Consolidated Application to the North Dakota Public Service Commission for a Certificate of Corridor Compatibility and Route Permit

Emmons-Logan 230 kV Transmission Line
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1.0 INTRODUCTION

Pursuant to North Dakota Century Code (NDCC) Section 49-22-08.2, Emmons-Logan Wind, LLC (Emmons-Logan Wind), a wholly owned, indirect subsidiary of NextEra Energy Resources, LLC (NEER), submits this consolidated application for a North Dakota Public Service Commission (Commission) Certificate of Corridor Compatibility (Certificate) and Transmission Facility Route Permit (Route Permit) to construct the Emmons-Logan 230 kV Transmission Line (Project). The Project is an approximately 6.85-mile-long 230-kilovolt (kV) overhead transmission line, with a 150-foot right-of-way (ROW), as shown in **Figure 1-1**. The Project will be entirely located in Emmons County, ND.

The Project will convey power from the planned Emmons-Logan Wind Energy Center (Wind Energy Center) to the interconnection point at the existing 230 kV Heskett-Wishek transmission line. Concurrently with this application, Emmons-Logan Wind is also filing an application for a certificate of site compatibility for the Wind Energy Center. Pursuant to NDCC Section 49-22-13, Emmons-Logan Wind respectfully requests that the hearing on this application for a Certificate and Route Permit be held on the same date and in conjunction with the hearing on its separately-filed application for Emmons-Logan Wind Energy Center Certificate of Site Compatibility.

The Wind Energy Center will have a nameplate capacity of approximately 298.1 megawatts (MW), consisting of up to 123 turbines in Emmons and Logan Counties, North Dakota. The Wind Energy Center's generated power will interconnect to the electrical grid via a tap to two planned interconnecting gen-tie transmission lines. The Project would convey 200 MW from 80 turbines to the existing 230 kV Heskett-Wishek transmission line. A separate 115 kV double circuit overhead transmission line would convey approximately 50 MW from each circuit from 43 turbines to a new substation near Linton, ND. Emmons-Logan Wind signed a 25-year power purchase agreement with Great River Energy for the output of the Wind Energy Center. Pursuant to this agreement, Great River Energy will purchase all of the electrical output generated by the Wind Energy Center for 25 years.

NEER, through its subsidiaries, develops renewable projects and associated transmission lines throughout the United States and Canada. NEER is the largest producer of wind energy in North America and owns and operates about 16 percent of the wind energy capacity in the United States, which includes nearly 14,000 MW of emissions-free wind energy. In North Dakota specifically, NEER, through its affiliates, owns and/or operates approximately 1,250 MW of wind generation. NEER designs, constructs, and operates its facilities in an environmentally sound and responsible manner. Attached as **Appendix A**, please find the sections from NEER's 2017 Corporate Responsibility Report that describe NEER's environmental accountability, management, and stewardship policies that are intended to:

- Design, construct, operate, and maintain our facilities in an environmentally sound and responsible manner;
- Prevent pollution, minimize waste, and conserve natural resources;
- Avoid, minimize, and/or mitigate impacts to habitat and wildlife; and
- Engage stakeholders to build trust and partner toward common goals for environmental stewardship and protection.

1.1 Compliance with the Energy Conversion and Transmission Facility Siting Act

The North Dakota Energy Conversion and Transmission Facility Siting Act requires an application for a Certificate to meet the criteria set forth in NDCC Section 49-22 and the North Dakota Administrative Code (NDAC) Article 69-06. The siting of a transmission facility is to be made in an orderly manner compatible with environmental preservation and the efficient use of resources (NDCC Section 49-22-02).

Emmons-Logan Wind will comply with the exclusion and avoidance areas and selection and policy criteria set forth in NDAC Section 69-06-08-02 in the design of the Project and has provided information

on such areas in this application. In addition, sufficient Project design and technical information have been provided for a thorough evaluation. **Table 1-1** outlines the requirements to fulfill a Certificate and Route Permit application and the application section that addresses the requirement.

Table 1-1 Certificate and Route Permit Checklist

Code and Subsection	Description	Section
NDAC 69-06-05-01	**Transmission Facility Permit**	
Subsection 2	**Contents**	
a.	A description of:	
	(1) The type of facility proposed	1.0, 1.2, 2.1
	(2) Purpose of the facility	1.0, 1.2, 2.1
	(3) The technology to be used	4.1
	(4) The type of product to be transmitted	1.0, 1.2, 2.1
	(5) The source of the product to be transmitted	1.0, 1.2, 2.1
	(6) The final destination of the transmission line	1.0, 1.2, 2.1
	(7) The proposed size and design, including: a. Right-of-way width b. Length of the facility c. The span length for electric facilities d. Proposed type of structure for electric facilities e. The voltage for electric facilities f. The requirement for, and location of, any new associated facilities	1.0, 1.3
b.	The anticipated time schedule for accomplishing major events, including:	
	(1) Obtaining the certification of corridor compatibility; (2) Obtaining the route permit; (3) Completing right-of-way acquisition; (4) Starting construction; (5) Completing construction; (6) Testing operations; (7) Commencing operations.	1.4
c.	A copy of each evaluative study or assessment of the environmental impact of the proposed facility submitted to the agencies listed in section 69-06-01-05 and each response received.	Appendix B, Appendix C
d.	An analysis of the need for the proposed facility based on present and projected demand for the product transmitted, including the most recent system studies supporting the analysis of the need.	2.1
e.	A description of any feasible alternative methods for serving the need	2.2
f.	The width of a corridor must be at least ten percent of its length, but not less than one mile [1.61 kilometers] or greater than six miles [9.66 kilometers] unless another appropriate width is determined by the commission.	1.2
g.	A study area that includes a proposed corridor of sufficient width to enable the commission to evaluate the factors addressed in North Dakota Century Code section 49-22-09.	1.2
h.	A discussion of the factors in North Dakota Century Code section 49-22-09 to aid the commission's evaluation of the proposed route.	1.2

Code and Subsection	Description	Section
i.	A discussion of the applicant's policies and commitments to limit the environmental impact of its facilities, including copies of board resolutions and management directives.	1.0, 5.0, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 5.10, 5.11, 5.12, 5.13, 5.14, 5.15, Figure 3-1, Figure 5-2, Figure 5-4, Appendix A
j.	Identification and map of the criteria that led to the proposed route location within the designated corridor, including exclusion areas, avoidance areas, selection criteria, policy criteria, design construction limitations, and economic considerations.	3.0, 3.1, 3.2, 3.3, 3.4, 3.5, Figure 1-3, Figure 3-1
k.	A discussion of the relative value of each criteria and how the applicant selected the proposed corridor location, giving consideration to all criteria and how the location, construction, and operation of the facility will affect each criteria.	1.0, 1.2, 2.1
l.	A discussion of the general mitigative measures that the applicant will take to minimize adverse impacts that result from a route location in the proposed corridor and the construction and operation of the facility.	5.2.3, 5.3.3, 5.4.3, 5.5.3, 5.6.3, 5.7.3, 5.8.3, 5.9.3, 5.10.3, 5.11.3, 5.12.3, 5.13.3, 5.14.3, 5.15.3
m.	Qualifications of each person involved in the corridor location study.	9.0
n.	A map identifying the criteria that led to the proposed route location within the designated corridor and the location of any new associated facilities. Several different criteria may be shown on each map depending on the map scale and the density and nature of the criteria.	Figure 1-1, Figure 1-2, Figure 1-3
o.	An eight and one-half-inch by eleven-inch black and white map suitable for newspaper publication depicting the site area	Provided on CD
p.	A discussion of present and future natural resource development in the area	5.0, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 5.10, 5.11, 5.12, 5.13, 5.14, 5.15
q.	Map and GIS requirements. The applicant shall provide information that is complete, current, presented clearly and concisely, and supported by appropriate references to technical and other written material available to the commission.	Figure 1-1, Figure 1-2, Figure 1-3
NDAC 69-06-08-02	**Transmission facility corridor and route criteria**	
	The following criteria must guide and govern the preparation of the inventory of exclusion and avoidance areas, and the corridor and route suitability evaluation process:	
1.	Exclusion Areas	3.1, Figure 3-1
2.	Avoidance Areas	3.2, Figure 3-1
3.	Selection Criteria	3.3
4.	Policy Criteria	3.4
NDCC 49-22-08	**Application for a certificate - Notice of filing - Amendment - Designation of a site or corridor.**	
Section 1	**An application for a certificate shall be in such form as the commission may prescribe, containing the following information:**	
a.	A description of the size and type of facility.	1.0, 1.2
b.	A summary of any studies which have been made of the environmental impact of the facility.	5.14, 5.15
c.	A statement explaining the need for the facility.	1.0, 1.2, 2.1
d.	An identification of the location of the preferred site for any energy conversion facility.	1.0, 1.2, 2.1

Code and Subsection	Description	Section
e.	An identification of the location of the preferred corridor for any transmission facility.	1.0, 1.2, 2.1
f.	A description of the merits and detriments of any location identified and a comprehensive analysis with supporting data showing the reasons why the preferred location is best suited for the facility.	1.0, 1.2, 2.1
g.	A description of mitigative measures that will be taken to minimize all foreseen adverse impacts resulting from the location, construction, and operation of the proposed facility.	5.2.3, 5.3.3, 5.4.3, 5.5.3, 5.6.3, 5.7.3, 5.8.3, 5.9.3, 5.10.3, 5.11.3, 5.12.3, 5.13.3, 5.14.3, 5.15.3
h.	An evaluation of the proposed site or corridor with regard to the applicable considerations set out in section 49-22-09 and the criteria established pursuant to section 49-22-05.1.	1.2, 3.0, 3.1, 3.2, 3.3, 3.4
i.	Such other information as the applicant may consider relevant or the commission may require.	3.5
NDCC 49-22-08.1	**Application for a permit - Notice of filing - Amendment - Designation of a route.**	
Section 1	An application for a route permit for a transmission facility within a designated corridor shall be filed no later than two years after the issuance of the certificate and shall be in such form as the commission may prescribe, containing the following information:	
a.	A description of the type, size and design of the proposed facility.	1.0, 1.2, 2.1
b.	A description of the location of the proposed facility.	1.0, 1.2
c.	An evaluation of the proposed route with regard to the applicable considerations set out in section 49-22-09 and the criteria established pursuant to section 49-22- 05.1.	1.2
d.	A description of mitigative measures that will be taken to minimize all foreseen adverse impacts resulting from the location, construction, and operation of the proposed facility.	5.2.3, 5.3.3, 5.4.3, 5.5.3, 5.6.3, 5.7.3, 5.8.3, 5.9.3, 5.10.3, 5.11.3, 5.12.3, 5.13.3, 5.14.3, 5.15.3
e.	A description of the right-of-way preparation and construction and reclamation procedures.	1.2, 4.2, 4.2.1, 4.1.2, 4.2.3
f.	A statement setting forth the manner in which:	
	(1) The utility will inform affected landowners of easement acquisition, and necessary easement conditions and restrictions.	1.3, 1.4, 2.2, 3.0, 3.3, 3.4, 4.2.1
	(2) The utility will compensate landowners for easements, without reference to the actual consideration to be paid.	1.3, 1.4, 4.1.2
g.	Such other information as the utility may consider relevant or the commission may require.	3.5
NDCC 49-22-09	**Factors to be considered in evaluating applications and designation of sites, corridors, and routes.** The commission shall be guided by, but is not limited to, the following considerations, where applicable, to aid the evaluation and designation of sites, corridors, and routes:	
1.	Available research and investigations relating to the effects of the location, construction, and operation of the proposed facility on public health and welfare, natural resources, and the environment.	5.0, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 5.10, 5.11, 5.12, 5.13, 5.14, 5.15, 8.1
2.	The effects of new energy conversion and transmission technologies and systems designed to minimize adverse environmental effects.	8.2
3.	The potential for beneficial uses of waste energy from a proposed energy conversion facility.	8.3
4.	Adverse direct and indirect environmental effects which cannot be avoided should the proposed site or route be designated.	8.4
5.	Alternatives to the proposed site, corridor or route which are developed during the hearing process and which minimize adverse effects.	2.2, 8.5

Code and Subsection	Description	Section
6.	Irreversible and irretrievable commitments of natural resources should the proposed site, corridor, or route be designated.	5.10, 5.11, 5.12, 5.13, 5.14, 5.15, 8.6
7.	The direct and indirect economic impacts of the proposed facility.	5.2, 5.9, 8.7
8.	Existing plans of the state, local government, and private entities for other developments at or in the vicinity of the proposed site, corridor, or route.	8.8
9.	The effect of the proposed site or route on existing scenic areas, historic sites and structures, and paleontological or archaeological sites.	3.1, 5.7, 5.8, 8.9
10.	The effect of the proposed site or route on areas which are unique because of biological wealth or because they are habitats for rare and endangered species.	5.14,5.15, 8.10
11.	Problems raised by federal agencies, other state agencies, and local entities.	6.0, 8.12, Appendix B

1.2 Project Summary

The Project is located in Emmons County in south central North Dakota, a primarily rural agricultural area located approximately 40 miles southeast of Bismarck, North Dakota and approximately eight miles southwest of Napoleon, North Dakota.

The Project is wholly within the Wind Energy Center boundary. The Project begins with a connection to the Wind Energy Center collection substation and terminates where it will connect with the existing 230 kV Heskett-Wishek transmission line (**Figure 1-1**). The Project would convey 200 MW from 80 turbines to the existing 230 kV Heskett-Wishek transmission line. A separate 115 kV double circuit overhead transmission line would convey approximately 50 MW from each circuit from 43 turbines to a new substation near Linton, ND. Terms used in this application associated with the Project are defined in **Table 1-2.**

Table 1-2 Project Terms

Term	Definition/Description
Project Route	In accordance with NDCC Section 49-22-03(12), "Route" means the location of an electric transmission facility within a designated corridor. The Project Route is approximately 6.85 miles long.
Project Corridor	The area that was studied (Study Area) to determine the best route for the Project. In accordance with NDAC Section 69-06-05-01(2), the width of a corridor must be at least ten percent of its length, but not less than one mile or greater than six miles unless another appropriate width is determined by the Commission. The Project Corridor is one mile wide. The Project Corridor encompasses approximately 4,843 acres.
Project Right-of-Way (ROW)	An area around the Project Route where easements were acquired. The typical easement that will be used during construction and maintained during the life of the Project. The Project ROW is 150 feet wide and encompasses approximately 125 acres.

The Project will be sited along existing roads, to the extent possible, to minimize impacts to farming and ranching operations and natural resources. The Project Route and ROW will be located entirely within Emmons County, North Dakota; however, the Project Corridor is located within Emmons and Logan Counties. Throughout most of this application, both Emmons and Logan Counties were considered as the Project directly borders Logan County, North Dakota. All of the land located within the Project Corridor is in private ownership. There are a total of 20 landowners within the Project Corridor with 19 landowners participating in the Project. As of the date of this application, 100 percent of landowners within the Project ROW and Project Route have signed leases (**Figure 1-4**).

The start of the Project Route will begin at the Wind Energy Center substation, where power from the turbines will be aggregated and stepped up to transmission line voltage of 230 kV. The point of interconnection will be located at the northern terminus of the Project where it will tap into the existing 230 kV Heskett-Wishek transmission line. **Table 1-3** shows the Township, Range, and Sections of the Project Route and Project ROW.

Table 1-3 Project Route and Project ROW

County	Township	Range	Sections
Emmons	134 North	74 West	13, 24, 25, 34, 35, 36

In accordance with NDAC Section 69-06-05-01(2)(f), the width of a corridor must be at least 10 percent of its length, but not less than one mile or greater than six miles unless another appropriate width is determined by the Commission. The Project Corridor is approximately one mile wide and encompasses the Project Route and Project ROW. The Project Corridor is shown on all map figures for this application. The Project Corridor is located in Emmons and Logan Counties, North Dakota and encompasses approximately 4,843 acres. **Table 1-4** shows the Township, Range, and Sections of the Project Corridor.

Table 1-4 Project Corridor

County	Township	Range	Sections
Emmons	134 North	74 West	12, 13, 24, 25, 33, 34, 35, 36
	133 North	74 West	1, 2, 3, 4
Logan	134 North	73 West	7, 18, 19, 30, 31
	133 North	73 West	6

1.3 Project Impact Assumptions

The Project is located in the area which Emmons-Logan Wind has negotiated easements with landowners. Permanent impacts are considered to be the Project footprint during operation. Temporary impacts are those impacts that result during construction to accommodate equipment and temporary activities outside of the areas that will remain as the permanent Project footprint during operation (**Table 1-5**). Temporary impacts will remain within the Project ROW.

Table 1-5 Estimated Project Ground Disturbing Impacts

Project Component	Assumptions	Impact Multiplier [1]	Permanent Impact (acres)	Temporary Impact (acres)
Monopole transmission Poles	Permanent: 3-foot radius poles/pole foundations = 28.3 sq. ft. per pole = 0.00065 acres	42 transmission support poles	0.0273 acres	30.24 acres
	Temporary: Up to 100-foot radius around poles for construction work area = 31,500 sq. ft. = 0.72 acres			
Transmission support anchors	Permanent: 0.75-foot radius anchor foundation = 1.8 sq. ft. per anchor = 0.000042 acres	18 transmission support anchors	0.00076 acres	3.24 acres

Project Component	Assumptions	Impact Multiplier [1]	Permanent Impact (acres)	Temporary Impact (acres)
	Temporary: Up to 50-foot radius around guy anchors for construction work area = 7,854 sq. ft. = 0.18 acres			
Access roads	Permanent: None	0 miles of access roads	None	None
	Temporary: None			
Wire stringing, pulling and tensioning sites	Permanent: None	4 pulling sites	None	4 acres
	Temporary: 1 acre per pulling site			
Point of Interconnect [3]	One 5 acre site located at the existing 230 kV Heskett-Wishek transmission line	One	5 acres	3 acres
		Totals (acres) [2]	**5.02806**	**40.48**

[1] The number of poles is based on preliminary engineering design and could change during final design.

[2] Total impact areas may overestimate actual impacts. These totals reflect conservative, worst-case scenarios.

[3] Exact location of point of interconnect construction to be determined.

1.4 Project Schedule

Construction will be coordinated with the construction of the associated Wind Energy Center from which it will carry generated power. Emmons-Logan Wind is requesting approval of the Certificate and Route Permit by the Commission by December 2018 to meet a targeted start date for construction of May 2019, provided all other pre-construction permits and approvals have been obtained and weather permitting. The target date for commercial operation is November 2019, dependent upon permitting, equipment deliveries, and the planned completion of the Wind Energy Center. The Project schedule includes the following components:

1. **Certificate and Route Permit**: Emmons-Logan Wind is requesting that the Certificate and Route Permit will be approved by at least December 2018.

2. **Land Acquisition**: All land easement agreements have been completed.

3. **Permits**: Emmons-Logan Wind will complete all required environmental studies for Certificate issuance. Emmons-Logan Wind will also obtain all permits and licenses that are required to initiate construction following Certificate and Route Permit issuance.

4. **Equipment Procurement, Manufacture and Delivery**: Emmons-Logan Wind will order the transmission conductor cables and other items with long-lead times as soon as practical following issuance of the Certificate and Route Permit.

5. **Construction**: Construction is scheduled to begin May 2019, subject to road restrictions, weather, and permitting and is scheduled to be completed in approximately two to four months.

6. **Test and Operations**: Emmons-Logan Wind anticipates testing to begin after all construction is complete.

7. **Commercial Operation**: Emmons-Logan Wind anticipates commercial operation to begin once the Wind Energy Center is complete in November 2019.

1.5 Project Ownership

Emmons-Logan Wind will own the entire Project and, as a result, will manage the construction of all equipment and associated facilities. Emmons-Logan Wind will select a third-party engineering, procurement, and construction (EPC) contractor to perform the majority of the engineering and construction. The Project and the Wind Energy Center will be competitively bid separately with qualified EPC contractors, and Emmons-Logan Wind will procure the equipment directly from a manufacturer.

2.0 NEED FOR FACILITY

2.1 Need Analysis

The need for the Project is driven by the need for the proposed Wind Energy Center and the preferred point of interconnection. As described in the application that is being filed for the Wind Energy Center, Emmons-Logan Wind has signed a power purchase agreement with Great River Energy for the output of the Wind Energy Center. The Wind Energy Center substation was located to minimize power loss from the collection system in order to allow for efficient collection of generated power from the turbines. The point of interconnection will be located at the northern terminus of the Project where it will tap into Montana-Dakota Utilities' (MDU) existing 230 kV Heskett-Wishek transmission line.

2.2 Alternatives

Emmons-Logan Wind identified the proposed point of interconnection with the existing Heskett-Wishek transmission line based on MDU and the Wind Energy Center's load injection needs. There is no existing infrastructure connecting the Wind Energy Center to existing transmission. The location of the Wind Energy Center was identified as an optimal site from wind resource, transmission, landowner participation, economic, and environmental perspectives. Therefore, there is no feasible alternative method to serving the facility need. The Project Route is the most viable alternative based on landowner preferences, adjacent to existing public roads or section lines, and it is the most direct route that also minimizes impacts on the exclusion, avoidance, selection, and policy criteria identified in NDAC Section 69-06-08-02.

2.3 Ten-Year Plan

Emmons-Logan Wind will file a Ten-Year Plan with the Commission in compliance with NDCC Section 49-22-04.

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3.0 SITE SELECTION CRITERIA

Emmons-Logan Wind has secured voluntary agreements with all landowners along the Project Route. The Project Route was also identified based on site inspection, topographic maps, known environmentally sensitive areas, review of Emmons County and state transmission line requirements, and communications with local, state, and federal agencies. NEER subsidiaries have used a similar siting process in developing recent transmission line projects in North Dakota. Through this process, NEER subsidiaries address environmental issues that commonly arise during project development and work within the parameters of state rules. North Dakota has several site selection criteria that are considered by the Commission to determine suitability of the transmission line. Emmons-Logan Wind has reviewed the criteria in NDAC Chapter 69-06-08 and has considered these criteria in Project design. These criteria are discussed in this section.

The Project Route is derived largely from the location of the Wind Energy Center and MDU's preferred point of interconnection. The location of the Wind Energy Center was identified as an optimal site for wind resources, landowner participation, economic and environmental perspectives, and close proximity to transmission infrastructure with which to interconnect. The location of the Project is based on some of these factors, including landowner cooperation, favorable environmental conditions, and the location of existing Heskett-Wishek transmission line.

3.1 Exclusion Areas

In accordance with NDAC Section 69-06-08-02(1), which implements NDCC Section 49-22-05.1, the geographical areas listed in **Table 3-1** shall be excluded in the consideration of a transmission facility route. Exclusion and avoidance areas may be located within a corridor, but at no given point shall such an area or areas encompass more than 50 percent of the corridor width unless there is no reasonable alternative. NDAC Section 69-06-08-02 further specifies that a buffer zone of a reasonable width to protect the integrity of the area shall be included. Natural screening may be considered in determining the width of the buffer zone. **Figure 3-1** depicts the exclusion areas.

Table 3-1 Exclusion Areas

NDAC 69-06-08-02(1)	Exclusion Area	Present within Project Corridor?	Present within Project ROW?	Description	Section Addressed
a.	Designated or registered national: parks; memorial parks; historic sites and landmarks; natural landmarks; monuments; and wilderness areas.	None	None	Not applicable	5.7, 5.8, 8.8, 8.9
b.	Designated or registered state: parks; historic sites; monuments; historical markers; archaeological sites; and nature preserves.	Present	None	Although archaeology sites are present within the Project Corridor, no archaeology sites are within the Project ROW.	5.7, 5.8, 8.8, 8.9, Figure 3-1
c.	County parks and recreational areas; municipal parks; and parks owned or administered by other governmental subdivisions.	None	None	Not applicable	5.8, 8.8

NDAC 69-06-08-02(1)	Exclusion Area	Present within Project Corridor?	Present within Project ROW?	Description	Section Addressed
d.	Areas critical to the life stages of threatened or endangered animal or plant species.	None	None	The Project Corridor is within the whooping crane migration corridor, but there is no designated critical habitat within the Project Area for any species.	5.14, 5.15, 8.10
e.	Areas where animal or plant species that are unique or rare to this state will be irreversibly damaged.	None	None	Not applicable	5.14, 5.15, 8.10
f.	Areas within one thousand two hundred feet of the geographic center of an intercontinental ballistic missile (ICBM) launch or launch control facility.	None	None	Not applicable	Not applicable
g.	Areas within thirty feet on either side of a direct line between ICBM launch or launch control facilities to avoid microwave interference.	None	None	Not applicable	Not applicable

3.2 Avoidance Areas

In accordance with NDAC Section 69-06-08-02(2), the geographical areas listed in **Table 3-2** shall not be approved as a site for routing of a transmission facility unless the applicant shows that, under the circumstances, there is no reasonable alternative. NDAC Section 69-06-08-02 further specifies that a buffer zone of a reasonable width to protect the integrity of the area shall be included. Natural screening may be considered in determining the width of the buffer zone. As with exclusion areas, most categories of avoidance areas are not present in the Project Corridor. Avoidance areas are mapped for the Project Corridor on **Figure 3-1**.

Table 3-2 Avoidance Areas

NDAC 69-06-08-02(2)	Avoidance Areas	Present within Project Corridor?	Present within Project ROW?	Description	Section Addressed
a.	Designated or registered national: historic districts; wildlife areas; wild, scenic, or recreational rivers; wildlife refuges; and grasslands.	None	None	Not applicable	5.7, 5.8, 8.8, 8.9

NDAC 69-06-08-02(2)	Avoidance Areas	Present within Project Corridor?	Present within Project ROW?	Description	Section Addressed
b.	Designated or registered state: wild, scenic, or recreational rivers; game refuges; game management areas; management areas; forests; forest management lands; and grasslands.	None	None	Not applicable	5.7, 5.8, 8.8, 8.9
c.	Historical resources which are not specifically designated as exclusion or avoidance areas.	Present	None	Sites with potential cultural significance are present within the Project Corridor, but not the ROW. Sites that may be discovered during construction will also be avoided.	5.7, 8.9, Figure 3-1
d.	Areas which are geologically unstable.	None	None	Not applicable	5.10, 5.11
e.	Within five hundred feet of a residence, school, or place of business.	Present	Present	In accordance with NDCC Section 49-22-05.1(2), Emmons Logan Wind will obtain a written waiver from the owner of the one residence located within 500 feet of the Project Route.	5.2, Figure 3-1
f.	Reservoirs and municipal water supplies.	None	None	Not applicable	5.4, 5.11
g.	Water sources for organized rural water districts.	None	None	Not applicable	5.4, 5.11
h.	Irrigated land.	None	None	Not applicable	5.9
i.	Areas of recreational significance which are not designated as exclusion areas.	None	None	Not applicable	5.8

3.3 Selection Criteria

In accordance with NDAC Section 69-06-08-02(3), a site shall be approved in an area only when it is demonstrated to the Commission by the applicant that any significant adverse effects resulting from the location, construction, and operation of the facility in that area, as they relate to the criteria listed in **Table 3-3**, will be at an acceptable minimum, or that those effects will be managed and maintained at an acceptable minimum.

Table 3-3 Selection Criteria

NDAC 69-06-08-02(3)	Selection Criteria	Potential Adverse Effects	Section Addressed
a.	The impact upon agriculture:		
(1)	Agricultural production	Only land needed during operations will be permanently affected. Areas within the construction easement may be disturbed during field surveys and construction, but will be restored as practicable and landowners will be compensated through an easement payment and for loss of agricultural production.	5.9, 5.10. Figure 5-1
(2)	Family farms and ranches	As stated above, landowner agreements also include compensation for crop damage, if any, during surveys and construction. Transmission line development is a compatible use with existing family farms and ranches and will not displace any farms or ranches.	5.9, 5.10
(3)	Land which the owner demonstrates has soil, topography, drainage, and an available water supply that cause the land to be economically suitable for irrigation	No agricultural irrigation is currently present within the Project Corridor. No adverse effects are expected.	5.10
(4)	Surface drainage patterns and ground water flow patterns	A wetlands and waters survey was completed in May 2019. Project infrastructure will be built to avoid impacts to surface waters to the extent practicable, and will be designed in such a manner that runoff from the upper portions of the watershed can flow unrestricted to the lower portion of the watershed. Temporarily disturbed areas will be returned to their original contours.	5.13, Figure 5-4
b.	The impact upon:		
(1)	Sound-sensitive land uses.	Following construction, there will be a minimal amount of sound from the Project as a result of corona effects. Corona effects occur when air molecules near conducting wire are ionized due to changes in the electric field intensity at the conductor surface. The sound is most noticeable when conductors are wet as a result of precipitation. Acoustic modeling for a 230-kV transmission line has shown the corona to be 17 A-weighted decibels (dBA) in fair weather and 42 dBA in wet weather at the edges of the right-of-way (USDA Rural Utilities Service 2013).	5.6
(2)	The visual effect on the adjacent area.	The Project will be visible to landowners and travelers along roadways. Existing transmission lines are present in the viewshed.	1.2
(3)	Extractive and storage resources.	There are no extractive and storage resources identified within the Project Corridor.	5.11, 5.12

NDAC 69-06-08-02(3)	Selection Criteria	Potential Adverse Effects	Section Addressed
(4)	Wetlands, woodlands, and wooded areas.	Permanent impacts to jurisdictional wetlands will be avoided and minimized as practicable. Few woodland impacts are anticipated. If impacts to trees and shrubs cannot be avoided, the individual trees/shrubs will be replaced according to the Commission's tree and shrub mitigation specifications.	5.13, Figure 5-1, Figure 5-4
(5)	Radio and television reception, and other communication or electronic control facilities.	No impacts to electronic communications are anticipated.	5.4
(6)	Human health and safety.	The Project will be designed and constructed to meet or exceed the standards of the National Electrical Safety Code (NESC). Regular maintenance and inspections will be performed during the life of the Project to ensure its continued integrity. The nearest occupied residence is approximately 400 feet from the Project Route, where electromagnetic fields (EMF) will be at background levels. Safety precautions will be taken during construction.	5.5
(7)	Animal health and safety.	Construction work will be coordinated with landowners to avoid impacts to livestock.	5.14, 5.15
(8)	Plant life.	The Project will result in approximately 5.028 acres of permanent ground disturbance, including loss of the existing plant populations. Emmons-Logan Wind will avoid existing trees and shrubs as practicable. If impacts to trees and shrubs cannot be avoided, the individual trees/shrubs will be replaced according to the Commission's tree and shrub mitigation specifications. Temporarily disturbed areas will be reseeded.	5.3, 5.10, 5.14, 5.15, Figure 5-1

3.4 Policy Criteria

In accordance with NDAC Section 69-06-08-02(4), the Commission may give preference to an applicant that will maximize benefits that result from the adoption of the policies and practices listed in **Table 3-4**, and may require the adoption of such policies and practices as appropriate.

Table 3-4 Policy Criteria

NDAC 69-06-08-02(4)	Policy Criteria	Applicability and Applicant Response	Section Addressed
a.	Location and design.	Emmons-Logan Wind has committed to minimizing and mitigating environmental impacts, following the National Electrical Safety Code (NESC) requirements and policies, designing the system to efficiently transfer electricity, ensuring worker and public health and safety, and constructing facilities to most effectively and efficiently meet its delivery obligations.	1.0, 1.2, 4.1, Figure 4-1, Figure 4-2
b.	Training and utilization of available labor in this state for the general and specialized skills required.	Emmons-Logan Wind will use local qualified contractors to provide labor for the Project to the extent practicable.	5.2
c.	Economies of construction and operation.	Emmons-Logan Wind will use experienced local contractors to the extent practicable. Emmons-Logan Wind has evaluated feasible alternatives and selected a Project Route that minimizes the extent and impacts to the social, economic, and natural environment to the extent practicable.	5.2
d.	Use of citizen coordinating committees.	Emmons-Logan Wind has coordinated a landowner open house on March 1, 2017, Project stakeholder luncheons on a quarterly basis, and meetings with County Commissioners on a bi-monthly basis. Emmons-Logan Wind will continue to work with landowners of properties for the proposed Project.	5.2
e.	A commitment of a portion of the transmitted product for use in this state.	The Project will transmit energy from the Wind Energy Center and injected into the existing MDU 230 kV Heskett-Wishek transmission line.	1.2, 2.1
f.	Labor relations.	No labor relations will be affected by the Project.	5.2
g.	The coordination of facilities.	Existing infrastructure was considered in the location of the Project Corridor, Project Route, and associated facilities. Emmons-Logan Wind will avoid impacts to existing infrastructure, other than interconnecting to the existing MDU 230 kV Heskett-Wishek transmission line.	1.2, 2.1
h.	Monitoring of impacts.	Emmons-Logan Wind and the engineering, procurement, and construction (EPC) contractor will employ best management practices during construction to monitor soil impacts and segregate topsoil. A stormwater pollution prevention plan (SWPPP) will be prepared for the Project.	4.2
i.	Utilization of Project ROW and Project Corridor.	Emmons-Logan Wind has routed the Project parallel to existing roadways and section lines to the extent practicable.	1.2

NDAC 69-06-08-02(4)	Policy Criteria	Applicability and Applicant Response	Section Addressed
j.	Other existing or proposed transmission facilities.	Emmons-Logan Wind is open to utilizing or paralleling existing utility right-of-ways (ROWs) when siting transmission routes, as practicable.	1.2, 2.1

3.5 County Criteria

In April 2018, Emmons-Logan Wind submitted an application for a Conditional Use Permit (CUP) to the Emmons County Planning Commission to construct, operate, and maintain the Project. The application includes a list of all of land owners with transmission easements, a site plan, transmission parcels, preliminary construction design of a 230 kV pole, and the memoranda of landowners with transmission easements.

On June 5, 2018, the Emmons County Commission, acting as the Emmons County Zoning Board, held a public hearing at the Emmons County Courthouse in Linton, ND to consider the CUP application. On June 19, 2018, an Emmons County Commission Special Meeting was held to act on the CUP application. The CUP was approved at the June 19 special meeting.

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4.0 GENERAL DESCRIPTION OF THE PROPOSED FACILITY

4.1 Project Layout and Associated Facilities

4.1.1 Transmission Line Design

The Project will be constructed using steel monopole structures. The average height of the single-pole structures will range from 90 to 120 feet depending on final engineering design (**Figure 4-1**). Each steel monopole structure will be directly embedded into the ground, with an overall foundation diameter of approximately six feet and embedded length of approximately 15 to 25 feet. The pole locations will be placed approximately 950 feet apart depending on site-specific considerations. The maximum span between pole locations will be 1,150 feet and will vary depending on geological, environmental, or engineering constraints identified during final design. Pole locations will avoid sensitive areas such as wetlands, streams, and riparian areas, and will generally be placed at the edges of farm fields to avoid disruption to agricultural practices. The Project ROW easement that will be used during construction and maintained during the life of the Project is 150 feet wide.

The Project will be constructed to maintain minimum conductor-to-ground clearance as required by National Electrical Safety Code (NESC) rules. Specific tower heights will be determined during final engineering design, in order to maintain this minimum clearance at the lowest point of conductor sag for all normal operating conditions. Clearances may be increased to account for site-specific situations.

The Project design includes a shield wire, which will be strung at the top of the poles to provide lightning protection. The shield wire will also contain a fiber optic core that forms part of the communications system for the transmission line, allowing for monitoring and remote control of interconnection facility components.

Guyed structures will be required at approximately three locations. Depending on the structure type, up to eight guy wires may be required per structure, each up to 125 feet from the pole structure **(Figure 4-2**). Specialty structures and foundations may be required in certain circumstances. Other hardware that is not associated with the transmission of electricity may be installed as part of the Project. This hardware may include aerial marker spheres or bird markers and other equipment to reduce bird mortality.

4.1.2 Project Access

No temporary or permanent access roads will be built to construct or maintain the Project. The Project Route is adjacent to existing public roads or section lines and can be accessed with minimal off-road work. Construction will take place when the ground is dry and hard enough to support construction equipment with no improvements.

4.1.3 Control System

The Project will be operated in conjunction with the Wind Energy Center, through its Supervisory Control and Data Acquisition (SCADA) system. The SCADA system will be located at the Wind Energy Center Operations & Maintenance (O&M) building.

4.2 Project Construction

The Project Route passes primarily through agricultural and pasture land and is alongside existing county roads and section lines. Due to the fact that there are few obstructions within the Project Route, minimal ROW preparations will be necessary. In those few areas where there is tree and shrub growth, ROW clearing will include cutting and removal. Where practicable, trees and low-growing vegetation will not be removed if future growth will not interfere with the operation or maintenance of the line. There may be limited use of herbicides to remove or control the growth of vegetation in some

areas. Herbaceous and smaller woody plants will not be disturbed, except for those that will be crushed unavoidably during structure installation. During operations, vegetation will be monitored regularly and trimmed so that it does not exceed safety provisions.

Some structure locations may require soil analysis. Soil borings will be taken for the purpose of determining the soil properties for engineering analysis. These borings will be taken by an experienced geotechnical testing laboratory. The geotechnical drill rig will need access to the test sites.

The structures will be designed for installation at existing grades. Therefore, structure sites will not be graded or leveled, unless it is necessary to provide a reasonably level area for construction crews and equipment, such as digger/derrick trucks to auger holes for the structures, a crane for structure setting, and crew vehicles and bucket trucks for wire stringing and clipping operations.

Ground disturbance will occur during the setting of transmission poles and support anchors. These disturbances will occur during the boring of the hole used for setting the pole and support anchor. Pole borings will extend into the subsurface approximately 15 to 25 feet and be approximately six feet in diameter. Support anchors will extend into the subsurface and be approximately 0.75-foot in radius. Boring equipment will be used to facilitate the installation of the transmission foundation. Soil removed during boring activities will be spread around the base of the pole.

The largest disturbance during installation of the transmission structures will occur during the excavation of the self-supporting dead-end foundations, if any are used (to be determined during final design). Foundations will extend into the subsurface approximately 25 to 35 feet and be approximately eight feet in diameter. Boring equipment will be used to facilitate the installation of transmission foundations. The foundations will be constructed of reinforced concrete with prefabricated anchor bolt cases placed in the boreholes. Soil removed during boring activities will be sloped around the structure after installation or in adjacent upland areas.

The most noticeable impact on the Project Route will be land disturbance in the area of transmission structure construction to allow adequate room for operation of equipment. Following the structure installation, the entire disturbed area will be groomed and seeded, including replacement of trees and herbaceous vegetation off the ROW. The anticipated area of disturbance at each structure site during construction will be approximately 0.72 acre at each tower location; this assumes a 100-foot radius of impact around each structure.

After structures have been erected, conductors will be installed by establishing stringing setup areas within the ROW. These stringing setup areas will be located approximately every three to four miles along the route. Conductors will be installed between setup areas using a “controlled tension method,” which ensures that the cable comes off the reel at a constant tension without backlashes. Conductor stringing operations will also require brief access to each structure to secure the conductor wires to the insulators or shield wire clamps once final line sag is established.

Stringing equipment generally consists of wire pullers, tensioners, conductor reels, shield wire reels, and stinging blocks. Stringing operations consist of pulling lightweight cables or ropes through the stringing sheaves located at every structure site. This cable or rope will be used to pull the conductors through the sheaves under sufficient tension to keep the conductor from coming into contact with the ground. Temporary guard or clearance poles will be installed over existing distribution or communication lines, streets, roads, highways, railways, or other obstructions after any necessary notifications are made and/or permits are obtained. This ensures that conductors will not obstruct traffic or come into contact with existing energized conductors or other cables, and protects the conductors from damage. Once a section of a line has been installed, temporary structures will be removed, holes backfilled, and the area of disturbance reseeded to produce the same cover that was removed.

Debris associated with the transmission line construction may include construction materials such as packaging material, insulator crates, conductor reels, and wrapping. This debris may also include excess excavated soil and removed vegetation. Materials with salvage value, including conductor reels, unused conductor and hardware, poles, and other materials, will be removed from the site for reuse. Excess soil and vegetation will be distributed along the ROW, but will not be placed in wetlands or other aquatic resources. Solid waste will be temporarily stored within the ROW and then transported to appropriate disposal facilities. Debris will be disposed of in accordance with local, state, and federal regulations.

Temporary staging areas will be located within the ROW, and will be limited to the structure site areas for structure laydown and framing prior to structure installation. Disturbed areas will be restored to their original condition to the maximum extent practicable.

Construction tasks will include the following:

- Pre-Construction: Includes activities such as environmental surveys, geotechnical analysis, cultural resources surveys, avian surveys, micro-siting, engineering, design, land procurement, various utility studies, and major procurement.
- Surveying: Initial line-survey work, consisting of aerial photography, survey control, route centerline location, profile surveys, and access surveys.
- Pole Structures: Vegetation will be removed from a limited area at structure locations. Once any vegetation is removed, holes will be drilled for structures using a truck mounted auger.
- Delivery and Assembly: The pole structures will be transported to the erection sites on flatbed trucks and assembled. The footings of each will be backfilled with one and a half inch rock and tamped into place to prevent structure movement or settling. Final structure assembly and hardware placement will be completed using cranes and bucket trucks.
- Conductor Installation: Following erection of all structures, conductor and ground wires will be installed. Conductor will be pulled and tensioned from several locations (approximately every three to four miles) along the Project Route. Heavy, truck-mounted winches that also carry reels of conductor and cable will be used for pulling and tensioning work.

Post-construction reclamation activities will generally include the following:

- Cleaning up all construction sites, including removing and properly disposing of debris;
- Removing all temporary facilities, including staging areas;
- Employing appropriate erosion control measures; and
- Reseeding and replacing trees and shrubs as necessary in disturbed areas (due to construction activities) with vegetation like that which was removed, and restoring the areas to their original condition to the extent practicable. Emmons-Logan Wind will incorporate a tree replacement policy based on the Commission's Tree and Shrub Mitigation Specifications.

4.2.1 Construction Management

The EPC contractors for the Project and the Wind Energy Center will be competitively bid separately. The best evaluated proposal for each part will be awarded separately. The EPC contractor will have primary responsibility for construction management for the Project. The EPC contractor will use the services of local contractors where possible and appropriate and will undertake the following activities:

- Securing building, electrical, grading, road, and utility permits;
- Performing detailed civil, structural and electrical engineering;
- Scheduling execution of construction activities;
- Forecasting Project labor requirements and budgeting;
- Coordinating and managing the work of all Project subcontractors; and
- Providing direct supervision for the installation of all Project components including foundations, poles, insulators and conductors, and interconnection equipment.

Construction activities under the supervision of the EPC will consist of the following general tasks:

- Project development;
- Foundation excavation;
- Concrete foundation installation;
- Electrical and communications equipment installation;
- Transmission line assembly and erection;
- System testing; and
- Restoration of temporary impact areas.

Throughout the construction phase, ongoing coordination will occur between Emmons-Logan Wind and the EPC. The EPC's on-site Project construction manager will help to coordinate ongoing communication with local officials and landowners. Emmons-Logan Wind, the EPC construction manager, and the O&M staff manager will work together to ensure a smooth transition from construction through the Project commissioning and operation.

4.2.2 Commissioning

The Project will be commissioned after completion of the construction phase and detailed inspection and testing. Inspection and testing will occur for each component of the Project.

4.2.3 Operation and Maintenance

Project O&M will consist of continuous remote monitoring through the SCADA system and regular on-site inspections and as maintenance is needed. The Project will be operated in conjunction with the Wind Energy Center, through its SCADA system. The SCADA system will be located at the Wind Energy Center O&M building.

5.0 ENVIRONMENTAL ANALYSIS

This section provides a description of the environmental conditions that exist within the Project Corridor, along with the potential Project impacts and mitigation measures. Consistent with the North Dakota Energy Conversion and Transmission Facility Siting Act, exclusion and avoidance criteria, as well as selection and policy criteria, were considered in the selection and design of the Project. To support this siting process, maps of the Project Corridor were generated that indicate the presence or absence of many of the criteria highlighted in NDAC Section 69-06-08-02.

5.1 Description of Environmental Setting

The Project is located in Emmons County in south central North Dakota, a primarily rural agricultural area located approximately 40 miles southeast of Bismarck, North Dakota and approximately eight miles southwest of Napoleon, North Dakota. The one-mile wide Project Corridor is located in Emmons and Logan Counties, North Dakota. Logan County is also primarily a rural agricultural area located in south central North Dakota.

5.2 Socioeconomics

5.2.1 Description of Resources

The Project is located in a primarily rural agricultural region in Emmons County, North Dakota. The Project Corridor is located east of U.S. Highway 83, north of State Highway 13, west of State Highway 3, and south of State Highway 34. There are no incorporated or unincorporated communities within the Project Corridor. The Project Corridor is located approximately 13 miles northeast of Linton (2016 population 1,022), eight miles southwest of Napoleon (2010 population 787), eight miles south of Kintyre (no census data available), and 16 miles southeast of Hazelton (2010 population 221). There are approximately five occupied residences within the Project Corridor and one occupied residence within 500 feet of the Project Route.

Emmons County had a population of 3,550 persons in 2010, with an estimated 5.7 percent decrease in 2016 for an estimated total of 3,346 persons in 2016 (U.S. Census Bureau 2017a). The county contains 1,510 square miles of land, with a density of approximately 2.2 persons per square mile. Approximately 97 percent of the population of Emmons County is composed of white persons who are not of Hispanic or Latino origin. As of 2016, it is estimated that approximately 27.1 percent of the county population is 65 years or older, while approximately 4.8 percent of the population is under five years of age.

Logan County had a population of 1,990 persons in 2010, with an estimated 2.5 percent decrease in 2016 for an estimated total of 1,941 persons in 2016 (U.S. Census Bureau 2017b). The county contains 993 square miles of land, with a density of approximately 2.0 persons per square mile. Approximately 97 percent of the population of Logan County is composed of white persons who are not of Hispanic or Latino origin. As of 2016, it is estimated that approximately 26.8 percent of the county population is 65 years or older, while approximately 5.5 percent of the population is under five years of age.

According to the 2016 U.S. Census Bureau American Community Survey approximately 26.5 percent of the Emmons County and 23.5 percent of Logan County workforce worked in agriculture, forestry, fishing and hunting, and mining, and 20.1 percent in Emmons County and 23.4 percent of Logan County worked in educational services, and health care and social assistance (U.S. Census Bureau 2016a, 2016b). Per capita income estimated in 2016 was $29,467 in Emmons County and $33.272 in Logan County and the median household income was $45,472 in Emmons County and $55,068 in Logan County. In 2016, approximately 12.0 percent of Emmons County and 7.0 percent of Logan County lived below the poverty level, compared to 12.7 percent nationwide.

Agriculture continues to play a significant role in Emmons and Logan Counties' land use and economy with 609 farms in Emmons County and 379 farms in Logan County (USDA 2014). According to the 2012 Census of Agriculture, total market value of agricultural products produced in Emmons County was $171,284,000, 81 percent of which was from crops and 19 percent from livestock sales. Total market value of agriculture in Logan County was $172,099,000, 50 percent of which was from crops and 50 percent from livestock sales. The primary livestock for Emmons and Logan Counties are cattle and the principal crops include soybeans and corn. Wheat, spring wheat, and forage for hay are also commonly grown.

5.2.2 Impacts

No residents will be displaced due to the Project. The Project will have positive economic impacts for the local population, including lease and royalty payments for participating landowners, employment, and property and sales tax revenue.

Emmons-Logan Wind estimates that the Project along with the Wind Energy Center will provide over $45 million in tax revenue to Emmons and Logan Counties over 25 years. In addition, the Project and Wind Energy Center will create approximately 200 to 300 temporary construction jobs and nine full-time O&M jobs. The Project and Wind Energy Center will also provide over $50 million in payments to participating landowners over 25 years, which will not only benefit those landowners, but also the local economy as that money is reinvested in local goods and services.

Landowner compensation has been established under individual lease agreements, and includes compensation for crop damage during surveys and construction. In general, agricultural areas surrounding each transmission pole can still be farmed. In addition, in an environment of uncertain and often declining agricultural prices and yields, the supplemental income provided to farmers is expected to provide stability to farm incomes and thus will help assure the continued viability of farming in the Project Corridor. Project construction will not cause additional impacts to leading industries within the Project Corridor. There is no indication that any minority or low-income population is concentrated in any one area of the Project, or that the Project will be placed in an area occupied primarily by any minority or low-income group.

