 R20W SEC. 18
T101 R20W SEC. 17
T101 R20W SEC. 16
T101 R20W SEC. 15
T101 R20W SEC. 14
T101 R20W SEC. 13
CHICAGO
DITCH
NO 49
AND
Radio Tower
130TH ST
S H E L L R O C K
810TH AVE
820TH AVE
830TH AVE
COUNTY ROAD 108/830TH AVE
T101 R20W SEC. 19
T101 R20W SEC. 20
T101 R20W SEC. 21
T101 R20W SEC. 22
T101 R20W SEC. 23
T101 R20W SEC. 24
65
Shell Rock Township
SHELL ROCK
WESTERN
UNION PACIFIC RAILROAD
NO 76
800TH AVE
DITCH
120TH ST
T101 R20W SEC. 29
T101 R20W SEC. 28
T101 R20W SEC. 27
T101 R20W SEC. 26
T101 R20W SEC. 25
T101 R20W SEC. 30
COUNTY
Gordonsville (Gordon)
BM 1210
BM 1271
110TH ST
Wanderers Rest Cem
RIVER
T101 R20W SEC. 31
T101 R20W SEC. 32
T101 R20W SEC. 33
T101 R20W SEC. 34
T101 R20W SEC. 35
T101 R20W SEC. 36
Freeborn Wind Farm
O&M and Project Substation

0 1,000 2,000 Feet

1 inch = 2,000 feet

Imagery Source: 2013 USA Topo
Data Source: Invenergy, MN DOT, MN DNR, Census, Freeborn County

- Existing Substation
- Proposed 161kV Transmission Line
- Proposed Route Width
- Proposed Freeborn Wind Farm O&M and Project Substation Site
- Proposed Freeborn Wind Farm O&M Building
- Proposed Freeborn Wind Farm Collector Substation
- City/Township Boundary
- Section Boundary

Existing Transmission Line

- 69 kV
- 161 kV

Figure 8
Topographic Map of Project Area

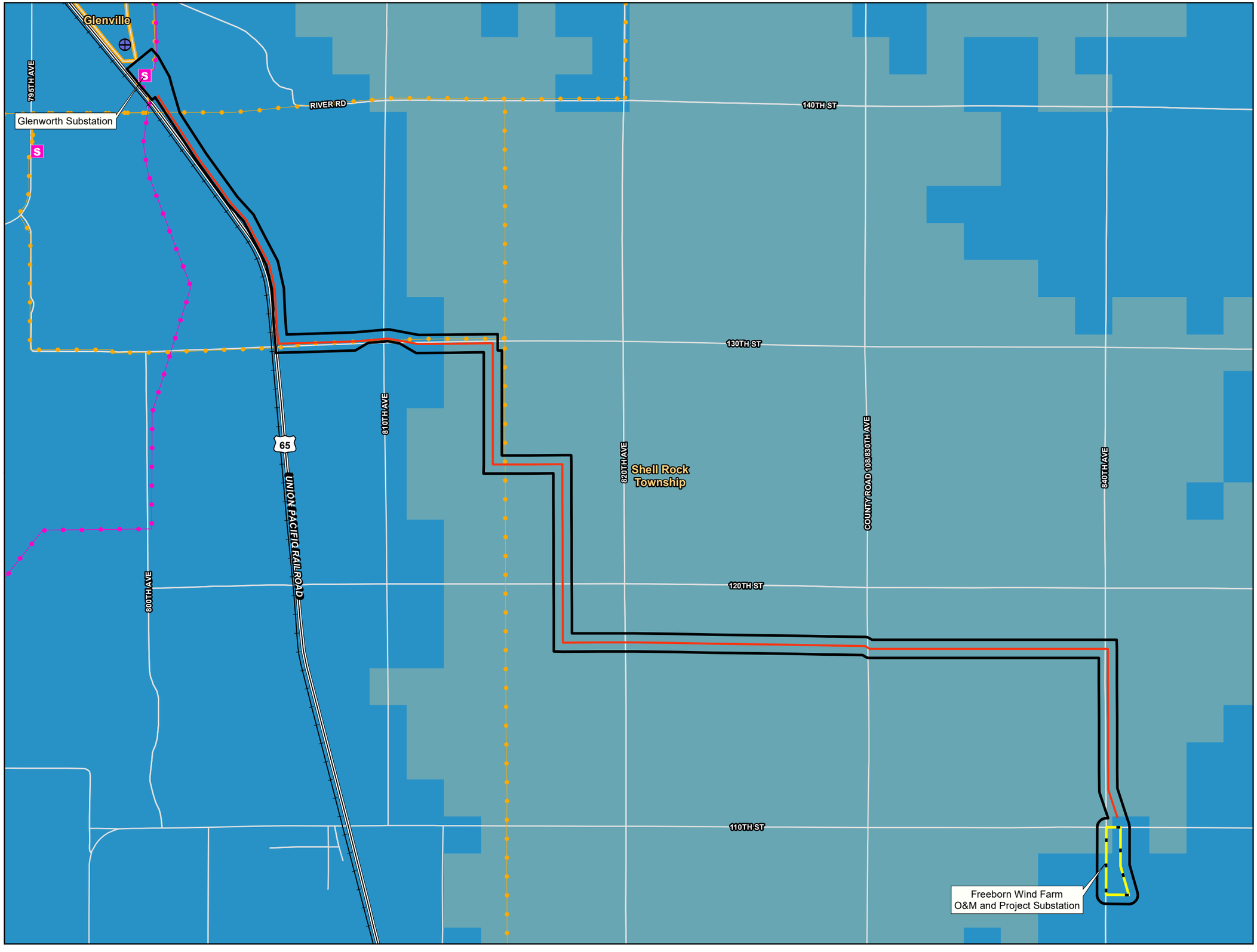
Freeborn Wind Farm to Glenworth Substation