To the extent that local contractors are used for portions of the construction, total wages and salaries paid to contractors and workers in Emmons and Logan Counties will contribute to the total personal income of the region. Additional personal income will be generated for residents in the counties as well as the state by circulation and recirculation of dollars paid out by the applicant as business expenditures and state and local taxes. Expenditures made for equipment, energy, fuel, operating supplies and other products and services will benefit businesses in the counties and the state.

Approximately 200 to 300 construction workers are expected to be required for two to four months for construction of the Project. It is likely that general skilled labor is available either in the county or the state to serve the basic infrastructure and site development needs of the Project. Specialized labor will be required for certain components of the Project. It is likely that this labor will be imported from other areas of the state or from other states, as the relatively short duration of construction does not warrant special training of local or regional labor. Balancing the use of local contractors and imported specialized contractors will likely alleviate any labor relations issues.

No effects on permanent housing are anticipated. During construction, out-of-town laborers will likely use lodging facilities in and around the city of Linton or Napoleon. The Project and Wind Energy Center will create approximately nine full-time O&M jobs. Most of these employees are expected to reside locally. Sufficient permanent housing is available within Emmons and Logan Counties to accommodate these new employees.

Long-term beneficial impacts to the county's tax base as a result of the construction and operation of the Project will contribute to improving the local economy in this area of North Dakota. The development of wind energy in this region has been important in diversifying and strengthening the economic base of North Dakota. In addition, establishing the central region of North Dakota as an important producer of renewable energy, such as wind, has spurred the development of wind-related businesses in the area and contributes to the economic growth in the region; there are at least four wind energy-related manufacturing facilities in North Dakota (AWEA 2017).

5.2.3 Mitigative Measures

Socioeconomic impacts will be primarily positive, with an influx of wages and expenditures made at local businesses during construction and an increase in the counties' tax base due to construction and an increase in the counties' tax base due to taxation of transmission infrastructure. In addition, the lease payments paid to landowners will offset potential financial losses associated with removing land from agricultural production. Additionally, Emmons-Logan Wind will obtain a written waiver from the owner of the one residence located within 500 feet of the Project Route.

5.3 Land Use and Vegetation

5.3.1 Description of Resources

The Project Corridor is located on private land in rural Emmons County, North Dakota with the predominant land use being agriculture, supporting both livestock grazing and crops (**Figure 5-1**). The Project Corridor has been largely replaced by wheat, corn, and other commercial crops. The Project Corridor is not within any city limits or within an area of any known military installments. Land classifications, including acreage within the Project Corridor and participating land, are shown in **Table 5-1**.

Table 5-1 Land Cover within the Project Corridor and Participating Land

Land Cover	Acreage within Project Corridor	Acreage within Participating Land	Percentage of Participating Land
Grassland/Herbaceous	2,151.97	2,113.81	44.38%
Cultivated Crops	1,672.76	1,668.99	35.04%
Pasture/Hay	774.80	773.55	16.24%
Developed, Open Space	184.34	155.22	3.26%
Shrub/Scrub	41.33	41.33	0.87%
Developed, Low Intensity	13.54	5.11	0.11%
Emergent Herbaceous Wetlands	2.67	2.67	0.06%
Deciduous Forest	2.00	2.00	0.04%
Total	**4,843.41**	**4,762.68**	**100.00%**

Source: National Land Cover Data 2011 (Homer et al. 2015)

In addition to the general land cover listed above, the U.S. Fish and Wildlife Service (USFWS) manages lands including their easements within the Project Corridor (**Figure 5-2**). There are no USFWS Waterfowl Production Areas (WPA) or National Wildlife Refuges (NWRs) within the Project Corridor (USFWS 2018b). The nearest NWR is the Springwater NWR which is located approximately seven miles southwest of the Project Corridor. Springwater NWR is managed by the Long Lake Wetland Management District.

The USFWS holds wetland easements within the Project Corridor. These easements are legal agreements between landowners and the USFWS to protect wetlands that are vital to wildlife habitat. The USFWS owns the perpetual rights to certain wetland basins within wetland easements which cannot

be burned, drained, filled, or leveled without authorization under a Special Use Permit from the USFWS. The upland portions of wetland easements may be developed without a permit as long as the wetland basins are avoided. Approximately 417 acres of wetland easements exist within the Project Corridor. Emmons-Logan Wind has avoided placing infrastructure on any USFWS wetland easement. There are no grassland easements within the corridor.

The North Dakota Game and Fish Department (NDGFD) holds Private Land Open to Sportsmen (PLOTS) agreements with private landowners within the Project Corridor, and allows walk-in public hunting access to otherwise private land. Normal farming and ranching activities are allowed in these PLOTS agreements. There are no PLOTS agreements within the Project Corridor.

Additionally, Conservation Reserve Program (CRP) lands are administered by the Farm Service Agency (FSA) through the U.S. Department of Agriculture (USDA). In exchange for yearly compensation, CRP lands are removed from agriculture production and planted with species that will improve environmental quality and health, with a long-term goal of establishing valuable land cover to improve water quality, prevent soil erosion, and reduce the loss of wildlife habitat (USDA, FSA 2018). Specific CRP acres are subject to privacy laws between each landowner and the FSA.

5.3.2 Impacts

The development will not result in a significant change in land use. No residents or farms will be displaced due to construction activities. The Project will not be located within USFWS easements or PLOTS agreements. Any land taken out of CRP will be negotiated between the individual landowner and the FSA.

5.3.3 Mitigative Measures

Operation of the Project will not change the land use in the majority of the Project Route. The land use will not involve any ongoing industrial use of non-renewable resources or emissions into the environment. Consequently, no further mitigative measures have been proposed.

5.4 Public Services

5.4.1 Description of Resources

Local Government Services

The Project Corridor is located in a sparsely populated, rural area in south central North Dakota in Emmons and Logan Counties. Around the Project Corridor is a network of established roads and utilities that provide access and necessary services to cities, communities, homesteads, and farms. There are no incorporated or unincorporated cities within the Project Corridor. The Project Corridor is located approximately 13 miles northeast of Linton, eight miles southwest of Napoleon, eight miles south of Kintyre, and 16 miles southeast of Hazelton. The county seat of Emmons County is Linton, and the county seat of Logan County is Napoleon. Linton and Napoleon provide sanitary sewer, water, utility services, educational facilities, and recreational facilities and parks to its residents and visitors. Linton and Napoleon's local services include emergency management, ambulance service, clinics, a landfill, fire department, and a police department. The Project Corridor is located in the Linton and Napoleon School Districts.

Roads

Roads located within and adjacent to the Project Corridor are U.S. Highway 83, State Highway 13, State Highway 3, and State Highway 34, county roads (gravel graded and drained roads), township roads, and section lines. Roads within the Project Corridor fall under the North Dakota Department of Transportation (NDDOT) District Boundary of Bismarck, North Dakota.

Traffic

The NDDOT supplies annual average daily traffic (AADT) levels for major roadways in North Dakota. The data is used for planning and transportation engineering. The total volume is used to calculate vehicle traffic of major roadways for a year. Existing traffic volumes on roadways are documented in **Table 5-2** and **Figure 5-3**. Additional county and township roads run through the Project Corridor, but no vehicle count data are available for them. In general, the NDDOT indicates that roads with vehicle counts under 100 AADT are rarely counted and roads with no count data are likely lower than those with count data.

Table 5-2 Existing Daily Traffic Levels

Roadway	Average Annual Daily Traffic
21st Avenue Southeast	60
68th Street Southeast	25
72nd Street Southeast	20

Source: 2018 Traffic Counts (NDDOT 2018).

Air Traffic

There are five public airports and four private airports within 25 miles of the Project Corridor (**Table 5-3**). Setbacks from public and private airports exceed North Dakota Aeronautics Commission and Federal Aviation Administration (FAA) requirements. The nearest airport certified for commercial carrier operations is the Bismarck Municipal Airport, located in Bismarck, North Dakota, approximately 40 miles northwest of the Project Corridor.

Table 5-3 Public/Private Airports within 25 Miles of the Project Corridor

Airport	Type	Distance from Project Corridor (miles)	Direction from the Project Corridor
Linton Municipal	Public	15.7	Southwest
Napoleon Municipal	Public	8.3	Northeast
Wishek Municipal	Public	19.7	Southeast
Hazelton Municipal	Public	15.3	Northwest
Humann Private Airstrip	Private	12.2	Northwest
Saville Private	Private	8.3	Northwest
Schirmeister Private	Private	28.5	Northwest
Preszler Airstrip	Private	21.9	North
Voller	Private	17.3	Southwest

Source: North Dakota Public and Private Airports by County (Toll Free Air 2018).

Water Supply

The South Central Regional Water District supplies potable water to communities within and near the Project Corridor. Emmons-Logan Wind will likely obtain water for construction from the cities of Linton, Hazelton, or Napoleon and truck the water to the construction site. Emmons-Logan Wind will consult with Linton, Hazelton, or Napoleon to obtain the appropriate permits and/or approvals for the Project.

Telecommunications

Emmons-Logan Wind conducted a preliminary telecommunications study to identify all non-federal microwave telecommunication systems within the Project Corridor.

The corona-induced broadband electromagnetic radiation (EMR) from transmission lines can produce interference with some communications signals if there is an overlap in the signal and EMR frequencies. Broadband corona EMR discharge typically occurs in the frequency spectrum from below 100 kilohertz (kHz) to approximately 1,000 megahertz (MHz), which overlaps with the frequencies used for AM and FM radio and some television signals.

5.4.2 Impacts

The Project is expected to have a minimal effect on the existing services and infrastructure. The following is a brief description of the impacts that may occur during construction and operation.

Local Government Services

No impact is expected to local services.

Roads

No temporary or permanent access roads will be built to construct or maintain the Project. Much of the Project Route is adjacent to existing public roads or section lines and can be accessed with minimal off-road work. Emmons-Logan Wind has obtained additional easements as necessary for access routes that cannot be accessed from section line rights-of-way or the Project ROW.

There will be a temporary increase in truck traffic during construction activities. Using any combination of state and county highways and other township roads, the traffic impacts are considered negligible. Approximately three concrete trucks will be required per transmission pole foundation. While there may be some noticeable increase in heavy vehicle traffic in discrete locations for limited amounts of time, the capacity of route and level-of-service to the traveling public will be negligible as any combination of state and county highways and other township roads will be used.

Truck access to the Project site is provided by adjacent highways to the Project Corridor, which includes U.S. Highway 83, State Highway 13, State Highway 3, and State Highway 34. Roads located within the Project Corridor are county roads (gravel graded and drained roads), township roads, and section lines. No highways are located within the Project Corridor. Specific truck routes will be dictated by delivery location. Additional operating permits will be issued by the state or county for over-sized truck movements.

Air Traffic

The Project will not be considered an obstruction to air navigation under FAA regulations. No part of the Project will exceed 200 feet in height above ground level, nor will it be located within three nautical miles of any airport. A preliminary Obstruction Evaluation / Airport Airspace Analysis (OE/AAA) has been performed by FAA.

Water Supply

Construction and operation will not significantly impact local water supply. Construction of the Project will require approximately five million gallons of water for foundations, backfill, and compaction; eight million gallons of water for civil infrastructure; and 13 million gallons of water for dust control. Construction water estimates are subject to change due to final site investigation and weather. The construction water will be brought on-site via trucks, most likely from the South Central Regional Water District, the city of Linton, Hazelton, or Napoleon. Water for operation of the O&M facility may be obtained from the South Central Regional Water District or via an on-site water well. The abandonment of wells is not required. The Project will not require appropriation of surface water or permanent dewatering. Temporary dewatering of groundwater (i.e., locally lowering groundwater levels in the vicinity of the excavation) may be required during construction of transmission poles.

Telecommunications

Existing telephone and fiber optic cables within the Project ROW will be located in the field by the respective utility companies prior to construction to ensure that impacts to telephone and fiber optic cables will be avoided. No impacts to Federal Communications Commission (FCC) licensed microwave beam paths are anticipated, as there are no beam paths within the Project Corridor.

With sufficient corona activity, some radio and television interference can be noticeable; however, the radio sound generated by a transmission line is very low in power and interference is generally only experienced in very close proximity to the transmission line. These effects are most pronounced directly underneath the line conductors, and decrease with distance from the transmission line. The level of interference with reception of a radio signal also depends on the relative locations of the radio transmitter, the radio receiver, and the transmission line. A transmission line that is directly between a radio transmitter and a listener's receiver may be more likely to interfere with that listener's reception, whereas a transmission line behind or beside the listener in relation to the transmitter will not necessarily cause interference depending on the radio receiver's antenna.

As digital signal processing has been integrated into television and radio receivers, the potential interference impact of corona-generated radio sound has been further reduced. Moreover, the advent of cable and satellite television service, and the federally-mandated conversion to digital television broadcast in June 2009 have greatly reduced the occurrence of corona-generated interference. Newer digital television receivers are equipped with systems to filter out interference.

5.4.3 Mitigative Measures

Construction and operation will be in accordance with all applicable local, state, and federal permits and laws, as well as industry construction and operation standards. Due to the minor impacts expected on the existing communications infrastructure during Project construction and operation, additional mitigation measures are not required.

Local Government Services

No impact to local government services is anticipated, and no mitigation is required.

Roads

The capacity of any route and level-of-service to the traveling public will not be affected, and as such, no mitigation is necessary.

Air Traffic

No impact to air traffic is anticipated, and no mitigation is required.

Water Supply

The abandonment of wells is not required. However, in the event wells are abandoned, they will be sealed as required by North Dakota law.

Telecommunications

No impacts to radar systems are anticipated with the construction or operation of the Project. Emmons-Logan Wind completed the FAA's online Department of Defense Preliminary Screening Tool (DoD Tool) to evaluate potential impacts of the Project on Air Defense and Homeland Security radar systems and to Weather Surveillance Radar. The DoD Tool indicates that there will be no impact to any type of radar system (**Appendix C**).

5.5 Human Health and Safety

5.5.1 Description of Resources

Electromagnetic Fields

Power frequency electromagnetic fields (EMF) are created wherever electricity flows. Leading U.S. and international scientific organizations, such as the National Cancer Institute and the World Health Organization, have evaluated EMF research. These organizations generally conclude that overall the body of scientific research does not show that exposure to EMF causes or contributes to any type of cancer or any other disease or illness (NIEHS 1999).

Hazardous Materials/Hazardous Waste

The Project is located in a rural area of North Dakota. Hazardous wastes from large industrial or commercial activities are not likely to be present in the Project Corridor. Potential hazards may exist in rural areas from farm dumps and agricultural chemicals. A Phase I Environmental Site Assessment will be conducted in the Project Corridor prior to construction to identify any recognized environmental conditions that may exist.

Security

The Project Corridor is located in an area that has low population density. Construction and operation of the Project will have minimal impact on the security and safety of the local communities.

5.5.2 Impacts

Electromagnetic Fields

Many studies of EMF have been conducted, but none has identified a cause and effect relationship between EMF exposure and health effects or a mechanism by which EMF could cause disease (NIEHS 1999).

Hazardous Materials/Hazardous Waste

A Phase I Environmental Site Assessment will be conducted and results will be used to minimize risk associated with potential recognized environmental conditions that may pose a threat to human health and safety. Significant findings are not anticipated due to the known historic uses of the property.

As with any construction activity, there is the possibility of accidentally spilling fuel, hydraulic fluid, or other hazardous substances during construction of the Project. The potential of such events will be minimized through implementation of a Spill Prevention, Control, and Countermeasure (SPCC) Plan, which will include the following:

- Construction equipment will be equipped with spill cleanup kits.
- Equipment refueling will take place at secure areas, away from wetlands or drainages.
- Workers will be trained in spill clean-up and the use of the spill cleanup kits.

These measures will ensure that surface and groundwater quality will not be degraded through inadvertent spillage of contaminants.

Security

Project construction and operation will have minimal impacts to the security and safety of the local communities.

5.5.3 Mitigative Measures

Electromagnetic Fields

Since no significant adverse impacts are anticipated, no mitigative measures are proposed at this time.

Hazardous Materials/Hazardous Waste

Because no significant findings are anticipated, no mitigation is proposed at this time. Any petroleum wastes generated will be handled and disposed of in accordance with local, state, and federal regulations.

Security

The following security measures will be taken to reduce the chance of physical and property damage, as well as personal injury, at the site:

- The Project Route will be placed at least 75 feet from public road ROW.
- Security measures will be taken during the construction and operation of the Project, including temporary and permanent (safety) fencing, warning signs, and locks on equipment.
- Emmons-Logan Wind will provide educational materials to landowners within the site boundaries and upon request to interested persons about the Project.

5.6 Audible Sound, Corona Discharge, and Aeolian Vibration

5.6.1 Description of Resources

Audible sound may consist of a variety of sounds of different intensities across the entire frequency spectrum. Audible sound is measured in units of decibels on a logarithmic scale. Because human hearing is not equally sensitive to all frequencies of sound, certain frequencies are given more “weight.” The A-weighted decibel (dBA) scale corresponds to the sensitivity range for human hearing. Sound levels capable of being heard by humans are measured in dBA.

Corona from transmission line conductors can generate electromagnetic “noise” at the same frequencies transmitted by radio and television signals. Corona consists of the breakdown or ionization of air within a few centimeters of conductors and hardware. This sound can cause interference with signal reception depending on the frequency and strength of the radio and television signal. Tightening loose hardware on the transmission line usually resolves the problem.

Aeolian vibration is produced when a steady flow of wind interacts with an object such as a transmission line. Wind must blow steadily and perpendicular to the lines to set up oscillating forces.

The Project Corridor is primarily rural and agricultural. There are no populated towns within the Project Corridor. The closest incorporated city is Napoleon, approximately eight miles northeast of the Project Corridor. The existing acoustic environment is defined primarily by distant traffic sound from the nearby arterial highways, and will also include intermittent aircraft overflights, and sound from agricultural operations. In addition to anthropogenic sound sources, the windy conditions of this site define a somewhat elevated ambient sound level, which increases with wind speed. Windy conditions can generate sound caused by the rustling of grass and tree leaves.

5.6.2 Impacts

Operations of the Project will periodically generate audible sound including sound from construction and maintenance, corona discharge, and aeolian vibration.

Sound from Maintenance and Construction

Project construction and maintenance may cause short-term but unavoidable sound impacts doe to construction and equipment. Construction and maintenance activities will also generate traffic that will have potential sound effects, such as trucks travelling to and from the Project on public roads. Sound generated by construction activities is generally exempt from state and local noise regulation. Once the Project has been built, no significant construction sound impacts are anticipated. Project maintenance will occur periodically but is not expected to result in significant sound generation

Corona Discharge

Corona effects occur when air molecules near conducting wire are ionized due to changes in the electric field intensity at the conductor surface. Measures such as carefully handling the conductor during construction to avoid nicking or scraping or otherwise damaging the surface and using hardware with no sharp edges or points are typically adequate to control corona. Corona effects are expected to be low enough that no objectionable audible sound will result outside the Project ROW. The sound is most noticeable when conductors are wet as a result of precipitation. Acoustic modeling for a 230 kV transmission line has shown the corona discharge to be 17 dBA in fair weather and 42 dBA in wet weather at the edges of the right-of-way (USDA Rural Utilities Service 2013).

Aeolian Vibration

Aeolian vibration is produced when a steady flow of wind interacts with an object such as a transmission line. Wind must blow steadily and perpendicular to the lines to set up oscillating forces. The resulting vibration can produce resonance if the frequency of the vibration matches the natural frequency of the line. Dampeners can be attached to the lines to minimize sound from aeolian vibration.

5.6.3 Mitigative Measures

This Project is located primarily in a rural agricultural area with five occupied residences located within Project Corridor. Sound from construction will be short-term and temporary, so significant impacts resulting from construction sounds are not anticipated, and no significant long-term acoustic impacts are anticipated from operation of the Project. Corona associated with the Project is expected to be low enough so that no radio or television interference is anticipated outside of the Project ROW, consistent with the operation of the existing Heskett-Wishek transmission line. Similarly, aeolian vibration is not expected to be significant outside of the Project ROW. Therefore, no mitigation will be required for the audible sound generated by the Project.

5.7 Cultural Resources

5.7.1 Description of Resources

Class I Literature Review

In July 2017, Kadrmas, Lee & Jackson performed a Class I Literature Review or file search for archaeological and architectural resources for the Project ROW and a one-mile study area around the Project ROW. The file review was completed at the State Historical Society of North Dakota (SHSND). The Project ROW was surveyed for cultural resources. This file review included identifying previously recorded archaeological sites documented during previous surveys and historic architecture within the Project ROW and a one-mile study area around the Project ROW.

The literature review identified no previously recorded archaeological sites, site leads, or architectural site within the Project ROW and a one-mile study area around the Project ROW. Site leads refer to resources that lack sufficient information to fully record and complete all necessary data fields on the North Dakota Cultural Resources Survey (NDCRS) site forms. Examples of site leads include: (1) locations recorded from various historic documents, (2) locations reported by a landowner or other non-professional, (3) isolates, a location with five or fewer surface visible artifacts which, in the professional

judgment of the archaeologist, is likely to be a limited surface expression of a former occupation area where most of the artifacts are still buried, and/or (4) locations recorded by a cultural resource specialist outside of the project area(s), and thus not fully recorded.

A Class I update was completed by AECOM on June 22, 2018 at the SHSND. No new sites had been recorded within the Project ROW or one-mile study area since the initial Class I file search.

Class III Cultural Resources Inventory for Archaeological Resources

Emmons-Logan Wind and AECOM has coordinated with the SHSND on the appropriate scope and level of survey for the Project. A Class III Intensive Cultural Resources Inventory of the Project ROW has been completed to identify archaeological resources and a Class III Cultural Resources Inventory Report is being completed. Once complete, the Class III Cultural Resources Inventory Report will be submitted to the SHSND for review and concurrence, and a summary will also be provided to the Commission.

Native American Coordination

On April 30, 2017, an outreach letter was sent to the following 17 Tribes in North Dakota, South Dakota, Montana, and Wyoming:

- Crow Nation
- Cheyenne River Sioux Tribe
- Crow Creek Sioux Tribe
- Flandreau Santee Sioux Tribe
- Fort Peck Assiniboine and Sioux Tribes
- Lower Brule Sioux Tribe
- Mandan, Hidatsa, and Arikara Nation
- Northern Cheyenne Tribe
- Northern Arapaho Tribe
- Oglala Sioux Tribe
- Rosebud Sioux Tribe
- Santee Sioux Nation
- Sisseton Wahpeton Oyate
- Spirit Lake Tribe
- Standing Rock Sioux Tribe
- Turtle Mountain Band of Chippewa Indians
- Yankton Sioux Tribe

On May 23, 2017, Emmons-Logan Wind held a day-long meeting in Aberdeen, South Dakota, to discuss the Project. Representatives from Rosebud Sioux Tribe, Sisseton Wahpeton Oyate, Standing Rock Sioux Tribe, and Yankton Sioux Tribe attended as well as AECOM. At the meeting, Emmons-Logan Wind described the Project and their plan for tribal involvement, including discussions of the results of the Class I Literature Review of the Project Area a one-mile study area around the Project Area, Emmons-Logan Wind's approach to incorporating cultural and tribal resources in Project development, and planning for the first phase of the Project surveys.

Since that time, numerous discussions and meetings have taken place with seven interested Tribes to discuss the Project, micrositing and survey plans, and cultural resource report content and format:

- Cheyenne River Sioux Tribe
- Northern Cheyenne Tribe
- Rosebud Sioux Tribe
- Sisseton Wahpeton Oyate
- Spirit Lake Tribe

- Standing Rock Sioux Tribe
- Yankton Sioux Tribe

The first stage of tribal participation for the Project and the Wind Energy Center focused micrositing proposed turbine locations. During this stage representatives from the Standing Rock Sioux Tribe and the Rosebud Sioux Tribe of Indians surveyed each turbine and service road location with representatives from Emmons-Logan Wind and AECOM to assess the locations for potential cultural resources and sites of cultural and/or religious significance to tribes. After completion of this preliminary stage AECOM provided all the micrositing results to Emmons-Logan Wind along with avoidance recommendations. Based on this information, Emmons-Logan Wind revised the Wind Energy Center prior to the second stage of study.

In October 2017, Emmons-Logan Wind and AECOM completed stage two of the tribal study, focusing on a revised Wind Energy Center layout. During this stage, Traditional Cultural Surveyors from the Standing Rock Sioux Tribe, the Rosebud Sioux Tribe, the Yankton Sioux Tribe, the Northern Cheyenne Tribe, and the Spirit Lake Tribe completed a combined tribal and AECOM field survey for cultural resources and sites of cultural and/or religious significance to tribes. AECOM provided the combined results and avoidance recommendations from this survey to Emmons-Logan Wind and these were considered during revisions of the Wind Energy Center layout in late October.

The revised Wind Energy Center layout was surveyed in a second round of micrositing in late October 2017. A tribal representative from the Rosebud Sioux Tribe participated in this effort. Further field work was completed in November 2017 and May 2018. Traditional Cultural Surveyors from the Standing Rock Sioux Tribe, the Rosebud Sioux Tribe, the Yankton Sioux Tribe, the Northern Cheyenne Tribe, and the Spirit Lake Tribe also completed joint field surveys with AECOM.

Emmons-Logan Wind, AECOM, participating Tribal Historic Preservation Offices, and the SHSND are coordinating a report that includes the results of the joint surveys into a Class III Cultural Resources Inventory.

5.7.2 Impacts

There are no newly documented sites or previously documented cultural resources within the Project ROW. The cultural resources inventory report will be submitted to the SHSND when complete for review and concurrence, and will also be submitted to the Commission.

5.7.3 Mitigative Measures

An Unanticipated Discovery Plan will be prepared for the Project that outlines the procedure that will be followed to prepare for and address any unanticipated discoveries of cultural resources, including possible human remains. It will provide direction to on-site personnel and their consultants as to the proper procedure to follow in the event that unanticipated discoveries are made during construction of the Project. No significant impacts to undiscovered archaeological sites are, therefore, anticipated from the Project.

In the event that burials or cultural sites with Native American religious values are identified during construction of the Project, construction will stop within 100 feet of the site and the site will be protected until SHSND and the North Dakota Indian Affairs Commission are consulted.

If confirmed or potential human skeletal remains are discovered, the Emmons or Logan County Sheriff's office will be contacted. The Sheriff will call the North Dakota State Forensic Examiner to determine if the remains are associated with a crime scene. If the remains are determined not to be part of an active crime scene or investigation, the North Dakota Chief Archaeologist will be contacted.

5.8 Recreational Resources

5.8.1 Description of Resources

There are no designated recreational areas such as state or federal parks, NWRs, designated scenic trails, PLOTS lands, or school trust land within the Project Corridor; however, a number of recreational opportunities exist within and around the Project Corridor. As stated above in Section 5.3 Land Use and Vegetation, there are no WPAs located within the Project Corridor, and the nearest NWR is the Springwater NWR, located approximated 7 miles southwest of the Project Corridor.

5.8.2 Impacts

Sportsman, landowners, and site seers that make use of private land could potentially be temporarily impacted by construction activities. Recreational opportunities that rely on wildlife resources may be temporarily impacted during construction as wildlife may avoid the busier construction areas. It is anticipated that wildlife will resume their normal behavior once construction is complete.

5.8.3 Mitigative Measures

No recreational resources will be directly impacted as impacts to recreational resources will mainly be visual in nature. Therefore, no mitigation is proposed.

5.9 Effects on Land-Based Economies

5.9.1 Description of Resources

Agriculture/Farming

The majority of the Project Corridor is classified as herbaceous grasslands (Homer et al. 2015). Grasslands encompass 2,151.97 acres (approximately 44 percent) of the Project Corridor; cultivated crops comprise 1,672.76 acres (approximately 35 percent) of the Project Corridor; and pasture/hay comprises 774.8 acres (approximately 16 percent) of the Project Corridor (**Figure 5-1**).

According to the Census of Agriculture, corn is the most widely grown crop in Emmons and Logan Counties, with over 13,700,000 bushels being harvested in 2012 (USDA, NASS 2012). Wheat and soybeans are the next most harvested crops with roughly 5,137,000 and 3,034,000 bushels being harvested. Oats, barley, and sunflowers are additional crops grown in Emmons and Logan Counties. Cattle, sheep, and chickens are the livestock raised in Emmons County with cattle being the most prevalent with roughly 58,900 head. Likewise, cattle, hogs, and chickens are the livestock raised in Logan County with cattle being the most prevalent with roughly 64,400 head. In 2012, the total market value of agriculture products produced in Emmons County was $171,284,000, 81 percent of which was from crops, while 19 percent was from livestock sales. Similarly, the 2012 total market value of agriculture products produced in Logan County was $172,099,000, with 50 percent from crops and 50 percent from livestock sales.

Woodlands

Wooded areas within the Project Corridor consist of isolated shelter belts. No economically important forestry resources are found within or around the Project Corridor.

5.9.2 Impacts

Agriculture/Farming

Agriculture is the principal land use within the Project Corridor. The majority of land within or adjacent to the Project ROW will still be available for agriculture following construction. No agricultural irrigation is currently present within the Project Corridor. Temporary impacts to prime farmland and farmland of

statewide importance will be minimal and will be limited to the disturbance around the foundation of each structure. Construction and operation of the Project will not interfere with continued use of the surrounding areas for agricultural uses.

Woodlands

No economically important forestry resources are found within the Project Corridor. Trees and shrubs in the Project Corridor are sparse and limited to shelterbelts between fields, windbreaks surrounding farmsteads, along drainages, and near wetlands. Therefore, tree removal from Project construction will be minimal.

5.9.3 Mitigative Measures

Agriculture/Farming

Emmons-Logan Wind will work with landowners to minimize impacts to their land. Much of the Project Route is adjacent to existing public roads or section lines and can be accessed with minimal off-road work. During construction, areas will be separated from grazing animals by temporary or permanent fencing. Once construction activities have been completed, temporary construction areas will be able to go back to their previous use.

Although the Project will result in the conversion of farmland to a transmission facility, economic losses to producers of the land are anticipated to be minimal in comparison to the additional income provided by the transmission facility and restoration and reseeding of temporarily impacted areas. Construction sites will utilize a stormwater pollution prevention plan (SWPPP) to mitigate disturbed soils and prevent erosion and contamination of surface waters. Additionally, per landowner requests, the north-south portion of the Project Route was sited to allow for field equipment to fit between the transmission line and the edge of the existing road.

Woodlands

No significant impacts are anticipated to woodlands. If trees and shrubs need to be removed during construction, removal will be coordinated with the landowner and a tree and shrub mitigation plan will be created for the Commission.

5.10 Geologic and Groundwater Resources

5.10.1 Description of Resources

The Project Corridor is located on the Coteau Slope in northeastern Emmons County and western Logan County. This region declines in elevation from the Missouri Coteau to the Missouri River. Unlike the Missouri Coteau, this region has fewer wetland basins and is comprised of more simple drainage channels and streams. Cropland is generally found within the gentle rolling hills with cattle grazing occurring on the steeper sloped areas. **Figure 1-3** shows the topography of the Project Corridor.

The Coteau Slope and the Project Corridor are within the Central Dark Brown Glaciated Plains major land resource area, which is almost entirely covered by glacial till plains (USDA, NRCS 2006). Surficial deposits within the Project Corridor consist of up to 300 feet of glacial sediments. The interspersed collapsing of these sediments developed the hummocky, rolling hills surrounding the numerous sloughs and lakes. No active sand or gravel mines are located within the Project Corridor (Anderson 2012). There are no active oil and gas wells or coal mines within or near the Project Corridor (NDDMR 2018).

The Braddock aquifer, an aquifer deposited in a small glacial lake, is located approximately 1.5 miles north of the Project Corridor (NDSWC 2018). This aquifer is approximately 9,010 acres with water depths ranging from at land surface to 110 feet below land surface (USGS 1978). There are approximately three water wells located within the Project Corridor (NDSWC 2018).

5.10.2 Impacts

Since the Project is routed along existing roadways, impacts of the Project to geological resources are anticipated to be minimal. There are no active oil and gas wells or coal mines within or near the Project Corridor (NDDMR 2018). Viable sand and gravel resources potentially occur within and around the Project Corridor; however, they are not likely to be encountered during construction since the Project is routed along existing roadways. If sand and gravel resources are found during Project construction, Emmons-Logan Wind will coordinate with landowners to facilitate any future development of these resources. If the Project does impact any sand or gravel resources, the regional supply of these materials will not be adversely impacted due to the abundance of this resource in the area.

Likewise, impacts of the Project to groundwater resources are anticipated to be minimal. Major groundwater withdrawals will not be necessary due to the limited amount of water needed for Project development. Based on the relatively small amount of increased impervious surface at each turbine and large distance between each transmission pole foundation, the Project will not contribute to significant impacts on groundwater flow or recharge. If groundwater is disturbed by the construction of transmission pole foundations, it is anticipated that it will resume its natural course of flow upon construction completion.

5.10.3 Mitigative Measures

Transmission lines will be sited to avoid any sand and gravel resources identified within the Project Corridor. Where these resources cannot be avoided, coordination will be done with landowners regarding impacts and any requested mitigation. If dewatering of excavations is necessary during construction and as long as the water is known to be uncontaminated, all water will be discharged according to items outlined in the SWPPP and allowed to infiltrate naturally back into the ground (Grossman 2011). If discharge water is suspected to be contaminated, an application for a temporary discharge permit (NDG-070000) will be completed.

5.11 Surface Water and Floodplain Resources

5.11.1 Description of Resources

USFWS National Wetlands Inventory (NWI) data and U.S Geological Survey (USGS) National Hydrography Dataset (NHD) data were used to identify potential surface waters within the Project Corridor (USFWS 2018a, USGS 2018). This data was used as a precursor for field delineations. Small drainages are found within the Project Corridor. The Project Corridor is divided into two watersheds; Long Lake Creek Watershed and Goose Lake Watershed. Both watersheds drain west into the Missouri River.

Due to the Project Corridor's rural location, no Federal Emergency Management Agency (FEMA) flood rating maps have been developed for the area (USDHS, FEMA 2018).

5.11.2 Impacts

Construction of the Project will temporarily and permanently disturb land within the Project Corridor and, as a result, have the potential to impact surface water resources. Field wetland delineations were conducted within the Project ROW in May 2018.

Because no flood rating map has been developed for the Project Corridor, floodplain resources will not be impacted.

5.11.3 Mitigative Measures

The Project will be built to avoid intermittent streams, drainages, and ponds as much as possible. Construction zones will be minimized crossing the delineated streams to ensure permanent impacts are kept under 0.10 acres, as described is Section 7.13.

Coverage under the North Dakota Department of Health's (NDDOH) National Pollutant Discharge Elimination System (NPDES) general construction permit will be obtained prior to the start of construction, and sediment runoff into surface waters will be minimized and/or avoided through the use of best management practices (BMPs) outlined in the accompanying SWPPP.

5.12 Wetlands

5.12.1 Description of Resources

Wetlands are an important natural resource providing a number of critical ecosystem functions. Some of these functions include flood flow attenuation, streambank stabilization, discharge and recharge of ground water, detention and removal of sediments, and the detention, removal, and transformation of nutrients and contaminants. Wetlands also may provide habitat for wildlife and sites for human recreation, education, and aesthetic enjoyment.

Wetlands are defined in the 1977 Executive Order 11990 – Protection of wetlands and in Section 404 of the Clean Water Act (CWA) of 1986, as areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. The three parameters that define a wetland, as outlined in the U.S. Army Corps of Engineers (USACE) Wetland Delineation Manual, are hydric soils, hydrophytic vegetation, and hydrology (Environmental Laboratory 1987). Wetlands generally include swamps, marshes, bogs, and similar areas such as slough, potholes, and river overflows. The functions of wetlands include providing habitat for wildlife, improving water quality through filtration and purification, storing floodwaters, and recharging groundwater.

A desktop analysis of the Project Corridor, using NWI, NHD, and aerial photography data was performed to identify probable locations of wetlands and waterbodies prior to field work (**Figure 5-4**). Field wetland delineations were conducted within the Project ROW in May 2018. The delineations followed methodology from the USACE Wetlands Delineation Manual (Environmental Laboratory 1987) and Regional Supplement to the USACE Wetland Delineation Manual: Great Plains Region (Version 2.0) (USACE 2010). Delineated wetlands will be avoided where feasible and to the maximum extent possible. Each wetland was identified and sufficient information was gathered for the preparation of jurisdictional determinations, should they be warranted.

The USACE has jurisdiction of waters of the US (WOUS) under Section 404 of the CWA and navigable waters under Sections 9 and 10 of the Rivers and Harbors Act of 1899. The USACE Nationwide Permit (NWP) 12: Utility Line Activities authorize the discharge of dredged or fill material into non-tidal WOUS given that there is not a loss of greater than ½-acre of WOUS for any "single and complete project." "Single and complete project" refers to each discrete intersection between Project infrastructure and jurisdictional wetlands and other WOUS. The NWP requires a preconstruction notification (PCN) to the USACE. However, for permanent impacts less than 0.10 acre, no PCN will be required. Based on wetland and other WOUS surveys, all permanent impacts are minimized to less than 0.10 acre.

5.12.2 Impacts

Emmons-Logan Wind has committed to minimizing impacts to jurisdictional wetlands and other WOUS to the extent practicable. Based on desktop analysis and preliminary field surveys, the Project is not expected to have any "single and complete project" that will meet or exceed the 0.10-acre impact threshold that would require a PCN to the USACE Bismarck Regulatory Office.

Based on discussions with the USACE, the Project will likely meet the authorization criteria for a Section 404 NWP 12 (Utility Line Activities). No Section 404 written permit is anticipated to be required as a result of construction of this Project because it is not anticipated that the Project would exceed the 0.10-acre PCN threshold for NWP 12. Nevertheless, if the Project does cause minor impacts less than 0.10-acre in jurisdictional wetlands/WOUS, then NWP requirements will be adhered to.

5.12.3 Mitigative Measures

Emmons-Logan Wind has committed to avoiding and minimizing impacts to potentially jurisdictional waters with the goal of not exceeding the 0.10-acre threshold of permanent impacts, which would trigger the need for a PCN. Wetlands will be delineated and flagged prior to construction when in close proximity to Project features. Since the initial field delineations, pole locations have been shifted to avoid wetlands as much as feasible. Sediment runoff into wetlands will be minimized and/or avoided through the use of BMPs outlined in the SWPPP. Coverage under the NDDOH NPDES general construction permit will be obtained prior to the start of construction. As noted in Section 5.3, Emmons-Logan Wind has avoiding placing infrastructure on any USFWS wetland easement.

5.13 Wildlife

5.13.1 Description of Resources

In order to minimize the potential to negatively impact wildlife during construction and/or operations, the following surveys and studies are currently completed to document wildlife and habitat within the Wind Energy Center and the Project Corridor:

- Critical Issues Analysis in 2013
- Spring Avian Use and Raptor Nest Surveys completed March to June 2014
- Eagle/Raptor Nest Surveys, two aerial surveys completed April and May 2017
- Large Bird Use Surveys, April 2017 through March 2018
- Sharp-tailed Grouse Lek Surveys, aerial surveys completed from April to May 2017 (**Appendix C**)
- Grassland Breeding Bird Surveys, grassland transects surveyed three times between June and July 2017
- Whooping Crane Habitat Review, desktop assessment using ArcGIS completed fall 2017 (**Appendix C**)
- Northern Long-eared Bat Habitat Mapping, desktop assessment completed fall 2017 (**Appendix C**)
- Desktop and parcel-level identification of native prairie tracts completed 2017 (**Appendix C**)

Avian Species

Based on the location of the Project Corridor and field observations of the habitat present, it is expected that the majority of avian species present within the Project Corridor will be those typically associated with grassland and agriculture habitats. Thirty unique bird species were identified during the grassland and breeding bird surveys, with 883 individual bird observations within 817 separate groups recorded (Derby et al. 2018a). Cumulatively, three species comprised 77.5% of the individual observations: Savannah sparrow (*Passerculus sandwichensis*), chestnut-collared longspur (*Calcarius ornatus*), and western meadowlark (*Sturnella neglecta*). All other species comprised less than 3.0% of the observations individually. Additionally, large bird use surveys were completed to estimate the use by large birds, particularly raptor species (Moratz et al. 2018). Out of 15,226 individual observations, the primary species observed were snow goose (*Chen caerulescens*) and sandhill crane (*Antigone Canadensi*) comprising 94.6% and 3.3% of the individual observations, respectively. During the grassland and breeding bird and large bird use surveys, no federally listed species were recorded.

Sharp-tailed grouse (*Tympanuchus phasianellus*) lek surveys identified no leks were within the Project Corridor (Moratz and Thorn 2018, **Appendix C**). The lek closest to the Project Corridor was 1.7 miles away.

Bat Species

Eleven bat species are found in North Dakota (Gullickson 1999). Suitable natural roosting habitats in the Project Corridor are limited to individual trees, windrows, woodlots, and buildings. The availability of tree-roosting habitat in the Project Corridor is limited due to the small size. Farmstead buildings (houses, barns, etc.) could also provide potential roosting locations within the Project Corridor; however, the suitability of these man-made structures has not been evaluated. Therefore, bat use of the Project Corridor is likely to be low given the limited availability of roosting habitat.

5.13.2 Impacts

Potential impacts from the Project to avian and bat species include collisions with the transmission line. Potential impacts to sensitive species are discussed in more detail in Section 5.15 below.

Avian Species

No federally listed species or eagles were recorded during breeding bird surveys (Derby et al. 2018a). No eagle nests were located within the Project Corridor during aerial surveys conducted in 2017; however, a total of two active and three potential eagle nests were recorded within the 10-mile buffer surrounding the Wind Energy Center. All occupied, unoccupied, and potential eagle nests were located outside of the Project Corridor, likely attributed to the lack of quality nesting habitat within the Project Corridor. The majority of the land within the Project Corridor does not include rivers, lakes, or wetland systems that would provide substantial foraging opportunities for eagles. No leks will be impacted by construction of the Project.

Bat Species

Based on the remoteness of the Project Corridor from native tree areas, lack of connection to larger riparian areas, and lack of hibernaculum near the Project, it is unlikely that the Northern Long-Eared Bat (NLEB) has summer presence in the Project.

5.13.3 Mitigative Measures

Emmons-Logan Wind is conducting environmental studies of the Project Corridor to minimize and potentially avoid impacts to wildlife and native habitat. The following measures will be used, to the extent practicable, by Emmons-Logan Wind:

- Overhead lines and guyed structures will be outfitted with bird flight diverters following Avian Protection Line Interaction Committee (APLIC 2012) guidelines to prevent bird collision, as practicable
- Temporarily disturbed areas will be reseeded or restored to crop, depending on original conditions and landowner preference
- Utilizing BMPs to prevent the spread of noxious weeds
- Developing a voluntary Wildlife Conservation Strategy (WCS) in collaboration with the Wind Energy Center, which includes an adaptive management approach, so that information gathered and experience gained from post-construction monitoring can be used to inform future management decisions at the Project
- During construction, limiting road speeds to 25 miles per hour (mph) within the Project Corridor to minimize wildlife collisions

5.14 Federally-Protected Species

5.14.1 Description of Resources

The Endangered Species Act (ESA) is administered by the USFWS and mandates protection of species federally listed as threatened or endangered (T&E) and their associated habitats. An endangered species is a species that is in danger of extinction throughout all or a significant portion of its range. A threatened species is a species that is likely to become endangered in the foreseeable future. Critical habitat for these species can be designated if that habitat includes specific areas that are occupied by a species at the time of listing or unoccupied areas that are considered essential to the conservation of a species. Candidate species receive no statutory protection from the USFWS unless they are formally listed. North Dakota does not have a state T&E species list; however, it recognizes those federally listed under the ESA.

Eleven species are federally listed in North Dakota; however, the USFWS Information for Planning and Conservation (IPaC) tool (USFWS 2015a), indicated that seven T&E species could potentially occur within the Project Corridor. These species include four birds, two mammals, and one fish: piping plover (*Charadrius melodus*) (threatened), red knot (*Calidris canutus rufa*) (threatened), whooping crane (*Grus Americana*) (endangered), least tern (*Sterna* antillarum) (endangered), gray wolf (*Canis lupus*) (endangered), NLEB (threatened), and pallid sturgeon (*Scaphirhynchus albus*) (endangered). Emmons-Logan Wind has also contacted the USFWS to evaluate if Dakota skippers (*Hesperia dacotae*) (threatened) occur in the vicinity of the Project Corridor; Dakota skippers are not currently believed to be present in Emmons County. No federally endangered or threatened species were observed during grassland breeding bird surveys or large bird use surveys conducted at Wind Energy Center and Project Corridor.

Additionally, bald and golden eagles (*Haliaeetus leucocephalus* and *Aquila chrysaetos*, respectively) are both protected under the Bald and Golden Eagle Protection Act (BGEPA). No bald or golden eagles were observed within the Project Corridor during the grassland breeding bird surveys (Derby et al. 2018a); however, one bald and one golden eagle were observed during large bird use surveys for the Wind Energy Center (Moratz et al. 2018). The BGEPA protects bald eagles and golden eagles throughout their range in the U.S. Although it does not designate critical habitat, BGEPA protects individual eagles and nests from disturbance. Emmons-Logan Wind will apply appropriate APLIC design standards for any necessary above-ground segments. These federally protected species are described in greater detail below.

Piping Plover (Federally Threatened)

Piping plovers are small shorebirds with a gray to brown back and a white belly (NDGFD 2015). Adults have orange legs and a black tipped orange bill. Males have a distinct black band that runs across the forehead and a single black band that encircles the body at the breast. Females will have the same but paler features. Their preferred nesting habitat is limited to sandy or gravelly beach and sandbars or alkaline wetlands while feeding on insects near the waterline. More than three-fourths of piping plovers in North Dakota nest on prairie alkali lakes, while the rest use the Missouri River (USFWS 2015b). The piping plover is a federally threatened species.

Piping plover populations are threatened by habitat loss due to vegetation encroachment, shoreline development, anthropogenic and animal disturbances, and water management activities, such as dam construction and channelization. Critical habitat has been federally designated for the piping plover in North Dakota. This habitat runs mainly along the shores of the Missouri River and Lake Sakakawea, but encompasses some surrounding wildlife refuge areas as well. No designated critical habitat is located within the Project Corridor, and no suitable piping plover habitat was observed in the Project Corridor during the onsite surveys. The closest designated critical habitat is located approximately 20 miles north, 20 miles west, and 26 miles east of the Project Corridor, so it is unlikely, although possible, the piping plover will occur within the Project Corridor.

Red Knot (Federally Threatened)

Red knots are medium-sized shorebirds with a red head and breast, a white abdomen and under tail, thick black legs, and finely mottled gray, black, and brown back wings (NDGFD 2015). In the winter, the adults turn a mottled pale gray color. They prefer to breed and nest in drier tundra areas with sparsely vegetated hillsides. The red knot is a federally threatened species. There is no federally designated critical habitat for this species in North Dakota.

The USFWS listed the rufa subspecies of red knot as threatened on December 11, 2014. The red knot is noted for its long-distance migrations of up to 9,320 miles between circumpolar breeding habitats and marine wintering habitats in southern latitudes of South America. Most of the known migration routes for the rufa subspecies are along coastal regions of Canada and the U.S. However, an interior migratory route was identified to and from the Arctic passing through Saskatchewan and Alberta Canada through the Great Plains states to non-breeding areas mostly in Texas and Louisiana along coastal areas of the Gulf of Mexico (Skagen et al. 1999). Population sizes for knots are in decline around the world, especially C. c. rufa, which declined from about 82,000 individuals in the 1980s to fewer than 30,000 in 2010 (Baker et al. 2013). Threats to the red knot include the loss of habitat in both breeding and nonbreeding areas; disruption of natural predator cycles on the breeding grounds; reduced prey availability at stopover areas and throughout the nonbreeding range; and increasing frequency and severity of asynchronies ("mismatches") in the timing of the birds' annual migratory cycle relative to favorable food and weather conditions (USFWS 2014b). No suitable red knot habitat was observed in the Project Corridor during the onsite surveys. However, it is possible, but unlikely, that red knots will occur within the Project Corridor during migration.

Whooping Crane (Federally Endangered)

Whooping cranes are North America's tallest bird, standing five feet tall when erect (NDGFD 2015). Their plumage is all white with the exception of black wing tips and a red/black crown. They have long black legs and can have a wing span of over seven feet. The whooping crane is a federally listed endangered species. There is no federally designated critical habitat for this species in North Dakota.

The whooping crane was considered endangered in the United States in 1970 and the endangered listing was 'grandfathered' into the ESA of 1973 (CWS and USFWS 2007). The whooping crane population was reduced to 16 individuals belonging to one flock that migrated between Wood Buffalo National Park in Canada and the Aransas National Wildlife Refuge in Texas. With conservation efforts the Aransas-Wood Buffalo National Park population, the single self-sustaining wild population, has been steadily rising with the population estimated at 431 birds (with a 95 percent probability of actual flock size being between 371 to 493 birds) as of the 2016/2017 winter whooping crane survey conducted by USFWS (USFWS 2017). A 200-mile wide migration corridor has been delineated for this population that contains 95 percent of all verified sightings. Spring migration occurs primarily in April and May whereas fall migration occurs primarily in October and November (Urbanek and Lewis 2015). Stopover habitat during migration includes a variety of croplands with roosting occurring in shallow, freshwater inland wetlands. Four additional areas associated with major stopover areas are designated as critical habitat: Quivira National Wildlife Refuge and Cheyenne Bottoms State Wildlife Management Area in Kansas; a section of the Platte River in Nebraska; and the Salt Plains National Wildlife Refuge in Oklahoma (USFWS 2012b).

A whooping crane habitat review and analysis was completed for the Wind Energy Center as well as the Project Corridor (Derby and Thorn 2018, **Appendix C**). The habitat review and analysis evaluates whether or not the Wind Energy Center and the Project Corridor represents unique or high-quality whooping crane habitat compared to the surrounding landscape. The analysis concluded that whooping crane habitat was less suitable than the surrounding habitat north, east, and south of the Project. While there is potential whooping habitat near the Project, impacts resulting from Project activities are unlikely given low historic use and similar or more wetland roosting habitat in adjacent areas.

Least Tern (Federally Endangered)

There were no least tern observations during onsite surveys within the Project Corridor (Derby et al. 2018a). With the lack of gravelly or sandy beaches or sandbars identified within the Project Corridor, it is unlikely that the Project will affect the least tern. However, it is possible, but unlikely, that least terns will occur within the Project Corridor during migration.

Gray Wolf (Federally Endangered)

The gray wolf was listed as endangered in 1974 (USFWS 2008, USFWS 2014a). Gray wolves previously inhabited a large portion of the United States in a variety of habitats including tundra, forests, grasslands and deserts. Gray wolves, also called Eastern timber wolves, are the largest undomesticated member of the canid family (NDGFD 2015). Males can reach over 100 pounds while the females can reach 75 pounds. Generally gray in color with a lighter underside, they can vary from pure white to dark black. Their habitat range is vast, occupying wherever large ungulates are found. In the Midwestern states, habitat currently used by wolves ranges from mixed hardwood forests to forest and prairie landscapes dominated by agriculture and pasture lands. In North Dakota, likely gray wolf habitat is in the forested areas in the north central and north east counties. There are no known breeding populations in North Dakota; however, transient wolves dispersing from the Great Lakes population may occasionally occur. The gray wolf is a federally listed endangered species. There is no federally designated critical habitat for this species in North Dakota.

The Project Corridor lacks forested areas known to support wolf pack establishment and persistence (USFWS 2012a). Therefore, it is unlikely this species will occur within the Project Corridor.

Northern Long-Eared Bat (Federally Threatened)

The NLEB is a medium sized brown bat three to four inches in length with a nine to 10 inch wingspan (NDGFD 2015). These bats have the largest ears of the Myotis genus. These bats either roost singularly or in colonies underneath bark, in cavities, or in crevices of trees. They are also seen roosting in cool caves or mines. The NLEB is a federally listed threatened species.

The NLEB was listed as threatened on April 2, 2015, under an interim Section 4(d) rule. The final 4(d) rule was released on January 14, 2016 (USFWS 2016). The USFWS determined that white-nose syndrome (WNS) is the primary threat to NLEB and regulating other sources of mortality or harm, such as from general habitat loss, will not effectively conserve this species. Additionally, in 2016 the USFWS determined designating critical habitat for NLEB was not prudent (USFWS 2016).

The 4(d) rule limits the prohibition of take to counties affected by WNS and an additional 150-mile buffer around these counties (the WNS Zone). The Project Corridor is located within the WNS Zone. Incidental take is prohibited within known NLEB hibernacula, and if tree removal occurs at an occupied hibernaculum during any time of year or maternal roost site from June 1 through July 31 (USFWS 2016).

NLEB have been found from Maine to North Carolina on the Atlantic Coast, westward to eastern Oklahoma and north through the Dakotas, reaching into eastern Montana and Wyoming (USFWS 2013a). The NLEB is considered common only in discrete portions of its western range, including the Black Hills of South Dakota. This species roosts in trees during the spring, summer, and fall. The species prefers large, contiguous tracks of upland forested habitat during the summer residency period. Natural roosting habitats in the Project Corridor are limited to individual trees and wind breaks. NLEB do not undertake long-distance seasonal migrations between summer and winter ranges, but do undertake shorter distance movements between summer roosts and winter hibernacula. These seasonal movements are generally between 35 miles and 55 miles, but may be substantially longer in some areas, perhaps as great as 168 miles. Information on habitat use during migration is limited, but individuals in transit are likely to use foraging habitats at least part of the time. NLEB spend winter

hibernating in caves and mines. However, there are no known wintering hibernacula within North Dakota.

Occurrence of the species in North Dakota is expected to be uncommon or rare (USFWS 2013a), and the likelihood of the species occurring in the Project Corridor during the summer residency period is low due to the lack of potentially suitable roosting and foraging habitat (**Appendix C**). Therefore, there is a low likelihood of Project-related impacts to this species.

Pallid Sturgeon (Federally Endangered)

No large tributaries to the Missouri River occur within the Project Corridor. Since the pallid sturgeon is only found within the Missouri River and its larger tributaries, it is highly unlikely pallid sturgeon will occur within or around the Project Corridor.

Bald Eagle (Federally Protected under BGEPA)

Bald eagles occur throughout the contiguous United States, Alaska, and Canada (Buehler 2000). Bald eagles may occur in North Dakota as breeders, winter residents, migrants or year-round residents. The nesting period in North Dakota begins with nest building or maintenance in January-February and ends when the young fledge, typically in July. Nests are relatively close to water, typically less than 2 miles. Although bald eagle nests have historically been found primarily along the Missouri River and Red River, the number of bald eagle nests has increased in North Dakota over the last 20 years as the species continues to recover from population declines, primarily due to environmental contaminants. Nesting bald eagles now occur in more than half of the counties in the state (Dyke et al. 2015). Most of the nests occur near streams and mid- to large-sized lakes, but bald eagles are also initiating nests in areas not considered traditional nesting habitat such as cottonwood trees surrounded by cropland or grassland (Dyke et al. 2015). The home range size of bald eagles is variable. Populations in Oregon and Washington have home ranges of 2.7 to 18.1 square miles, with an average of 8.5 square miles (Watson et al. 1991), and in Montana the average home range size was 3.5 square miles (Stangl 1994). Along the Mississippi River in Minnesota, nests were located an average of 0.94 mile from the nearest neighboring nest (Mundahl et al. 2013).

During the non-breeding season (September through January), bald eagles will concentrate near large bodies of water where the water remains unfrozen and will roost up to 20 miles from foraging sites, depending on abundance of prey (Buehler 2000, USFWS 2013b). Bald eagles are opportunistic foragers that prey primarily on fish, but also feed on other aquatic and terrestrial vertebrates, as well as on carrion (Buehler 2000).

No bald eagles were recorded during grassland breeding bird surveys (Derby et al. 2018a); however, one was documented during large bird use surveys for the Wind Energy Center (Moratz et al. 2018). No eagle nests were located within the Project Corridor during aerial surveys conducted in 2017; however, a total of two active and three potential eagle nests were recorded within the 10-mile buffer surrounding the Wind Energy Center (Derby et al. 2018b). However, bald eagles are unlikely to breed within the Project Corridor due to a lack of suitable habitat.

Golden Eagle (Federally Protected under BGEPA)

Golden eagles are common in western North America west of the 100th meridian with small populations also present in the eastern portions of Canada and the United States (Kochert et al. 2002). Golden eagles in the western U.S. are most commonly associated with open and semi-open habitats such as shrublands, grasslands, woodland-brushlands, and coniferous forests as well as in farmland and riparian habitats. Both year-round and migratory golden eagles occur in North Dakota (NDGFD 2015). Golden eagles nest on cliffs, utility poles, and in large trees in open areas from late January through August (Kochert et al. 2002). Golden eagles in North Dakota nest mainly west of the Missouri River (Dyke et al. 2015), and egg-laying occurs from late March to early May (Stewart 1975, DeLong 2004). The species

feeds upon a wide variety of prey species, but tends to hunt small to medium-sized mammals such as hares, rabbits, ground squirrels, marmots, and prairie dogs depending upon local availability (Bloom and Hawks 1982, Kochert et al. 2002).

No golden eagles were recorded during grassland breeding bird surveys (Derby et al. 2018a); however, one was documented during large bird use surveys for the Wind Energy Center (Moratz et al. 2018). No eagle nests were located within the Project Corridor during aerial surveys conducted in 2017; however, a total of two active and three potential eagle nests were recorded within the 10-mile buffer surrounding the Wind Energy Center (Derby et al. 2018b). Golden eagles may potentially occur in the Project Corridor during any time of the year, but are unlikely to be breeding within the Project Corridor due to a lack of suitable habitat.

5.14.2 Impacts

Emmons-Logan Wind is developing a voluntary WCS in collaboration with the Wind Energy Center, which includes an adaptive management approach so that information gathered and experience gained from post-construction monitoring can be used to inform future management decisions at the Project. No irreversible damage to rare or unique animal or plant species is anticipated. Individual species are discussed below.

Piping Plover

There were no piping plover observations during avian surveys. The species is known to occur in Emmons and Logan Counties; however the closest designated critical habitats are located approximately 20 miles north, 20 miles west, and 26 miles east of the Project Corridor. Collisions with transmission lines is low given that the species was not been recorded during the grassland breeding bird survey in 2017. The potential for indirect impacts such as habitat loss is unlikely as impacts to wetlands are proposed to be minimal.

Red Knot

There were no red knot observations during avian surveys within the Project Corridor. With no red knot observations during avian surveys and since there is no preferred stopover habitat identified within the Project Corridor, it is unlikely that the Project will affect the red knot.

Whooping Crane

Although potentially suitable habitat was identified within and around the Project Corridor, these habitat features are not unique on the landscape. This is because the potential stopover habitat within the Project Corridor is minimal compared to the area surrounding the Project. Based on location of the Project Corridor within the migration corridor, the Project is not likely to impact the whooping crane.

Least Tern

There were no least tern observations during onsite surveys within the Project Corridor (Derby et al. 2018a). With the lack of gravelly or sandy beaches or sandbars identified within the Project Corridor, the Project is not likely to impact the least tern.

Gray Wolf

The gray wolf is uncommon in North Dakota; however, individual wolves occasionally pass through parts of the state. Most wolf sightings are in the northeastern part of the state, far away from the Project Corridor. Additionally, there is a high degree of agricultural use within the Project Corridor as well as roadways associated with this use. The resulting combination of human population density and road density exceeds optimal levels for wolves (Mech et a. 1988, Fuller et al. 1992, Erb and Sampson 2013). Therefore, it is unlikely gray wolves will occur in the vicinity of, and therefore be affected by, the Project.

Northern Long-Eared Bat

There is little suitable roosting or foraging habitat in the Project Corridor and no known hibernacula in North Dakota for the NLEB. The species could potentially collide with transmission lines during the spring and fall periods when migrating between summer roosts and winter hibernacula; however migratory movements by the species are short, which reduces the likelihood of individuals encountering the Project. Due to the limited amount of forested habitat within the Project Corridor, and with all recorded instances of the NLEB occurring within regions with more topographic relief than the Missouri Coteau, the NLEB's likelihood of occurrence within the Project Corridor is low; therefore, likelihood of Project-related impacts is also low.

Pallid Sturgeon

No large tributaries to the Missouri River occur within the Project Corridor. Since the pallid sturgeon is only found within the Missouri River and its larger tributaries, it is highly unlikely pallid sturgeon will occur within or around the Project Corridor.

Bald Eagle

The landscape within the Project Corridor does not support any large waterbodies or an abundance of smaller waterbodies that will attract bald eagles for nesting or foraging, and no eagle nests were identified within the Project Corridor during aerial surveys conducted in 2017. Although the species may potentially forage in or pass through the Project Corridor during the breeding season, the impacts of the Project on the bald eagle are likely to be low.

Golden Eagle

No eagle nests were located within the Project Corridor during aerial surveys conducted in 2017. The landscape within the Project Corridor lacks any buttes or rock or dirt cliff faces suitable to support eagle nests, and most potentially suitable trees are close to homes or other sources of disturbance; therefore, it is unlikely that golden eagles will nest within the Project Corridor. Golden eagles may occasionally forage in or pass through the Project Corridor; however, there are no known features that will concentrate golden eagles within the Project Corridor compared to the surrounding area. Therefore, the impacts of the Project on the golden eagle are likely to be low.

5.14.3 Mitigative Measures

Emmons-Logan Wind conducted environmental studies of the Project Corridor to minimize and potentially avoid impacts to wildlife. The following measures will be used, to the extent practicable, by Emmons-Logan Wind:

- Overhead lines and guyed structures will be outfitted with bird flight diverters following Avian Protection Line Interaction Committee (APLIC 2012) guidelines to prevent bird collision, as practicable
- Temporarily disturbed areas will be reseeded or restored to crop, depending on original conditions and landowner preference
- Utilizing BMPs to prevent the spread of noxious weeds
- Siting infrastructure outside of wetlands and avoiding impacts to wetlands during construction
- Developing a voluntary WCS in collaboration with the Wind Energy Center, which includes an adaptive management approach, so that information gathered and experience gained from post-construction monitoring can be used to inform future management decisions at the Project
- During construction, limiting road speeds to 25 mph within the Project Corridor to minimize wildlife collisions.

6.0 PUBLIC AND AGENCY COORDINATION

Per Section 69-06-01-05 of the NDAC, Emmons-Logan Wind and its representatives have contacted key local, state, and federal agencies in May 2018 to inform them of the Project, in conjunction with the Wind Energy Center and for assistance in identifying concerns or issues with the Project. Public and agency correspondence and responses received as of July 17, 2018 are included in **Appendix B**; **Table 6-1** summarizes the responses received from agencies to date.

Emmons-Logan Wind and its consultants have been coordinating with the USFWS since September 2016 and the NDGFD since the spring of 2017. On April 25, 2017, Western EcoSystems Technology, Inc. (WEST) requested eagle and other species nest locations through the NDGFD. The NDGFD provided information in the form of a shapefile on May 19, 2017. WEST provided eagle nest information collected to the NDGFD on April 17, 2018. In July 2017, WEST requested USFWS grassland and wetland easements through the Long Lake Wetland Management District. The USFWS coordinated internally to provide a response that included both Emmons County (within the Long Lake Wetland Management District) as well as Logan County (within the Kulm Wetland Management District). Additionally, Emmons-Logan Wind coordinated a meeting with the USFWS and NDGFD on January 29, 2018 to review with all parties the studies completed to date, ongoing studies, and initial siting plans. Following the January meeting, per request at the meeting, Emmons-Logan Wind circulated an updated map outlining whooping crane use information and the NDGFD provided information on Conservation Reserve Program State Acres for Wildlife Enhancement lands.

The Linton Industrial Development Corporation (LIDC) provided Emmons-Logan Wind with a letter on June 13, 2018 in support of the Project (**Appendix B**). The LIDC's goal and vision is to promote projects and business opportunities for the betterment of growth, employment, and economic benefits for the city of Linton and the surrounding communities. The LIDC considers the Project an opportunity and not an obstacle for employments and economic growth.

Principal stakeholders for the Project are landowners that have entered into landowner agreements with Emmons-Logan Wind for the Project. Emmons-Logan Wind will continue to meet with county officials as the Project moves forward and Emmons-Logan Wind seeks any necessary local permits (e.g. building permit). Additionally, Emmons-Logan Wind has notified 17 Tribes in North Dakota, South Dakota, Montana, and Wyoming of the Project. An example of the tribal notification letter is attached in **Appendix B**. Representatives from Rosebud Sioux Tribe, Sisseton Wahpeton Oyate, Standing Rock Sioux Tribe, and Yankton Sioux Tribe attended a day-long meeting in Aberdeen, SD to discuss the Project (see Section 5.7 for more details).

Table 6-1 Summary of Agency Responses

Agency	Response Date	Response Summary
Federal Aviation Administration	May 3, 2018	No objection provided the Federal Aviation Administration is notified of construction or alterations by Federal Aviation Regulations, Part 77, Objects Affecting Navigable Airspace, Paragraph 77 9. Notice may be filed on-line.
State Historical Society of North Dakota	May 9, 2018	State Historical Society of North Dakota recommends a current Class I to determine any additional recorded cultural resources in the Project Area; a Class III survey by a permitted architectural historian for standing buildings and structures over 50 years old in the visual APE; and a Class III archaeological survey of all areas of direct impact including crane paths, Met towers, access roads, turbine locations, and staging areas unless the footprint has been recently surveyed for cultural resources.

Agency	Response Date	Response Summary
Department of North Dakota Trust Lands	May 11, 2018	To obtain an easement across trust lands, an on-line application form must be completed. Any proposed towers or lines would be subject to review by the surface division staff and approval by the Land Commissioner of behalf of the Board of University and School Lands. There are school trust surface interests that are managed by the North Dakota Department of Trust Lands on behalf of the Board of University and School Lands which are located within or near the proposed Project.
North Dakota Game and Fish Department	May 22, 2018	Based on the initial review, the Project appears to fall with an area with relatively low risk to native wildlife; however, valuable habitat for these species does exist within the Project area. The Department believes that with responsible placement of infrastructure, this Project could successfully avoid impacts to our species of conservation concern. If impacts associated with this Project cannot be avoided, the Department recommends that a voluntary offset package be developed for both the direct and indirect permanent impacts infrastructure constructed within native habitats (i.e., unbroken native prairie ≥ 160 acres and wetlands).
North Dakota Department of Health	May 29, 2018	Care must be taken during construction activities near any water of the state to minimize adverse effects on water body. Project disturbing one or more acres are required to have a permit to discharge storm water runoff until the site is stabilized by reestablishment of vegetation or other permanent cover. Care should be taken to avoid spills of any material that may have an adverse effect on groundwater quality.
North Dakota State Water Commission	May 29, 2018	Initial review indicates the Project does not require a conditional or temporary permit for water appropriation. However, if surface water or groundwater will be diverted for construction of the Project, a water permit will be required per NDCC Section 61-04-02. The Office of the State Engineer requests to be notified regarding the Projects impacts, if any, to water resources, agricultural drain, and wetlands as any alterations, modifications, or improvements to those water resources may require a drainage permit or construction permit.
North Dakota Department of Transportation	May 30, 2018	The project should have no adverse effects on NDDOT highways. If any work needs to be done on a highway right-of-way, appropriate permits and risk management documents will need to be obtained.

7.0 POTENTIAL PERMITS/APPROVALS

Table 7-1 shows the federal and state permits or approvals that have been identified as potentially required for the construction and operation of the Project. Permits dependent on the final site layout will be applied for after receiving Commission approval, but prior to construction.

Table 7-1 Potential Permits and Approvals Required for Construction and Operation of the Project

Agency	Type of Approval	Status*	Need
Federal Approvals			
United States Army Corps of Engineers (USACE)	Nationwide Permit (NWP)12	4	A wetland survey has been completed to ensure that the Project minimizes impacts to waters of the United States (WOUS) and stays below the Pre-Construction Notification (PCN) threshold.
U.S. Environmental Protection Agency (USEPA)	Spill Prevention, Control, and Countermeasure (SPCC) Plan	3	Required if more than 1,320 gallons of oil storage is located on-site.
U.S. Fish and Wildlife Service (USFWS)	Special Use Permit	4	Emmons-Logan Wind is committed to siting the Project outside of USWFS easements.
State of North Dakota			
North Dakota Public Service Commission (Commission)	Certificate of Site Compatibility and Route Permit Transmission Facility	2	Required for construction of transmission facility over 115 kilovolts (kV).
State Historical Society of North Dakota (SHSND)	Concurrence with effect determinations	2	Reports for the Class III cultural resources inventories will be submitted to SHSND for review when complete.
North Dakota Department of Health (NDDOH)	National Pollutant Discharge Elimination System (NPDES) Permit: General Construction Storm Water	3	Required for disturbance of over 1 acre of land and a stormwater pollution prevention plan (SWPPP) must be prepared.
North Dakota Highway Patrol	Overheight/Overweight Permit	3	Required for hauling construction equipment and materials on State Highways.
North Dakota Department of Transportation (NDDOT)	Road Approach/Access Permit	4	Required for construction of access roads from State Highways.
	Utility Permit/Risk Management Documents	4	Required for utility crossings on State Highway right-of-way.
North Dakota State Water Commission (NDSWC)	Drainage Permit	4	Required if draining a wetland with a drainage area of 80 acres or more.
	Water Permit	4	Required if drilling a well.
Emmons County			
County Planning Commission	Conditional Use Permit	1	Required to construct, operate or maintain the Project.

*Status Explanation:

1 Completed and approved
2 Applied and/or decision pending
3 Will apply for prior to construction
4 Final Project layout will determine whether permit/approval is required

8.0 FACTORS CONSIDERED

The North Dakota Energy Conversion and Transmission Facility Siting Act lists 11 factors to guide the Commission in the evaluation and designation of the site of the facility (NDCC Section 49-22-09).

8.1 Public Health and Welfare, Natural Resources, and the Environment

The preceding sections discuss the research and investigations relating to the effects of the Project on public health and welfare, natural resources, and the environment. These effects and the proposed mitigation to minimize these effects are summarized in Section 5.

8.2 Technologies to Minimize Adverse Environmental Effects

Emmons-Logan Wind will utilize the most current technologies that minimize impacts to the environment. Current technologies include the use of bundled conductors to minimize corona sound and EMF effects. The Project will be designed and constructed according to APLIC (2012) standards to limit potential impacts to raptors, bat, and avian species.

8.3 Potential for Beneficial Uses of Waste Energy

This factor is not applicable to this Project. No waste energy is produced by a transmission line.

8.4 Unavoidable Adverse Environmental Effects

Unavoidable adverse environmental effects are described for each resource area in Section 5. The Project is expected to permanently impact up to 5.028 acres during Project operations, which will not be available for other uses. Additional unavoidable effects include visual effects and sound and air emissions related to construction.

8.5 Alternatives to Proposed Site

Other alternatives were considered for the Project Route within the area between the existing 230 kV Heskett-Wishek transmission line and the Wind Energy Center substation. Emmons-Logan Wind believes that the Project Route is the most viable route alternative based on landowner preferences and the fact that the Project Route follows and is the most direct route that also minimizes impacts on the exclusion, avoidance, selection, and policy criteria identified in NDAC Section 69-06-08-02.

8.6 Irreversible and Irretrievable Commitment of Natural Resources

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 effects primarily result from use or destruction of a specific resource that cannot be replaced within a reasonable timeframe. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action. There are few commitments of resources associated with this Project that are irreversible and irretrievable, but these include those resources primarily related to construction.

Labor and natural resources will be used in the fabrication and preparation of construction materials. These materials are usually not retrievable. Construction resources that will be used include aggregate resources, concrete, steel, and hydrocarbon fuel. Each monopole structure requires the construction of a direct embedded foundation approximately six feet in diameter and approximately 15 to 25 feet deep. During construction, vehicles will be traveling to and from the site, utilizing hydrocarbon fuels. These resources are not in short supply, and their use will not have an adverse effect on the availability of these resources. In addition, the anticipated economic benefits of the Project will balance the irretrievable commitment of resources resulting from the construction of the Project (see Section 8.7).

8.7 Direct and Indirect Economic Impacts

Economic impacts include impacts associated with the temporary disturbance of up to 40.48 acres of land during construction, which could potentially interrupt farming and ranching for landowners. Permanent impacts will be lower, at approximately 5.028 acres. In general, agricultural areas surrounding each pole can still be farmed, and landowner compensation has been established in individual lease agreements.

The remaining direct and indirect economic impacts are primarily positive. Transmission line development removes less total land from agricultural use. The rural economy and energy production in the county and state is diversified. To the extent that local contractors are used for portions of the construction, total wages and salaries paid to contractors and workers in Emmons and Logan Counties will contribute to the total personal income of the region. Additional personal income will be generated for residents in the counties and the state by circulation and recirculation of dollars paid out by the Emmons-Logan Wind as business expenditures and state and local taxes. Expenditures made for equipment, energy, fuel, operating supplies, and other products and services benefit businesses in the counties and the state.

Long-term beneficial impacts to the counties' tax base as a result of the construction and operation of the Project will contribute to improving the local economy in this area of North Dakota. The development of Project in this region will be important in diversifying and strengthening the economic base of south central North Dakota. Additional revenues are expected from property and income taxes.

8.8 Existing Development Plans of the State, Local, Government and Private Entities at or in the Vicinity of the Site

No conflicts are anticipated with existing state and local government and private entities' development plans.

8.9 Effect of Site on Cultural Resources

As described in Section 5.7, a Class I Literature Review was conducted and a Class III Cultural Resources Inventory for archaeology was completed. The literature review identified no previously recorded archaeological sites, site leads, or architectural site within the Project Corridor. Emmons-Logan Wind will avoid directly impacting all cultural resources sites. Once complete, the Class III Cultural Resources Inventory Report will be submitted to the SHSND for review and concurrence and a summary will be provided to the Commission.

8.10 Effect of Site on Biological Resources

Detailed discussion of potential impacts and proposed mitigation measures on biological resources is provided in Section 5.14 (Wildlife), and Section 5.15 (Federally-Protected Species). While few studies have considered population-level consequences of wind energy development, the following two studies have addressed this question as it pertains to birds. Erickson et al. (2014) completed a review of small bird fatality in the U.S. that adjusted for avifaunal biome estimates and concluded that fatalities were much less than one percent per year or that less than one tenth of one percent of continent-wide populations were affected per year. Beston et al. (2016) calculated measures of turbine risk for 428 species and determined that modeled risk of potential population level impact is species-specific and that small birds are at relatively low risk of population impacts. The Project will be designed and constructed following APLIC (2012) recommendations to minimize the risk of electrocution for raptor, bat, and avian species. Additionally, Emmons-Logan Wind developed a voluntary WCS, which includes an adaptive management approach, so that information gathered and experience gained from post-construction monitoring can be used to inform future management decisions for the Project and Wind Energy Center.

8.11 Cumulative Effects

Activities that currently exist within the Project Corridor are primarily limited to agriculture. Sand and gravel mining is an existing industrial component of the landscape near the Project Corridor. It is likely that wind energy development and associated transmission lines will continue in south central North Dakota.

Socioeconomic impacts are anticipated to be positive, as the rural economy is stimulated and local energy production is diversified. The potential negative cumulative impacts are anticipated to be primarily on land use, mineral resources, vegetation, and wildlife.

With the increase in the amount of land being used for transmission facility activities, farming activities may decrease slightly. This potential shift in land use in rural communities that have historically made their living from agricultural activities may lead to a decrease in agricultural activities; however, the additional income to farmers from transmission lines may make it more feasible for them to keep most of their land in agricultural uses rather than being developed for residential, commercial, or industrial uses. By enabling farmers to keep land in agriculture, transmission line development may lead to a net positive cumulative impact as less total land is converted from agricultural use than other forms of development.

With regard to the potential cumulative impacts to wildlife resources, there is potential for the Project to affect local wildlife both directly (mortality) and indirectly (habitat loss and fragmentation). Both direct and indirect potential impacts will be avoided and minimized to the extent practicable, and therefore, are not expected to cause cumulative impacts. Although the Project will contribute to the utility/industrial component of the existing landscape, the area will remain primarily agricultural in nature. As these agricultural lands are of minimal value to wildlife compared to native vegetation, the Project is not expected to result in a cumulative loss of quality wildlife habitat. Based on the existing land use, location of existing and planned facilities, it is expected that the Project will have minimal cumulative impacts to wildlife.

8.12 Agency Comments

Agency coordination and potential permits/approvals are discussed in Section 6 and Section 7, respectively. A copy of agency response letters is included in **Appendix B**.

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9.0 QUALIFICATIONS OF CONTRIBUTORS

Table 9-1 Qualifications of Contributors

Name Project Role	Education and Professional Experience
Kimberly Wells, PhD Environmental Services Project Manager NEER	Dr. Wells has 16 years of environmental permitting experience including experience as both a consultant and environmental manager in the renewable industry. Her primary expertise is technically challenging and interdisciplinary projects on private and public land, with a focus on large environmental impact assessment and permitting projects with the National Environmental Policy Act (NEPA) and state equivalents; the Endangered Species Act, the Clean Water Act, and associated natural resource laws. She is a certified wildlife biologist and wetland delineator, and obtained her Bachelor of Science in Natural Resource Management from the University of Arizona, her Master of Science in Fisheries and Wildlife Ecology from Oklahoma State, and her PhD in Fisheries and Wildlife Sciences from the University of Missouri–Columbia. Dr. Wells and her team are responsible for all environmental permitting in the Mid-Continent Region that includes North Dakota.
Dustin Jones Environmental Services Project Manager NEER	Mr. Jones has 16 years of environmental permitting experience as both a consultant and environmental manager in the renewable industry. His primary responsibility is permitting and licensing projects on private and public land in compliance with federal and state environmental laws. He is a certified wetland delineator and obtained his Bachelor of Science in Wildlife and Fisheries Sciences from Texas A&M University.
Clay Cameron Wind Development NEER	Mr. Cameron has over 20 years of experience in project management including development, construction, federal, state and local permitting and compliance. His responsibilities include financial feasibility analysis, cost and schedule management, and coordination of functional project teams and customer relationships. He has 10 years of experience in the utility industry including roles of increasing responsibility in community development, engineering & construction, and project development. He studied business management at Louisiana State University, and holds a State of Florida General Contractor license, and a State of California General Engineering license.
Barry Lane Engineering and Construction Management NEER	Mr. Lane is responsible for the management and oversight of early stage phases of project planning, engineering, and construction of wind projects. His duties also include budget development, contract execution, procurement, logistical planning, and ultimately transition to the construction execution team. He has more than four years of experience in the development of wind energy projects, including 300 MW of wind projects that were constructed in North Dakota in 2016. Mr. Lane also has over 20 years of experience in construction management and holds a Bachelor of Arts in Environmental Geography from Rutgers University.
Carolyn Stewart Director Tribal Relations NEER	Ms. Stewart is Director Tribal Relations for NEER and is responsible for all indigenous and tribal relations efforts in the U.S. and Canada. She has 40 years of energy industry experience in conventional and renewable energy development, energy planning, and gas distribution and electric distribution operations, including nearly 20 years of tribal renewable energy project development and tribal relations experience. She earned a Bachelor of Science in Finance from the University of Illinois, and an M.B.A. from University of Chicago Graduate School of Business.
Richard Estabrook, PhD, RPA Environmental Services Project Manager – Archaeologist NEER	Dr. Estabrook has over 30 years of cultural resources management experience, both as a consultant and as an environmental manager in the renewable industry. He obtained his Bachelor of Arts in Anthropology from Stony Brook University, his Master of Arts in Public Archaeology from University of South Florida, his GIS Certificate from University of South Florida, and his PhD in Applied Anthropology/Archaeology from University of South Florida.

Name Project Role	Education and Professional Experience
Lindsey Churchill, PhD, PWS Project Manager AECOM	Dr. Churchill has 11 years of environmental permitting experience in wetlands and natural resources. Her responsibilities included project management, application preparation, and oversight of the wetlands and cultural resources surveys. She has a PhD in Natural Resources Management from North Dakota State University (NDSU), a Master of Science in Natural Resources Management from NDSU, and a Bachelor of Science in biology and mathematics from University of Jamestown. She is registered as a Professional Wetland Scientist and a USACE certified wetland delineator.
Melinda McCarthy, MA, RPA Archaeologist/GIS Analyst AECOM	Ms. McCarthy has 10 years of cultural resources and historic preservation experience. Her responsibilities included leading the cultural resources archaeology and architecture surveys, GIS, and tribal outreach. She has a Bachelor of Arts in Anthropology with an emphasis in Archeology and a Master of Arts in History with a specialization in Historic Preservation, both from Southeast Missouri State University. She is permitted as a Principle Investigator through the North Dakota State Historic Preservation Office (NDSHPO) in North Dakota.
Marcia Bender, MA, RPA Archaeologist AECOM	Ms. Bender has 15 years of cultural resources experience. Her responsibilities included leading the cultural resources archaeology and tribal surveys. She has a Bachelor of Arts in Anthropology and a Master of Arts in Anthropology with an emphasis in Archaeology, both from Wichita State University. She is permitted as a Principle Investigator through NDSHPO in North Dakota.
Dirk Churchill Environmental Specialist AECOM	Mr. Churchill has 7 years of experience in environmental assessment, permitting, and compliance services. His responsibilities included application preparation and leading the wetland surveys. He has a Bachelor of Science in Natural Resources Management from NDSU. He is a USACE certified wetland delineator.
Steven Ensley GIS Analyst AECOM	Mr. Ensley has 13 years of experience as a GIS specialist within the Planning, Design and Development group. His responsibilities included mapping, data analysis, and technical expertise. He has a Bachelor of Science in Environmental Conservation from Northern Michigan University.

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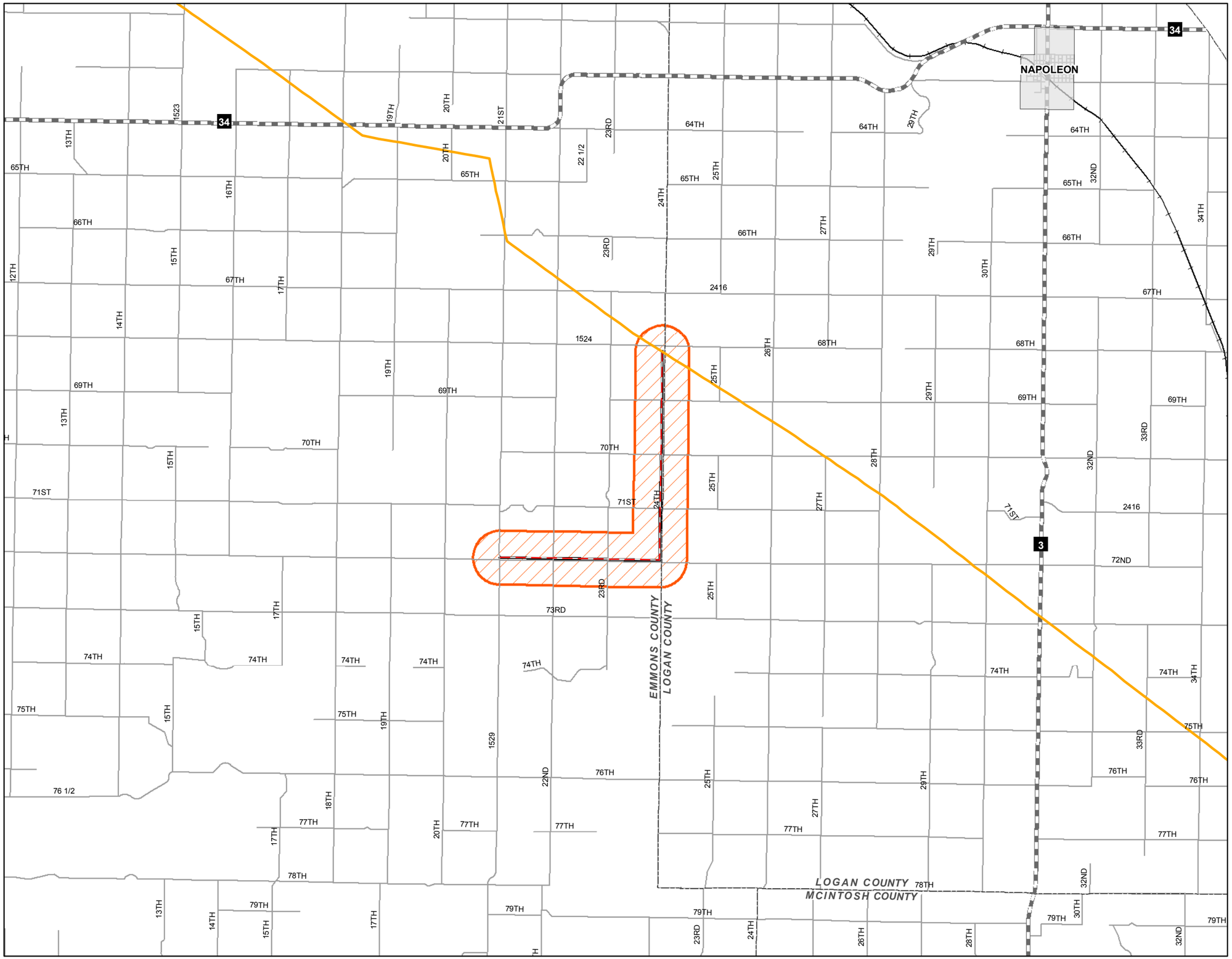
11.0 ACRONYMS AND ABBREVIATIONS

AAA	Airport Airspace Analysis
AADT	Average Annual Daily Traffic
APLIC	Avian Power Line Interaction Committee
BGEPA	Bald and Golden Eagle Protection Act
BMPs	Best Management Practices
Certificate	Certificate of Corridor Compatibility
Commission	North Dakota Public Service Commission
CRP	Conservation Reserve Program
CUP	Conditional Use Permit
CWA	Clean Water Act
CWS	Canadian Wildlife Service
dBA	decibel, A-weighted
DoD	Department of Defense
EMF	electromagnetic fields
EMR	electromagnetic radiation
EPC	engineering, procurement, and construction
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FSA	Farm Service Agency
ICBM	Intercontinental ballistic missile
IPaC	Information for Planning and Conservation
kHz	kilohertz
kV	kilovolt
LIDC	Linton Industrial Development Corporation
MDU	Montana-Dakota Utilities
MHz	megahertz
mph	miles per hour
MW	megawatt
NASS	National Agricultural Statistics Service
NDAC	North Dakota Administrative Code
NDCC	North Dakota Century Code
NDCRS	North Dakota Cultural Resources Survey
NDDMR	North Dakota Department of Mineral Resources
NDDOH	North Dakota Department of Health
NDDOT	North Dakota Department of Transportation
NDGFD	North Dakota Game and Fish Department
NDSHPO	North Dakota State Historic Preservation Office
NDSWC	North Dakota State Water Commission
NEER	NextEra Energy Resources, LLC
NESC	National Electrical Safety Code
NHD	National Hydrography Dataset
NIEHS	National Institute of Environmental Health Sciences

NLEB	northern long-eared bat
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
NWP	Nationwide Permit
NWR	National Wildlife Refuge
O&M	operations and maintenance
OE	Obstruction Evaluation
PCN	preconstruction notification
PLOTS	Private Land Open to Sportsmen
Project	Emmons-Logan 230 kV Transmission Line
Route Permit	Transmission Facility Route Permit
ROW	right-of-way
SCADA	Supervisory Control and Data Acquisitions
SHSND	State Historical Society of North Dakota
SPCC	Spill Prevention, Control, and Countermeasure
SWPPP	Storm Water Pollution Prevention Plan
T&E	threatened and endangered
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USDHS	U.S. Department of Homeland Security
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WEST	Western EcoSystems Technology, Inc.
WCS	Wildlife Conservation Strategy
WOUS	waters of the United States
WPA	Waterfowl Production Area

Figures



Legend

- Existing 230kV Heskett-Wishek Transmission Line
- County Boundary
- Municipal Boundary
- State Highway
- County Road
- Railroad

Project Features

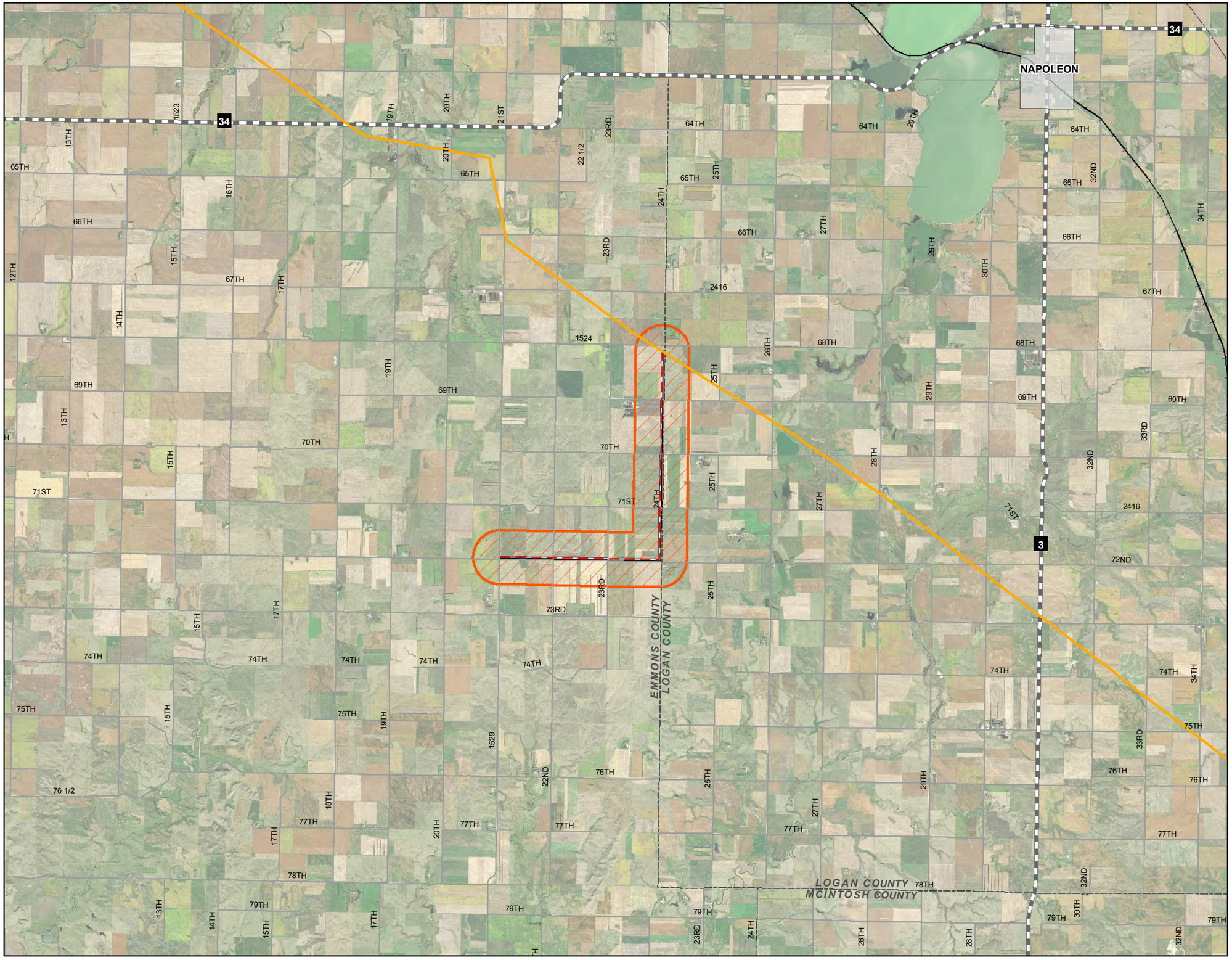
- Project Route
- Project Right-of-Way
- Project Corridor

0 1 2 3 Miles

Figure 1-1
Project Location
Emmons-Logan 230 kV Transmission Line
Emmons and Logan Counties, ND

N W E S

AECOM



Legend

- Existing 230kV Heskett-Wishek Transmission Line
- County Boundary
- Municipal Boundary
- State Highway
- County Road
- Railroad

Project Features

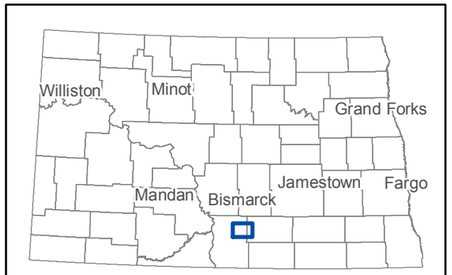
- Project Route
- Project Right-of-Way
- Project Corridor

0 1 2 3 Miles

Figure 1-2
Project Location (Aerial)
Emmons-Logan 230 kV Transmission Line
Emmons and Logan Counties, ND

N W E S

AECOM



Legend

Existing 230kV Heskett-Wishek Transmission Line

County Boundary

Municipal Boundary

State Highway

County Road

Railroad

Project Features

Project Route

Project Right-of-Way

Project Corridor

0 1 2 3 Miles

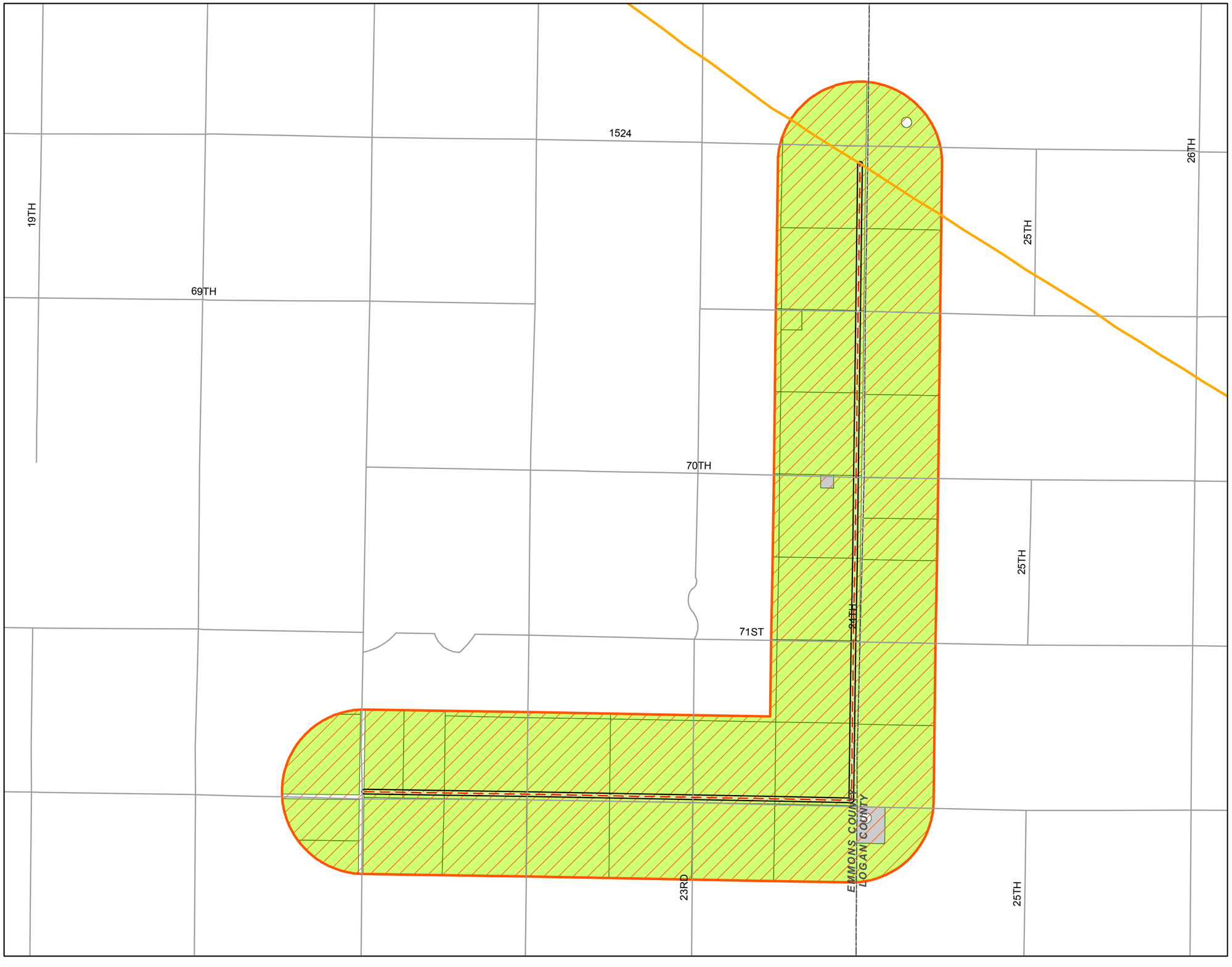
Figure 1-3

Project Location (Topographic)

Emmons-Logan 230 kV Transmission Line
Emmons and Logan Counties, ND

N W E S

AECOM



Legend

- Existing 230kV Heskett-Wishek Transmission Line
- County Boundary
- County Road
- Participating Landowner
- Non-Participating Landowner

Project Features

- Project Route
- Project Right-of-Way
- Project Corridor

0 0.5 1 Miles

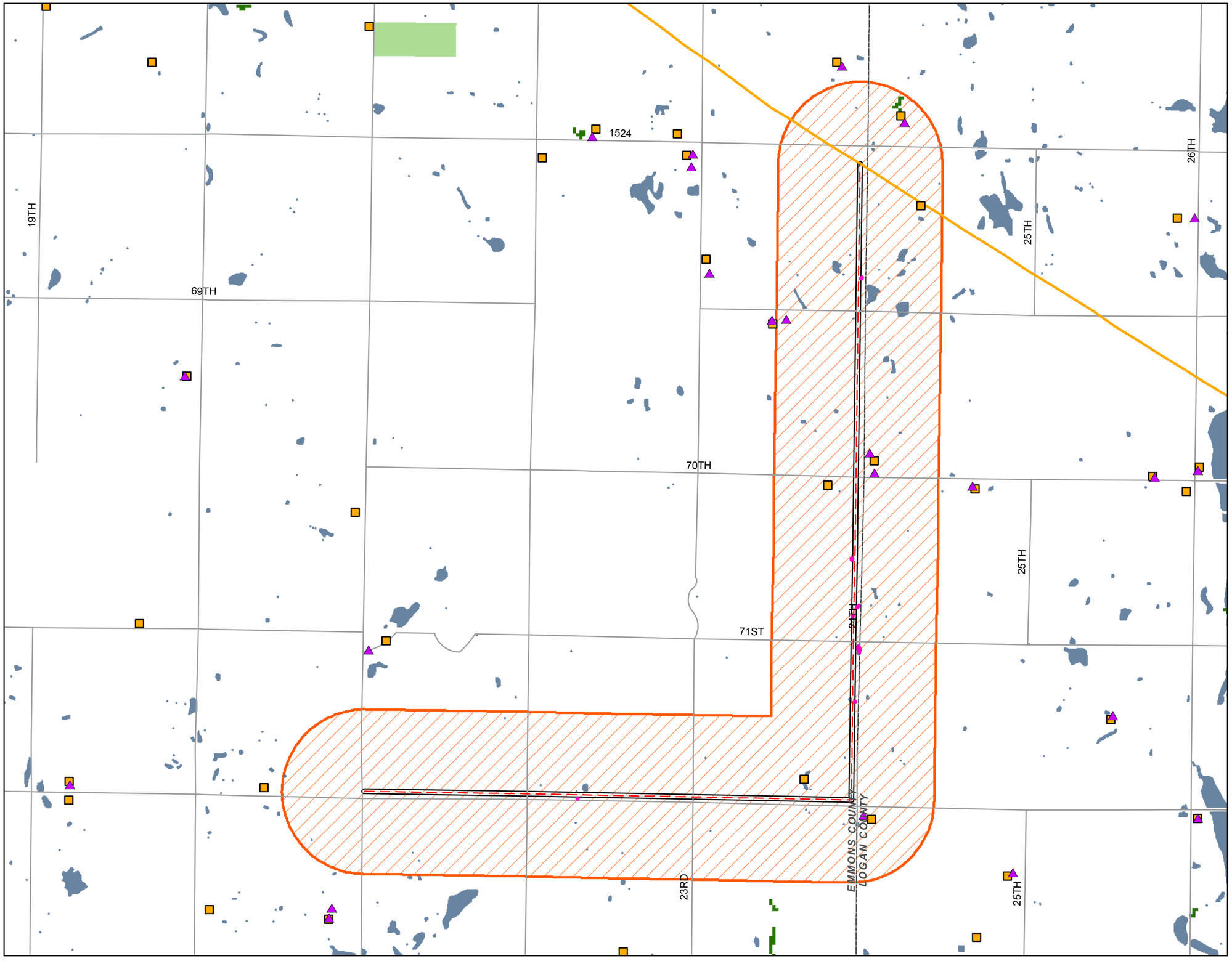
Figure 1-4

Participating Landowners

Emmons-Logan 230 kV Transmission Line
Emmons and Logan Counties, ND

N W E S

AECOM



Legend

Existing 230kV Heskett-Wishek Transmission Line

County Boundary

County Road

Project Features

Project Route

Project Right-of-Way

Project Corridor

Exclusion Areas*

USFWS Grassland/Wetland Easement

Avoidance Areas

Historical Resource

Occupied Residence

NLCD Forest (Homer et al. 2015)

National Wetlands Inventory (USFWS 2018)

Surveyed Wetlands

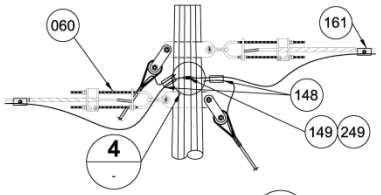
** Archaeological sites not shown due to confidentiality.*

0 0.5 1 Miles

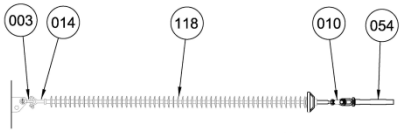
Figure 3-1
Exclusion and Avoidance Areas
Emmons-Logan 230 kV Transmission Line
Emmons and Logan Counties, ND

N W E S

AECOM

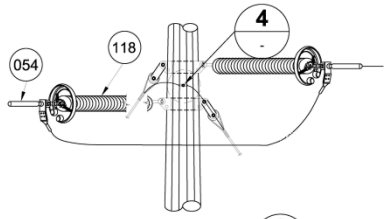


DETAIL 1
OPGW TERMINAL (N.T.S.)