Transmission Line Route Permit Application

Freeborn County, MN

For Environmental Review Purposes Only

Source: Z:\Clients_L\Invenergy\Freeborn_Wind_Farm_Project\Permitting\State\HVTL_Route_Permit\Mapping\RPA_Figures\Figure_8_Topographic_Map_of_Project_Area.mxd
Date: (8/9/2017)



0 1,000 2,000 Feet

1 inch = 2,000 feet

Data Source: Invenergy, MN DOT, MGS, Census

- Existing Substation
- Proposed 161kV Transmission Line
- Proposed Route Width
- Proposed Freeborn Wind Farm O&M and Project Substation Site
- City/Township Boundary

Existing Transmission Line

- 69 kV
- 161 kV

Gravel Pits

- Commercial Aggregate

Depth to Bedrock (feet)

- 0 - 100
- 100 - 200

Figure 9
Bedrock Geology

Freeborn Wind Farm to Glenworth Substation

Transmission Line Route Permit Application

Freeborn County, MN

FREEBORN WIND FARM

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Source: Z:\Clients_L\Invenergy\Freeborn_Wind_Farm_Project\Permitting\State\HVTL_Route_Permit\Mapping\RPA_Figures\Figure_9_Bedrock_Geology.mxd

Date: (8/9/2017)

Glenville

Glenworth Substation

WEBSTER-ESTHERVILLE-DICKINSON (S3616)

LESTER-HAMEL (S3504)

MOLAND-MERTON-MAXCREEK-CANISTEO (S3619)

WEBSTER-NICOLLET-CLARION-CANISTEO (S1750)

Shell Rock Township

WEBSTER-NICOLLET-LESTER (S1752)

MAYER-ESTHERVILLE-BISCAY (S3510)

65

UNION PACIFIC RAILROAD

Freeborn Wind Farm
O&M and Project Substation

STATSGO Soil Type
- Lester-Hamel (s3504)
- Mayer-Estherville-Biscay (s3510)
- Moland-Merton-Maxcreek-Canisteo (s3619)
- Webster-Estherville-Dickinson (s3616)
- Webster-Nicollet-Clarion-Canisteo (s1750)
- Webster-Nicollet-Lester (s1752)

0 1,000 2,000 Feet

1 inch = 2,000 feet

N

Data Source: Invenergy, MN DOT, STATSGO, Census

- Existing Substation
- Proposed 161kV Transmission Line
- Proposed Route Width
- Proposed Freeborn Wind Farm O&M and Project Substation Site
- City/Township Boundary

Existing Transmission Line
- 69 kV
- 161 kV

Figure 10
Soils

Freeborn Wind Farm to Glenworth Substation

Transmission Line Route Permit Application

Freeborn County, MN

FREEBORN WIND FARM

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Source: Z:\Clients_L\Invenergy\Freeborn_Wind_Farm_Project\Permitting\State\HVTL_Route_Permit\Mapping\RPA_Figures\Figure_10_Soils.mxd
Date: (8/9/2017)

Glenville
Glenworth Substation
RIVER RD
140TH ST
785TH AVE
130TH ST
810TH AVE
820TH AVE
Shell Rock Township
COUNTY ROAD 108/830TH AVE
840TH AVE
65
UNION PACIFIC RAILROAD
800TH AVE
120TH ST
110TH ST
Freeborn Wind Farm O&M and Project Substation

0 1,000 2,000 Feet

1 inch = 2,000 feet

N

Data Source: Invenergy, MN DOT, NLCD, Census

- Existing Substation
- Proposed 161kV Transmission Line
- Proposed Route Width
- Proposed Freeborn Wind Farm O&M and Project Substation Site
- City/Township Boundary

NLCD Land Cover

- Open Water
- Developed, Open Space
- Developed, Low Intensity
- Developed, Medium Intensity
- Developed, High Intensity
- Deciduous Forest
- Grassland/Herbaceous
- Hay/Pasture
- Cultivated Crops
- Woody Wetlands
- Emergent Herbaceous Wetlands