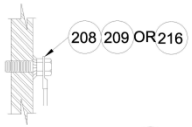


DETAIL 3
CONDUCTOR - DEADEND (N.T.S.)

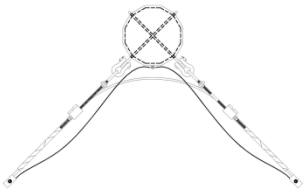
BILL OF MATERIAL				
ITEM #	QTY	UNIT	DESCRIPTION	MANUFACTURER/PART #
1**	2	EA	SHACKLE, ANCHOR 30K	MACLEAN ASH-55-BC
3	6	EA	ANCHOR SHACKLE WIDE 60K	MACLEAN ASH-66-BC
10	6	EA	Y-CLEVIS SOCKET - 50K	MACLEAN SYC-87
14	6	EA	Y-CLEVIS BALL EXT - 50K (ANSI 52-8 & 52-11)	MACLEAN YCBHL-78
16**	1	EA	Y-CLEVIS EYE - 19K	MACLEAN YCE-65-625
54	6	EA	DEADEND - COMPRESSION - HORIZONTAL - DRAKE	HUBBELL A0314251SS
60	2	EA	FIBERLIGN - U-BOLT DEADEND OPGW (SHACKLE)	PLP 2801309S2
61**	1	EA	QUADRANT CLAMP DEADEND - 3/8 EHS	HUBBELL SWDE55N
76**	1	EA	8" TRIANGLE YOKE PLATE	HUBBELL YPD5024685
118*	6	EA	230kV POLYMER INSULATOR - 50k	NGK 502-SCT40-SK-09 MACLEAN S278103VA08
148	3	EA	CONNECTOR: #2 Cu to #2 Cu, COMPRESSION	BURNDY YH2C2C
149	8	EA	COMPRESSION TERMINAL: 1/2" TO #2	BURNDY YA2CN
160**	1	EA	CONNECTOR: 3/8" TO #2 PG CLAMP	AFL OBC-T1-N1-1
161	2	EA	CONNECTOR: OPGW TO #2 PG CLAMP	AFL OBC-E2-N1-1
208	5	EA	1/2" LOCK WASHER, GALV	ELECTRIC MOTION EM 12L
209	4	EA	1/2" - 13x1" LONG BOLT, GALV	ELECTRIC MOTION EM12C1B
216	1	EA	1/2" x 1/2" BOLT, GALV	ELECTRIC MOTION EM12C12B
249	50	FT	#2 - 7 STRAND FLEXIBLE COPPER	ALL MAKES
* PART SHALL NOT BE SUBSTITUTED				
** SEE NOTE 6				



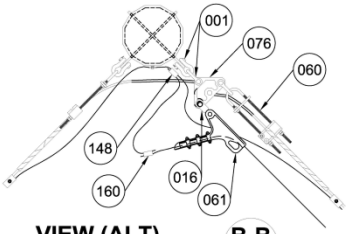
DETAIL 2
CONDUCTOR ELEVATION (N.T.S.)



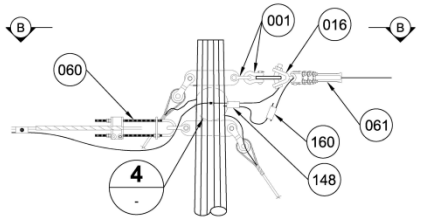
DETAIL 4
GROUNDING NUT (N.T.S.)
(5 LOCATIONS)



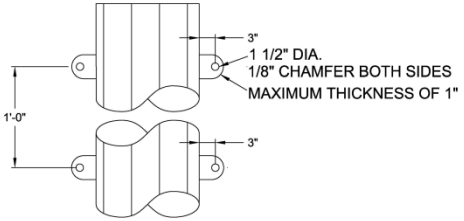
VIEW B-B
OPGW
TERMINAL (N.T.S.)
SEE NOTE 6



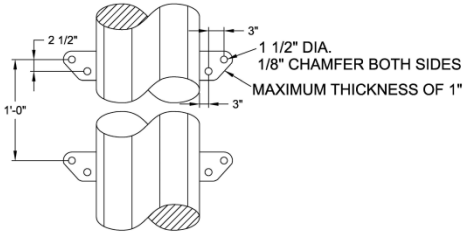
VIEW (ALT) B-B
OPGW & OHGW
TERMINAL (N.T.S.)
SEE NOTE 6



DETAIL 5
OPGW & OHGW
TERMINAL (N.T.S.)



DETAIL 6
OPGW VANG
(ROTATED FOR CLARITY)



DETAIL 7
CONDUCTOR VANG
(ROTATED FOR CLARITY)

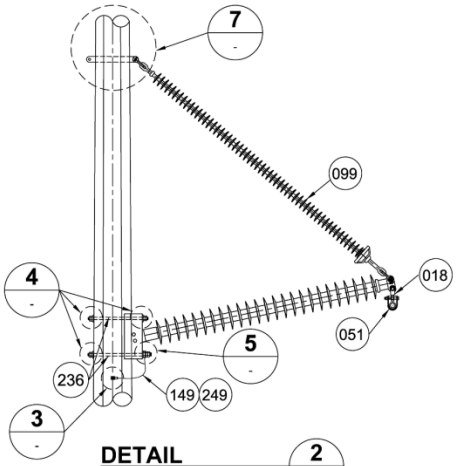
NOTES:

1. MATERIAL LIST QUANTITY IS TOTAL QUANTITY PER STRUCTURE.
2. BISECTOR SHALL BE MARKED BY 1" WELD LINE 2' ABOVE CORROSION COLLAR.
3. REFER TO DRAWING 13139-057-T1-0315 FOR GUYING DETAILS.
4. GROUNDING NUTS SHALL BE 1/2" -13 UNC STAINLESS STEEL HEAVY HEX NUTS WELDED TO POLE. ITEM 216 SHALL BE USED IN LOCATIONS WHERE 5/8" HOLE IS NOT PRESENT.
5. ALL HARDWARE GROUNDING NUTS SHALL BE PLACED ON AHEAD SPAN FACE, STRUCTURE GROUND SHALL BE PLACED ON THE BISECTOR.
6. ITEMS IDENTIFIED IN BOM ARE INCLUDING THOSE USED WHEN 2 SHIELD WIRES ARE ATTACHED AT SAME CONNECTION LOCATION. VIEW B SHOWS THE TYPICAL OPGW ATTACHMENT AND THE OPGW & OHGW ATTACHMENT TO BE INSTALLED AT STRUCTURE XXX.
7. CORONA RINGS SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.

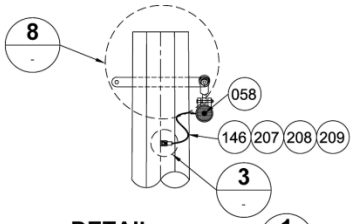
PRELIMINARY
NOT FOR CONSTRUCTION

Emmons-Logan 230 kV Transmission Line
Emmons-Logan Wind, LLC
Emmons and Logan Counties, ND

Figure 4-1a
Engineering Design
230 kV Single Circuit Guyed Deadend (75°-105°) Details
Drawing 13139-057-T1-0226



DETAIL 2
BRACED POST (N.T.S.)



DETAIL 1
OPGW SUSPENSION (N.T.S.)

HOLD

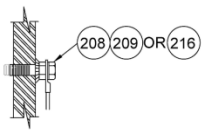
BILL OF MATERIAL

ITEM #	QTY	UNIT	DESCRIPTION	MANUFACTURER/PART #
18	3	EA	Y-CLEVIS EYE - 19K	MACLEAN RYCE-65-625
51	3	EA	AGS CLAMP - DRAKE	PLS AGS-5130
58	1	EA	FIBERLIGN - SUSPENSION OPGW W/ Y-CLEVIS	PLP 4300109-YC
99*	3	EA	230kV BRACED POST - 2.5" POST - 120° GAIN BASE	NGK HV-951 MACLEAN B291089AL99N-60
146*	1	EA	S-STRAP #2 7-STRAND - (2) 0.5" TERMINAL	ELECTRIC MOTION EM02-7S-24-LP
149	2	EA	COMPRESSION TERMINAL: 1/2" TO #2	BURNDY YA2CN
152	2	EA	BONDING CLIP 7/8"	HUGHES BROS. 2727.8
207	1	EA	1/2" HEX NUT, GALV	ELECTRIC MOTION EM12CN
208	5	EA	1/2" LOCK WASHER, GALV	ELECTRIC MOTION EM 12L
209	4	EA	1/2" - 13x1" LONG BOLT, GALV	ELECTRIC MOTION EM12C1B
216	1	EA	1/2" x 1/2" BOLT, GALV	ELECTRIC MOTION EM12C12B
220	12	EA	2" (15/16" HOLE) WASHER, GALV	HUGHES BROS. RW2-80
221	14	EA	7/8" HEX NUT, GALV	HUGHES BROS. HN80
222	8	EA	7/8" LOCK NUT, GALV	HUGHES BROS. MF80
236	2	EA	7/8" x XX" ALL-THREAD, GALV (NO NUTS INCLUDED)	HUGHES BROS. TR8XX-FNN
238	2	EA	7/8" x XX" ALL-THREAD, GALV (NO NUTS INCLUDED)	HUGHES BROS. TR8XX-FNN
249	12	FT	#2 - 7 STRAND FLEXIBLE COPPER	ALL MAKES

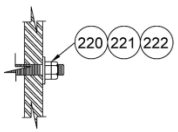
* PARTS SHALL NOT BE SUBSTITUTED

BOLT SCHEDULE - 230kV TANGENT

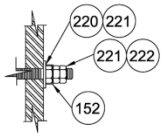
BOLT POSITION	DESCRIPTION	QTY
1 PHASE 1 POST TOP	7/8" x XX" ALL THREAD, GALV	1
	15/16" WASHER, GALV	2
	7/8" HEX NUT, GALV	2
	7/8" LOCK NUT, GALV	2
2 PHASE 1 POST BOTTOM	7/8" x XX" ALL THREAD, GALV	1
	15/16" WASHER, GALV	2
	7/8" HEX NUT, GALV	3
	7/8" LOCK NUT, GALV	2
3 PHASE 2&3 POST TOP	7/8" x XX" ALL THREAD, GALV	1
	15/16" WASHER, GALV	4
	7/8" HEX NUT, GALV	4
	7/8" LOCK NUT, GALV	2
4 PHASE 2&3 POST BOTTOM	7/8" x XX" ALL THREAD, GALV	1
	15/16" WASHER, GALV	4
	7/8" HEX NUT, GALV	5
	7/8" LOCK NUT, GALV	2



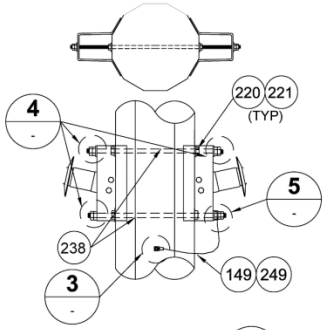
DETAIL 3
GROUNDING NUT (N.T.S.)
(4 LOCATIONS)



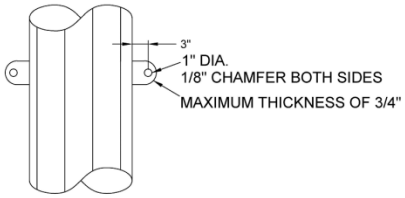
DETAIL 4
HEX - LOCK NUT (N.T.S.)
(6 LOCATIONS)



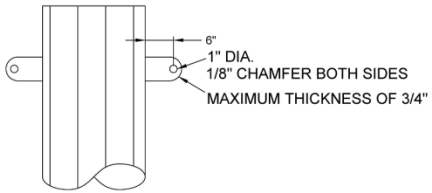
DETAIL 5
DOUBLE HEX NUT WITH
BONDING CLIP (N.T.S.)
(2 LOCATIONS)



DETAIL 6
BACK TO BACK BRACED POST
CONNECTION (N.T.S.)



DETAIL 7
CONDUCTOR VANG



DETAIL 8
OPGW VANG

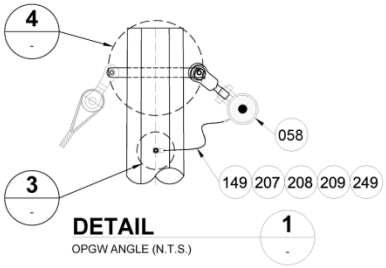
NOTES:

1. BOLTS SHALL PROTRUDE NO MORE THAN 4" PAST THE FACE OF THE ATTACHMENT. IF BOLTS INTERFERE WITH HARDWARE OR EXCEED ALLOWABLE PROTRUSION. ALL THREAD BOLTS SHALL BE FIELD CUT AND SPRAY GALVANIZED ACCORDING TO ASTM A780.
2. ALL THROUGH-BOLT NUTS SHALL NOT BE TENSIONED BEYOND A SNUG TIGHT CONDITION.
3. MATERIAL LIST QUANTITY IS TOTAL QUANTITY PER STRUCTURE.
4. GROUNDING NUTS SHALL BE 1/2" -13 UNC STAINLESS STEEL HEAVY HEX NUTS WELDED TO POLE. ITEM 216 SHALL BE USED IN LOCATIONS WHERE 5/8" HOLE IS NOT PRESENT.
5. ALL HARDWARE GROUNDING NUTS SHALL BE PLACED ON AHEAD SPAN FACE, STRUCTURE GROUND SHALL BE PLACED ON THE BISECTOR.

PRELIMINARY
NOT FOR CONSTRUCTION

Emmons-Logan 230 kV Transmission Line
Emmons-Logan Wind, LLC
Emmons and Logan Counties, ND

Figure 4-1b
Engineering Design
230 kV Single Circuit Guyed 230 Single Circuit Tangent
Drawing 13139-057-T1-0201

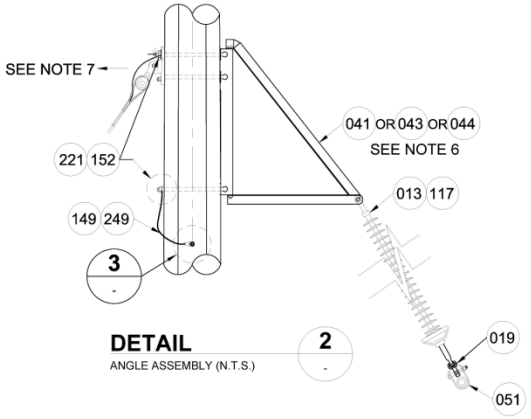


DETAIL 1
OPGW ANGLE (N.T.S.)

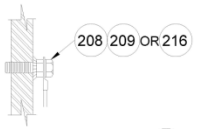
ITEM #	QTY	UNIT	DESCRIPTION	MANUFACTURER/PART #
13	3	EA	Y-CLEVIS BALL EXT - 30K (ANSI 52-3 & 52-5)	MACLEAN YCBHL-65A
19	3	EA	SOCKET EYE - 30K (ANSI 52-3852-5)	HUBBELL SA07
41	1	EA	SWING ANGLE BRACKET (TEE AND BOLTS INCLUDED)	HUGHES BROS. 2848-ES-22
43	1	EA	SWING ANGLE BRACKET (TEE AND BOLTS INCLUDED)	HUGHES BROS. 2848-ES-20
44	1	EA	SWING ANGLE BRACKET (TEE AND BOLTS INCLUDED)	HUGHES BROS. 2848-ES-26
51	3	EA	ASS'CLAMP - DRAKE	PLP AGS-5130
58	1	EA	FIBERLIGN - SUSPENSION OPGW W/ Y-CLEVIS	PLP 4300109-YC
117*	3	EA	230kV POLYMER INSULATOR - 30k	NGK 302-SC770-SJ-09 MACLEAN S278103VA10
149	5	EA	COMPRESSION TERMINAL: 1/2" TO #2	BURNDY YA2CN
152	6	EA	BONDING CLIP 7/8"	HUGHES BROS. 2727.8
207	1	EA	1/2" HEX NUT, GALV	ELECTRIC MOTION EM12CN
208	6	EA	1/2" LOCK WASHER, GALV	ELECTRIC MOTION EM 12L
209	5	EA	1/2" - 13x1" LONG BOLT, GALV	ELECTRIC MOTION EM12C1B
216	1	EA	1/2" x 1/2" BOLT, GALV	ELECTRIC MOTION EM12C12B
221	6	EA	7/8" HEX NUT, GALV	HUGHES BROS. HN80
249	40	FT	#2 - 7 STRAND FLEXIBLE COPPER	ALL MAKES

HOLD

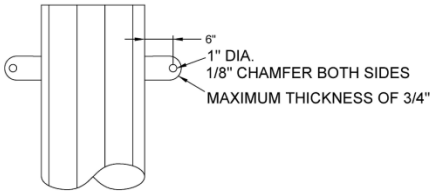
* PARTS SHALL NOT BE SUBSTITUTED



DETAIL 2
ANGLE ASSEMBLY (N.T.S.)



DETAIL 3
GROUNDING NUT (N.T.S.)
(5 LOCATIONS)



DETAIL 4
OPGW VANG

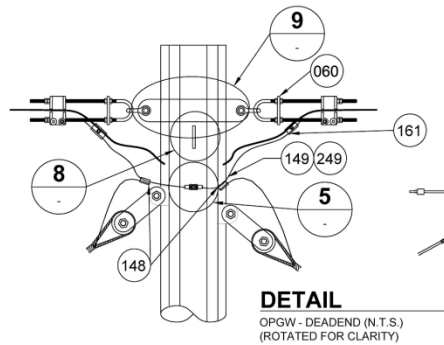
NOTES:

1. BOLTS SHALL PROTRUDE NO MORE THAN 4" PAST THE FACE OF THE ATTACHMENT. IF BOLTS INTERFERE WITH HARDWARE OR EXCEED ALLOWABLE PROTRUSION. ALL THREAD BOLTS SHALL BE FIELD CUT AND SPRAY GALVANIZED ACCORDING TO ASTM A780.
2. ALL THROUGH-BOLT NUTS SHALL NOT BE TENSIONED BEYOND A SNUG TIGHT CONDITION.
3. MATERIAL LIST QUANTITY IS TOTAL QUANTITY PER STRUCTURE.
4. GROUNDING NUTS SHALL BE 1/2" -13 UNC STAINLESS STEEL HEAVY HEX NUTS WELDED TO POLE. ITEM 216 SHALL BE USED IN LOCATIONS WHERE 5/8" HOLE IS NOT PRESENT.
5. ALL HARDWARE GROUNDING NUTS SHALL BE PLACED ON AHEAD SPAN FACE, STRUCTURE GROUND SHALL BE PLACED ON THE BISECTOR.
6. SWING ANGLE BRACKET INCLUDES WASHERS, NUTS & LOCKNUTS.
7. REFER TO DRAWING 13139-057-T1-0315 FOR GUY DETAILS AND MATERIALS.
8. CORONA RINGS SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.

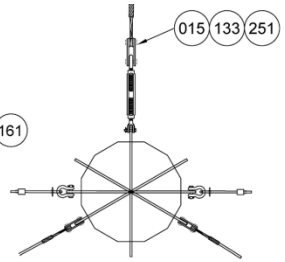
PRELIMINARY
NOT FOR CONSTRUCTION

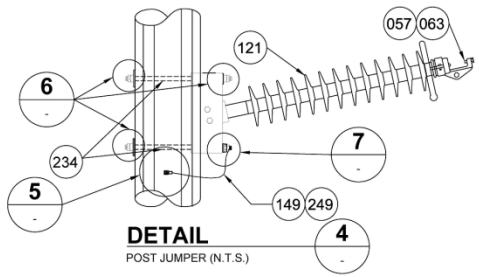
Emmons-Logan 230 kV Transmission Line
Emmons-Logan Wind, LLC
Emmons and Logan Counties, ND

Figure 4-1c
Engineering Design
230 kV Single Circuit Guyed Light Angle (10°-30°) Details
Drawing 13139-057-T1-0206



DETAIL 1
OPGW - DEADEND (N.T.S.)
(ROTATED FOR CLARITY)





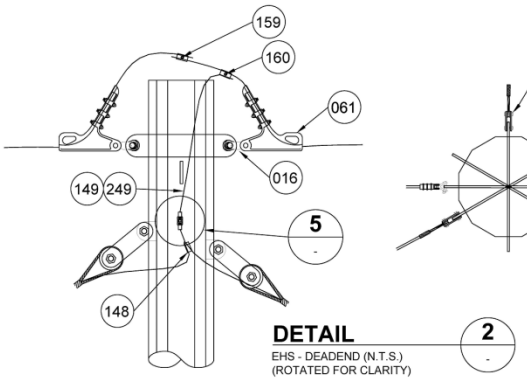
DETAIL 4
POST JUMPER (N.T.S.)

BILL OF MATERIAL

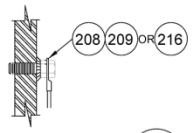
ITEM #	QTY	UNIT	DESCRIPTION	MANUFACTURER/PART #
3	6	EA	ANCHOR SHACKLE WIDE 60K	MACLEAN ASH-66-BC
10	6	EA	Y-CLEVIS SOCKET - 50K	MACLEAN SYC-67
14	6	EA	Y-CLEVIS BALL EXT - 50K (ANSI 52-8 & 52-11)	MACLEAN YCBHL-78
15	2	EA	CLEVIS THIMBLE - 90K	LINDSEY R-22157
16	2	EA	Y-CLEVIS EYE - 19K	MACLEAN YCE-65-625
54	6	EA	DEADEND - COMPRESSION - HORIZONTAL - DRAKE	HUBBELL A03142515S
57	3	EA	TRUNNION - DRAKE	MACLEAN ACTS-200-SS
60	2	EA	FIBERLIGN - U-BOLT DEADEND OPGW (SHACKLE)	PLP 280130952
61	2	EA	QUADRANT CLAMP DEADEND - 3/8 EHS	HUBBELL SWDE55N
63	3	EA	ARMOR ROD - (1.099-1.139) - DRAKE	PLP AR-0141
118*	6	EA	230kV POLYMER INSULATOR - 50k	NGK 502-SCT40-SK-09 MACLEAN S278103VA08
121*	3	EA	230kV POLYMER POST JUMPER	NGK L2-SN584-23-W MACLEAN H2 90 20 086 MA SS 044
133	2	EA	BIG GUY GRIP - 3/4"	PLP BG-2112
148	3	EA	CONNECTOR: #2 Cu to #2 Cu, COMPRESSION	BURNDY YHDC2C
149	15	EA	COMPRESSION TERMINAL: 1/2" TO #2	BURNDY YA2CN
152	3	EA	BONDING CLIP 7/8"	HUGHES BROS. 2727.8
159	1	EA	CONNECTOR: 3/8" TO 3/8" PG CLAMP	AFL OBC-T1-T1-1
160	1	EA	CONNECTOR: 3/8" TO #2 PG CLAMP	AFL OBC-T1-N1-1
161	2	EA	CONNECTOR: OPGW TO #2 PG CLAMP	AFL OBC-E2-N1-1
162	2	EA	CONNECTOR: GUY TO #2 PG CLAMP	AFL OBC-T2-N1-1
208	16	EA	1/2" LOCK WASHER, GALV	ELECTRIC MOTION EM 12L
209	13	EA	1/2" - 13x1" LONG BOLT, GALV	ELECTRIC MOTION EM12C1B
216	3	EA	1/2" x 1/2" BOLT, GALV	ELECTRIC MOTION EM12C12B
220	12	EA	2" (15/16" HOLE) WASHER, GALV	HUGHES BROS. RW2-80
221	15	EA	7/8" HEX NUT, GALV	HUGHES BROS. HN80
222	7	EA	7/8" LOCK NUT, GALV	HUGHES BROS. NL80
234	6	EA	7/8" x XX" ALL-THREAD, GALV (NO NUTS INCLUDED)	HUGHES BROS. TR8XX-FNN
249	75	FT	#2 7 STRAND, FLEXIBLE COPPER	ALL MAKES
250	50	FT	#4 - SOLID HARD DRAWN COPPER	ALL MAKES
251	50	FT	3/4" EHS 19 STRAND	ALL MAKES

* PARTS SHALL NOT BE SUBSTITUTED

HOLD



DETAIL 2
EHS - DEADEND (N.T.S.)
(ROTATED FOR CLARITY)

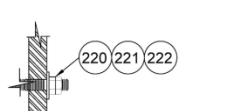


DETAIL 5
GROUNDING NUT (N.T.S.)
(13 LOCATIONS)

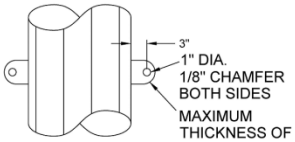
BOLT SCHEDULE - IN-LINE DEADEND

BOLT POSITION	DESCRIPTION	QTY
1 JUMPER POST TOP	7/8" x XX" ALL THREAD, GALV	1
	15/16" WASHER, GALV	2
	7/8" HEX NUT, GALV	2
	7/8" LOCK NUT, GALV	2
2 JUMPER POST BOTTOM	7/8" x XX" ALL THREAD, GALV	1
	15/16" WASHER, GALV	2
	7/8" HEX NUT, GALV	3
	7/8" LOCK NUT, GALV	2

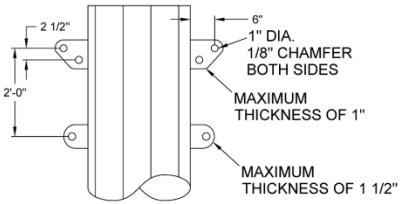
HOLD



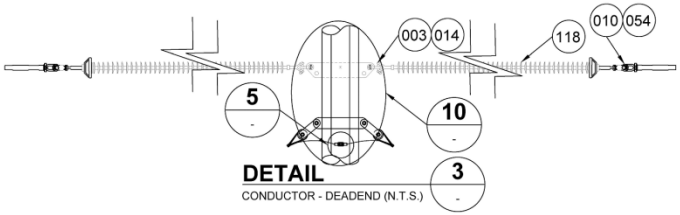
DETAIL 6
HEX - LOCK NUT (N.T.S.)
(9 LOCATIONS)



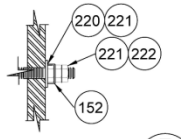
DETAIL 9
OPGW VANG (N.T.S.)



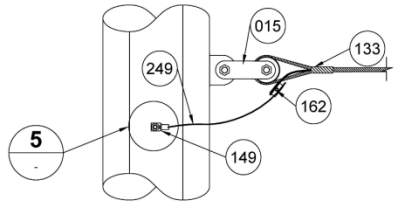
DETAIL 10
CONDUCTOR VANG (N.T.S.)



DETAIL 3
CONDUCTOR - DEADEND (N.T.S.)



DETAIL 7
DOUBLE HEX NUT WITH
BONDING CLIP (N.T.S.)
(3 LOCATIONS)



DETAIL 8
SPAN GUY (N.T.S.)
(ROTATED FOR CLARITY)

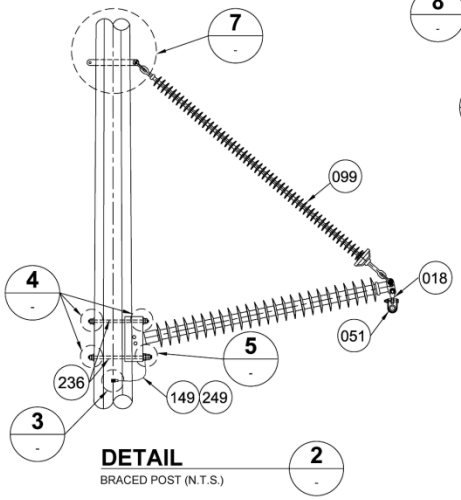
NOTES:

1. BOLTS SHALL PROTRUDE NO MORE THAN 4" PAST THE FACE OF THE ATTACHMENT. IF BOLTS INTERFERE WITH HARDWARE OR EXCEED ALLOWABLE PROTRUSION. ALL THREAD BOLTS SHALL BE FIELD CUT AND SPRAY GALVANIZED ACCORDING TO ASTM A780.
2. ALL THROUGH-BOLT NUTS SHALL NOT BE TENSIONED BEYOND A SNUG TIGHT CONDITION.
3. MATERIAL LIST QUANTITY IS TOTAL QUANTITY PER STRUCTURE.
4. GROUNDING NUTS SHALL BE 1/2" -13 UNC STAINLESS STEEL HEAVY HEX NUTS WELDED TO POLE. ITEM 216 SHALL BE USED IN LOCATIONS WHERE 5/8" HOLE IS NOT PRESENT.
5. ALL HARDWARE GROUNDING NUTS SHALL BE PLACED ON AHEAD SPAN FACE, STRUCTURE GROUND SHALL BE PLACED ON THE BISECTOR.
6. REFER TO DRAWING 13139-057-T1-0315 FOR GUYING DETAILS.
7. CORONA RINGS SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.

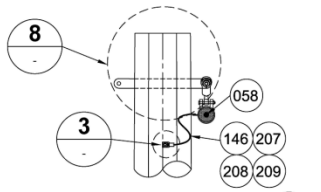
PRELIMINARY
NOT FOR CONSTRUCTION

Emmons-Logan 230 kV Transmission Line
Emmons-Logan Wind, LLC
Emmons and Logan Counties, ND

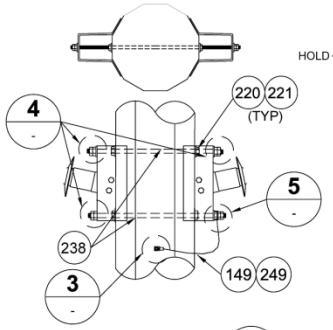
Figure 4-1d
Engineering Design
230 kV Circuit In-line Deadend Details
Drawing 13139-057-T1-0231



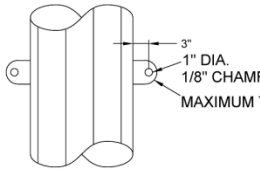
DETAIL 2
BRACED POST (N.T.S.)



DETAIL 1
OPGW SUSPENSION (N.T.S.)



DETAIL 6
BACK TO BACK BRACED POST CONNECTION (N.T.S.)



DETAIL 7
CONDUCTOR VANG

HOLD

BILL OF MATERIAL

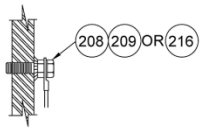
ITEM #	QTY	UNIT	DESCRIPTION	MANUFACTURER/PART #
16	1	EA	Y-CLEVIS EYE - 19K	MACLEAN YCE-65-625
18	4	EA	Y-CLEVIS EYE - 19K	MACLEAN RYCE-65-625
51	3	EA	AGS CLAMP - DRAKE	PLS AGS-5130
58	1	EA	FIBERLIGN - SUSPENSION OPGW W/ Y-CLEVIS	PLP 4300109-YC
61	1	EA	QUADRANT CLAMP DEADEND - 3/8 EHS	HUBBELL SWDE55N
99*	3	EA	230kV BRACED POST - 2.5" POST - 120° GAIN BASE	NGK HV-951 MACLEAN B291089AL99N-60
146*	1	EA	S-STRAP #2 7-STRAND - (2) 0.5" TERMINAL	ELECTRIC MOTION EM02-7S-24-LP
149	4	EA	COMPRESSION TERMINAL: 1/2" TO #2	BURNDY YA2CN
152	2	EA	BONDING CLIP 7/8"	HUGHES BROS. 2727.8
160	1	EA	CONNECTOR: 3/8" TO #2 PG CLAMP	AFL OBC-T1-N1-1
207	1	EA	1/2" HEX NUT, GALV	ELECTRIC MOTION EM12CN
208	5	EA	1/2" LOCK WASHER, GALV	ELECTRIC MOTION EM 12L
209	4	EA	1/2" - 13x1" LONG BOLT, GALV	ELECTRIC MOTION EM12C1B
216	1	EA	1/2" x 1/2" BOLT, GALV	ELECTRIC MOTION EM12C12B
220	12	EA	2" (15/16" HOLE) WASHER, GALV	HUGHES BROS. RW2-80
221	14	EA	7/8" HEX NUT, GALV	HUGHES BROS. HN80
222	8	EA	7/8" LOCK NUT, GALV	HUGHES BROS. MF80
236	2	EA	7/8" x XX" ALL-THREAD, GALV (NO NUTS INCLUDED)	HUGHES BROS. TR8XX-FNN
238	2	EA	7/8" x XX" ALL-THREAD, GALV (NO NUTS INCLUDED)	HUGHES BROS. TR8XX-FNN
249	24	FT	#2 - 7 STRAND FLEXIBLE COPPER	ALL MAKES

* PARTS SHALL NOT BE SUBSTITUTED

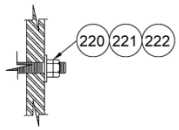
BOLT SCHEDULE - 230kV TANGENT

BOLT POSITION	DESCRIPTION	QTY
1 PHASE 1 POST TOP	7/8" x XX" ALL THREAD, GALV	1
	15/16" WASHER, GALV	2
	7/8" HEX NUT, GALV	2
	7/8" LOCK NUT, GALV	2
2 PHASE 1 POST BOTTOM	7/8" x XX" ALL THREAD, GALV	1
	15/16" WASHER, GALV	2
	7/8" HEX NUT, GALV	3
	7/8" LOCK NUT, GALV	2
3 PHASE 2&3 POST TOP	7/8" x XX" ALL THREAD, GALV	1
	15/16" WASHER, GALV	4
	7/8" HEX NUT, GALV	4
	7/8" LOCK NUT, GALV	2
4 PHASE 2&3 POST BOTTOM	7/8" x XX" ALL THREAD, GALV	1
	15/16" WASHER, GALV	4
	7/8" HEX NUT, GALV	5
	7/8" LOCK NUT, GALV	2

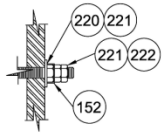
HOLD



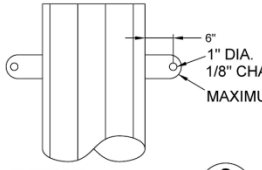
DETAIL 3
GROUNDING NUT (N.T.S.)
(4 LOCATIONS)



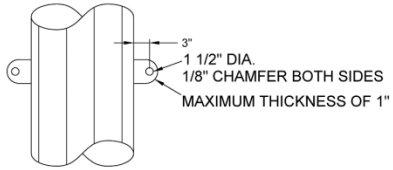
DETAIL 4
HEX - LOCK NUT (N.T.S.)
(6 LOCATIONS)



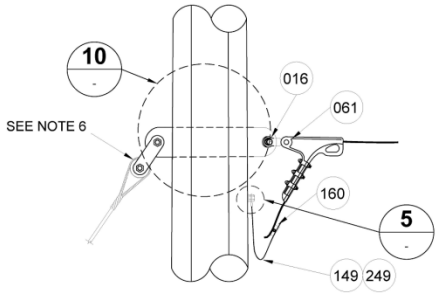
DETAIL 5
DOUBLE HEX NUT WITH BONDING CLIP (N.T.S.)
(2 LOCATIONS)



DETAIL 8
OPGW VANG



DETAIL 10
SW DE CONDUCTOR VANG



DETAIL 9
SHIELD WIRE DEADEND (N.T.S.)
(ROTATED FOR CLARITY)

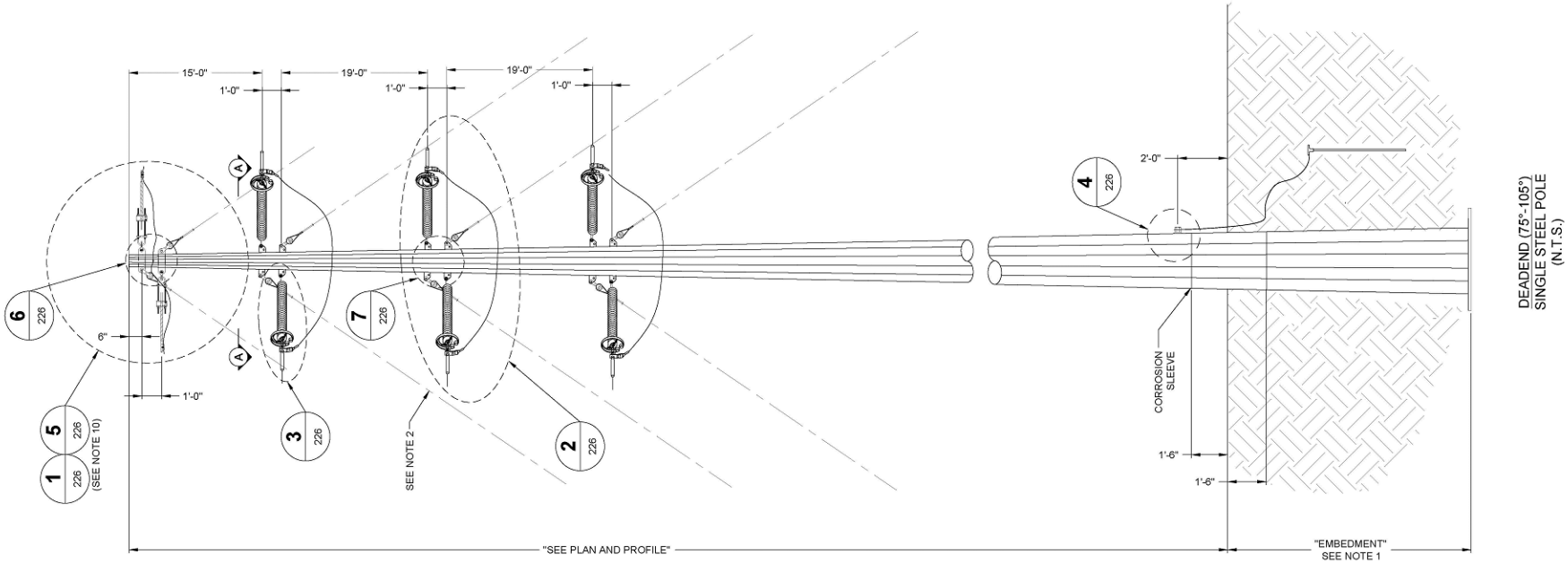
NOTES:

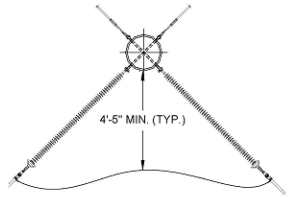
1. BOLTS SHALL PROTRUDE NO MORE THAN 4" PAST THE FACE OF THE ATTACHMENT. IF BOLTS INTERFERE WITH HARDWARE OR EXCEED ALLOWABLE PROTRUSION. ALL THREAD BOLTS SHALL BE FIELD CUT AND SPRAY GALVANIZED ACCORDING TO ASTM A780.
2. ALL THROUGH-BOLT NUTS SHALL NOT BE TENSIONED BEYOND A SNUG TIGHT CONDITION.
3. MATERIAL LIST QUANTITY IS TOTAL QUANTITY PER STRUCTURE.
4. GROUNDING NUTS SHALL BE 1/2" -13 UNC STAINLESS STEEL HEAVY HEX NUTS WELDED TO POLE. ITEM 216 SHALL BE USED IN LOCATIONS WHERE 5/8" HOLE IS NOT PRESENT.
5. ALL HARDWARE GROUNDING NUTS SHALL BE PLACED ON AHEAD SPAN FACE, STRUCTURE GROUND SHALL BE PLACED ON THE BISECTOR.
6. REFER TO DRAWING 13139-057-T1-0315 FOR GUYING DETAILS.

PRELIMINARY
NOT FOR CONSTRUCTION

Emmons-Logan 230 kV Transmission Line
Emmons-Logan Wind, LLC
Emmons and Logan Counties, ND

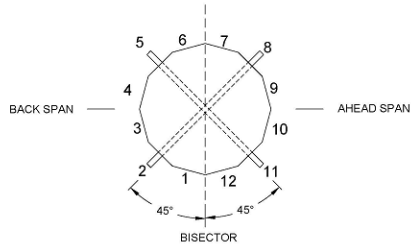
Figure 4-1e
Engineering Design
230 kV Single Circuit Tangent – SW DE Details
Drawing 13139-057-T1-0211





SECTION A-A
JUMPER ASSEMBLY (N.T.S.)

GUY ARRANGEMENT - PLAN
(N.T.S.)



VANG ARRANGEMENT
(N.T.S.)

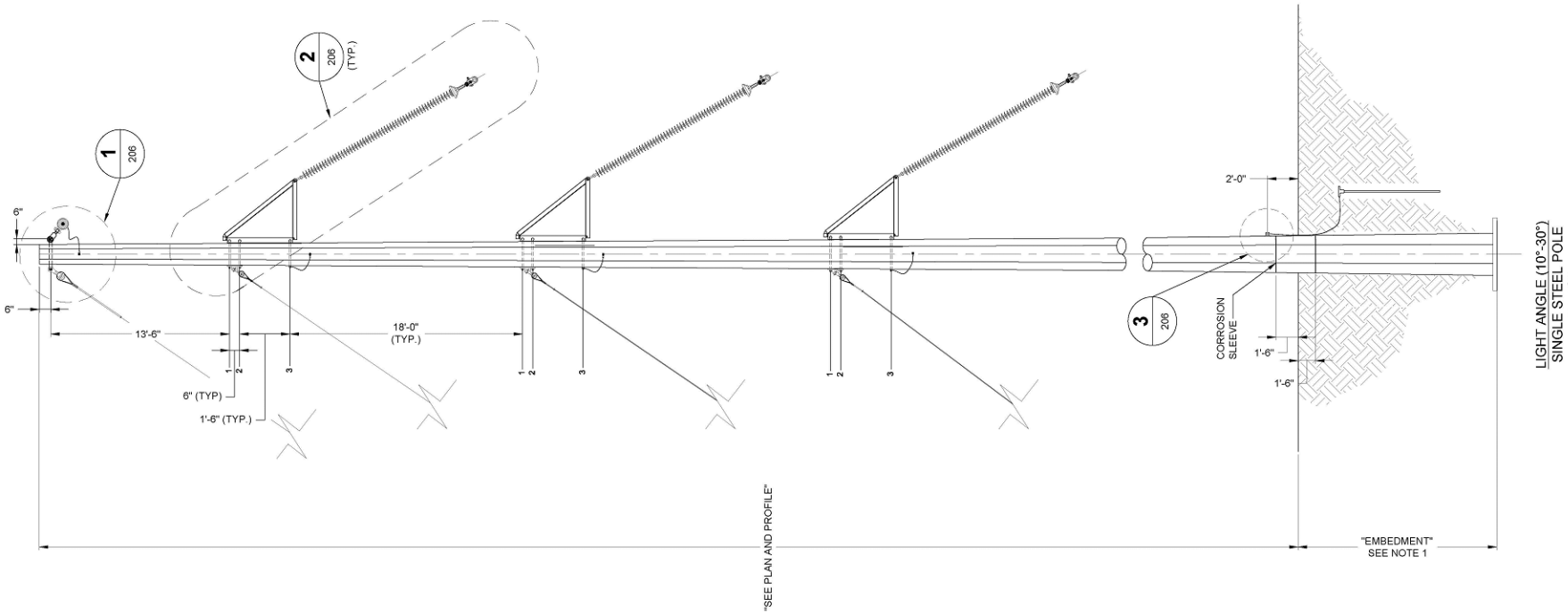
NOTES:

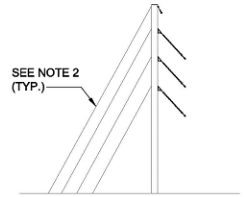
1. REFER TO DRAWING 13139-057-T1-0350 FOR DIRECT EMBEDMENT DETAILS AND 13139-057-T1-0351 FOR EMBEDMENT SCHEDULE.
2. REFER TO DRAWING 13139-057-T1-0315 FOR GUYING DETAILS.
3. REFER TO DRAWING 13139-057-T1-0325 FOR SIGN DETAILS.
4. REFER TO DRAWING 13139-057-T1-0300 FOR STRUCTURE GROUNDING REQUIREMENTS.
5. STRUCTURE ARRANGEMENT SHALL BE ACCORDING TO PHASING DIAGRAM 13139-057-T1-0600.
6. CORROSION SLEEVE THICKNESS AND COATING DETAILS SHALL BE ACCORDING TO PROJECT STEEL POLE SPECIFICATION.
7. ELEVATION VIEW IS SHOWN LOOKING AT THE BISECTOR.
8. FOR ADDITIONAL FRAMING DETAILS AND BILL OF MATERIAL REFER TO DEADEND DETAIL SHEET 13139-057-T1-0226.
9. THROUGH BOLT HOLE SIZE SHALL BE 15/16" UNLESS SPECIFIED OTHERWISE.
10. ITEMS INDENTIFIED ARE ONLY USED ON STRUCTURE XXXX WHEN TWO SHIELD WIRES ARE ATTACHED AT SAME CONNECTION LOCATION. (HOLD)
11. FOR ANCHOR LOCATIONS REFER TO CONSTRUCTION STAKING.

PRELIMINARY
NOT FOR CONSTRUCTION

Emmons-Logan 230 kV Transmission Line
Emmons-Logan Wind, LLC
Emmons and Logan Counties, ND

Figure 4-2a
Transmission Pole Design
230 kV Single Circuit Guyed (75°-105°) Framing
Drawing 13139-057-T1-0225





BISECTOR GUY ARRANGEMENT - PROFILE
(N.T.S.)

BISECTOR GUY ARRANGEMENT - PLAN
(N.T.S.)

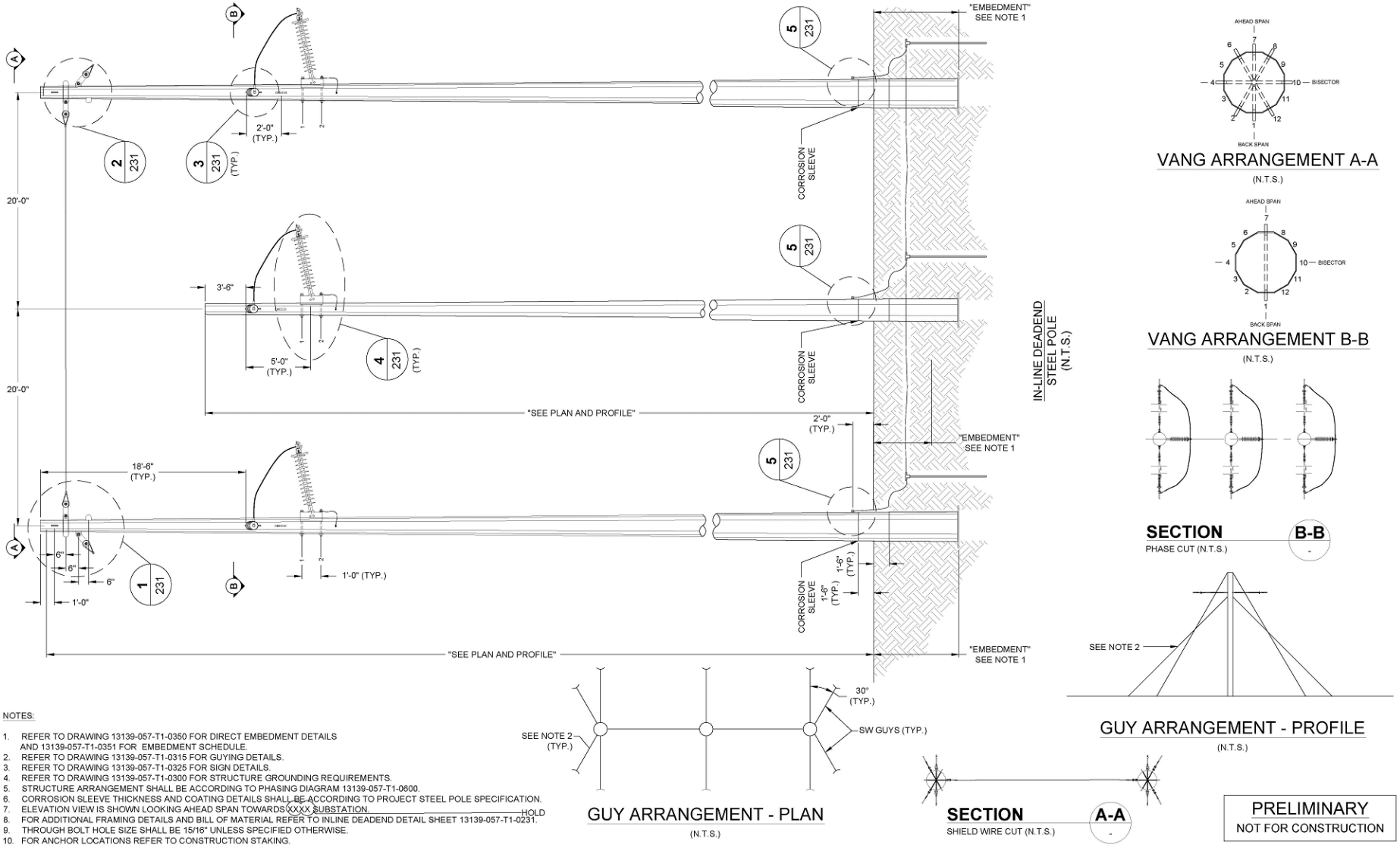
PRELIMINARY
NOT FOR CONSTRUCTION

NOTES:

1. REFER TO DRAWING 13139-057-T1-0350 FOR DIRECT EMBEDMENT DETAILS AND 13139-057-T1-0351 FOR EMBEDMENT SCHEDULE.
2. REFER TO DRAWING 13139-057-T1-0315 FOR GUYING DETAILS.
3. REFER TO DRAWING 13139-057-T1-0325 FOR SIGN DETAILS.
4. REFER TO DRAWING 13139-057-T1-0300 FOR STRUCTURE GROUNDING DETAILS.
5. STRUCTURE ARRANGEMENT SHALL BE ACCORDING TO PHASING DIAGRAM 13139-057-T1-0600.
6. CORROSION SLEEVE THICKNESS AND COATING DETAILS SHALL BE ACCORDING TO PROJECT STEEL POLE SPECIFICATION.
7. ELEVATION VIEW IS SHOWN LOOKING AHEAD SPAN TOWARDS XXXX SUBSTATION FOR RIGHT LINE ANGLES. HOLD
8. FOR ADDITIONAL FRAMING DETAILS AND BILL OF MATERIAL REFER TO LIGHT ANGLE DETAIL SHEET 13139-057-T1-0206.
9. THROUGH BOLT HOLE SIZE SHALL BE 15/16" UNLESS SPECIFIED OTHERWISE.
10. FOR ANCHOR LOCATIONS REFER TO CONSTRUCTION STAKING.

Emmons-Logan 230 kV Transmission Line
Emmons-Logan Wind, LLC
Emmons and Logan Counties, ND

Figure 4-2b
Transmission Pole Design
230 kV Single Circuit Guyed Light Angle (10°-30°) Framing
Drawing 13139-057-T1-0205



Emmons-Logan 230 kV Transmission Line

Emmons-Logan Wind, LLC

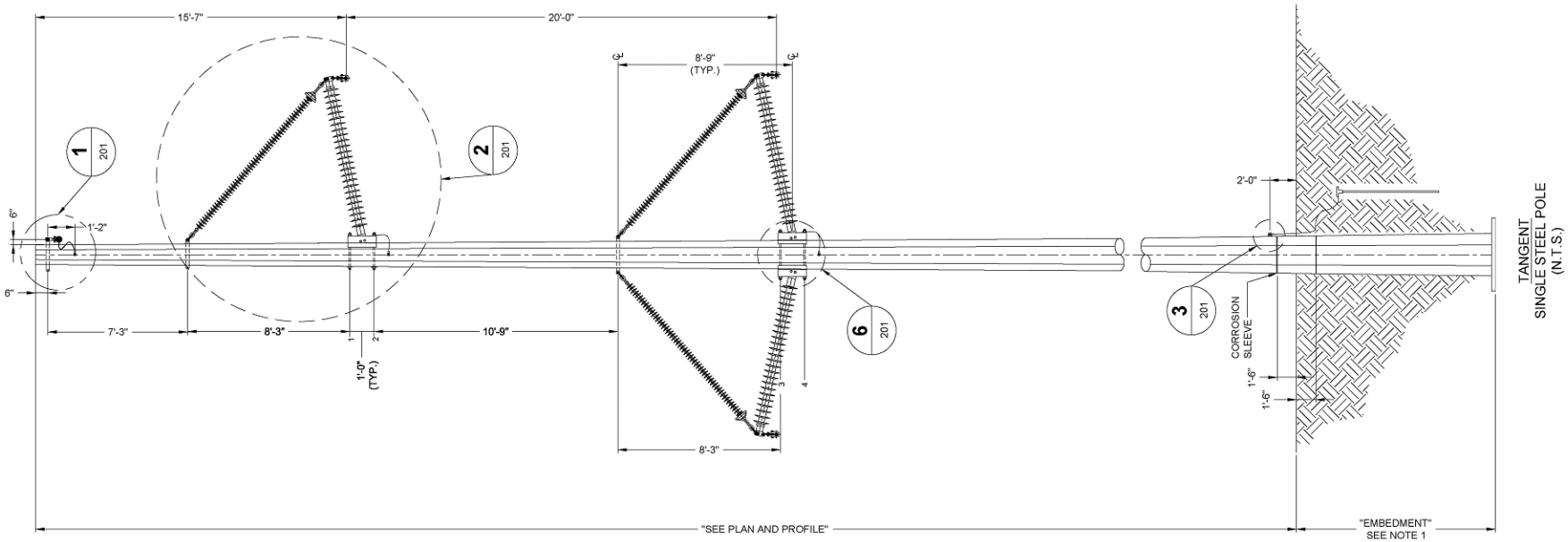
Emmons and Logan Counties, ND

Figure 4-2c

Transmission Pole Design

230 kV Single Circuit In-line Deadend Framing

Drawing 13139-057-T1-0230



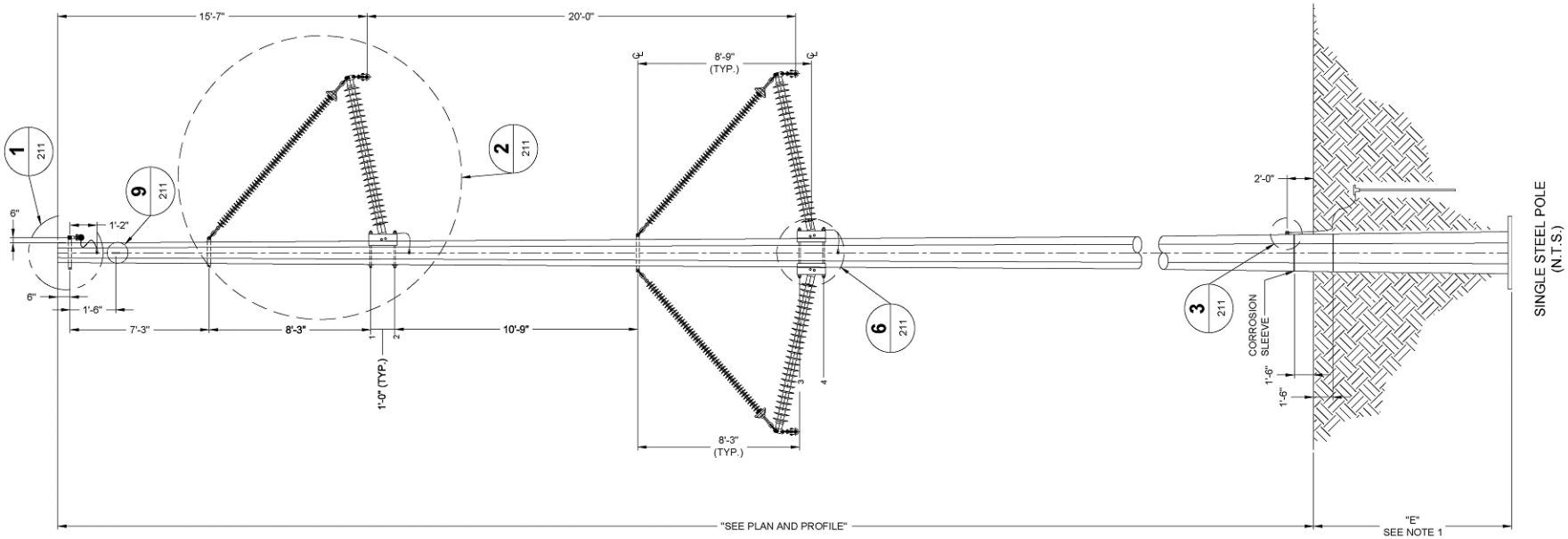
NOTES:

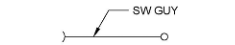
1. REFER TO DRAWING 13139-057-T1-0350 FOR DIRECT EMBEDMENT DETAILS AND 13139-057-T1-0351 FOR EMBEDMENT SCHEDULE.
2. REFER TO DRAWING 13139-057-T1-0325 FOR SIGN DETAILS.
3. REFER TO DRAWING 13139-057-T1-0300 FOR STRUCTURE GROUNDING REQUIREMENTS.
4. STRUCTURE ARRANGEMENT SHALL BE ACCORDING TO PHASING DIAGRAM 13139-057-T1-0600.
5. CORROSION SLEEVE THICKNESS AND COATING DETAILS SHALL BE ACCORDING TO PROJECT STEEL POLE SPECIFICATION.
6. ELEVATION VIEW IS SHOWN LOOKING AHEAD SPAN TOWARDS XXXX SUBSTATION. HOLD
7. FOR ADDITIONAL FRAMING DETAILS AND BILL OF MATERIAL REFER TO DWG 13139-057-T1-0201.
8. THROUGH BOLT HOLE SIZE SHALL BE 15/16" UNLESS SPECIFIED OTHERWISE.
9. CORONA RINGS SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.

PRELIMINARY
NOT FOR CONSTRUCTION

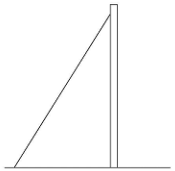
Emmons-Logan 230 kV Transmission Line
Emmons-Logan Wind, LLC
Emmons and Logan Counties, ND

Figure 4-2d
Transmission Pole Design
230 kV Single Circuit Tangent Framing
Drawing 13139-057-T1-0200





GUY ARRANGEMENT - PLAN



GUY ARRANGEMENT - PROFILE
(ROTATED FOR CLARITY)

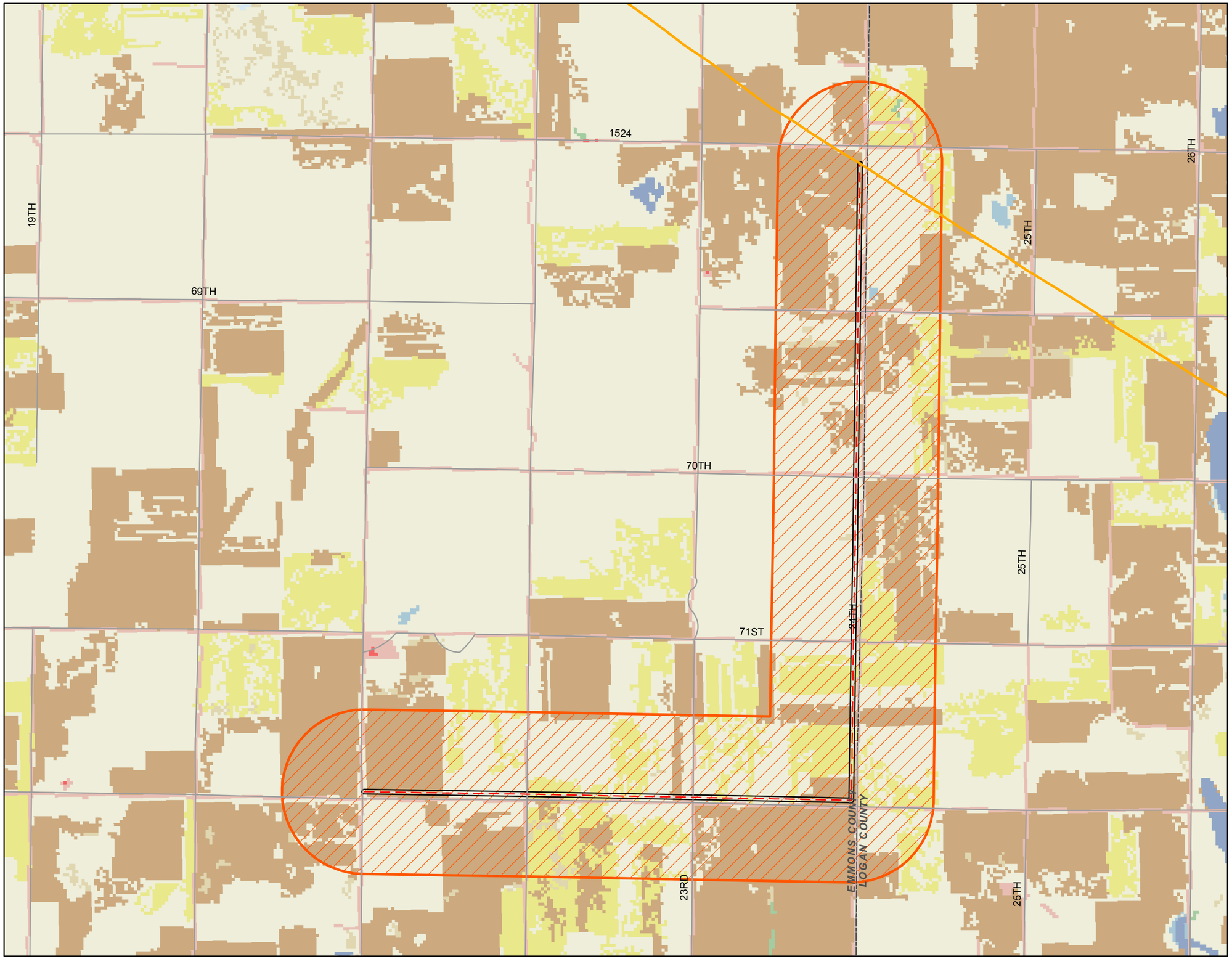
NOTES:

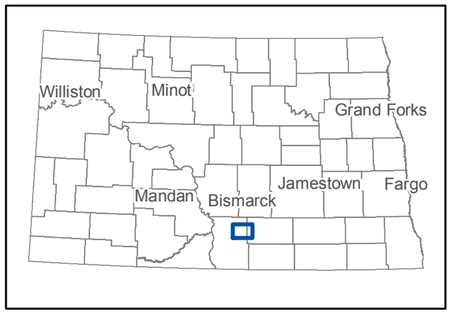
1. REFER TO DRAWING 13139-057-T1-0350 FOR DIRECT EMBEDMENT DETAILS AND 13139-057-T1-0351 FOR EMBEDMENT SCHEDULE.
2. REFER TO DRAWING 13139-057-T1-0315 FOR GUYING DETAILS.
3. REFER TO DRAWING 13139-057-T1-0325 FOR SIGN DETAILS.
4. REFER TO DRAWING 13139-057-T1-0300 FOR STRUCTURE GROUNDING REQUIREMENTS.
5. STRUCTURE ARRANGEMENT SHALL BE ACCORDING TO PHASING DIAGRAM 13139-057-T1-0600. HOLD
6. CORROSION SLEEVE THICKNESS AND COATING DETAILS SHALL BE ACCORDING TO PROJECT STEEL POLE SPECIFICATION.
7. ELEVATION VIEW IS SHOWN LOOKING AHEAD SPAN TOWARDS XXXX SUBSTATION. HOLD
8. FOR ADDITIONAL FRAMING DETAILS AND BILL OF MATERIAL REFER TO DWG 13139-057-T1-0201.
9. THROUGH BOLT HOLE SIZE SHALL BE 15/16" UNLESS SPECIFIED OTHERWISE.
10. CORONA RINGS SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.

PRELIMINARY
NOT FOR CONSTRUCTION

Emmons-Logan 230 kV Transmission Line
Emmons-Logan Wind, LLC
Emmons and Logan Counties, ND

Figure 4-2e
Transmission Pole Design
230 kV Single Circuit Tangent – SW DE Framing
Drawing 13139-057-T1-0210





Legend

- Existing 230kV Heskett-Wishek Transmission Line
- County Road
- County Boundary

Project Features

- Project Route
- Project Right-of-Way
- Project Corridor

NLCD Land Cover (Homer et al. 2015)

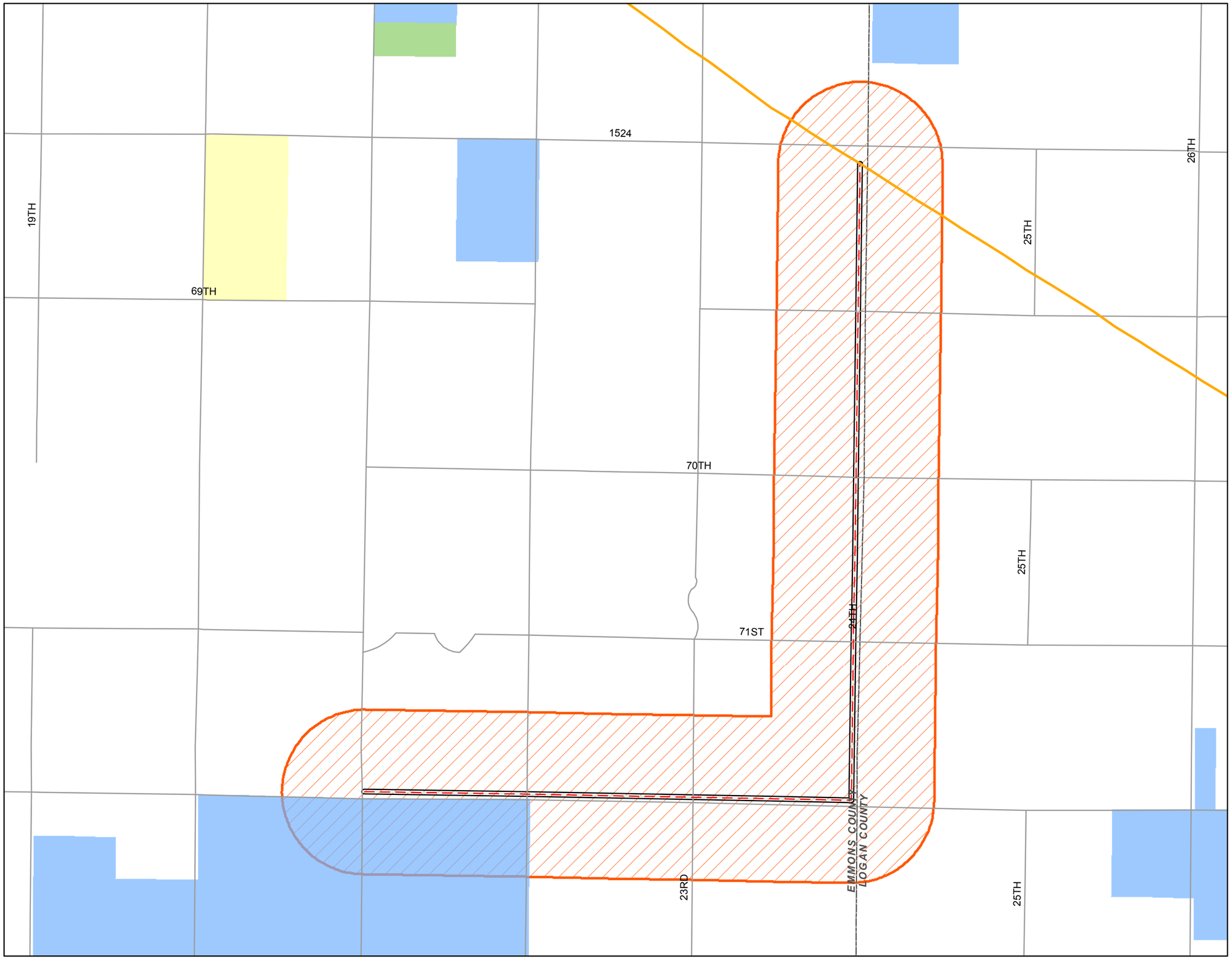
- Cultivated Crops
- Deciduous Forest
- Developed, Low Intensity
- Developed, Medium Intensity
- Developed, Open Space
- Emergent Herbaceous Wetlands
- Grassland/ Herbaceous
- Open Water
- Pasture/Hay
- Shrub/Scrub
- Woody Wetlands

0 0.5 1 Miles

Figure 5-1
Land Cover
Emmons-Logan 230 kV Transmission Line
Emmons and Logan Counties, ND

N W E S

AECOM



Legend

- Existing 230kV Heskett-Wishek Transmission Line
- County Boundary
- County Road
- State Trust Land
- USFWS Grassand/Wetland Easement
- USFWS Wetland Easement

Project Features

- Project Route
- Project Right-of-Way
- Project Corridor

0 0.5 1 Miles

Figure 5-2

Public Lands & Easements

Emmons-Logan 230 kV Transmission Line
Emmons and Logan Counties, ND

N W E S

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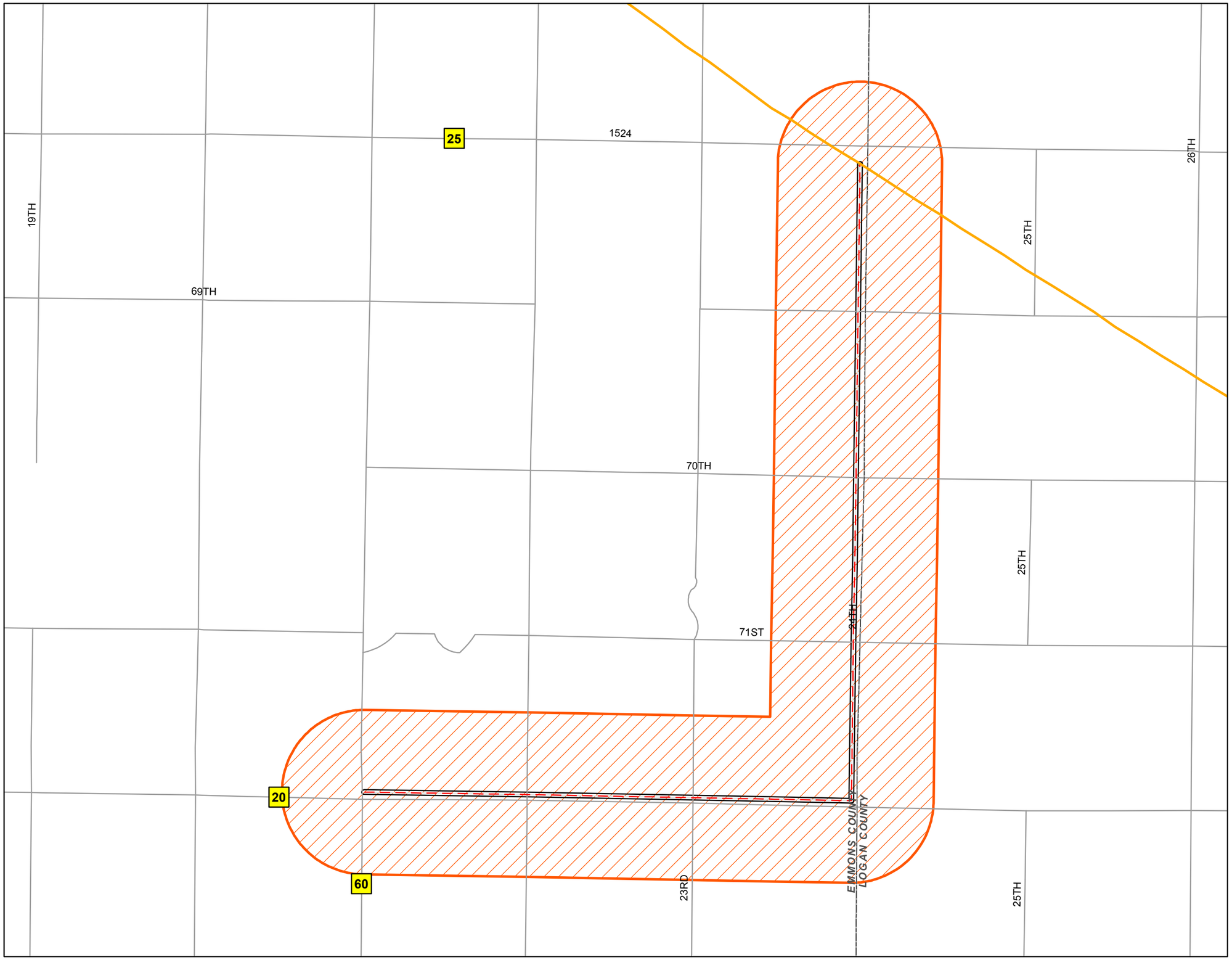


Legend

- Existing 230kV Heskett-Wishek Transmission Line
- County Boundary
- County Road
- 25 Average Daily Traffic (NDDOT 2018)

Project Features

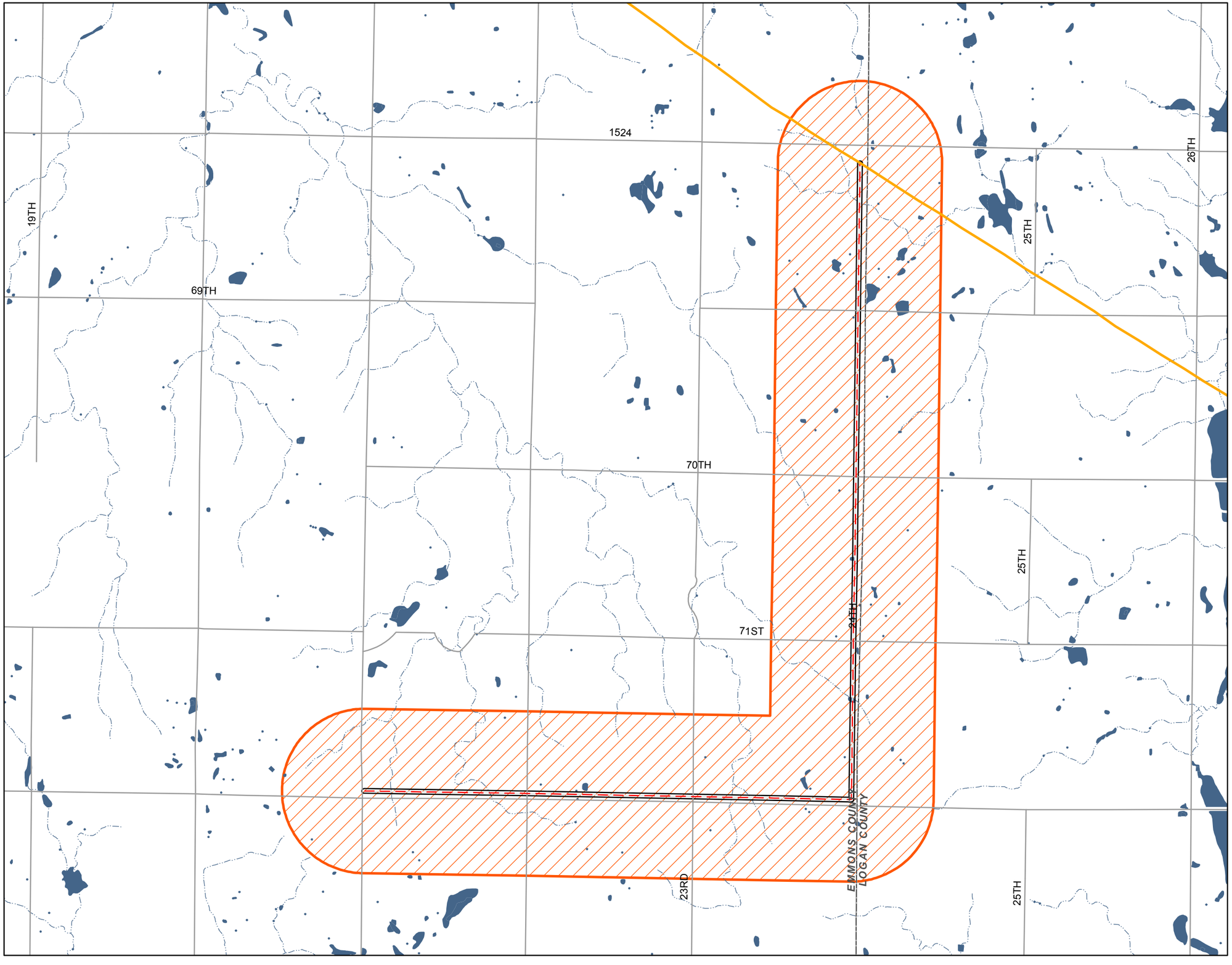
- Project Route
- Project Right-of-Way
- Project Corridor

0 0.5 1 Miles

Figure 5-3
Average Daily Traffic
Emmons-Logan 230 kV Transmission Line
Emmons and Logan Counties, ND

N W E S

AECOM



Legend

- Existing 230kV Heskett-Wishek Transmission Line
- County Boundary
- County Road
- National Wetlands Inventory (USFWS 2018)
- National Hydrography Dataset (USGS 2018)

Project Features

- Project Route
- Project Right-of-Way
- Project Corridor

0 0.5 1 Miles

Figure 5-4

National Wetlands Inventory and Surface Waters

Emmons-Logan 230 kV Transmission Line
Emmons and Logan Counties, ND

N W E S

AECOM

Appendix A

Excerpt of NextEra Energy, Inc.’s 2017 Corporate Responsibility Report

2017 | CORPORATE RESPONSIBILITY EXECUTIVE DIGEST

CORPORATE PROFILE

NEXTera® ENERGY

INVESTING IN AMERICA'S ENERGY INFRASTRUCTURE SUSTAINABLY AND RESPONSIBLY


Jim Robo

Our Vision

Be North America's Leader in the Generation and Delivery of Clean Energy

Our Values

We Are Committed to Excellence
We Do the Right Thing
We Treat People with Respect

NYSE Ticker Symbol: NEE

Recognitions

- Most Admired Companies (Fortune magazine) – No. 1 in electric & gas utilities industry – 10 times, incl. 2017
- A World's Most Ethical Company® (Ethisphere Institute) – 10 times, incl. 2017
- No. 1 Green Utility in U.S. and No. 4 in the world (EI Energy Intelligence)
- Florida Employer Support of the Guard and Reserves "Above and Beyond Award" – three times, incl. 2016
- A Fortune 200 company; included in S&P 100 Index

At a Glance (2016)

~14,700 employees	~$2.9 billion in net income
Operations in 30 U.S. states, four Canadian provinces	~$90 billion in total assets
~$16.2 billion in operating revenue	~45,900 megawatts (MW) in total generation capacity

Data in At A Glance is as of Dec. 31, 2016.

Cautionary statements and risk factors that may affect future results can be found on the inside back cover of this report.

To view our complete Corporate Responsibility Report, visit **NextEraEnergy.com/CRR**.

As our nation and our world continue to grow and change, we at NextEra Energy remain committed to doing so sustainably.

We're one of America's largest infrastructure developers, and by investing in infrastructure we're creating a more sustainable world. We've invested more than $75 billion across the U.S. since 2004, and we plan to invest billions more through 2020. This new infrastructure includes strengthening power lines, as well as new natural gas-fired generation in Florida. It includes a multistate natural gas pipeline in the Southeast and another in the Mid-Atlantic. And, it includes more than a thousand wind turbines and millions of solar panels across America.

Our investments in infrastructure create significant benefits for our stakeholders:

- **For our environment: NextEra Energy and our affiliates generate more energy from the wind and sun than any other company in the world. We now own and operate approximately 16 percent of the U.S. wind capacity and roughly 11 percent of the U.S. universal solar capacity, both more than anyone else.**
- **For our customers: At our regulated electric utility, Florida Power & Light Company, we continue to deliver high reliability, award-winning customer service, a clean emissions profile and low bills to our nearly 5 million customers.**
- **For our communities: Our investments across North America create jobs and economic opportunity, including in many rural communities, and our tax payments provide funding for schools, emergency services and other local needs. Our employees logged more than 85,000 volunteer hours in 2016.**
- **For our shareholders: We have delivered higher total shareholder return than 71 percent of the companies in the S&P 500 Index over the last 10 years. We have also outperformed our peer utility companies in total shareholder return over the last five years, seven years and 10 years.**

Investing in infrastructure is how NextEra Energy helps make our country and our world more sustainable and more successful. Our team works hard to advance that vision every day. We salute every person, company, school, supplier, government agency and charitable organization that has a similar passion for sustainability, and we appreciate the opportunity to work together to create a more sustainable world.

You can find more details on our sustainability performance throughout this report and on our company websites, including NextEraEnergy.com, FPL.com and NextEraEnergyResources.com.

Sincerely,

Jim Robo
Chairman and Chief Executive Officer

Floridians benefit from clean, emissions-free, U.S.-produced solar energy generated at FPL's Manatee Solar Energy Center in Parrish, Florida.

Respecting Our Environment

- NextEra Energy's emissions rates of carbon dioxide (CO_2), sulfur dioxide (SO_2) and nitrogen oxide (NOx) are substantially better than the U.S. electric sector averages.
- We continue to be the world's largest generator of renewable energy from the wind and the sun.
- Nearly 99 percent of the water we use is returned to its original source.
- We are committed to interacting with nature in a positive manner and have developed wildlife programs to protect a number of species and their habitats.

IN 2016 ALONE, NEARLY 64 MILLION TONS OF CO_2 WERE AVOIDED THANKS TO NEXTERA ENERGY'S EMISSIONS-FREE WIND, SOLAR AND NUCLEAR POWER GENERATION.

The environmental attributes of NextEra Energy's electric generation facilities, such as renewable energy credits, emissions reductions, offsets, allowances, and the avoided emission of greenhouse gas pollutants, have been or likely will be sold or transferred to third parties, who are solely entitled to the reporting rights to any federal, state, foreign or voluntary emissions trading program and to ownership of such environmental attributes.

To view our complete Corporate Responsibility Report, visit **NextEraEnergy.com/CRR**.

OUR EMISSIONS RATES ARE SUBSTANTIALLY BETTER THAN THE U.S. ELECTRIC SECTOR AVERAGES

53% LOWER CO_2

94% LOWER SO_2

74% LOWER NOx

Kurtis Hill, a member of the National Guard and a wind technician with NextEra Energy Resources, uses an iPad® to plan and execute work at the Peetz Table Wind Energy Center in Logan County, Colorado.

Outstanding Customer Value

- Our customers range from homes and businesses to utilities, retail electricity providers, power cooperatives, municipalities and, increasingly, individual companies committed to renewable and sustainable energy.
- In 2017, FPL was recognized as one of the most trusted U.S. electric utilities by Market Strategies International. We're committed to doing the right thing for our customers, and we challenge ourselves each and every day to enhance the service we provide our customers.
- The investments we make in our nation's electric infrastructure provide these customers with affordable, reliable and clean energy.
- At FPL, our typical residential customer bill is lower than it was 10 years ago.

care to share

Since 1994, the Care To Share® program raised more than

$22.5 million

helping 89,000 families

To view our complete Corporate Responsibility Report, visit **NextEraEnergy.com/CRR**.

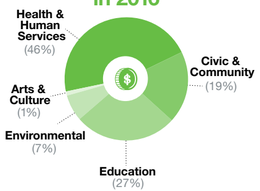
These FPL employees and thousands of their colleagues are working daily to provide affordable, reliable and clean energy to Floridians.

FPL customers can discover ways to save money by visiting **FPL.COM/ENERGYDASHBOARD**

Sustaining Our Communities

- As part of our signature Power to Care volunteer program, our employee volunteers contributed more than 85,000 hours in 2016 to our communities through company-sponsored projects and personal volunteer time.
- To spark student interest in science, technology, engineering and math (STEM), we sponsor more than 70 robotics teams or clubs at all grade levels, as well as science shows, solar education stations and other programs that use real-life applications to motivate our future workforce.
- Our employees and company contributed $15 million in 2016 to support initiatives that contribute to the well-being of our communities.

Charitable Giving in 2016



To view our complete Corporate Responsibility Report, visit **NextEraEnergy.com/CRR**.

NextEra Energy employee volunteers working with Whole Foods® Market packed hurricane kits to benefit patrons of Meals on Wheels.

In 2016, our employees

Raised more than $**3.7 million** for the community

Donated $**143,000** worth of **Dollars for Doers** grants

Volunteered **85,000** hours of service

Logged **22**% more service hours than in 2015

Expanded CEO Volunteer Circle membership to **270** employees

Investing in Our Team

- Our 2016 safety performance was 63 percent better than 10 years ago.
- Through our NextEra University and other venues, our employees spent approximately 1 million hours in 2016 growing their skills, completing 850,000 individual training sessions.
- The NextEra Health & Well-Being program provides information, motivation and on-site facilities to help employees take care of themselves and their families.
- We encourage and value a diverse and inclusive work environment, stressing these values in our recruiting, development, internal knowledge sharing and community involvement.

STRIVING TO BE WELL IN 2016

58	On-site fitness centers
17,000	On-site health center visits
4,000	On-site wellness screenings
5,000	Employees attended nearly 200 health and wellness presentations

To view our complete Corporate Responsibility Report, visit **NextEraEnergy.com/CRR**.

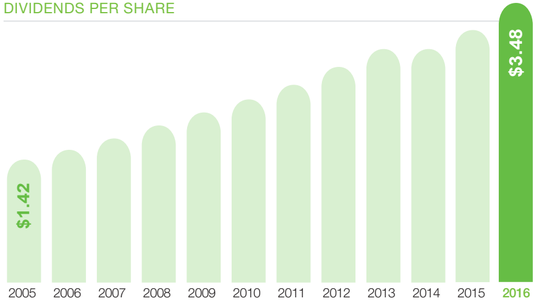
Training in this control room simulator underscores NextEra Energy's commitment to the safe and efficient operation of our nuclear power plant fleet.

850,000
TRAINING SESSIONS COMPLETED

Growing Shareholder Value

- NextEra Energy delivered a 10-year total shareholder return through Dec. 31, 2016, of approximately 206 percent, compared with 96 percent for the S&P 500 Utilities Index and 96 percent for the S&P 500 Index.
- We achieved a compound annual growth rate in dividends per share of approximately 8.5 percent since 2005 through Dec. 31, 2016.
- We continue to maintain strong credit ratings.

DIVIDENDS PER SHARE



To view our complete Corporate Responsibility Report, visit **NextEraEnergy.com/CRR**.

Value creation at NextEra Energy is everyone's business. Here, employees use leading-edge technology to help FPL produce its best-ever service reliability in 2016, ranking among the best in the nation among all investor-owned energy companies.

No. **170**
FORTUNE 500, 2017

TOTAL SHAREHOLDER RETURN
206%
over the last decade, outperforming our peers and the S&P 500
10 years ending 12/31/16

NEXTera ENERGY

NextEra Energy

Building America's Energy Infrastructure

At NextEra Energy, we're investing in infrastructure for this and future generations.

NextEra Energy is an industry leader

- We are among the top 10 companies in the world, across all industries, in: 1) innovation, 2) social responsbility and 3) use of corporate assets (Fortune magazine).
- We generate more electricity than any other electric utility in the U.S.
- We generate more wind and solar energy than any other company in the world.

NextEra Energy is one of America's largest investors in infrastructure

- We made U.S. capital investments of more than $75 billion from 2004 through 2016.
- We are among the largest capital investors in any industry.
- From 2017 through 2020, we plan new infrastructure investment of tens of billions more.

NextEra Energy's infrastructure delivers economic benefits across America

- We employ approximately 14,700 workers in the U.S.
- We paid $580 million in property taxes in 2016, providing communities with much-needed funding for schools, emergency services and other local needs.

Production Technician Troy Munroe is pictured at the Port Everglades Next Generation Clean Energy Center in Florida. This fuel-efficient facility generates clean, affordable and reliable electricity for thousands of residential and business customers.

WE INVESTED MORE THAN $75 BILLION IN U.S. ENERGY INFRASTRUCTURE FROM 2004 THROUGH 2016

NextEra Energy at a Glance (2016)

Operating Revenue	~$16.2 billion
Operations in	30 U.S. states, 4 Canadian provinces
Total Generating Capacity	~45,900 MW
Number of Employees	~14,700

Florida Power & Light Company

Smart, Affordable, Reliable, Clean

With residential bills significantly lower than the national and Florida averages, FPL's focus continues to be on finding smart investments to lower costs, improve reliability and provide clean energy solutions for the benefit of our customers.

Sheep are used at the DeSoto Solar Energy Center as an environmentally responsible method to prevent weeds and slow the growth of grass.

Most Reliable U.S. Electric Utility

As a result of its ongoing investments to enhance service reliability, FPL delivered its best-ever service reliability in 2016, ranking highest among all investor-owned energy companies in Florida and among the best in the nation for the second consecutive year.

Since 2006, FPL has invested nearly $3 billion to strengthen its electric system, resulting in fewer and shorter customer interruptions of service.

Over the next four years, the company plans to make further investments to improve reliability by continuing to strengthen and automate its transmission and distribution system.

Continuing to Modernize Our Fleet

At FPL, we continue to advance our strategy of making smart, long-term investments in clean energy infrastructure, while keeping electric bills low, reliability high, and delivering superior customer value.

Clean Natural Gas

Progress continues on the approximately 1,750-MW Okeechobee Clean Energy Center that is scheduled to begin operation in mid-2019.

We also plan to modernize one of FPL's oldest power plants in Dania Beach, Florida, with a new approximately 1,200-MW high efficiency natural gas plant that is expected to begin serving FPL customers by mid-2022.

Phasing Out Coal Plants

Over the last two years, FPL has bought out existing contracts with two independent coal-fired power plants with the goal of shutting down both plants, saving hundreds of millions of dollars for customers and significantly reducing emissions.

- The first of these, the Cedar Bay plant in Jacksonville, ceased operations in 2016.
- FPL also has significantly reduced operations at the Indiantown plant in Martin County and it is on track to be retired by 2019.