Figure 11
Land Cover

Freeborn Wind Farm to Glenworth Substation

Transmission Line Route Permit Application

Freeborn County, MN

FREEBORN WIND FARM

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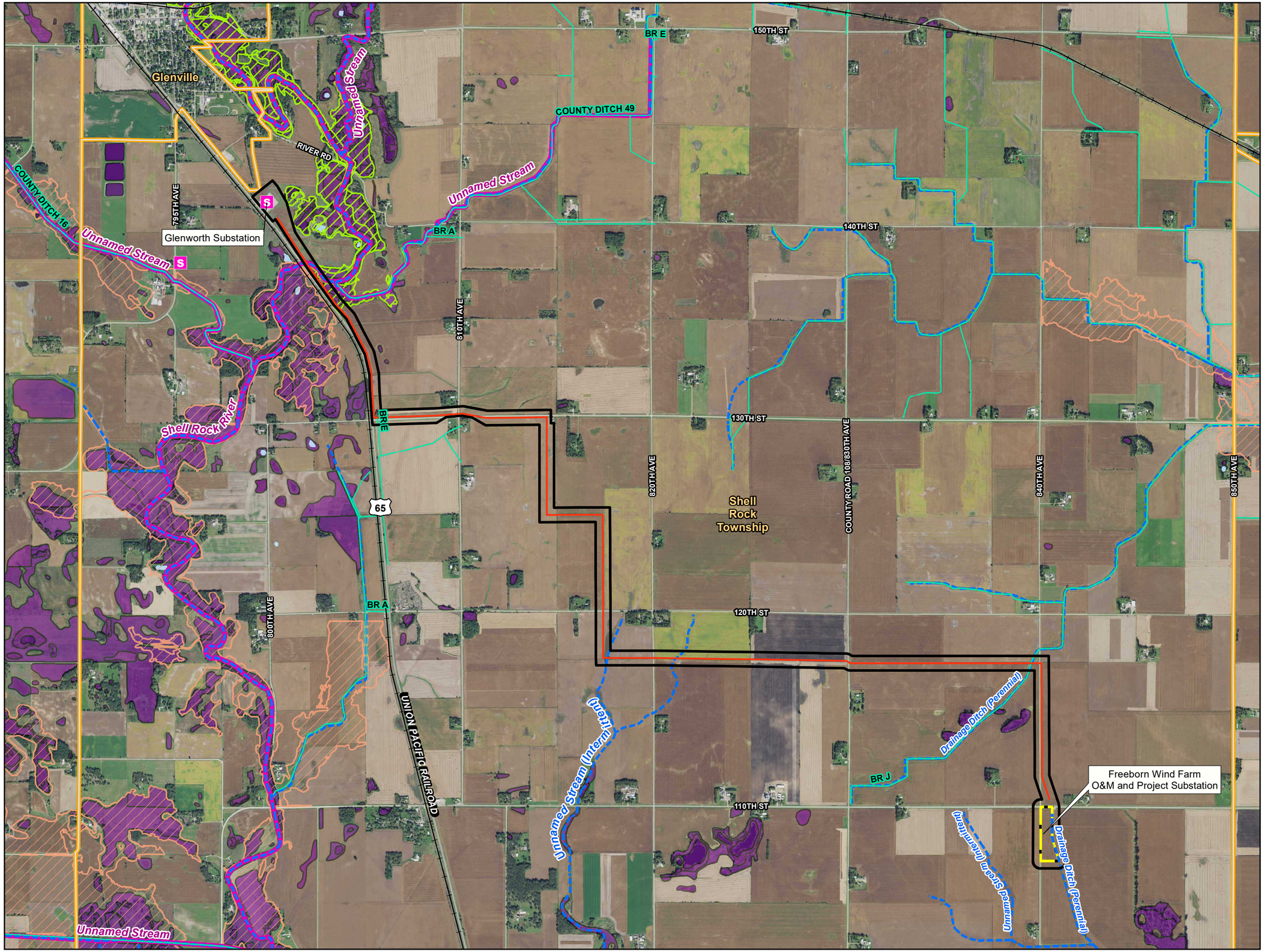
For Environmental Review Purposes Only

Source: Z:\Clients_L\Invenergy\Freeborn_Wind_Farm_Project\Permitting\State\HVTL_Route_Permit\Mapping\RPA_Figures\Figure_11_Land_Cover.mxd
Date: (8/9/2017)



0 1,250 2,500 Feet

1 inch = 2,500 feet

Imagery Source: 2015 Color FSA
Data Source: Invenergy, MN DOT, Census Freeborn County, USFWS, MN DNR, FEMA

- Existing Substation
- Proposed 161kV Transmission Line
- Proposed Route Width
- City/Township Boundary
- Proposed Freeborn Wind Farm O&M and Project Substation Site
- PWI Waterbody
- River/Stream
- County and Judicial Ditch
- Lake, Pond or Reservoir
- NWI Wetland

FEMA Floodzone

- Zone A
- Zone AE

Figure 12
Water Resources

Freeborn Wind Farm to Glenworth Substation

Transmission Line Route Permit Application

Freeborn County, MN

FREEBORN WIND FARM

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Source: Z:\Clients_L\Invenergy\Freeborn_Wind_Farm_Project\Permitting\State\HVTL_Route_Permit\Mapping\RPA_Figures\Figure_12_Water_Resources.mxd
Date: (8/9/2017)