Also, in 2017, FPL reached a preliminary agreement with JEA to close the St. Johns River Power Park, an approximately 1,300-MW coal-fired power plant jointly owned by the two utilities. If finalized, retirement of St. Johns in 2018 is expected to produce $183 million in savings for FPL customers and eliminate 5.6 million tons of carbon dioxide emissions annually.

Advancing Universal Solar Cost-Effectively For All Customers

Our universal solar energy centers generate clean, zero-emissions power for all FPL customers by using the sun for fuel. Universal solar is the fastest and most cost-effective way to bring more solar to more Floridians.

In 2016, we built three, 74.5-MW universal solar energy centers, each capable of generating enough solar to power about 15,000 homes.

We're leading one of the largest solar expansions ever in the eastern United States. Construction is underway at eight 74.5-MW solar energy centers across FPL's service area. Once complete, the eight solar energy centers will produce 600 MW of combined solar capacity – enough to power approximately 120,000 homes. Those eight facilities alone will feature 2.5 million solar panels that could wrap around Florida's coastline more than two times.

BY EARLY 2018,
WE'RE BUILDING
8 NEW SOLAR ENERGY CENTERS
COMPRISED OF
2.5 MILLION SOLAR PANELS

THAT'S ENOUGH TO
WRAP AROUND FLORIDA'S COASTLINE
2X

One of the Largest U.S. Electric Utilities	
Customer Accounts	~5 million
People Served	~10 million
Employees	~8,900
Generating Capacity	~26,000 MW
Substations	~600
Power Lines	~74,800 miles

NextEra Energy Resources, LLC

We're Delivering Clean Energy Across Much of North America

The World Leader in Wind Energy

We produced more wind energy in 2016 than any other company in the world.

Over the last decade, our wind energy capacity has nearly tripled, and today we own and operate nearly 14,000 MW of wind energy.

In 2016 alone, our wind energy portfolio grew by approximately 1,465 MW, adding eight wind energy centers in six states.

For 2017-2018, we expect to bring online an additional 2,400 to 4,100 MW of clean, emissions-free wind energy.

The World Leader in Solar Energy

- NextEra Energy Resources produced more solar energy in 2016 than any other company in the world.
- We produce universal solar energy in Alabama, Arizona, Arkansas, California, Georgia, Minnesota, Nevada, New Jersey, New Mexico and Canada.
- In 2017-2018, we expect to bring online an additional 400 to 1,300 MW of clean, emissions-free solar energy.
- We also continue to tailor solutions for commercial, utility and public power customers to produce clean solar energy from rooftops, parking structures and vacant land. We develop, build, finance and operate these systems to help these customers control costs and meet their renewable energy goals. We have these kind of solar facilities in operation in 9 states across the U.S. and in 2017 have 18 of these solar facilities in development or construction in eight states.

Emissions-Free Nuclear Energy

NextEra Energy Resources operates emissions-free nuclear power plants in Iowa, New Hampshire and Wisconsin. This nuclear fleet as a whole produces enough electricity to power 3 million homes. Each nuclear power plant employs hundreds of highly trained workers. These plants pay millions of dollars in local and state taxes each year, and create billions of dollars in economic activity.

Investing in Natural Gas Infrastructure

We began investing in shale gas production in 2008, and today we have more than $2.7 billion deployed around the country.

We are also executing on our plans for significant investments in natural gas pipelines:

- In Texas, the more than 500 miles of NET Midstream pipelines (seven pipelines);
- In Alabama, Georgia and Florida, the approximately 515-mile Sabal Trail Transmission Pipeline;
- In West Virginia and Virginia, the 303-mile Mountain Valley Pipeline;
- In Florida, the 126-mile Florida Southeast Connection pipeline; and
- In North Dakota, the Flickertail and Wheatland pipelines.

Meeting the Need for Energy Storage

Today's power infrastructure must balance electricity supply and demand instantaneously, while accounting for the intermittency of renewable energy. Customers are looking for energy services and products that provide flexibility and value in areas like grid reliability and peaking power. Our battery energy storage technologies help customers meet these challenges.

- At the end of 2016, we had in operation approximately 90 MW of battery energy storage systems in Arizona, California, Florida, Illinois, Maine, New Jersey and Pennsylvania; and
- Other projects are in development in Arizona, California, New York, Texas, and Ontario, Canada.

Providing Affordable Retail Products and Services

Gexa Energy, our wholly owned subsidiary, is a leading provider of affordable retail energy products and services for residential and commercial customers and is one of the fastest growing retail energy providers in North America.

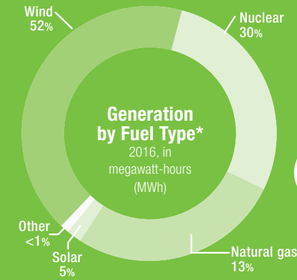
Today, Gexa serves more than 125,000 residential customers and 5,500 commercial customers in Texas. Outside of Texas, Gexa provides retail energy services under the brand NextEra Energy Services and currently serves more than 500,000 residential customers and 6,000 commercial customers in 14 states in the Midwest and Northeast U.S.

Gexa Energy®

NextEra Energy produced more solar energy in 2016 than any other company in the world. The Roswell-Chaves Solar Energy Center is one of several solar facilities that went into operation in 2016.

NextEra Energy Resources at a Glance (2016)

Operating Revenues	~$4.9 billion
Total Assets	~$41.7 billion
Employees	~5,300



WORLD'S NO. 1 GENERATOR OF WIND AND SOLAR ENERGY

* Includes megawatts associated with noncontrolling interests related to NextEra Energy Partners, LP.

Electricity's Superhighways

NextEra Energy Transmission

It's one thing to generate affordable, reliable and clean energy, but getting it safely and quickly to where it's needed most is equally important. That role falls to large poles and high voltage electric transmission lines that cross urban and rural areas alike. At NextEra Energy, these businesses are making it happen across much of North America.

Business	Location	Scope
FPL	35 counties across Florida	6,926 circuit miles (69kV - 500kV)
NextEra Energy Resources	Alabama, Alberta (Can.), Arizona, California, Colorado, Illinois, Iowa, Kansas, Maine, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, Nevada, New Jersey, New Mexico, New York, North Dakota, Nova Scotia (Can.), Oklahoma, Ontario (Can.), Pennsylvania, Quebec (Can.), South Dakota, Texas, Washington, West Virginia, Wisconsin	1,244 circuit miles (69kV - 345kV)
NextEra Energy Transmission	California, New Hampshire, Ontario (Can.), Texas	624 circuit miles (345kV)

LONEstar — Owner and operator of approximately 330 miles of high-voltage transmission lines and associated equipment in Texas, bringing wind power to Central Texas, strengthening the electric grid and enhancing electric reliability from all sources.

NEW HAMPSHIRE TRANSMISSION — The majority owner of the Seabrook Substation, a 345-kV facility in New Hampshire connecting the Seabrook Nuclear Generating Station and three critical 345-kV transmission lines in New England to the power grid.

NEXTBRIDGE INFRASTRUCTURE — The designated developer of the Ontario East-West Tie line, which will be an approximately 250-mile, 230-kV transmission line between Thunder Bay and Wawa and will connect to the bulk transmission system in Northern Ontario to improve reliability.

NEXTera ENERGY TRANSMISSION WEST — The designated developer for two projects in California, the Suncrest Dynamic Reactive Power Support Project located in San Diego and the Estrella Substation Project located in Paso Robles.

Delivering Unique Solutions

FPL Energy Services, FPL Services, NextEra Energy Solutions, GEXA Energy Solutions

With a strong commitment to excellence and customer satisfaction, FPL Energy Services (FPLES) offers convenient, affordable energy products and services that add value and comfort to our customers' homes and businesses. Our residential portfolio of innovative products and services includes: SurgeShield®, Electronics Surge Protection, Home Electrical Solutions, ElectricShield®, A/C Filter Smart®, installation and service of backup generators, water heater and plumbing protection plans and more.

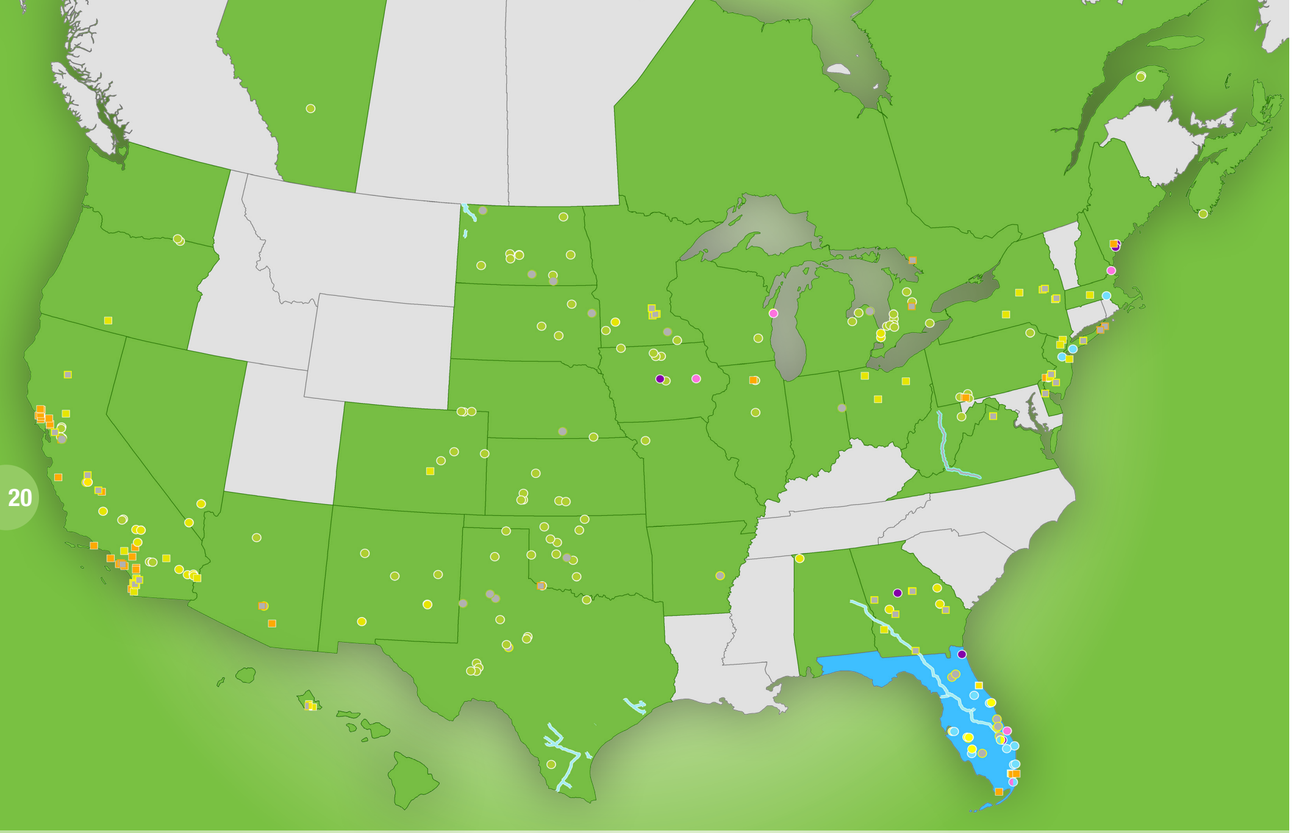
- **Natural gas supply services:** FPLES has been providing a reliable supply of natural gas at competitive rates, coupled with sophisticated industry analysis and custom consulting services in Florida for more than 15 years.
- **Commercial lighting solutions:** This program offers specialized lighting upgrades and retrofits for commercial and industrial customers. We install comprehensive energy efficient solutions that reduce costs, minimize risk and improve customers' bottom lines.
- **Energy savings performance contracting:** We develop, design and construct comprehensive, sustainable energy solutions for governments and businesses in Florida, Texas and other states through our family of Energy Service Companies (ESCOs) – FPLES, FPL Services, NextEra Energy Solutions and Gexa Energy Solutions. To date, our ESCO businesses have helped customers save more than $198 million, using 1.6 million MWh less electricity and 5.3 billion gallons less water. That's enough electricity to power more than 134,630 homes for one year and enough water to fill more than 8,874 Olympic-size swimming pools.

NEXTera ENERGY SOLUTIONS | FPL Services | FPL Energy Services

NextEra Energy Partners, LP

NextEra Energy Partners, LP (NYSE: NEP) is a growth-oriented limited partnership formed by NextEra Energy, Inc. to acquire, manage and own contracted clean energy projects with stable, long-term cash flows. Headquartered in Juno Beach, Florida, NextEra Energy Partners owns interests in wind and solar projects in North America, as well as natural gas infrastructure assets in Texas. The renewable energy projects are fully contracted, use industry-leading technology and are located in regions that are favorable for generating energy from the wind and sun. The seven natural gas pipelines in the portfolio are all strategically located, serving power producers and municipalities in South Texas, processing plants and producers in the Eagle Ford Shale and commercial and industrial customers in the Houston area. The NET Mexico Pipeline, the largest pipeline in the portfolio, provides a critical source of natural gas transportation for low-cost, U.S.-sourced shale gas to Mexico. For more information about NextEra Energy Partners, visit **NextEraEnergyPartners.com**.

NEXTera energy PARTNERS



Providing Clean Energy Across North America

LEGEND:
Wind Natural Gas Nuclear Solar (universal) Solar
Battery Energy Storage Other Development/Construction Pipeline
States and provinces served by: NextEra Energy Resources Florida Power & Light Company

Locations with more than one facility are illustrated with a single dot; locations are those in operation as of February 2017.

CAUTIONARY STATEMENTS AND RISK FACTORS THAT MAY AFFECT FUTURE RESULTS

This report contains "forward-looking statements" within the meaning of the safe harbor provisions of the Private Securities Litigation Reform Act of 1995. Forward-looking statements are not statements of historical facts, but instead represent the current expectations of NextEra Energy, Inc. (together with its subsidiaries, NextEra Energy) regarding future operating results and other future events, many of which, by their nature, are inherently uncertain and outside of NextEra Energy's control. In some cases, you can identify the forward-looking statements by words or phrases such as "will," "may result," "expect," "anticipate," "believe," "intend," "plan," "seek," "potential," "projection," "forecast," "predict," "goals," "target," "outlook," "should," "would" or similar words or expressions. You should not place undue reliance on these forward-looking statements, which are not a guarantee of future performance. The future results of NextEra Energy and its business and financial condition are subject to risks and uncertainties that could cause actual results to differ materially from those expressed or implied in the forward-looking statements, or may require it to limit or eliminate certain operations. These risks and uncertainties include, but are not limited to, the following: effects of extensive regulation of NextEra Energy's business operations; inability of NextEra Energy to recover in a timely manner any significant amount of costs, a return on certain assets or a reasonable return on invested capital through base rates, cost recovery clauses, other regulatory mechanisms or otherwise; impact of political, regulatory and economic factors on regulatory decisions important to NextEra Energy; disallowance of cost recovery based on a finding of imprudent use of derivative instruments; effect of any reductions or modifications to, or elimination of, governmental incentives or policies that support utility scale renewable energy projects or the imposition of additional tax laws, policies or assessments on renewable energy; impact of new or revised laws, regulations, interpretations or other regulatory initiatives on NextEra Energy; capital expenditures, increased operating costs and various liabilities attributable to environmental laws, regulations and other standards applicable to NextEra Energy; effects on NextEra Energy of federal or state laws or regulations mandating new or additional limits on the production of greenhouse gas emissions; exposure of NextEra Energy to significant and increasing compliance costs and substantial monetary penalties and other sanctions as a result of extensive federal regulation of its operations and businesses; effect on NextEra Energy of changes in tax laws, guidance or policies as well as in judgments and estimates used to determine tax-related asset and liability amounts; impact on NextEra Energy of adverse results of litigation; effect on NextEra Energy of failure to proceed with projects under development or inability to complete the construction of (or capital improvements to) electric generation, transmission and distribution facilities, gas infrastructure facilities or other facilities on schedule or within budget; impact on development and operating activities of NextEra Energy resulting from risks related to project siting, financing, construction, permitting, governmental approvals and the negotiation of project development agreements; risks involved in the operation and maintenance of electric generation, transmission and distribution facilities, gas infrastructure facilities and other facilities; effect on NextEra Energy of a lack of growth or slower growth in the number of customers or in customer usage; impact on NextEra Energy of severe weather and other weather conditions; threats of terrorism and catastrophic events that could result from terrorism, cyber attacks or other attempts to disrupt NextEra Energy's business or the businesses of third parties; inability to obtain adequate insurance coverage for protection of NextEra Energy against significant losses and risk that insurance coverage does not provide protection against all significant losses; a prolonged period of low gas and oil prices could impact NextEra Energy's gas infrastructure business and cause NextEra Energy to delay or cancel certain gas infrastructure projects and for certain existing projects to be impaired; risk of increased operating costs resulting from unfavorable supply costs necessary to provide full energy and capacity requirement services; inability or failure to manage properly or hedge effectively the commodity risk within its portfolio; effect of reductions in the liquidity of energy markets on NextEra Energy's ability to manage operational risks; effectiveness of NextEra Energy's risk management tools associated with its hedging and trading procedures to protect against significant losses, including the effect of unforeseen price variances from historical behavior; impact of unavailability or disruption of power transmission or commodity transportation facilities on sale and delivery of power or natural gas; exposure of NextEra Energy to credit and performance risk from customers, hedging counterparties and vendors; failure of counterparties to perform under derivative contracts or of requirement for NextEra Energy to post margin cash collateral under derivative contracts; failure or breach of NextEra Energy's information technology systems; risks to NextEra Energy's retail businesses from compromise of sensitive customer data; losses from volatility in the market values of derivative instruments and limited liquidity in OTC markets; impact of negative publicity; inability to maintain, negotiate or renegotiate acceptable franchise agreements; occurrence of work strikes or stoppages and increasing personnel costs; NextEra Energy's ability to successfully identify, complete and integrate acquisitions, including the effect of increased competition for acquisitions; NextEra Energy Partners, LP's (NEP's) acquisitions may not be completed and, even if completed, NextEra Energy may not realize the anticipated benefits of any acquisitions; environmental, health and financial risks associated with ownership and operation of nuclear generation facilities; liability of NextEra Energy for significant retrospective assessments and/or retrospective insurance premiums in the event of an incident at certain nuclear generation facilities; increased operating and capital expenditures and/or result in reduced revenues at nuclear generation facilities resulting from orders or new regulations of the Nuclear Regulatory Commission; inability to operate any owned nuclear generation units through the end of their respective operating licenses; effect of disruptions, uncertainty or volatility in the credit and capital markets on NextEra Energy's ability to fund its liquidity and capital needs and meet its growth objectives; inability to maintain current credit ratings; impairment of liquidity from inability of credit providers to fund their credit commitments or to maintain their current credit ratings; poor market performance and other economic factors that could affect NextEra Energy's defined benefit pension plan's funded status; poor market performance and other risks to the asset values of nuclear decommissioning funds; changes in market value and other risks to certain of NextEra Energy's investments; effect of inability of NextEra Energy subsidiaries to pay upstream dividends or repay funds to NextEra Energy or of NextEra Energy's performance under guarantees of subsidiary obligations on NextEra Energy's ability to meet its financial obligations and to pay dividends on its common stock; the fact that the amount and timing of dividends payable on NextEra Energy's common stock, as well as the dividend policy approved by NextEra Energy's board of directors from time to time, and changes to that policy, are within the sole discretion of NextEra Energy's board of directors and, if declared and paid, dividends may be in amounts that are less than might be expected by shareholders; NEP's inability to access sources of capital on commercially reasonable terms could have an effect on its ability to consummate future acquisitions and on the value of NextEra Energy's limited partner interest in NextEra Energy Operating Partners, LP; and effects of disruptions, uncertainty or volatility in the credit and capital markets on the market price of NextEra Energy's common stock. NextEra Energy discusses these and other risks and uncertainties in its annual report on Form 10-K for the year ended December 31, 2016 and other SEC filings, and this report should be read in conjunction with such SEC filings made through the date of this report. The forward-looking statements made in this report are made only as of the date of this report and NextEra Energy undertakes no obligation to update any forward-looking statements.

ON THE COVER (clockwise from top left): Babcock Solar Energy Center, Punta Gorda, Florida; High Lonesome Mesa Wind Energy Center, Torrance County, New Mexico; Power Delivery Diagnostic Center, Jupiter, Florida.

NextEra Energy, Inc.
700 Universe Boulevard, Juno Beach, FL 33408

For more information:

NextEraEnergy.com

FPL.com

NextEraEnergyResources.com

Printed: September 2017
CC195-1709
40957

Appendix B

Public and Agency Correspondence

EXAMPLE TRIBAL OUTREACH LETTER

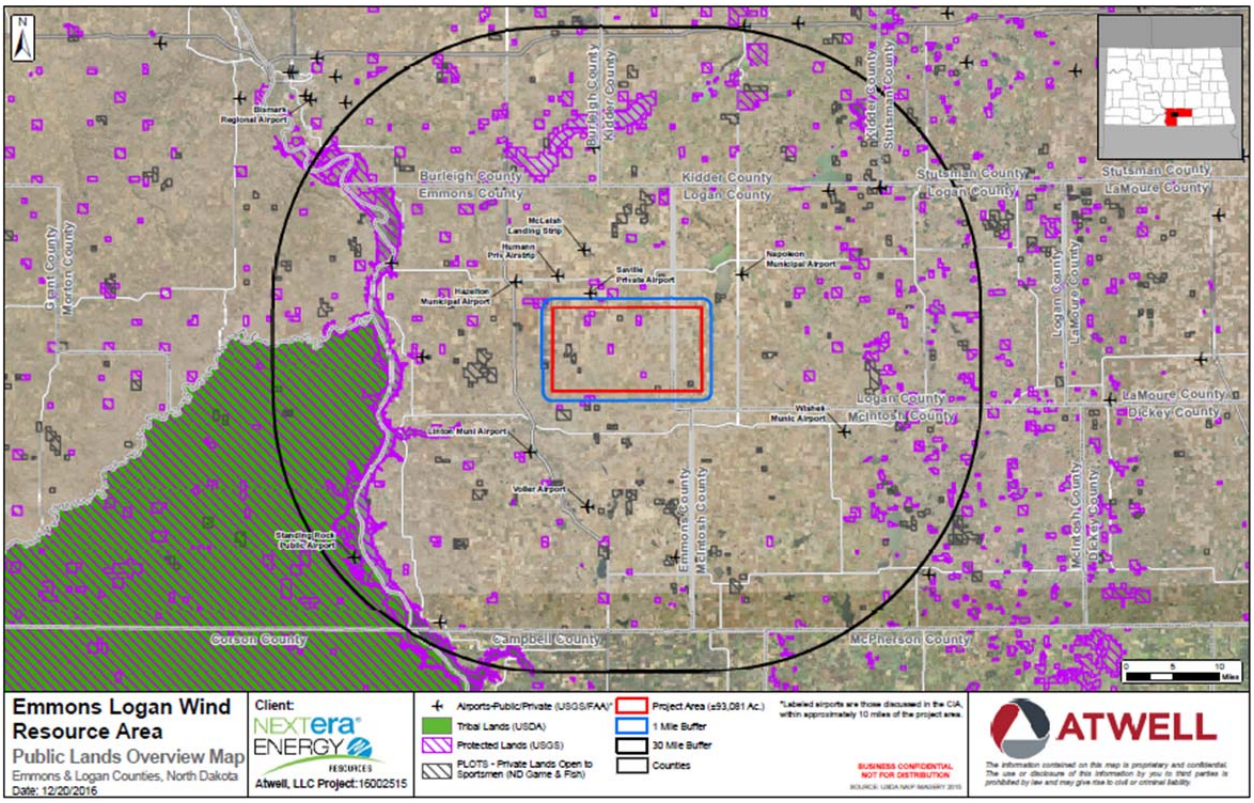
April 30, 2017

Subject: Proposed Emmons Logan Wind Energy Center in Emmons and Logan Counties, North Dakota

Dear _____,

Emmons Logan Wind, LLC (Emmons Logan) is an indirect, wholly-owned subsidiary of NextEra Energy Resources, LLC (NextEra) that is in the process of developing the proposed 300 MW Emmons Logan Wind Energy Center in Emmons and Logan Counties, North Dakota. The proposed Emmons Logan Wind Energy Center (Project) is planned to be located on 93,081 acres of private land in western Logan County and eastern Emmons County, approximately 19 miles east of the Missouri River and 11 miles northeast of Linton, ND, as shown below in Figure 1.

Figure 1



NextEra Energy Resources, LLC

700 Universe Boulevard, Juno Beach, FL 33408

The Project would consist of up to 142 wind turbine generators, with a total nameplate capacity of up to 300 megawatts (MW). Additional facilities include access roads, electrical collection systems and cabling, a collection substation, an operation and maintenance (O&M) yard, a batch plant location, one temporary laydown yard, and meteorological (MET) towers. The Project will have two points of interconnection: one to Montana-Dakota's (MDU's) 230 kV Heskett-Wishek line and one to MDU's 115 kV Linton line. There will be two collector substations and two generation tie lines totaling approximately 30 miles.

Emmons Logan expects to complete initial turbine micro-siting in summer 2017, and complete preliminary cultural surveys in summer or early fall 2017, so that the layout of all project facilities can be relatively finalized before snowfall in October or November. Emmons Logan anticipates initiating permitting through the North Dakota Public Service Commission in mid-2018, with construction scheduled to start in spring 2019. At this time, we are not expecting to coordinate with any Federal agencies, as no Federal permits are anticipated.

Consistent with NextEra's policy to reach out to Tribes in the area of its projects, I wanted to provide you with information about the Project and ask whether you have an interest in receiving further information. We anticipate holding a meeting of interested Tribes the week of May 22 in Aberdeen, ND, so that we can answer any questions, provide you additional information, discuss any concerns you may have about the Project location, and plan any requested tribal participation accordingly.

Project Area

The Project Area is located within a rural, agriculturally dominated area in south central North Dakota and is situated approximately 45 miles southeast of Bismarck. No incorporated or unincorporated municipalities are present within the Project Area or within a 1-mile area around the project boundary. The closest municipalities are the towns of Linton, approximately 4 miles southwest, Hazelton, approximately 5 miles northwest, and Napoleon, approximately 6 miles northeast. Farmsteads and rural homes are scattered through the Project Area. All public roads within the Project Area are unpaved and maintained with crushed gravel. Overall, the Project Area is dominated by agricultural land use and supports a mix of grasslands and cultivated cropland/hayfields/pasturelands.

The Project Area is situated in the Missouri Coteau Slope ecoregion with elevation generally declining to the Missouri River. The Missouri Coteau Slope has a simple drainage pattern and fewer wetland depressions. Today, due to level to gently rolling topography, livestock grazing land and cropland dominate the region. An extensive network of intermittent and ephemeral streams with herbaceous riparian buffers and scattered prairie pothole emergent wetlands, livestock ponds and freshwater ponds are present. Forested habitat is limited and highly fragmented, consisting primarily of planted wind breaks. The surficial geology in the Project region is primarily undulating to rolling topography with knolls, ridges, and incised drainages. Within the Project Area, the topography is generally flat but contains undulating relief, with approximate elevations between 2,030 and 2,150 feet above mean sea level. The southern portion supports steeper terrain with scattered bluffs.

Proposed Project

As described above, the proposed Project would consist of an array of wind turbines, each with an associated transformer. Proposed Project facilities would include the following components:

- Up to 142 wind turbines;
- All-weather access roads to each turbine site;
- Two collection substations (approximately 5 acres);

- Underground electrical collection lines and fiber optic cables from each turbine to the collection substation;
- An O&M yard (approximately 10 acres);
- A batch plant location (up to 5 additional acres);
- A temporary laydown yard (up to 15 acres);
- Up to 4 temporary and 3 permanent SCADA MET towers; and
- Two generation tie-lines that would not exceed 30 miles in length

Although the Project layout is still preliminary, based on similar projects in the region, we anticipate that no more than 5 percent of the proposed Project area would be disturbed during construction of the Project. Construction activities may temporarily disturb soils and vegetation to an extent that would require some regrading, compaction mitigation, and reseeding following completion of operations. Should such disturbance occur, these soils would be restored to the original contours and reseeded, if necessary, with native perennial species common to the area in areas with existing native prairie, or reseeded in agricultural crops pending landowner preference and existing conditions. Based on the small percentage of the Project area that would be disturbed by construction, impacts to vegetation are expected to be minimal. Additionally, the areas temporarily affected could be restored to crop production or grassland, depending on landowner preferences.

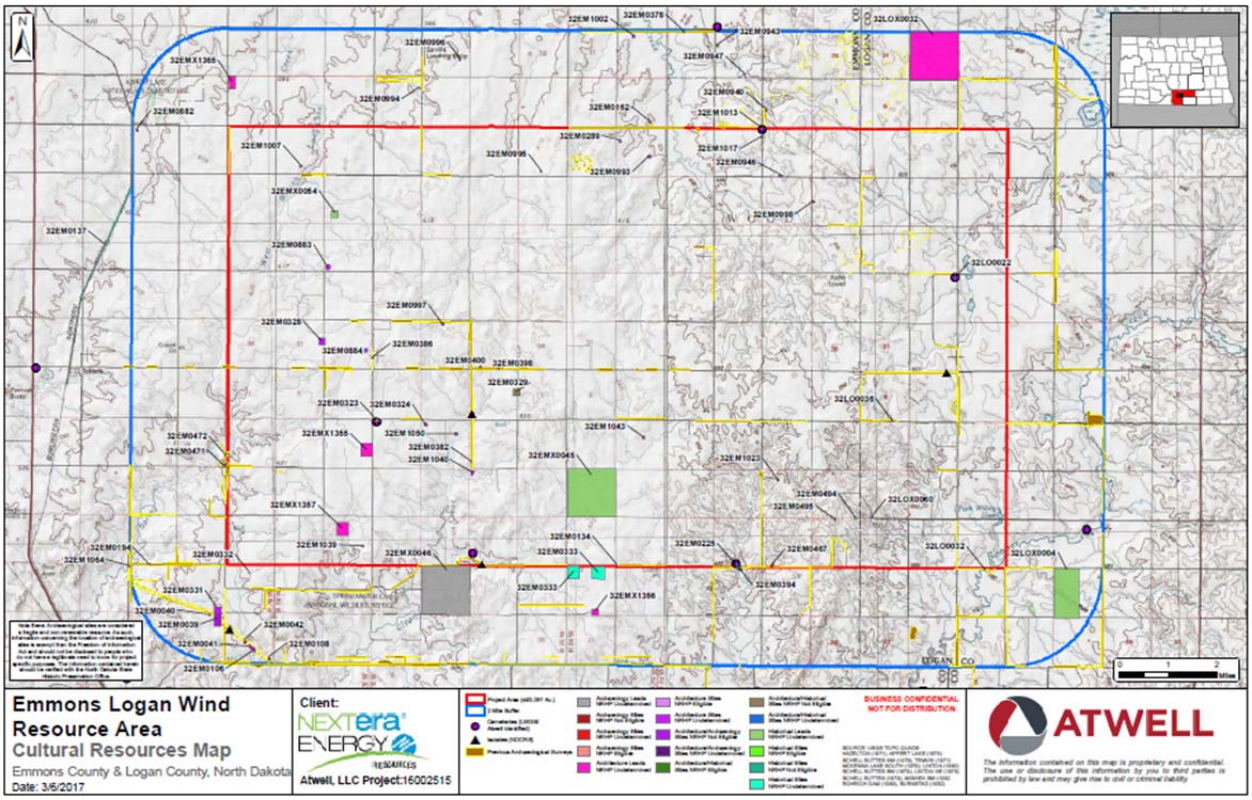
Land would be graded on-site for the turbine pads with native vegetation. Drainage systems, access roads, storage areas, and construction/laydown areas would be installed as necessary to fully accommodate all aspects of Project construction, operation, and maintenance.

Cultural Resources Studies

Atwell conducted a Class I Cultural Resources Inventory of the Project Area by reviewing NRHP and NDCRS records and available historic atlases and topographic maps. To assist NextEra in siting project facilities in a manner to avoid impacts to cultural resources, Atwell provided recommendations for avoidance of specific cultural resources within the Project Area. Once Project infrastructure has been sited, a Class III Archaeological Survey of all ground disturbance locations, plus a two-mile buffer for wind turbine generators, would be undertaken by an archaeologist permitted by SHSND to conduct cultural resources investigations in North Dakota.

The file search indicated that no NRHP-listed cultural resources were located within the Project Area. The NDCRS records included 65 cultural resources recorded within the Project Area. See Figure 2 below for a map identifying locations of those resources.

Figure 2



Architectural Resources

Atwell identified 27 architectural resources within the Project Area. Three additional resources (32EM0039, 32EM0040, and 32EM0041) were cross listed as architectural and archaeological resources and five additional resources (32EM0225, 32EM0329, 32EM0332, 32EM394 and 32EM1013) were cross listed as architectural and historical resources. Of the 27 architectural resources identified within the Review Area, two resources (32LO0022 and 32EM1013) were considered eligible for listing on the NRHP. The St. Benedict Church and Cemetery contained an assemblage of wrought iron cross grave markers and is located within the Project Area.

The 26 remaining architectural resources within the Project Area were documented as Undetermined for listing on the NRHP when they were recorded and 17 of these resources are located within the Project Area. The remainder of the architectural resources are located within two miles of the Project Area. An additional six architectural leads were identified within the Project Area. These architectural leads are Undetermined for listing on the NRHP. Three of the architectural leads are located within the Project Area and the remaining three leads are located within two miles of the Project Area.

Archaeological Sites

Atwell identified 16 archaeological sites within the Project Area. Six archaeological sites (32EM382, 32EM398, 32EM400, 32EM467, 32EM495, and 32LO0036) are located within the Project Area and an additional 10 archaeological sites (32EM0039, 32EM0040, 32EM0041, 32EM0042, 32EM0106, 32EM0108, 32EM162, 32EM0194, 32EM0471, and 32EM472) are located within two miles of the Project Area. Several of the archaeological sites within the Project Area contain stone circle and/or cairn features.

Archaeological site 32EM0382 consists of an unknown prehistoric rock cairn made up of over 60 stones and is considered Eligible for listing on the NRHP. Archaeological site 32EM0398 consists of a prehistoric stone circle. Archaeological site 32EM0400 consists of an unknown prehistoric stone circle. Archaeological site 32EM0467 consists of 10 stone circles and one possible piece of fire-cracked rock. Archaeological site 32EM0471 consists of seven stone circles. Archaeological site 32LO0036 consists of a single stone circle. Archaeological sites 32EM0398, 32EM0400, 32EM0467, 32EM0471, and 32LO0036 are Undetermined for NRHP eligibility. Archaeological site 32EM0495 consists of 10 stone circles and one possible piece of fire-cracked rock and is considered Not Eligible for listing on the NRHP.

Archaeological sites 32EM0039, 32EM0041, and 32EM0042 consist of chipped stone material scatters between 1 and 1.5 miles southwest of the Project Area. Archaeological site 32EM0040 consists of an unknown prehistoric stone circle approximately 1.0 mile southwest of the Project Area.

Archaeological site 32EM0106 consists of a hearth, faunal remains, and a projectile point approximately 1.8 miles southwest of the Project Area. Archaeological site 32EM0108 consists of a stone circle approximately 1.9 mile south of the Project Area boundary. Archaeological site 32EM0162 consists of a cairn and stone circle approximately 0.1 mile north of the Project Area boundary. Archaeological site 32EM0194 consists of a stone circle and other rock features approximately 1.6 miles west of the Project Area boundary. Archaeological site 32EM0471 consists of a stone circle approximately 0.1 mile west of the Project Area boundary. Archaeological site 32EM0472 consists of a cairn approximately 0.1 mile west of the Project Area boundary. Archaeological sites 32EM0040, 32EM0106, 32EM0108, 32EM0162, 32EM0471, and 32EM0472 are Undetermined for NRHP eligibility.

Archaeological sites 32EM0039, 32EM0041, and 32EM0042 were recommended Not Eligible for listing on the NRHP. Examination of the spatial distribution of stone circle and stone cairn sites did not indicate that sites within the Project Area are associated in such a way to suggest a cultural landscape of Native American importance. Atwell recommends utilizing a 100-foot avoidance buffer from archaeological sites that are considered Eligible (32EM0382) or Undetermined (32EM0040, 32EM0106, 32EM0108, 32EM0162, 32EM0398, 32EM0400, 32EM0467, 32EM0471, 32EM0472, and 32LO0036) for listing on the NRHP, to avoid direct impacts to archaeological sites.

Atwell identified five archaeological sites leads within the Project Area. Three of the site leads are located within the Project Area and an additional two site leads are located within two miles of the Project Area. Of these site leads, one is characterized as faunal remains, two are characterized as a chipped stone, and two are of unknown function. Cultural resource investigations of the site leads have not been made to verify the exact location, NRHP eligibility, and/or the actual existence of site leads.

Thirty-nine (39) previous cultural resources surveys have been conducted within the Project Area. The majority of compliance reports in the Project Area are transportation related projects, utility and telecommunications review projects, including a cellular communications tower, public utility lines, and telephone line reports. The remaining previous cultural resources surveys conducted in the Project Area include: material borrow locations and oil and gas related projects. Atwell reviewed the location of previous cultural resources survey projects within the Project Area and determined that the majority of the Project Area has not been previously surveyed to determine if cultural resources are present. As a result, it is likely that additional undocumented cultural resources, especially prehistoric and historic archaeological sites and historic architectural resources (historic structures) could be located within the Project Area. Therefore, further cultural resources investigations would likely be necessary to further evaluate the presence/absence of cultural resources within the Project Area.

In addition, site reconnaissance indicated the potential for undocumented archaeological sites to be present within the Project Area based on the presence of bluffs and other topographic landforms conducive to preservation of archaeological sites. Based on the high percentage of Project area located on prominent or elevated landforms with numerous stones on the surface, there is the potential that some locations may contain configurations or alignments of stones that may be considered significant to regional Tribes. Therefore, as I mentioned previously, NextEra is inviting tribal participation in order to help identify potentially sensitive locations. This could take place prior to, concurrent with, or following NextEra conducting a full Class III Cultural Resource Inventory for Archaeology, which would include a full pedestrian and shovel probing surveys.

An Unanticipated Discovery Plan would be prepared for the proposed Project outlining the procedure that would be followed to prepare for and address any unanticipated discoveries of cultural resources, including archeological sites and possible human remains. It would provide direction to on-site personnel and their consultants as to the proper procedure to follow in the event that unanticipated discoveries were to be made during construction.

In the event that human remains are identified during construction, work would immediately halt within 100 feet of the site and the site would be protected until potential impact can be identified by the State Historical Society of North Dakota (SHSND) and the North Dakota Indian Affairs Commission is consulted.

If confirmed or potential human skeletal remains are discovered, the County Sheriff's office would be contacted. The Sheriff would call the North Dakota State Forensic Examiner to determine if the remains are associated with a crime scene. If the remains are determined not to be part of an active crime scene or investigation, the North Dakota Chief Archeologist would be contacted.

Emmons Logan commits to avoid any newly documented sites and the previously-documented cultural resources within the Project area. Any sites avoided during construction would be fenced to reduce the potential that they would be inadvertently disturbed.

****

I hope this information has been helpful to you. Again, as it is NextEra's policy to reach out to Tribes in the vicinity of its projects, I wanted to provide you this information about the Project, and to ask whether ask whether you have an interest in receiving further information about the project. We anticipate holding a meeting of interested Tribes in Aberdeen, ND, the week of May 22, so that we can answer any questions, provide you additional information, discuss any concerns you may have about the Project location, and plan any requested tribal participation accordingly. I can be reached at (224) 251-7580 or via e-mail at Carolyn.Stewart@NextEraEnergy.com.

Regards,

Carolyn T. Stewart
Director, Tribal Relations

Cc: Ashley Nasby, NextEra
Kimberly Wells, NextEra
Richard Estabrook, NextEra

AECOM
1000 East Calgary Avenue, Suite 1
Bismarck, ND 58503

701.221.4140 tel
701.221.4155 fax

US Department of Transportation
Federal Aviation Administration

Date: 5/17/18

No objection provided the Federal Aviation is notified of construction or alterations as required by Federal Aviation Regulations, Part 77, Objects Affecting Navigable Airspace, Paragraph 77.9. Notice may be filed on-line at https://oeaaa.faa.gov.

David P Anderson, Acting Deputy Manager
FAA/Dakota-Minnesota Airports District Office, Bismarck Office
2301 University Drive, Building 23B
Bismarck, ND 58504

May 3, 2018

Ms. Shari Lares
Environmental Protection Specialist
Dakota-Minnesota Airports District
Federal Aviation Administration
2301 University Drive, Building 23B
Bismarck, ND 58504

Subject: Emmons-Logan Wind Energy Center and Transmission Line Project
Emmons and Logan Counties, ND

Emmons-Logan Wind, LLC (Emmons-Logan Wind), a wholly-owned, indirect subsidiary of NextEra Energy Resources, LLC is proposing to develop the Emmons-Logan Wind Energy Center and an associated 230 kilovolt (kV) electric transmission line (collectively, the "Project") in Emmons and Logan Counties, in south central North Dakota. Emmons-Logan Wind plans to complete North Dakota Public Service Commission permitting in 2018 and begin construction in 2019.

The Wind Energy Center will have a nameplate capacity of approximately 298.1 megawatts, consisting of 123 wind turbines and associated infrastructure. The approximately 7-mile-long 230 kV electric transmission line and an additional 14-mile long 115 kV electric transmission line will connect the Wind Energy Center to the electrical grid. Per North Dakota Century Code (NDCC) 49-22-03, the 115 kV transmission line is not subject to review by the North Dakota Public Service Commission; however, it is included on the attached map for informational and planning purposes only. Emmons-Logan Wind requests the consideration of the Project shown on the attached map (Figure 1). The Project encompasses the following legal locations in Emmons and Logan Counties, ND:

County	Township	Range	Sections
Emmons	134 North	75 West	12, 13, 15, 16, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36
	134 North	74 West	1 (S ½), 2 (S ½), 3 (S ½), 7, 10, 11, 12, 13, 14, 15, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36
	133 North	74 West	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 25, 26, 28, 29, 30, 31, 32, 33, 35, 36
	133 North	75 West	1, 2, 3, 4, 5, 8, 9, 10, 11, 12, 13, 14 (N ½), 15 (N ½), 16, 17, 20, 21, 24, 25, 36
Logan	134 North	73 West	7, 17, 18, 19, 20, 29, 30, 31, 32, 33 (S ½)
	133 North	73 West	3, 4, 5, 6, 9, 10

To ensure that all social, economic, and environmental effects are considered, we are soliciting your views and comments on the Project. We are particularly interested in any property which your agency may own or have an interest in and which would be adjacent to the Project. We would also appreciate being made aware of any proposed developments your agency may be contemplating in the areas under consideration for the Project. Any information that might help us in our siting studies and permit applications would be appreciated. It is requested that any comments or information be forwarded to our office on or before June 8, 2018. If no reply is received by this date, it will be assumed that you have no comment on this Project.

If further information is desired regarding the proposed Project, please contact Lindsey Churchill at 701-221-4148 in Bismarck, ND, or at the email and address below.

Sincerely,

LChurchill

Lindsey (Meyers) Churchill, PhD, PWS
Environmental Project Manager
1000 East Calgary Avenue Suite 1
Bismarck, ND 58503
Lindsey.Meyers@aecom.com

Enclosure:
Figure 1 - Project Location Map

STATE HISTORICAL SOCIETY OF NORTH DAKOTA

May 9, 2018

Lindsey (Meyers) Churchill, Ph.D.
Environmental Project Manager
AECOM
1000 East Calgary Avenue, Suite 1
Bismarck, ND 58503

ND SHPO REF: 18-0844 ND Public Service Commission – Proposed 298.1 MW Emmons-Logan Wind Energy Center & Transmission Line in Emmons and Logan Counties, North Dakota

Dear Dr. Churchill,

Thank you for your preliminary information on ND SHPO REF: 18-0844 ND Public Service Commission – Proposed 298.1 MW Emmons-Logan Wind Energy Center & Transmission Line in Emmons and Logan Counties, North Dakota. We recommend survey for cultural resources as follows:

- A current Class I (file search) to determine any additional recorded cultural resources in the project area.

- A Class III (pedestrian) survey by a permitted architectural historian for standing buildings and structures (including cemeteries) over 50 years old in the visual Area of Potential Effect (APE). This is within a 2 mile radius of individual turbine locations. The purpose is to evaluate any architectural or structural features that may be eligible for nomination to the National Register of Historic Places. At least three out of the seven aspects of integrity used to evaluate historic properties could be impacted by the proposed project: the setting, feeling, and association of historic sites.

- A Class III archaeological survey of all areas of direct impact including crane paths, met towers, access roads, turbine locations and staging areas, unless the footprint has been recently surveyed for cultural resources.

Thank you for the opportunity to review preliminary information on this project. We look forward to answering any questions and reviewing the requested reports. If you have questions please contact or Susan Quinnell at squinnell@nd.gov or (701) 328-3576.

Sincerely,

Claudia J. Berg
Director, State Historical Society of North Dakota

1707 North 9th Street
PO Box 5523
Bismarck, ND 58506-5523
Phone: (701) 328 – 2800
Fax: (701) 328 – 3650

https://land.nd.gov

DEPARTMENT OF
ND TRUST LANDS
INVESTING FOR EDUCATION

Jodi A. Smith, Commissioner

May 11, 2018

LINDSEY (MEYERS) CHURCHILL
AECOM ENVIRONMENTAL PROJECT MANAGER
1000 EAST CALGARY AVE SUITE 1
BISMARCK ND 58503

RE Emmons-Logan Wind Energy Center and Transmission Line Project

Dear Ms. Churchill:

We received your letter dated May 3, 2018, regarding a request for information on the proposed Emmons-Logan Wind Energy Center and Transmission Line Project.

To obtain an easement across trust Lands, an on-line application form must be completed. This application can be found at: https://land.nd.gov/SurfaceROW/RightOfWay. Any proposed towers or lines would be subject to review by the surface division staff and approval by the Land Commissioner on behalf of the Board of University and School Lands.

The following items may be considered in the review of an easement application:

1. Financial benefit to the trusts;
2. Availability of alternate encumbrance site or route;
3. The least environmentally damaging site or route regardless of property ownership;
4. Physical stability of the landscape;
5. Other potential future uses for the trust lands, including urban development;
6. Potential mineral and other material development including oil, gas, coal, cement materials, sodium sulfate, sand and gravel, road material, building stone, chemical substances, metallic ores, uranium ores, or colloidal or other clays;
7. Feasibility for reclamation;
8. Maintenance of existing wetlands and water flows;
9. Any cultural, historical, archeological, and paleontological resources;
10. Federally listed threatened and endangered species;
11. Location of the proposed route or site in relation to section lines, quarter section lines and corridors;
12. Potential liability to the trusts;
13. Applicant's past encumbrances on trust lands;
14. Applicant's financial stability; and
15. Any other information relevant to the application which would assist in the determination.

There are school trust surface interests that are managed by the North Dakota Department of Trust Lands on behalf of the Board of University and School Lands which are located within or near the proposed project area. These surface interests are as follows:

County	*Township*	*Range*	*Section*	*Subdivision*
EMMONS	133	74	16	NE4, NW4, SW4
EMMONS	134	75	2	LOT 3, LOT 4
EMMONS	134	75	10	SW4
EMMONS	134	75	16	NE4, SE4
EMMONS	134	75	36	NW4, SW4

The North Dakota Department of Trust Lands has received an application for the proposed 115 kV electric transmission line across the below listed school trust tract (ROW# 8246).

County	*Township*	*Range*	*Section*	*Subdivision*
EMMONS	133	76	36	SE4

The Board of University and School Lands will not move forward until site inspection and review have been completed and all local and state approvals have been obtained.

If you have any questions, feel free to contact our office at 701-328-2800.

Sincerely,

Kayla Graber
Land Management Specialist

cc: Thomas VonBische
Emmons-Logan Wind, LLC
7217 41st St. CT N
Oakdale, MN 55128

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GOVERNOR, Doug Burgum
DIRECTOR, Terry Steinwand
DEPUTY, Scott A. Peterson

"VARIETY IN HUNTING AND FISHING"

NORTH DAKOTA GAME AND FISH DEPARTMENT
100 NORTH BISMARCK EXPRESSWAY BISMARCK, NORTH DAKOTA 58501-5095 PHONE 701-328-6300 FAX 701-328-6352

22 May 2018

Lindsey (Meyers) Churchill
Environmental Project Manager
1000 East Calgary Avenue Suite 1
Bismarck, ND 58503

Dear Ms. Churchill:

Subject: Emmons-Logan Wind Energy Center and Transmission Line Project
Emmons and Logan Counties, ND

The North Dakota Game and Fish Department has been in discussion with proponents of the Emmons-Logan Wind Energy Center since 2017. Based on our initial review, the project appears to fall within an area with relatively low risk to our native wildlife; however, valuable habitat for these species does exist within the project area. During consultations with Emmons-Logan Wind, the Department emphasized the importance of careful placement of turbines, roads, and other associated infrastructure, avoiding to the extent possible any impacts to native unbroken prairie of tracts of 160 acres or greater, woodlands, and wetlands. In a joint meeting dated January 29, 2018, the Department was made aware that 55 turbines were proposed to be relocated to avoid native prairie. We would like to applaud this constructive revision and other efforts Emmons-Logan Wind has put into minimizing its impacts to our state's Species of Conservation Priority and the habitat resources they rely on. Although final turbine siting is not known, we are encouraged that proactive collaborations can result in consideration of beneficial modifications to the project.

Though much of the project area has been significantly altered by agriculture, there is still a noteworthy amount of relatively undisturbed native habitats. Native prairie is the most endangered ecosystem in North Dakota and, as we are a grassland state, the majority of our native species are linked to prairie. Disturbance, fragmentation, and loss of native prairie have adversely impacted a wide variety of species and these negative impacts will only continue to compound as more development takes place on the landscape. The small remaining tracts of unbroken prairie are becoming more and more vital to many declining bird and pollinator species. A portion of the wind resource area is composed of native, unbroken prairie which may support 30 or more of the 115 Species of Conservation Priority identified in the North Dakota State Wildlife Action Plan (Dyke et. al 2015). For species of conservation priority, such as the Chestnut-collared Longspur which has declined -86% or the Loggerhead Shrike which has declined -74% since 1974 (Rosenberg et. al 2016) the loss and fragmentation of native prairie in the project area may further

negatively impact these rapidly declining species.

The proposed project area is located within the Missouri Coteau, a landscape that not only has a considerable amount of native prairie, but an extremely high concentration of wetlands, roughly 800,000 basin acres. Prairie Pothole wetlands are the most productive wildlife habitat in North Dakota, supporting 54 Species of Conservation Priority, as well as a considerable number of waterfowl, shorebirds and cranes throughout the year. Though the project area only includes a small number of wetlands, the resources they provide are still of value to many of our native species.

Though the Department believes the best way to protect our species of conservation priority is by taking a habitat-focused approach, we would also like to reiterate the following species-specific concerns.

- Nearly 31% of the entire Sharp-tailed Grouse population falls within North Dakota and declines to the state's population will likely lead to range-wide population declines. Sharp-tailed Grouse are a high-valued upland game bird, and because research indicated that prairie grouse may be adversely affected by energy development, it is vital that surveys be conducted to understand the risk associated with development.

- Bats are long-lived, reproduce slowly, and migrate long distances, making them particularly susceptible to wind development. Acoustic surveys should begin at a minimum two years pre-construction to assess the risk the project poses to local bat populations.

- The Whooping Crane's migration corridor centers along the east side of the Missouri River. The project falls within the 75% core migration corridor and the northwest corner is considered to be core stopover habitat. A considerable number of Whooping Cranes have been observed along the river to the west of the project and at Long Lake to the north and it is possible they use resources within the project boundary as well. Contact the US Fish and Wildlife Habitat and Population Evaluation Team (HAPET) in Bismarck to request the Whooping Crane model of predicted use of landscapes.

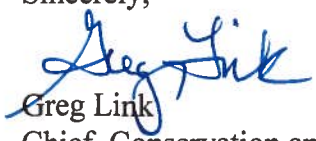
- The Bald Eagle population and number of nest sites is increasing significantly in North Dakota. The number of nest sites has increased from 10 known sites in the year 2000 to more than 300 in the year 2017. Due to the continual increase and selection of non-traditional nest sites, it is possible that Bald Eagle nests may be found anywhere across the state where large trees are present. Therefore, it is necessary to conduct searches for raptor nests during the breeding season to understand the risk associated with development.

As stated earlier, the Department believes that with responsible placement of turbines, roads, and infrastructure, this project could successfully avoid impacts to our species of conservation concern. However, if impacts associated with this project cannot be avoided, we recommend that a voluntary offset package be developed for both the direct and indirect permanent impacts of roads, turbine pads, and associated infrastructure constructed within native habitats (i.e. unbroken

native prairie ≥ 160 acres and wetlands).

The developer has a draft copy of North Dakota Native Wildlife Resources: Guidelines for Reducing Impacts from Wind Energy Development, and can use this guide, as well as consulting directly with us, for developing wildlife survey plans and creating a voluntary offset package, if one should be recommended.

Sincerely,



Greg Link
Chief, Conservation and Communications Division

Cc: Kevin Shelley, US Fish and Wildlife Service
ND Public Service Commission

NORTH DAKOTA
DEPARTMENT *of* HEALTH

ENVIRONMENTAL HEALTH SECTION
Gold Seal Center, 918 E. Divide Ave.
Bismarck, ND 58501-1947
701.328.5200 (fax)
www.ndhealth.gov

May 29, 2018

Dr. Lindsey Churchill, PhD, PWS
Environmental Project Manager
AECOM
1000 East Calgary Avenue, Suite 1
Bismarck, ND 58503

Re: Emmons-Logan Wind Energy Center & Transmission Line Project
Emmons and Logan Counties

Dear Dr. Churchill:

This department has reviewed the information concerning the above-referenced project submitted under date of May 3, 2018, with respect to possible environmental impacts.

This department believes that environmental impacts from the proposed construction will be minor and can be controlled by proper construction methods. With respect to construction, we have the following comments:

1. Care is to be taken during construction activity near any water of the state to minimize adverse effects on a water body. This includes minimal disturbance of stream beds and banks to prevent excess siltation, and the replacement and revegetation of any disturbed area as soon as possible after work has been completed. Caution must also be taken to prevent spills of oil and grease that may reach the receiving water from equipment maintenance, and/or the handling of fuels on the site. Guidelines for minimizing degradation to waterways during construction are attached.

2. Projects disturbing one or more acres are required to have a permit to discharge storm water runoff until the site is stabilized by the reestablishment of vegetation or other permanent cover. Further information on the storm water permit may be obtained from the Department's website or by calling the Division of Water Quality (701-328-5210). Also, cities may impose additional requirements and/or specific best management practices for construction affecting their storm drainage system. Check with the local officials to be sure any local storm water management considerations are addressed.

3. The northeaster portion of the proposed construction project overlies the Braddock glacial drift aquifer, which is a designated sensitive aquifer. Numerous stock watering and domestic water wells are located within the proposed project area. Care should be taken to avoid spills of any materials that may have an adverse effect on groundwater quality. All spills must be immediately reported to this Department and appropriate remedial actions performed.

The department owns no land in or adjacent to the proposed improvements, nor does it have any projects scheduled in the area. In addition, we believe the proposed activities are consistent with the State Implementation Plan for the Control of Air Pollution for the State of North Dakota.

If you have any questions regarding our comments, please feel free to contact this office.

Sincerely,

L. David Glatt, P.E., Chief
Environmental Health Section

LDG:cc
Attach.

NORTH DAKOTA
DEPARTMENT of HEALTH

ENVIRONMENTAL HEALTH SECTION
Gold Seal Center, 918 E. Divide Ave.
Bismarck, ND 58501-1947
701.328.5200 (fax)
www.ndhealth.gov

Construction and Environmental Disturbance Requirements

These represent the minimum requirements of the North Dakota Department of Health. They ensure that minimal environmental degradation occurs as a result of construction or related work which has the potential to affect the waters of the State of North Dakota. All projects will be designed and implemented to restrict the losses or disturbances of soil, vegetative cover, and pollutants (chemical or biological) from a site.

Soils

Prevent the erosion of exposed soil surfaces and trapping sediments being transported. Examples include, but are not restricted to, sediment dams or berms, diversion dikes, hay bales as erosion checks, riprap, mesh or burlap blankets to hold soil during construction, and immediately establishing vegetative cover on disturbed areas after construction is completed. Fragile and sensitive areas such as wetlands, riparian zones, delicate flora, or land resources will be protected against compaction, vegetation loss, and unnecessary damage.

Surface Waters

All construction which directly or indirectly impacts aquatic systems will be managed to minimize impacts. All attempts will be made to prevent the contamination of water at construction sites from fuel spillage, lubricants, and chemicals, by following safe storage and handling procedures. Stream bank and stream bed disturbances will be controlled to minimize and/or prevent silt movement, nutrient upsurges, plant dislocation, and any physical, chemical, or biological disruption. The use of pesticides or herbicides in or near these systems is forbidden without approval from this Department.

Fill Material

Any fill material placed below the high water mark must be free of top soils, decomposable materials, and persistent synthetic organic compounds (in toxic concentrations). This includes, but is not limited to, asphalt, tires, treated lumber, and construction debris. The Department may require testing of fill materials. All temporary fills must be removed. Debris and solid wastes will be removed from the site and the impacted areas restored as nearly as possible to the original condition.

North Dakota State Water Commission

900 EAST BOULEVARD AVENUE, DEPT 770 • BISMARCK, NORTH DAKOTA 58505-0850
(701) 328-2750 • TTY 1-800-366-6888 or 711 • FAX (701) 328-3696 • http://swc.nd.gov

May 29, 2018

Lindsey Churchill
AECOM
1000 East Calgary Avenue, STE 1
Bismarck, ND 58503

Dear Ms. Churchill:

This is in response to your request for a review of the environmental impacts associated with the Emmons-Logan Wind Energy Center and Transmission Line Project located in Emmons and Logan Counties, ND.

The proposed project has been reviewed by State Water Commission staff, and the following comments are provided:

- Initial review indicates the project does not require a conditional or temporary permit for water appropriation. However, if surface water or groundwater will be diverted for construction of the project, a water permit will be required per North Dakota Century Code (NDCC) § 61-04-02. Please consult with the Water Appropriations Division of the Office of the State Engineer (OSE) if you have any questions regarding this comment at 701-328-2754 or waterpermits@nd.gov.

The State Water Commission (SWC) maintains a network of observation wells across the state for monitoring the water levels and quality in glacial and bedrock aquifers. These wells are often installed in road and highway rights-of-way to limit inconvenience to the adjacent landowners. SWC observation wells have a yellow protective casing extending between 1 and 3 feet above ground surface, and their locations are marked with a stake. If an observation well is encountered during project activities and must be removed, please contact the Water Appropriations Division. The SWC hopes to keep all observation wells, but otherwise will ensure the well is properly abandoned.

- There are no floodplains identified and/or mapped where this proposed project is to take place. However, due to the size of the project area, please work with the local floodplain administrator for any potential permitting requirements. The floodplain administrator for Logan County is Blanche Shumacher, 701-754-2425, baschuma@nd.gov. The floodplain administrator for Emmons County is Glen Geffe, 701-254-4802.

- The OSE Engineering and Permitting Section reviewed the project route and determined that the project route traverses over or through surface water resources. The OSE requests to be notified regarding the proposed project's impacts, if any, to water resources (i.e. streams or rivers), agricultural drains, and wetlands (i.e. ponds, sloughs, lakes, or any series thereof) as any alterations, modifications, improvements, or impacts to those water resources may require a drainage permit(s) or a construction permit(s) from the OSE. For further information on the OSE's permitting requirements, please visit the Regulation & Appropriation tab on the OSE's website (swc.nd.gov). Please contact the OSE Engineering and Permitting Section at 701-328-4898 if you have any questions regarding this comment.

- There are three (3) low-hazard dams located within the project boundary, legal locations listed below. Ownership and responsibility of the dams must be obtained before any modification or

removal takes place. If removal or modification is anticipated, please notify Karen Goff at kgoff@nd.gov.

SW ¼ of the NW ¼ of S36, T134N, R75W
SW ¼ of the NE ¼ of S32, T133N, R74W
SE ¼ of the SE ¼ of S3, T133N, R73W

Thank you for the opportunity to provide review comments. If you have any questions, please call me at 701-328-4967.

Sincerely,

Jared Huibregtse
Water Resource Planner IV

JH:dm/1570

North Dakota Department of Transportation

Thomas K. Sorel
Director

Doug Burgum
Governor

May 30, 2018

Lindsey (Meyers) Churchill, PhD, PWS
Environmental Project Manager
AECOM
1000 East Calgary Avenue, Suite 1
Bismarck, ND 58503

DEVELOP THE EMMONS-LOGAN WIND ENERGY CENTER AND ASSOCIATED 230 KILOVOLT (kV) ELECTRIC TRANSMISSION LINE, EMMONS & LOGAN COUNTIES, NORTH DAKOTA

We have reviewed your May 3, 2018, letter.

This project should have no adverse effect on the North Dakota Department of Transportation highways.

However, if because of this project any work needs to be done on highway right of way, appropriate permits and risk management documents will need to be obtained from the Department of Transportation District Engineer, Larry Gangl at 701-328-6955.

Robert Fode

ROBERT A. FODE, P.E., DIRECTOR – OFFICE OF PROJECT DEVELOPMENT

57/raf/js
c: Larry Gangl, Bismarck District Engineer

CITY OF LINTON

LINTON INDUSTRIAL DEVELOPMENT CORPORATION

PO Box 433 • Linton, ND 58552
Phone: 701-254-4267 • Fax: 701-254-4223 • E-mail: lidcbek@bektel.com

To: Emmons County Commissioners

From: Linton Industrial Development Corporation President

Subject: Emmons – Logan Wind Farm Project

Date: June 13, 2018

The Linton Industrial Development Corporation (LIDC) is providing this letter to you in support of the Emmons-Logan Wind Farm project. The LIDC's goals and vision is to promote projects and business opportunities for the betterment of growth, employment and economic benefits for Linton and the surrounding Communities. The LIDC supports this project and considers this an opportunity for employment and economic growth.

The Emmons-Logan Wind Farm would provide the following benefits:

- Employment during construction (laborers, truck drivers, fuel distributers, vehicle repair, etc.)
- Permanent employment for 10 to 13 full-time positions. These positions would provide opportunities for current residents, former residents that wish to return to these Communities, and new residents that want to enjoy what our area provides. These positions will provide a "family living" income. The LIDC feels persons selected for these positions would certainly consider making the Linton, Hazelton and Napoleon area their home and buy or purchase homes, groceries, fuel, utilities, send their children to local schools, Churches, and become important members of the Community.
- Provide a revenue source that does not need to come from property owners for emergency services such as advanced life support (ambulance), equipment for the hospital, fire district and local school needs. This tax revenue would certainly help offset the inevitable increase of supplying these services for County Residents.

The LIDC considers the Emmons-Logan Wind Farm an opportunity and not an obstacle for employments and economic growth.

Appendix C

Studies and Assessments

DoD Preliminary Screening Tool

Northern Long-Eared Bat Desktop Habitat Assessment

Whooping Crane Habitat Review

2017 Grassland Assessment

2017 Sharp-tailed Grouse Lek Report

DoD Preliminary Screening Tool

Federal Aviation Administration

« OE/AAA

DoD Preliminary Screening Tool

DoD Preliminary Screening Tool - Desk Reference Guide V_2014.2.0

Disclaimer:

- The DoD Preliminary Screening Tool enables developers to obtain a preliminary review of potential impacts to Long-Range and Weather Radar(s), Military Training Route(s) and Special Airspace(s) prior to official OE/AAA filing. This tool will produce a map relating the structure to any of the DoD/DHS and NOAA resources listed above. The use of this tool is **100 % optional** and will provide a first level of feedback and single points of contact within the DoD/DHS and NOAA to discuss impacts/mitigation efforts on the military training mission and NEXRAD Weather Radars. **The use of this tool does not in any way replace the official FAA processes/procedures.**

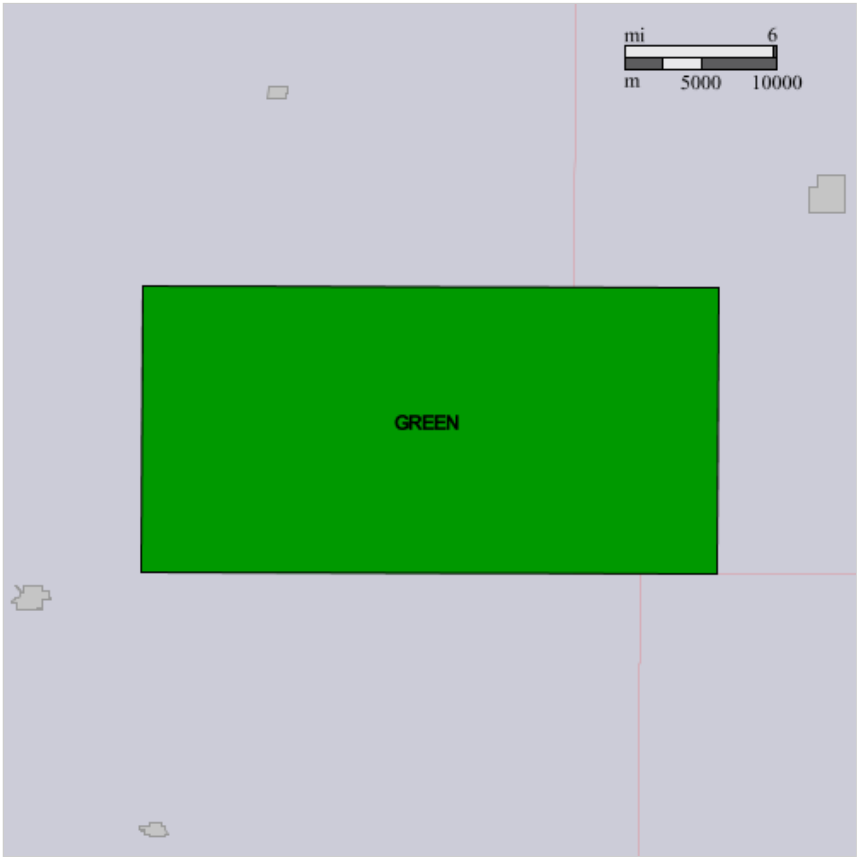
Instructions:

- Select a screening type for your initial evaluation. Currently the system supports pre-screening on:
  -Air Defense and Homeland Security radars(Long Range Radar)
  -Weather Surveillance Radar-1988 Doppler radars(NEXRAD)
  -Military Operations
- Enter either a single point or a polygon and click submit to generate a long range radar analysis map.
- Military Operations is only available for a single point.
- At least three points are required for a polygon, with an optional fourth point.
- The largest polygon allowed has a maximum perimeter of 100 miles.

Screening Type: Long Range Radar ▼ **Geometry Type:** Polygon ▼

Point	Latitude				Longitude			
	Deg	Min	Sec	Dir	Deg	Min	Sec	Dir
1	46	27	2.145	N ▼	100	10	7.878	W ▼
2	46	27	0.187	N ▼	99	49	57.25	W ▼
3	46	16	59.75	N ▼	100	10	9.397	W ▼
4	46	16	57.77	N ▼	99	50	0.175	W ▼

Horizontal Datum: NAD83 ▼



Map Legend:

- **Green:** No anticipated impact to Air Defense and Homeland Security radars. Aeronautical study required.
- **Yellow:** Impact likely to Air Defense and Homeland Security radars. Aeronautical study required.
- **Red:** Impact highly likely to Air Defense and Homeland Security radars. Aeronautical study

required.

Note: Map colors will show as depicted in the map legend when using the 'Polygon' Geometry Type; map colors will be subdued when using the 'Single Point' Geometry Type.

Federal Aviation Administration

« OE/AAA

DoD Preliminary Screening Tool

DoD Preliminary Screening Tool - Desk Reference Guide V_2014.2.0

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Instructions:

- Select a screening type for your initial evaluation. Currently the system supports pre-screening on:
  -Air Defense and Homeland Security radars(Long Range Radar)
  -Weather Surveillance Radar-1988 Doppler radars(NEXRAD)
  -Military Operations
- Enter either a single point or a polygon and click submit to generate a long range radar analysis map.
- Military Operations is only available for a single point.
- At least three points are required for a polygon, with an optional fourth point.
- The largest polygon allowed has a maximum perimeter of 100 miles.

Screening Type: Military Operations ▼ **Geometry Type:** Single Point ▼

Point	Latitude				Longitude			
	Deg	Min	Sec	Dir	Deg	Min	Sec	Dir
1	46	21	44.27	N ▼	100	0	26.50	W ▼

Horizontal Datum: NAD83 ▼

The preliminary review of your proposal does not return any likely impacts to military airspace. Please contact Dr. Thomas (Thom) H. Rennie at the USAF Regional Enviromental Coordinator at (214)767-4678 for confirmation and documentation.

The preliminary review of your proposal does not return any likely impacts to military airspace. Please contact LTC Owen B. Castlemain at the USA Regional Enviromental Coordinator at (817) 222-5921 for confirmation and documentation.

The preliminary review of your proposal does not return any likely impacts to military airspace. Please contact the US Navy Representative, FAA Central Service Area at the USMC Regional Enviromental Coordinator at (817) 222-5930 for confirmation and documentation.

The preliminary review of your proposal does not return any likely impacts to military airspace. Please contact the US Navy Representative, FAA Central Service Area at the USN Regional Enviromental

Any questions interpreting the map, please email Steve Sample with your question/s and phone number at steven.sample@pentagon.af.mil

Coordinator at (817) 222-5930 for confirmation and documentation.

This is a preliminary review of your proposal and does not preclude official FAA processes.
Your search data is not retained and the privacy of all your searches is assured.

Federal Aviation Administration

« OE/AAA

DoD Preliminary Screening Tool

DoD Preliminary Screening Tool - Desk Reference Guide V_2014.2.0

Disclaimer:

- The DoD Preliminary Screening Tool enables developers to obtain a preliminary review of potential impacts to Long-Range and Weather Radar(s), Military Training Route(s) and Special Airspace(s) prior to official OE/AAA filing. This tool will produce a map relating the structure to any of the DoD/DHS and NOAA resources listed above. The use of this tool is **100 % optional** and will provide a first level of feedback and single points of contact within the DoD/DHS and NOAA to discuss impacts/mitigation efforts on the military training mission and NEXRAD Weather Radars. **The use of this tool does not in any way replace the official FAA processes/procedures.**

Instructions:

- Select a screening type for your initial evaluation. Currently the system supports pre-screening on:
  -Air Defense and Homeland Security radars(Long Range Radar)
  -Weather Surveillance Radar-1988 Doppler radars(NEXRAD)
  -Military Operations
- Enter either a single point or a polygon and click submit to generate a long range radar analysis map.
- Military Operations is only available for a single point.
- At least three points are required for a polygon, with an optional fourth point.
- The largest polygon allowed has a maximum perimeter of 100 miles.

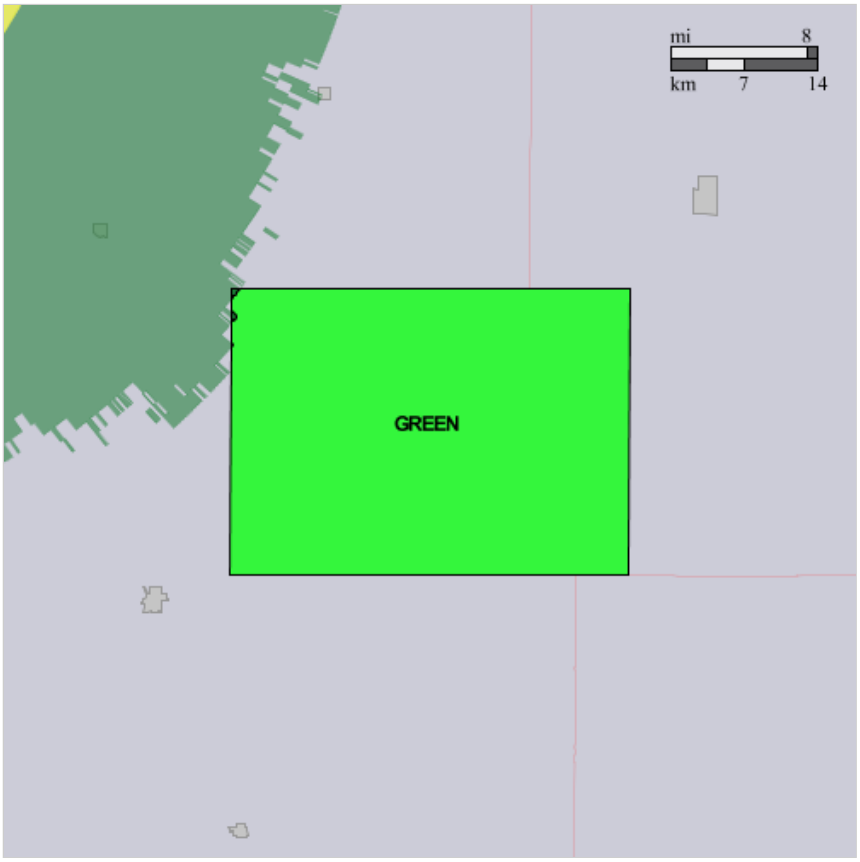
Screening Type: NEXRAD ▼ **Geometry Type:** Polygon ▼

Point	Latitude				Longitude			
	Deg	Min	Sec	Dir	Deg	Min	Sec	Dir
1	46	27	2.145	N ▼	100	10	7.878	W ▼
2	46	27	0.187	N ▼	99	49	57.25	W ▼
3	46	16	59.75	N ▼	100	10	9.397	W ▼
4	46	16	57.77	N ▼	99	50	0.175	W ▼

Horizontal Datum: NAD83 ▼

Map Legend:

- **Green: No Impact Zone.** Impacts not likely. NOAA will not perform a detailed analysis, but would still like to know about the project.
- **Dk Green: Notification Zone.** Some impacts possible. Consultation with NOAA is optional, but NOAA would still like to know about the project.



Because the NEXRAD can detect wind turbines occasionally at great distance, NOAA would like to know the location of all wind farm projects so that corrupted radar data can be flagged. Send project information directly to NOAA at wind.energy.matters@noaa.gov or through the National Telecommunications & Information Administration (NTIA) in the Dept. of Commerce. NOAA protects all wind project information as proprietary and sensitive.

- **Yellow: Consultation Zone.** Significant impacts possible. NOAA requests consultation to discuss project details and to perform a detailed impact analysis. NOAA may request mitigation of significant impacts.
- **Orange: Mitigation Zone.** Significant impacts likely. NOAA will likely request mitigation if a detailed analysis indicates that the project will cause significant impacts.
- **Red: No-Build Zone.** Severe impacts likely. NOAA requests developers not build wind turbines within 3 km of the NEXRAD. Detailed impact analysis required.

Note: Map colors will show as depicted in the map legend when using the 'Polygon' Geometry Type; map colors will be subdued when using the 'Single Point' Geometry Type.

Northern Long-Eared Bat Desktop Habitat Assessment

Northern Long-Eared Bat Desktop Habitat Assessment

Emmons-Logan Wind Energy Center

Emmons and Logan Counties, North Dakota

Final Report

Prepared for:

Emmons-Logan Wind, LLC

Prepared by:

Clayton Derby, Terri Thorn, and Sofia Agudelo

Western EcoSystems Technology, Inc.
4007 State Street, Suite 109
Bismarck, North Dakota 58503

July 10, 2018

STUDY PARTICIPANTS

Western EcoSystems Technology, Inc.

Clayton Derby	Project Manager
Terri Thorn	GIS Specialist/Report Writer
Sofia Agudelo	Reviewer/Technical Editor

REPORT REFERENCE

Western EcoSystems Technology, Inc. 2017. Northern Long-Eared Bat Desktop Habitat Assessment, Emmons-Logan Wind Energy Center, Emmons and Logan Counties, North Dakota. Prepared for Emmons-Logan Wind, LLC. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota.

TABLE OF CONTENTS

LIST OF FIGURES

INTRODUCTION

Emmons-Logan Wind, LLC (Emmons-Logan Wind), a wholly-owned, indirect subsidiary of NextEra Energy Resources, LLC, is considering the development of the Emmons-Logan Wind Energy Center (Project) in east-central Emmons and southwest Logan counties, North Dakota. To evaluate potential northern long-eared bat (*Myotis septentrionalis*; NLEB) habitat and use within the proposed Project area and to address past recommendations from the U.S. Fish and Wildlife Service (USFWS) and North Dakota Game and Fish Department, Emmons-Logan Wind requested that Western Ecosystems Technology, Inc. (WEST) evaluate potential habitat for NLEB within the Project area during the summer months.

This report describes the results of the NLEB desktop habitat assessment completed for the Project by WEST, which was done following the Phase 1 survey recommendations found in the USFWS' *Northern Long-Eared Bat Interim Conference and Planning Guidance* (Guidance; USFWS 2014) and *2016 Range-Wide Indiana Bat Summer Survey Guidelines* (Guidelines; USFWS 2016).

Northern Long-eared Bat Summer Habitat Requirements

The NLEB is a federally threatened species throughout its range listed under the Endangered Species Act (1973), but take due to operation of wind projects is exempt under a 4(d) rule (81 Federal Register 9: 1900-1922. 2016). The NLEB is a forest-dependent species that tends to avoid open habitats, generally relying on forest features for both foraging and roosting during the summer months (Owen et al. 2003, USFWS 2017), and requiring forest interior habitat with adequate canopy closure for both roost and foraging (Lausen 2009). Abundance of NLEB prey items, particularly beetles and moths, are typically higher in more closed forest stands than in forest openings, and wing morphology makes this bat species ideally suited for the high maneuverability required for gleaning-type foraging within a cluttered forest interior (Henderson and Broders 2008). Additionally, riparian areas are considered critical resource areas for many species of bats because they support higher concentrations of prey, provide drinking areas, and act as unobstructed commuting corridors (Grindal et al. 1999).

It is unlikely that NLEB would cross over large open areas (i.e., land lacking suitable habitat) to search for foraging and roosting habitats. Henderson and Broders (2008) found that NLEB did not travel more than 255 feet (ft; 68.6 meters [m]) from the edge of intact forest structure; however, they also have been documented to occur in agricultural settings where forest habitats have been highly fragmented. A study of nine female NLEB using an intensively managed forest in West Virginia found this species forages in areas with forest patch sizes between 114 – 161 acres (ac; 46.1 – 65.2 hectares [ha]; Owen et al. 2003), while studies in landscapes dominated by agricultural activities found NLEB used woodlots and riparian zones with as little as 15 – 50 ac (6.1 – 20.2 ha) of forest cover (Foster and Kurta 1999, Henderson and Broders 2008).

During the summer months, NLEB roost singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees (USFWS 2014). In general, NLEB seem opportunistic in

selecting roosts, using tree species that retain bark or provide cavities or crevices. Rarely, NLEB have also been found roosting in structures like barns and sheds (USFWS 2015); however, any structures that may be used as roosts would be expected to be located relatively close to wooded habitat that would be used for foraging. Cooler roost locations such as caves and mines may be used by non-reproductive females and males (Bat Conservation International 2017); no caves or mines are present within the Project area or 2.5-mile (mi; 4-kilometer [km]) buffer.

PROJECT AREA

The analysis was completed based on a Project boundary provided by Emmons-Logan Wind in 2017 encompassing about 75,056 acres (ac; 303.7 square kilometers [km^2]; 117.3 square miles [mi^2]) but is applicable to current boundary as only minor adjustments have been made. The Project is located in the south-central North Dakota counties of Emmons and Logan, approximately 7 miles (mi; 11.3 kilometers [km]) northeast of the City of Linton (Figure 1). The landscape area is generally rolling to flat. Elevations range from 1,917.1 to 2,176.0 feet (ft; 584.3 to 663.2 meters [m]) above sea level. Historically, the landscape was grassland but has since been converted to agricultural use with crop production and livestock grazing the primary practices. Trees and shrubs can be found around farmsteads, within planted shelter belts, and along/within drainages. Natural wetlands are present and scattered throughout the Project and surrounding area. Common agricultural crops include small grains, corn, soybeans, sunflowers, and alfalfa.

HABITAT ASSESSMENT

Methods

The NLEB Guidance provides an estimate of the average maximum movement distance of 1.5 mi (2.4 km) for NLEB and 2.5 mi for Indiana bats. Using US Department of Agriculture's (USDA) 2016 National Agricultural Imagery Program imagery (USDA 2016) and National Land Cover Database (US Geological Survey 2011, Homer et al. 2015) data, WEST digitized trees, considered potential NLEB summer habitat, within the Project area and within a 2.5 mi buffer around the Project. The larger 2.5 mi buffer was used to provide a conservative estimate of the potential foraging range of NLEB and to depict any potential corridors of connected habitat in the vicinity of the Project.

A habitat analysis was then conducted to assess connectivity of suitable foraging (i.e., woodlots, forested riparian corridors, and areas adjacent to these habitats), roosting, or commuting (i.e., shelterbelts/tree-lines, wooded hedgerows) habitats. Given that NLEB have similar habitat requirements as Indiana bats, the approach used in this habitat evaluation followed recommendations for habitat assessment included in the USFWS' *Indiana Bat Section 7 and Section 10 Guidance for Wind Energy Projects* (USFWS 2011). This guidance assesses the potential for bats to use the Project area based on presence of travel/commuting corridors within the Project boundary and connectivity to foraging or roosting habitat within a 2.5 mi buffer of the

Project. Connectivity is defined in the guidance as commuting habitat within 1,000 ft (304.8 m) and connected to roosting or foraging habitat within 2.5 mi of the Project boundary (USFWS 2011). The 1,000 ft distance is based on studies of Indiana and NLEB behavior using telemetry data on foraging activity, which indicated that isolated trees or small patches might only be suitable as habitat when they are less than 1,000 ft from other forested/wooded habitats; therefore, it is reasonable to conclude that these bats are unlikely to occur within areas located more than 1,000 ft from roosting/foraging habitat (USFWS 2011, 2014).

For purposes of this review, WEST categorized habitat patches equal to, or smaller than 14 ac (5.6 ha), as potential commuting/travel corridors (generally shelterbelts or small woodlots); patches 15 – 50 ac (6.1 – 20.2 ha) were considered small roosting/foraging areas (larger woodlots or riparian forests); and patches greater than 50 ac (20.2 ha) were considered medium-large roosting/foraging areas (larger contiguous forests or riparian corridors).

Results

Wooded habitat within the Project area is generally confined to small (less than 14 ac [6.1 ha]), scattered woodlots and tree rows that would not be considered suitable summer habitat for NLEB (Figure 1). There are three small (15 to 50 ac [6.1 – 20.2 ha]) wooded fragments in the northern half of the Project area that could provide potential roosting habitat for NLEB. These wooded areas were analyzed to determine potential foraging and/or travel corridors around them by looking at the area within a 1,000-foot buffer. There were no direct wooded travel corridors between these three small patches and each other or other larger patches of wooded areas. The 2.5 mi buffer did not contain any treed areas greater than or equal to 15 ac (Figure 1).

Imagery analysis shows all potential roost/reproduction sites to consist of planted tree rows with a variety of tree sizes and species; both the potential roost sites and corresponding foraging areas are associated with, or encompass, active farmsteads.

Based on the remoteness of the Project from native tree areas (all three areas within the 15-50 ac [6.1-20.2 ha] were planted trees as well as most other smaller treed areas being tree rows or shelter belts), lack of connection to larger riparian areas (e.g., Missouri River), and lack of hibernaculum near the Project, it is unlikely that the NLEB has summer presence in the Project.

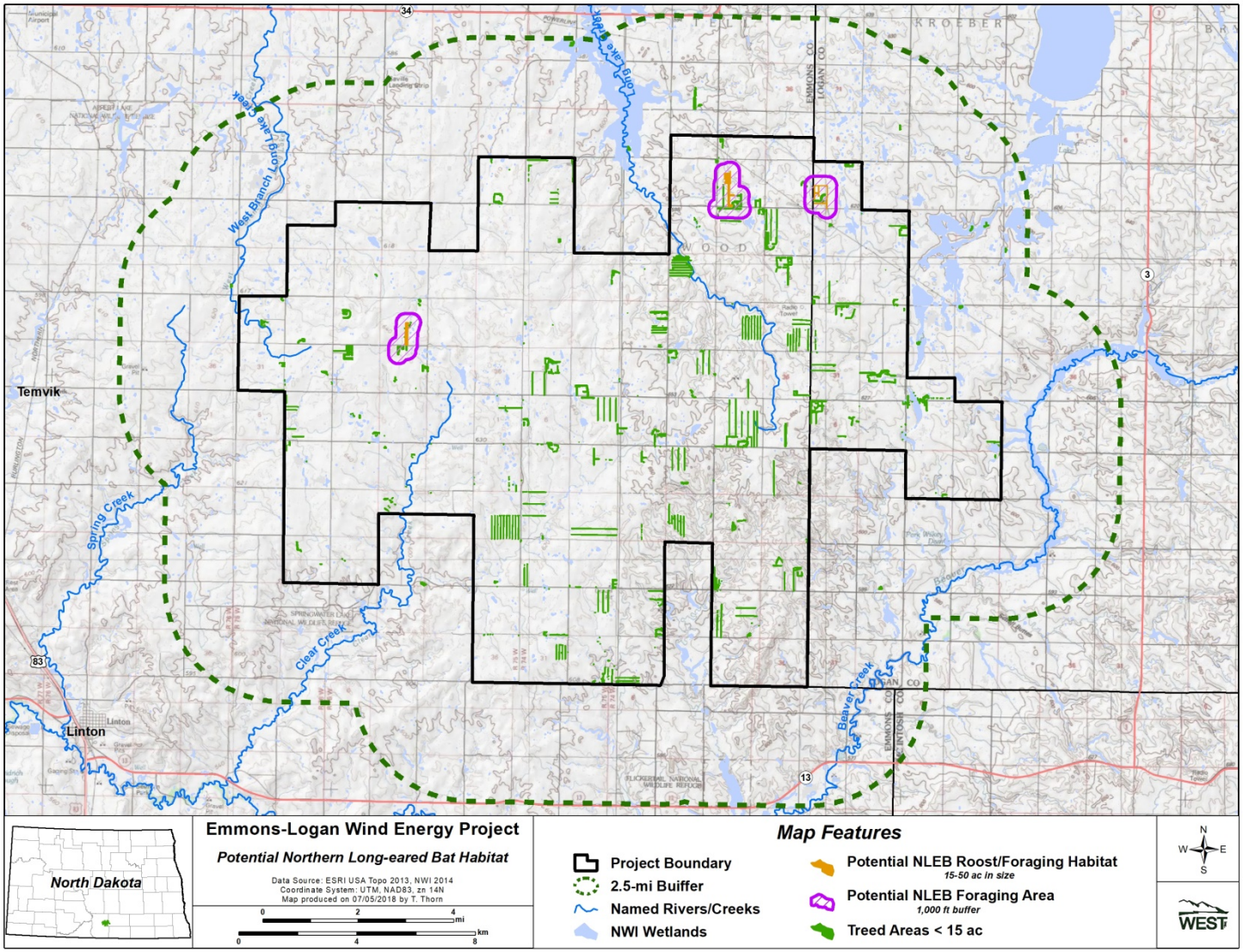


Figure 1. Potential northern long-eared bat habitat within the proposed Emmons-Logan Wind Energy Center and a 2.5 mile buffer, in Emmons and Logan Counties, North Dakota.

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Whooping Crane Habitat Review

Whooping Crane Habitat Review
Emmons-Logan Wind Energy Center
Emmons and Logan Counties, North Dakota

Final Report

Prepared for:

Emmons-Logan Wind, LLC

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INTRODUCTION

Emmons-Logan Wind, LLC (Emmons-Logan Wind), a wholly-owned, indirect subsidiary of NextEra Energy Resources, LLC proposes to develop the Emmons-Logan Wind Energy Center (Project) in Emmons and Logan Counties, North Dakota (Figure 1). Emmons-Logan Wind requested that Western EcoSystems Technology, Inc. (WEST) conduct a desktop review of potential whooping crane (*Grus americana*) habitat resources within the Project and perform a comparative analysis to resources in the surrounding landscape using four adjacent and similarly-sized reference areas.

PROJECT AREA

The analysis was completed based on a Project boundary provided by Emmons-Logan Wind in 2017 encompassing about 75,056 acres (ac; 303.7 square kilometers [km^2]; 117.3 square miles [mi^2]) but is applicable to the current boundary as only minor adjustments have been made. The Project is located in the south-central North Dakota counties of Emmons and Logan, approximately 7 miles (mi; 11.25 kilometers [km]) northeast of the City of Linton (Figure 1). The landscape area is generally rolling to flat. Elevations range from 1,917.1 to 2,176.0 feet (ft; 584.3 to 663.2 meters [m]) above sea level. Historically, the landscape was grassland but has since been converted to agricultural use with crop production and livestock grazing the primary practices. Trees and shrubs can be found around farmsteads, within planted shelter belts, and along/within drainages. Natural wetlands are present and scattered throughout the Project and surrounding area. Common agricultural crops include small grains, corn, soybeans, sunflowers, and alfalfa.

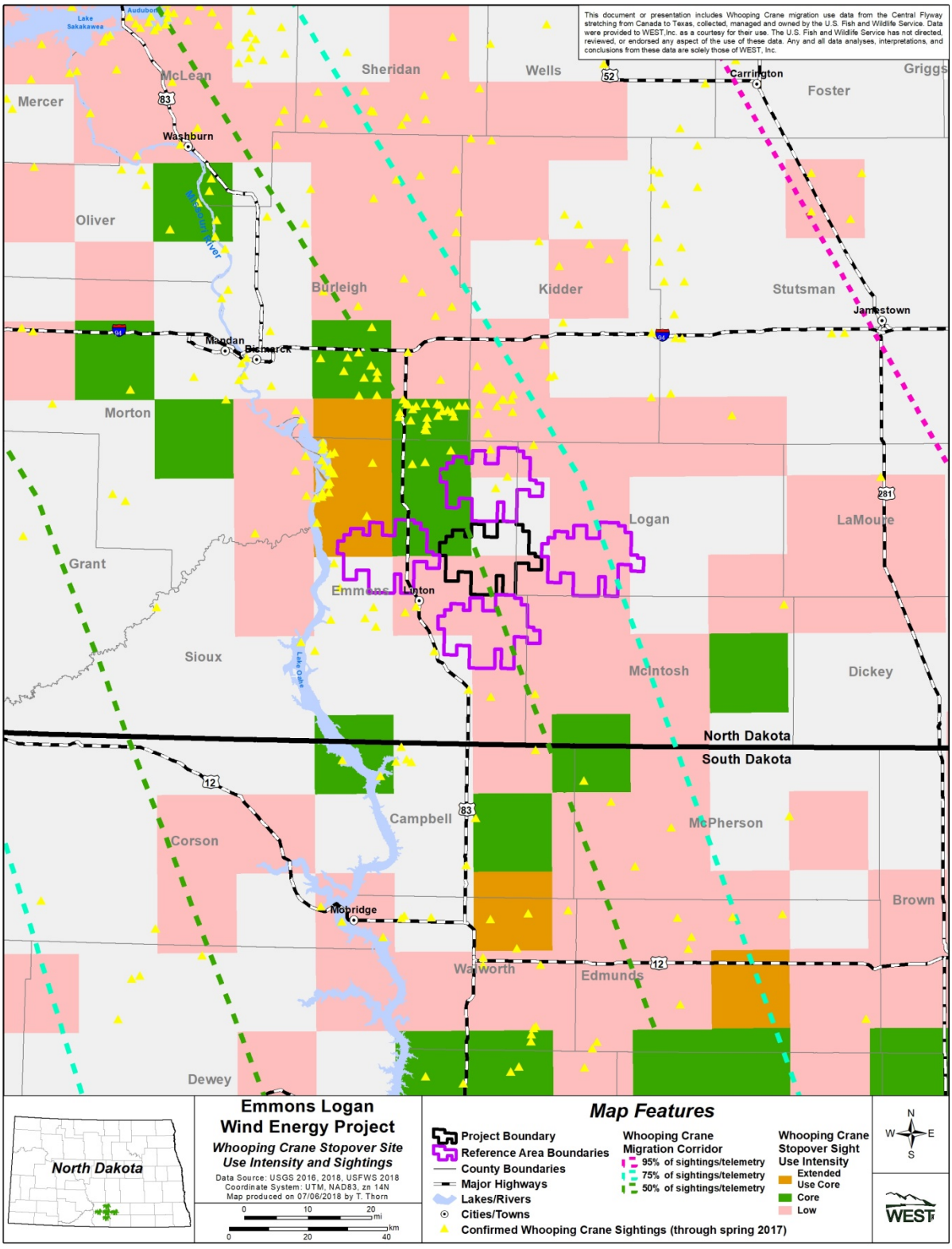

Figure 1. Location of the Emmons-Logan Wind Energy Center, adjacent reference areas, and whooping crane stopover site use intensity and sightings.

METHODS

A desktop review was completed using ArcGIS, ArcMap 10.3.1, National Land Cover Database (NLCD) information, National Wetland Inventory (NWI) data, 2016 National Agricultural Imagery Program (NAIP) aerial imagery, and the Project area as provided by Emmons-Logan Wind in 2017. A site visit was not completed by WEST for this exercise specifically, but WEST has conducted other surveys within the Project area and confirmed that the mapping generally agrees with current conditions.

The whooping crane habitat analysis included a comparison of land cover within the Project and four similarly-sized reference areas (collectively, the "study areas") located adjacent to the Project in the four cardinal directions (Figure 1). A potentially suitable habitat assessment (Watershed Institute 2012) was also used to quantify and compare whooping crane habitat within the study areas. This assessment first screens all wetlands within the study areas for minimum size, visual obstructions, and disturbances. Those wetlands left are then quantified by their size, density of wetlands around them, distance to food, whether they are natural or man-made, and their water regime as a means to quantify suitability. This work was initially done in Kansas and the results were compared to Quivira National Wildlife Refuge, a traditional migratory stopover area. Further, the study areas were reviewed qualitatively using a recent habitat suitability from the USFWS (Niemuth et al. 2018).

RESULTS

There are approximately 48,724 ac of grassland/herbaceous and pasture/hay land cover/ land use types within the proposed Project area, or 64.9% of the total area. Croplands make up slightly more than 31% of the Project area while developed lands occupy another 3.3%. The remaining <1% of the Project area is composed of wetlands, trees, and shrubs (Figure 2; Table 1).

Croplands, Grasslands, and Other Habitats

The percentage of cropland varied by less than 10% between the study areas with the east reference area having the lowest at 23.0% and the Project area having the highest at 31.4% (Figure 2; Table 1). All cropland has the potential as foraging areas for whooping cranes but crop type could influence the extent of use of a particular field during any one migration season.

Grassland habitats (including both the grassland/herbaceous and pasture/hay types) also varied between study areas by 10% (Figure 2; Table 1). The percentage of grassland types ranged from 69.6% (east reference area) to 59.6% (north reference area; Table 1). The influence of grassland habitats on migrating whooping crane behavior is unknown; however, short grasslands (i.e. grazed pasture) adjacent to wetlands may provide loafing areas and cranes may utilize grasslands to some degree for foraging.

All other habitat types comprised approximately 3.3% of the Project area which was similar to the percentage of these habitats found in the reference areas (Table 1).

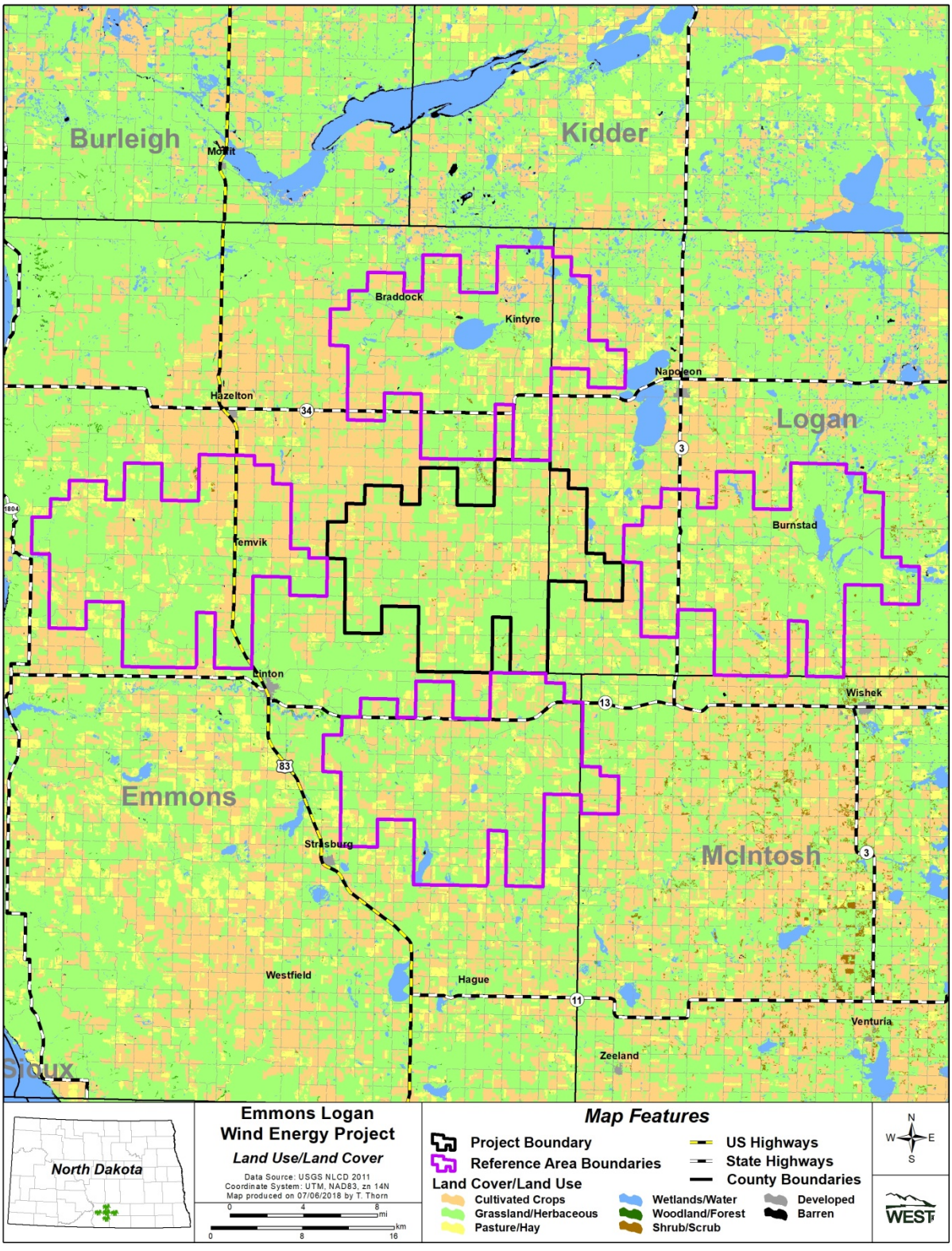

Figure 2. Land Use/Land Cover within and around the Emmons-Logan Wind Energy Center.

Table 1. Land Use/Land Cover within the Emmons-Logan Wind Energy Center and adjacent reference areas.

	Project		North		East		South		West	
Habitat Type	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**
Cultivated Crops	23,569.0	31.4	24,108.6	32.1	17,242.9	23.0	19,798.4	26.4	21,346.8	28.4
Grassland/Herbaceous	42,426.1	56.5	38,655.3	51.5	44,652.1	59.5	44,057.3	58.7	44,846.4	59.8
Pasture/Hay	6,297.7	8.4	6,049.4	8.1	7,580.5	10.1	7,120.4	9.5	6,233.8	8.3
Developed	2,470.5	3.3	2,381.5	3.2	2,316.7	3.1	2,752.4	3.7	2,361.6	3.1
Water/Wetlands	57.3	<0.1	3,530.4	4.7	2,570.0	3.4	1,231.9	1.6	173.4	0.2
Shrub/Scrub	219.14	0.3	195.2	0.3	667.4	0.9	39.8	0.1	26.6	<0.1
Forests	15.8	<0.1	72.2	<0.1	18.9	<0.1	41.2	0.1	52.5	0.1
Barren			63.0	<0.1	7.1	<0.1	14.2	<0.1	14.5	<0.1

Data Source: National Land Cover Database (Fry et al. 2011) with similar land cover/land use combined.

Wetlands

NWI wetland data was used for this analysis because it represents wetland features to a higher degree than the NLCD. For this portion of the analysis, it is assumed that all wetlands are potential whooping crane roosting areas under one water regime or another (e.g., drought, normal, or flood). The Project area had the least wetland acreage, smallest mean wetland size, narrowest wetland size range, and third fewest wetlands of all study areas (Figure 3; Table 2). The north reference area had the greatest number of wetlands (1,883), largest mean wetland size (4.7 ac), widest wetland size range (<0.1 to 1,713.9 ac), and the highest wetland acreage (8,915.9 ac).

Freshwater emergent wetlands were the dominant wetland type in all study areas. However, approximately 33% of the east and 20% of the north area wetlands were lakes (Figure 3: Table 3).

In general, wetland characteristics were similar (smallest/fewest) for the Project and west reference area while the north and east reference area characteristics were also similar but they had the largest/greatest wetland numbers with lakes being more prevalent.

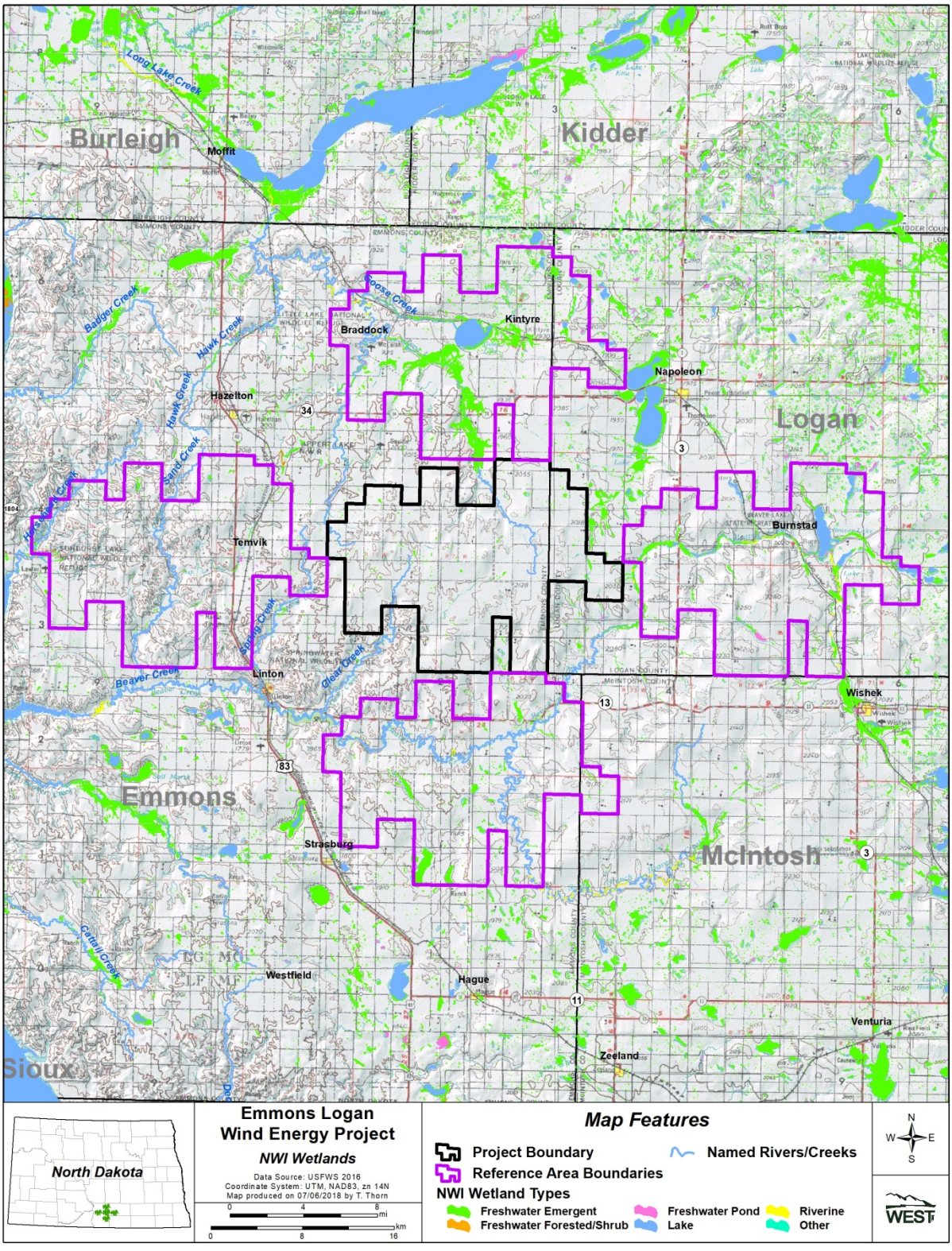

Figure 3. NWI wetlands and rivers/creeks within and around the Emmons-Logan Wind Energy Center.

Table 2. Comparison of the number of wetland basins and mean size within the Emmons-Logan Wind Energy Center and adjacent reference areas.

Area	Basins	Total – acres	Mean Size – acres	Range – acres
Project	975	771.6	0.8	<0.1 – 30.7
North	1,883	8,915.9	4.7	<0.1 – 1,713.9
East	1,223	4,985.4	4.1	<0.1 – 1,130.9
South	967	2,477.2	2.6	<0.1 – 601.8
West	698	777.2	1.1	<0.1 – 58.5

Data Source: NWI 2010 data with wetland parts dissolved.

Table 3. Wetland types within the Emmons-Logan Wind Energy Project and adjacent reference areas.

Wetland Type	Project Acres	%	North Acres	%	East Acres	%	South Acres	%	West Acres	%
Freshwater Emergent	714.1	92.6	7,122.1	79.9	3,059.2	61.4	2,350.5	94.9	625.5	80.5
Freshwater Forested/Shrub	1.7	0.2	7.7	<0.1	0.2	<0.1	6.4	0.3	2.9	0.4
Freshwater Pond	54.7	7.1	138.3	1.6	150.3	3.0	104.6	4.2	141.2	18.1
Lake	-	-	1,617.6	18.1	1,668.1	33.5	-	-	2.3	0.3
Other	1.1	0.1	0.2	<0.1	-	-	2.8	0.1	5.3	0.7
Riverine	-	-	30.1	0.3	107.6	2.1	12.9	0.5	-	-

Data Source: NWI 2010.

Whooping Crane Suitable Habitat Assessment

The habitat assessment model identified 351 wetland basins totaling 450.1 ac within the Project as potential whooping crane roosting habitat. The mean suitability score for these wetlands was 10.1 with the scores ranging from seven to 16. Only the west reference area had fewer potential basins (258), less total acres (412.7), and a smaller mean score (9.7) than the Project area. The highest number (559), total acreage (6,178.0), and mean score (11.2) of potential whooping crane wetlands was in the north reference area.

In Kansas, a wetland with a score of 12 or more was considered potentially suitable whooping crane habitat (Watershed Institute 2012). If applied to the Project, 65 (18.5%) of the wetlands scored would have a score greater than 12 and thus be considered potentially suitable habitat. For the reference areas, the percentage of potentially suitable habitat wetlands with a score of 12 or greater was 42.8% in the north, 37.6% in the east, 18.9% in the south, and 12.8% in the west.

Table 4. Comparison of suitable whooping crane habitat within the Emmons-Logan Wind Energy Center and adjacent reference areas.

Area	Basins	Total – acres	Mean Score	Score range
Project	351	450.1	10.1	7 – 16
North	559	6,178.0	11.2	7 – 18
South	381	1,771.5	10.1	7 – 18
East	396	3,098.6	10.8	8 – 18
West	258	412.7	9.7	5 – 16

Data Derived From: Potentially Suitable Habitat Assessment, Watershed Institute 2012.

Whooping Crane Stopover Site Use Intensity

The U.S. Geological Survey (USGS) and its' partners recently determined whooping crane stopover sites and the intensity of use of these areas within the Great Plains using radio telemetry information from 2010 to 2014 of tagged whopping cranes (Pearse et al. 2015). Stopover sites and their use intensity were based on 20 km square grid cells. USGS describes four use intensity cells (Pearse et al. 2015):

1. "Unoccupied" lacks evidence of use,
2. "Low intensity" show evidence of use and low stopover site use intensity,
3. "Core intensity" contains density of stopovers identified as high use intensity and crane days of lower intensity, and
4. "Extended use core" show high use intensity of stopovers and crane days.

The Project falls within core intensity and unoccupied cells, with most of the Project in a low intensity region (Figure 1). The reference areas include a mix of all use types (Figure 1). The north reference area includes more core intensity areas, because Long Lake National Wildlife Refuge is a common stopover for whooping cranes during migration. The west reference area includes extended use core intensity cells due to whooping crane use along the Missouri River. The east and south reference areas only fall within unoccupied and low intensity cells.

USFWS Whooping Crane Habitat Suitability Model

The USFWS Habitat and Population Evaluation Team (HAPET) developed a habitat suitability model based on opportunistically collected whooping crane observation data with landscape level data within a GIS (Niemuth et al. 2018). The landscape data used included NWI wetland information, distance to whooping crane migration centerline, upland cover types, disturbance factors, and other variables. The report and associated spatial data were reviewed to help evaluate potential whooping crane habitat suitability within the Project.

The Project falls within an area of variable potential whooping crane use based on the habitat suitability, from low potential to higher potential, with higher potential in the northwest part of the Project (Figure 4) that contains more agriculture (Figure 2). All four reference areas also

contain variable potential use based on the model, with the western and northern areas having a larger percentage of higher use potential than the Project or other reference areas.

Whooping cranes are currently listed as endangered under the Endangered Species Act (32 FR 4001) except where nonessential experimental populations exist (66 FR 33903-33917, 2001 June 26; 62 FR 38932-38939, 1997 July 21; and 58 FR 5647-5658, 1993 January 22). In the US, the whooping crane was listed as threatened with extinction in 1967 and endangered in 1970 – both listings were "grandfathered" into the Endangered Species Act of 1973 (ESA 1973). The 2015 – 2016 winter population within the primary wintering grounds was estimated at 329 birds (291 – 371, 95% confidence interval.). There was another 10 whooping cranes thought to be outside of the primary wintering grounds when systematic surveys were conducted (USFWS 2016a). Whooping cranes typically migrate from their breeding grounds in Wood Buffalo National Park, Canada to their wintering areas in Aransas National Wildlife Refuge, Texas. During the migration, most birds pass through central North Dakota.

The Project is within the central 75% migration corridor band. The USGS has recently determined whooping crane stopover sites and their intensity of use within the Great Plains from radio telemetry information. This information shows that at least a part of all reference areas lay within an area of low intensity crane use, with the western reference area within a portion of extended core use area. Similarly, the USFWS habitat suitability model shows varying levels of potential use based on habitat suitability. The model largely follows the results of the USGS telemetry data that indicates more actual use to the north and west of the Project. No confirmed whooping crane sightings have been reported within the Project through spring 2016 (USFWS 2016b) but there have been reports of whooping cranes around the Project, mainly to the north and west (Figure 1). Although the majority of the Project falls within a low intensity region and no whooping crane sightings have been reported to the USFWS from within the Project, it is possible that whooping cranes would fly over or through the Project area during migration. Whooping cranes generally migrate at 1,000-6,000 ft (305-1830 m) altitude, well above turbine height (Stehn 2007), and thus for the most part are unlikely to collide with turbines. However, as whooping cranes ascend and descend during takeoff and landing, or migrate during inclement weather, they may fly at lower altitudes, including those corresponding to the rotor swept area (generally less than 200 m). In summary, low altitude flight is generally of short duration in the mornings and evenings with more time and distance covered at higher elevation during typical migration flight; reducing potential risk to whooping cranes.

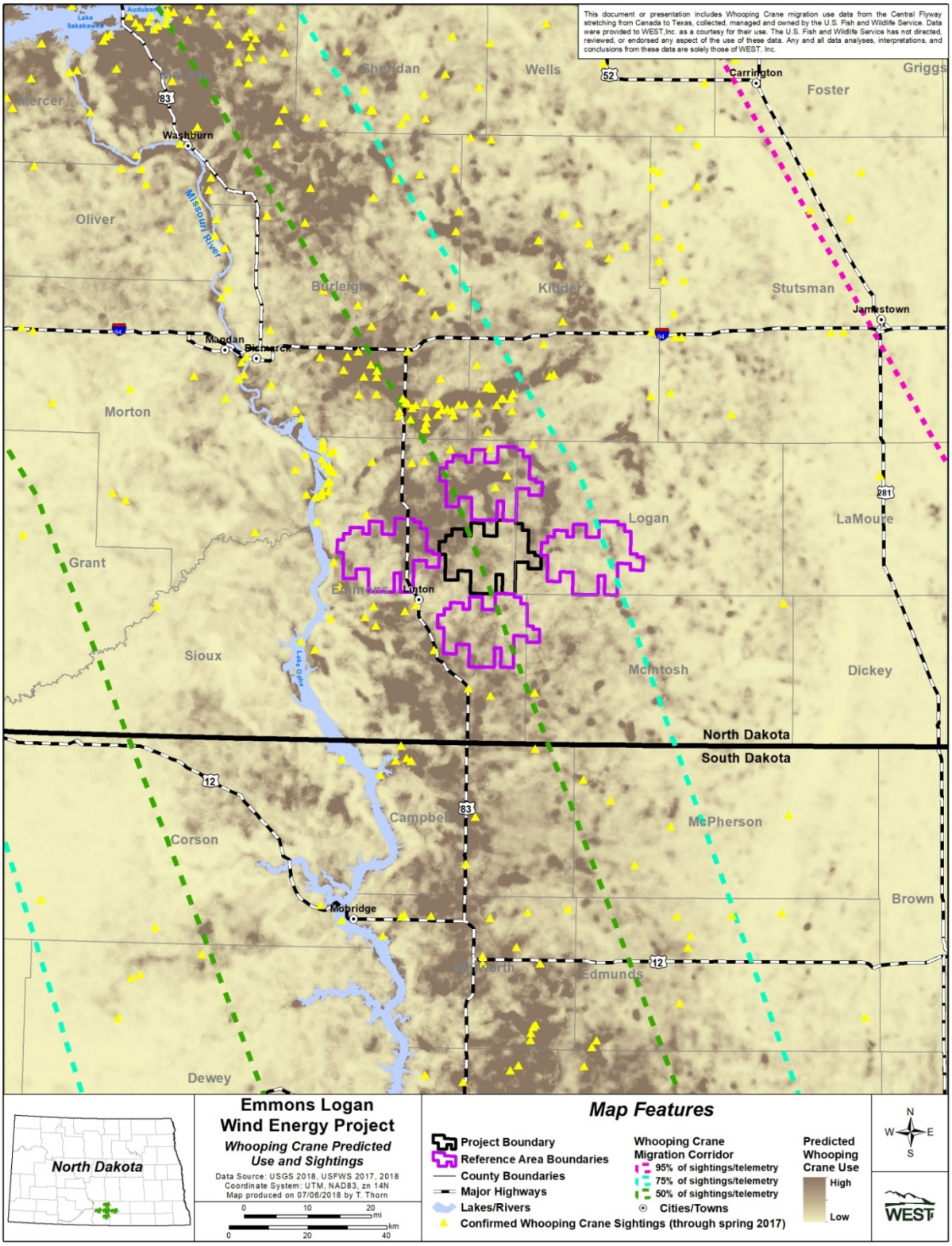

Figure 4. Potential whooping crane use based on the USFWS habitat suitability model for the Emmons-Logan Wind Energy Center and reference areas.

DISCUSSION

A review of whooping literature reveals no whooping cranes have been reported as being killed or injured by wind turbines. One sandhill crane (*Grus canadensis*) mortality was reported at the Altamont wind energy facility in California (Smallwood and Karas 2009), it is unclear if this was a result of turbine collision or collision with a power line. Two sandhill cranes were also apparently collided with turbines during a study of wintering cranes in Texas (Navarrete and Griffis 2011a). No sandhill cranes or whooping cranes have been found as fatalities at five wind facilities searched daily for crane mortalities during migration in North Dakota and South Dakota for up to three years (Derby et al. 2012). It appears that cranes are not overly susceptible to collision with turbines given that 100,000's sandhill cranes migrate twice annually through the Great Plains and none have been documented as wind turbine collision fatalities in this region during migration.

Although developed for transmission line impacts on whooping crane habitat in Kansas, the Watershed Institute's (2012) potentially suitable habitat assessment for whooping cranes can help to quantify potential whooping crane habitat in and around a proposed wind energy project. This tool indicates that the Project had the second fewest potential whooping crane wetland basins, total acres, and mean score. Only the west reference area had fewer/less potential wetland basin statistics. About 20% of the identified potential whooping crane habitat in the Project had a score 12 or greater. Again, only the west reference area had a lower percentage (12.8) of wetland basins with a score of 12 or more. A score of 12 or higher was considered quality whooping crane (Watershed Institute 2012).

SUMMARY

In analyzing the potential for significant impacts from wind development on whooping crane stopover habitat, Stehn (2007) suggests assessing whether there is "*lots of suitable stopover habitat in the general area … or is the proposed wind farm site the only suitable whooping crane stopover habitat for miles around*". This issue was investigated by comparing the potential whooping crane stopover habitat (using wetlands as this indicator) in the Project to adjacent reference areas. GIS was used to calculate the amount of the various habitats and in the case of wetlands, number of individual basins and their type, in each of the reference areas compared to the proposed Project (Tables 1, 2, and 3). This analysis shows that both roosting (i.e. wetlands) and foraging (i.e. croplands) habitats are available in the Project and alternate areas. In general, potential whooping crane habitat within the Project appears to be most similar to that in the west reference area and less suitable than that found in the north reference area. Based on recent whooping crane telemetry tracking and confirmed sighting data, whooping cranes will likely migrate over or through the Project during some migration period. While there is potential whooping crane habitat within the Project, impacts resulting from Project activities are unlikely given low historic use, low or lack of use based on radio telemetry information, similar or more wetland roosting habitat in adjacent areas, and the lack of recorded whooping crane fatalities at other facilities and scarcity of sandhill crane fatalities across the U.S.

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2017 Grassland Assessment

2017 Grassland Assessment

Emmons-Logan Wind Energy Center

Emmons and Logan Counties, North Dakota

Final Report

Prepared for:

Emmons-Logan Wind, LLC

Prepared by:

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INTRODUCTION

Emmons-Logan Wind, LLC (Emmons-Logan Wind), a wholly-owned, indirect subsidiary of NextEra Energy Resources, LLC, is developing the Emmons-Logan Wind Energy Project (Project), in Emmons and Logan counties, North Dakota (Figure 1). Emmons-Logan Wind tasked Western EcoSystems Technology, Inc. (WEST) to conduct a grassland assessment, identifying unbroken (native prairie) and previously broken grasslands, to inform siting within the Project area.

PROJECT AREA

The Project area, located in Emmons and Logan counties, approximately 8 miles (mi; 13 kilometers [km]) north of the town of Linton, North Dakota (Figure 1), encompasses approximately 75,375 acres (ac; 30,503 hectares [ha]). The Project topography is flat to rolling and is within the Northwestern Glaciated Plains Level III Ecoregion, a region dominated by agricultural cropland followed closely by grassland (both unbroken and broken, including hay land; US Environmental Protection Agency 2016). Ownership within the Project area is largely private, but three areas of North Dakota State School Land are found within the Project (US Geological Survey [USGS] 2013).

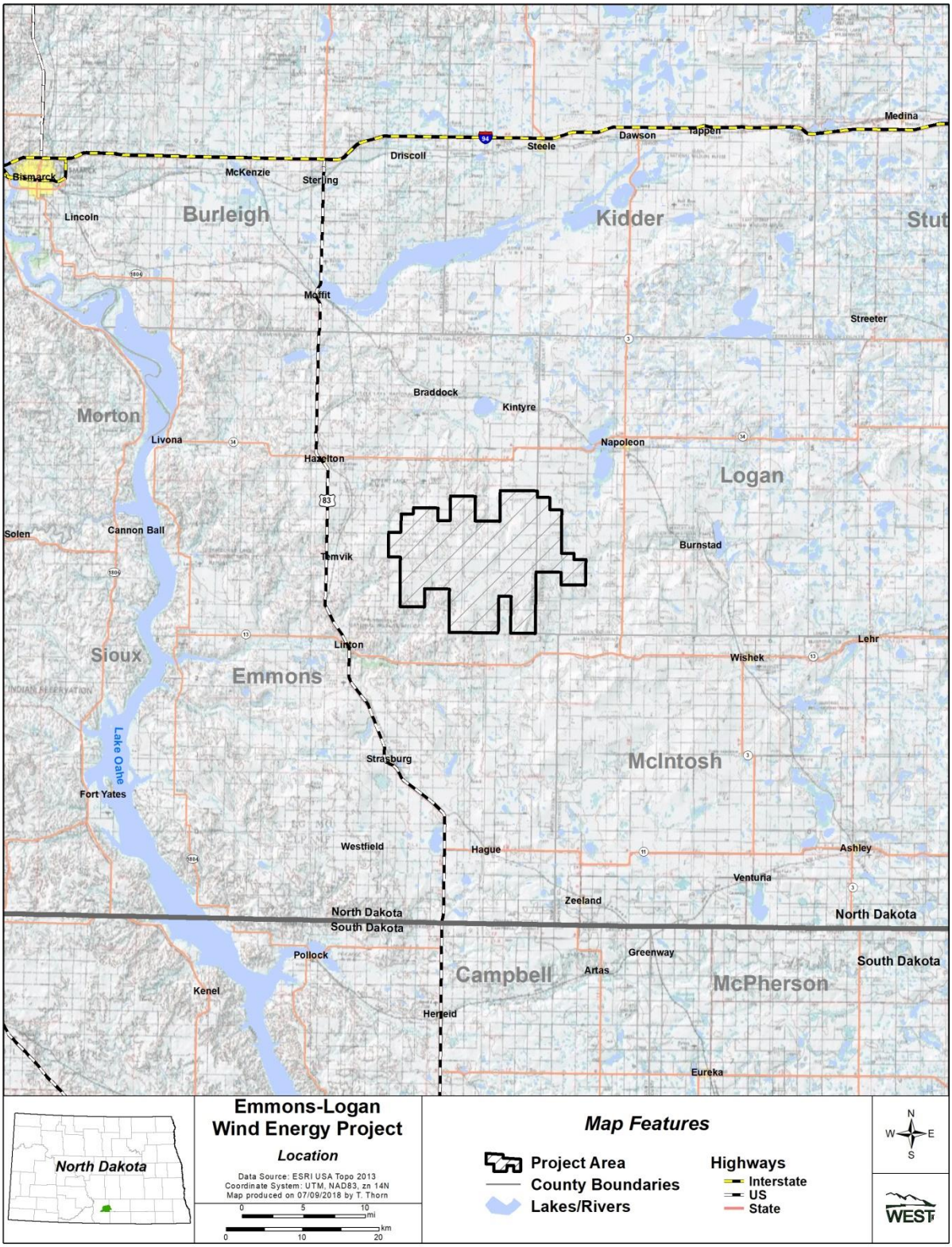

Figure 1. Location of the Emmons-Logan Wind Energy Center in Emmons and Logan counties, North Dakota.

METHODS

WEST completed a desktop review of existing land use/land cover features within the Project area using current aerial photography (US Department of Agriculture [USDA] National Agriculture Imagery Program [NAIP] 2016), existing land cover and wetland data (USGS National Land Cover Database 2011, USFWS NWI 2017), and North Dakota Game and Fish Department's (NDGFD) "Native Prairie" layer (NDGFD 2014), resulting in a digital data layer of polygons delineating grassland cover.

Once all grassland areas were identified, each grassland polygon was examined through a series of historical USDA NAIP aerial photography, ESRI imagery (larger scale/higher resolution; ESRI 2018), and North Dakota statewide historical imagery from 1957 – 1962 (USDA 2017) to determine the grassland sod type (broken or unbroken). Broken sod was identified based on features such as rock piles indicating extensive mechanized rock clearing; presence and amount or height of trees and shrubs; field edge changes; absence of scattered rocks; straight line features indicating plowing, disking, harvesting, or planting; or any other features indicating human disturbance.

Field surveys were completed to further evaluate if tracts of grassland were broken or unbroken. Grassland areas were assessed on foot where access was permitted, from roadsides where access was not permitted, or a combination of both if a grassland included areas with and without access. Sod was considered broken if rock piles or tillage lines were present. Areas within grasslands that appeared different than the surrounding area were delineated on a map, identified as broken or unbroken sod, and digitized by a GIS specialist at a later date. At each grassland area, notes were taken on the dominant grass type (native versus introduced), forb species present, and grazing status. Multiple photographs were taken to document the condition of the grassland area. The priority for the field surveys was larger blocks of continuous grassland and fine scale mapping was not completed during the field survey.

Upon completion of field surveys, field survey data were again compared to the NDGFD's "Native Prairie" layer, and those digitized grasslands with sod type not matching NDGFD's determination were re-examined to further evaluate sod type. WEST also coordinated with consultants from AECOM to agree upon grassland sod type where AECOM's turbine micro-siting assessment and WEST's assessment were inconsistent. Figures and tables included herein reflect these small micro-siting assessments.

RESULTS

The Project consists of approximately 30,479.7 ac (12,334.7 ha; 40.4%) of potential grassland, of which field survey types varied based on survey permission, accessibility, etc. (Table 1; Figure 2). Table 2 categorizes grassland sod type by percentage of total grassland (Figure 3) and by percentage in the Project.

Table 1. Summary of grassland acres by field survey type during surveys conducted by WEST with micro-siting adjustments from AECOM in 2017 at the Emmons-Logan Wind Energy Center, in Emmons and Logan counties, North Dakota.

Survey Type	Acres of Grassland	% of Total
Walk-in	21,611.5	70.9
Roadside	5,378.8	17.6
No survey	2,731.6	9.0
Walk-in and roadside	757.9	2.5
Total	**30,479.7**	**100**

Table 2. Summary of grassland acres by sod type during surveys conducted by WEST with micro-siting adjustments from AECOM in 2017 at the Emmons-Logan Wind Energy Center, in Emmons and Logan counties, North Dakota.

Sod Type	Acres of Grassland	% of Total Grassland	% of Project
Unbroken	22,340.5	73.3	29.6
Broken	8,139.2	26.7	10.8
Total	**30,479.7**	**100**	**40.4**

Geospatial Data

Two shapefiles were created as a result of the grassland assessment to describe grassland polygons that were surveyed and polygons that were not field surveyed (Table 3). Attribute data associated with each polygon are described in Table 2.

Table 3. Titles and definitions of column attributes on shapefiles created for fields surveyed and not surveyed. Shapefiles were based on desktop review and field surveys conducted in 2017 at the Emmons-Logan Wind Energy Center, in Emmons and Logan Counties, North Dakota.

Attribute Column Name	Definition
Field Surveyed File: EL_WEST_lc_grassland_12152017	
Type	Polygon land use/cover type; all areas labeled grassland
Acres	Total acres included in the grassland polygon
Sod_Type	Grassland sod type (unbroken or broken) identified during field surveys and desktop analysis
ImpactType	Grassland disturbance type identified as tilled (farmed) or untilled during desktop analysis
Not Surveyed File: EL_grassland_NOTfieldsurveyed_08152017	
Acres	Total acres included in the grassland polygon
Tillage	Grassland disturbance type identified as tilled (farmed) or untilled during desktop analysis
Habtype	Polygon land cover type; all areas labeled unknown after desktop analysis

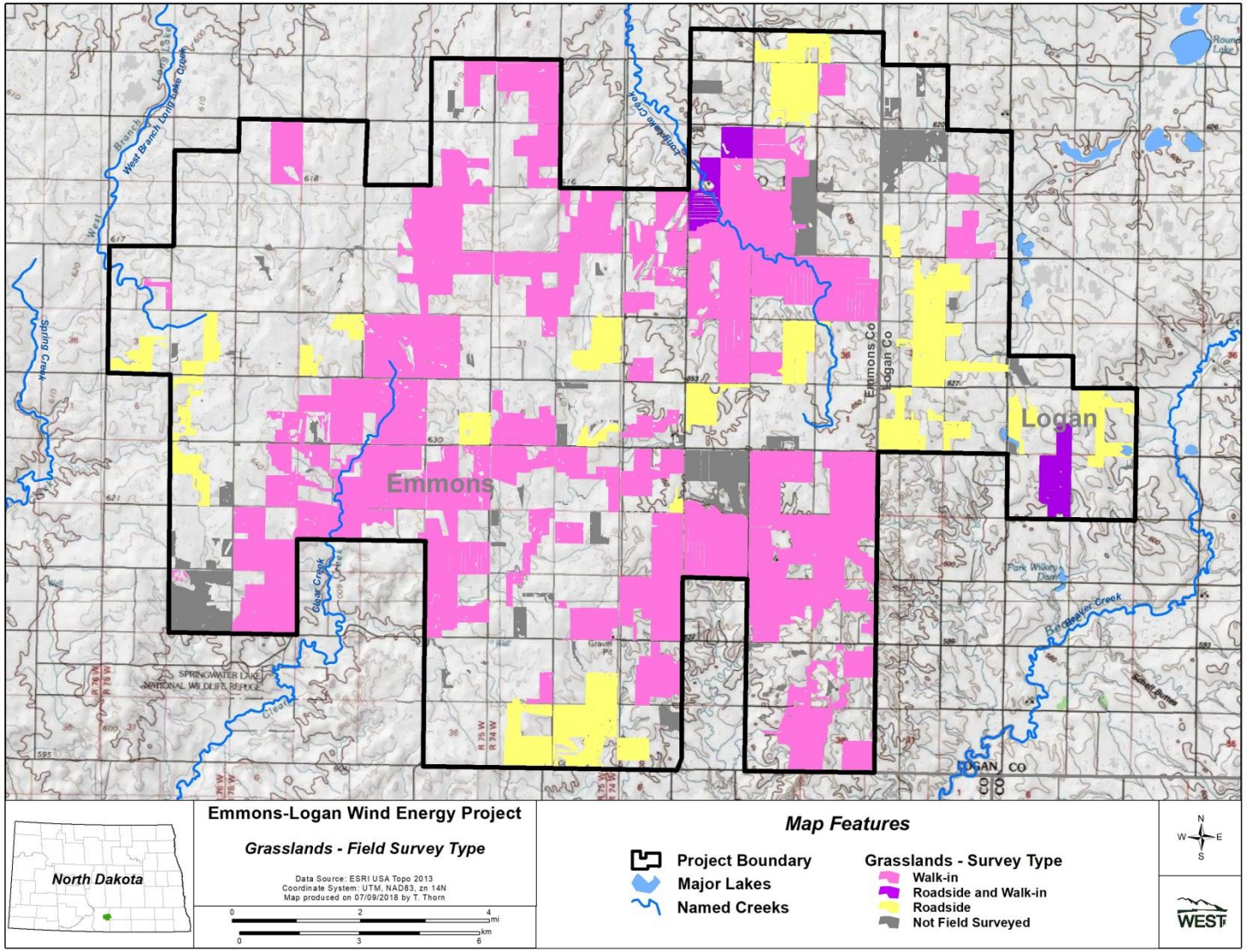

Figure 2. Survey types for grassland areas at the Emmons-Logan Wind Energy Center and associated transmission line in Emmons and Logan counties, North Dakota.

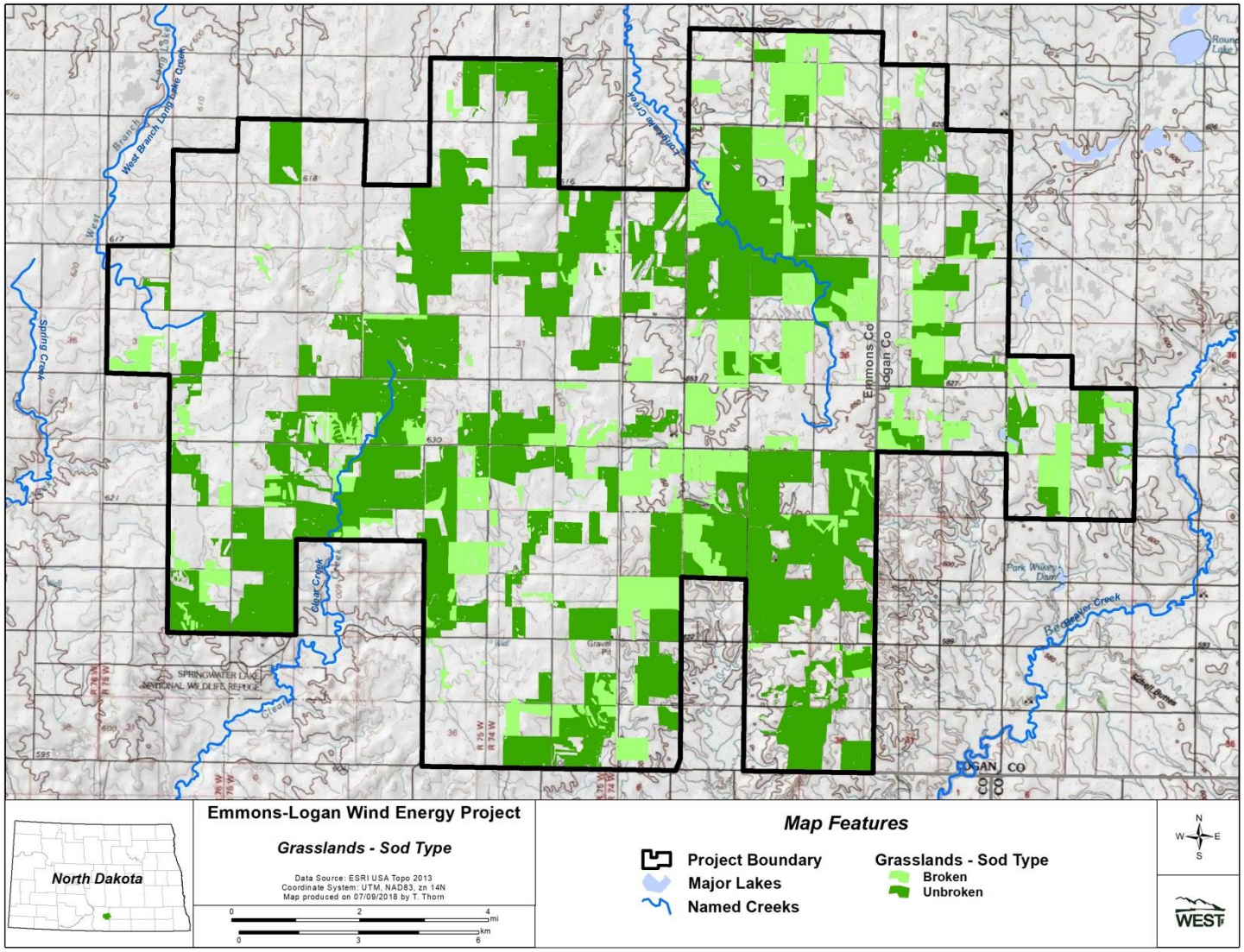

Figure 3. Grassland sod type within grassland areas at the Emmons-Logan Wind Energy Center and associated transmission line in Emmons and Logan counties, North Dakota.

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2017 Sharp-tailed Grouse Lek Report

2017 Sharp-tailed Grouse Lek Report
Emmons-Logan Wind Energy Center
Emmons and Logan Counties, North Dakota

Final Report

Prepared for:

Emmons-Logan Wind, LLC

Prepared by:

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INTRODUCTION

Emmons-Logan Wind, LLC (Emmons-Logan Wind), a wholly-owned, indirect subsidiary of NextEra Energy Resources, LLC, is proposing to construct the Emmons-Logan Wind Energy Center (Project) in Emmons and Logan Counties, North Dakota. Emmons-Logan Wind tasked Western EcoSystems Technology, Inc. (WEST) to survey sharp-tailed grouse (*Tympanuchus phasianellus*) leks within the Project and a 0.5-mile (mi; 0.8-kilometer [km]) buffer (collectively, the "study area"). This report presents results of aerial lek surveys conducted during April and May 2017. Data includes sharp-tailed grouse observation locations, number of grouse observed, and lek status.

PROJECT AREA

The Project encompasses approximately 75,375 acres (ac; 30,503 hectares [ha]) and is located in south-central North Dakota in Emmons and Logan counties approximately eight miles (13 kilometers [km]) northeast of Linton, North Dakota. The Project is within the Northwestern Glaciated Plains Level III Ecoregion with a flat to gently rolling landscape (USEPA 2016). Sections of the Project remain in grassland and are utilized for grazing and other areas have been tilled for cropland. Wetland depressions can be found across the landscape.

The Project boundary used for this survey was received prior to surveys in 2017. Figures in this report show the current Project boundary received by WEST on in July 2018 date. Survey data from 2017 is applicable to the current boundary as all changes were within 0.5-mile buffer.

METHODS

The objective of the sharp-tailed grouse lek aerial survey was to determine the location of sharp-tailed grouse leks and provide a general sense of sharp-tailed grouse use within and immediately adjacent to the Project during peak lekking activity (late March through early May). Survey methodology was similar to that used at other wind sites in North and South Dakota and followed methods outlined in Martin and Knopf (1981). Historical lek data was requested from North Dakota Game and Fish Department (NDGFD) prior to the start of surveys.

Confirmed leks were locations where birds were observed, generally in courtship behavior, during more than one survey period. Possible leks were locations where birds were observed engaging in courtship behavior during only one survey period. Birds were considered: 1) male, when observed in courtship behavior, 2) female, when observed along the edges of a lek with males engaging in courtship behavior, or 3) unknown, when in flight or when no courtship was observed.

North/south transects were created throughout the study area. Transects started 0.5 miles (mi; 800 meters [m]) outside the east/west Project boundary and were placed at approximately 0.25 mi (400 m) intervals covering the study area (Figure 1). The length of each transect varied

based on the study area. Each transect was flown by fixed-wing aircraft (e.g. Cessna 172) at approximately 30 to 46 m (100 – 150 feet) during three separate survey periods.

Surveys were conducted approximately two weeks apart and occurred during the normal sharp-tailed grouse lekking period in North Dakota. Surveys were conducted approximately 30 minutes before sunrise, depending on cloud cover, until 2 hours after sunrise. When three or more sharp-tailed grouse observed together, the location was recorded with a global positioning system (GPS) unit along with the number of birds, activity, and lek status. Precipitation, temperature, wind speed, and cloud cover (%) were also recorded for each flight. Survey flights occurred during calm weather (wind <20 mph) with no rain.

RESULTS

Approximately 679 km (1093 mi) of transects were surveyed during each survey period: (April 3-6, April 17, 19-20, 22, and April 27, 30, May 1-3) encompassing nearly 48 flight hours. Two survey days were canceled due to poor weather conditions and one day was shortened due to ground-level fog, but surveys were completed the next day with calm weather. No historical lek data was received from NDGFD.

One confirmed lek (Lek 1) and two possible leks (Lek 2 and 3) were observed during the three survey periods (Table 1; Figure 1). One confirmed lek (Lek 1) and one possible lek (Lek 2) were within the Project boundary. Birds were observed at Lek 1 during all three survey periods, but no courting behavior was observed from the airplane. A ground survey was conducted by a field biologist on May 6 confirming courtship behavior at Lek 1 (Figure 1).

With one confirmed lek within the Project, Emmons-Logan yields an approximate density of one lek per 131 mi^2. The average number of sharp-tailed grouse observed on a lek was 10.67 birds. While the maximum number of birds recorded on a lek during aerial was 11 birds (Lek 1; Table 1), a total of 17 birds were observed during the ground check on May 6. All leks were recorded within grassland/hay habitat.

Table 1. Summary of aerial sharp-tailed grouse lek surveys conducted during April and May 2017 at the Emmons-Logan Wind Energy Center.

Lek ID	Date First Observed	Other Dates Observed	Highest Total	Lek
1	4/5	4/20, 5/1	11	Confirmed
2	4/30	n/a	10	Possible
3	5/3	n/a	11	Possible

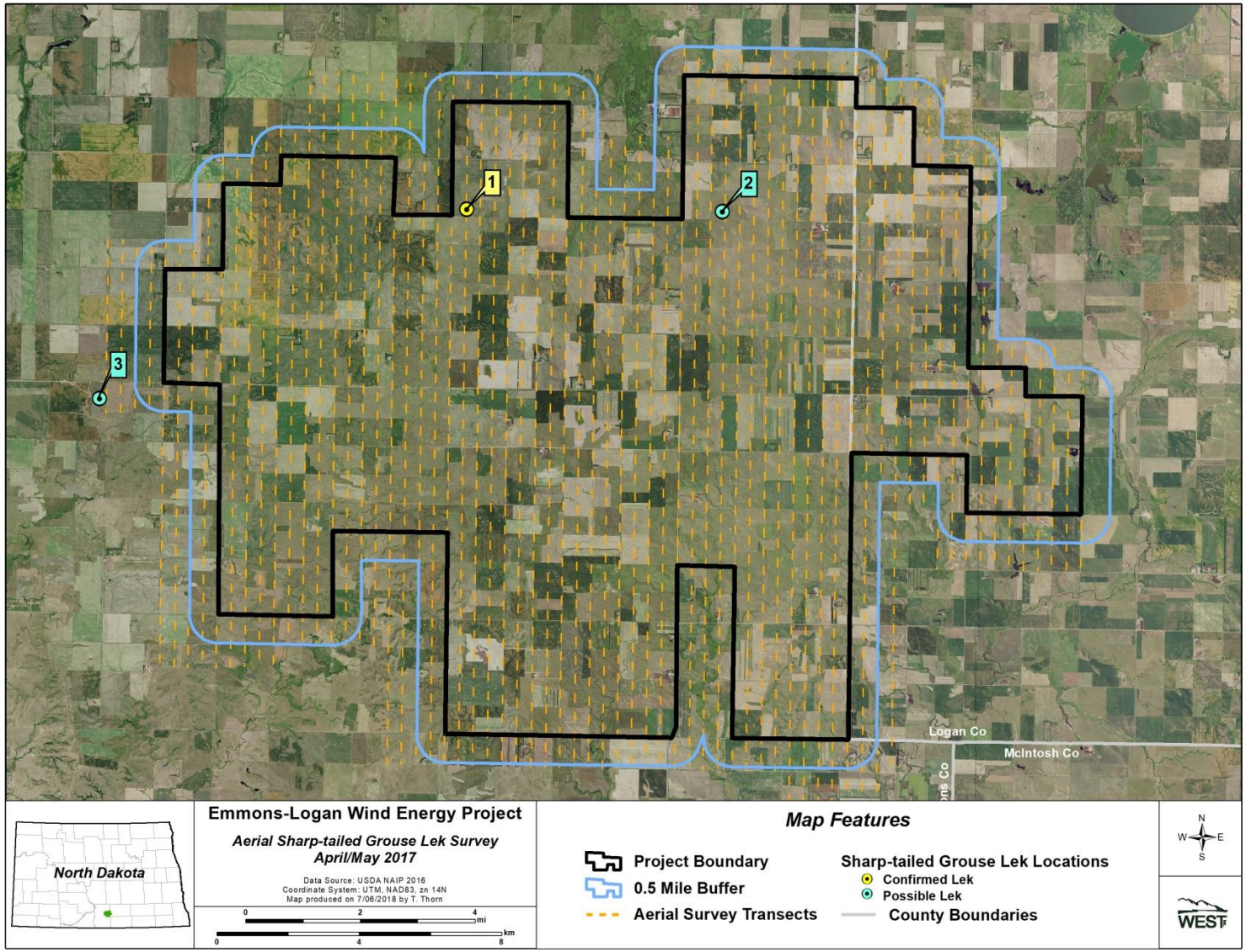

Figure 1. Sharp-tailed grouse leks observed during aerial surveys at the Emmons-Logan Wind Energy Center conducted in April and May 2017.

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