Application to the North Dakota Public Service Commission for a Certificate of Site Compatibility

Emmons-Logan Wind Energy Center
Emmons-Logan Wind, LLC
Emmons and Logan Counties, North Dakota

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1.0 INTRODUCTION

Emmons-Logan Wind, LLC (Emmons-Logan Wind), a wholly owned, indirect subsidiary of NextEra Energy Resources, LLC (NEER), is submitting this application for a Certificate of Site Compatibility (Certificate) to construct the Emmons-Logan Wind Energy Center (Project). The Project consists of up to 123 turbines, access roads, underground electrical collection systems, collection substations, an operations and maintenance (O&M) building, meteorological evaluation (Met) towers, a construction laydown area, and a batch plant (**Figure 1-1**). The Project Area encompasses approximately 64,563 acres (101 square miles) in Emmons and Logan Counties, North Dakota (**Figures 1-2** and **1-3**). The Project will use up to 111 GE (General Electric) 2.5 megawatt (MW) wind turbines and up to 12 GE 1.715 MW wind turbines and will have a nameplate capacity of 298.1 MW (**Figure 1-4**).

Emmons-Logan Wind signed a 25-year power purchase agreement (PPA) with Great River Energy (GRE) for the Project. Pursuant to this PPA, GRE will purchase all of the electrical output generated by the Project for 25 years. The Project's generated power will interconnect to the electrical grid via a tap to two planned interconnecting gen-tie transmission lines. The planned 6.85-mile-long Emmons-Logan 230 kilovolt (kV) transmission line will convey 200 MW from 80 turbines to the existing 230 kV Heskett-Wishek transmission line. A separately planned 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. The Emmons-Logan 230 kV transmission line must be permitted separately, and Emmons-Logan Wind is submitting contemporaneously a separate application for a Certificate of Corridor Compatibility and Route Permit for the transmission line in July 2018.

The Project is currently being studied under the Midcontinent Independent System Operator, Inc. (MISO) Definitive Planning Phase (DPP) Study Cycle. This consists of four MISO interconnection requests including two 100 MW requests (MISO August 2016 DPP Study Cycle / J302 & J503) into Montana-Dakota Utilities' (MDU's) 230 kV Heskett to Wishek line and two 50 MW requests (MISO February 2017 DPP Study Cycle / J741 & J779).

NEER, through its affiliates, develops renewable projects 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 North Dakota Century Code (NDCC) Chapter 49-22 and North Dakota Administrative Code (NDAC) Article 69-06. The siting of an energy conversion 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 69-06-08-01 in the design of the Project and has provided information on such areas in this application. In addition, sufficient Project design, wind resource, and technical information have been provided for a thorough evaluation of the Project. **Table 1-1** outlines the information required to fulfill the requirements for a Certificate with the North Dakota Public Service Commission (Commission) and where these requirements are addressed in this document.

Table 1-1 Certificate Completion Checklist

State Authority	Description	Section
NDAC 69-06-04-01	**Certificate of Site Compatibility Application**	
Section 2	**Contents**	
a.	A description of:	
	(1) The type of energy conversion facility proposed	1.0, 4.0
	(2) The gross design capacity	1.0
	(3) The net design capacity	1.3.2
	(4) The estimated thermal efficiency of the energy conversion process and the assumptions upon which the estimate is based	Not applicable
	(5) The number of acres that the proposed facility will occupy	1.3.1, Table 1-4
	(6) The anticipated time schedule for: (a) Obtaining the certificate of site compatibility (b) Completing land acquisition (c) Starting construction (d) Completing construction (e) Testing operations (f) Commencing commercial production (g) Beginning any expansions or additions	1.4
b.	Copies of any evaluative studies or assessments of the environmental impact of the proposed facility submitted to any federal, regional, state, or local agency.	Appendix B
c.	An analysis of the need for the proposed facility based on present and projected demand for the product or products to be produced by the proposed facility, including the most recent system studies supporting the analysis of the need.	2.1
d.	A description of any feasible alternative methods of serving the need.	2.2
e.	A study area that includes the proposed facility site, of sufficient size to enable the commission to evaluate the factors addressed in NDCC Section 49-22-09.	1.3.1, 3.0, 10.0; Figures 1-1, 1-2, and 1-3
f.	A discussion of the utility's policies and commitments to limit the environmental impact of its facilities, including copies of board resolutions and management directives.	Appendix A
g.	A map identifying the criteria that provides the basis for the specific location of the proposed facility within the study area.	Figures 1-4 and 3-1
h.	A discussion of the criteria evaluated within the study area, including exclusion areas, avoidance areas, selection criteria, policy criteria, design and construction limitations, and economic considerations.	3.1, 3.2, 3.3, 3.4, 3.5, 3.6, Tables 3-1 through 3-4, Figure 3-1
i.	A discussion of the mitigative measures that the applicant will take to minimize adverse impacts which result from the location, construction, and operation of the proposed facility.	7.2.3, 7.3.3, 7.4.3, 7.5.3, 7.6.3, 7.7.3, 7.8.3, 7.9.3, 7.10.3, 7.11.3, 7.12.3, 7.13.3, 7.14.3, 7.15.3, 7.16.3, 7.17

State Authority	Description	Section
j.	The qualifications of each person involved in the facility site location study.	11.0
k.	A map of the study area showing the location of the proposed facility and the criteria evaluated.	Figures 1-4 and 3-1
l.	An eight and one-half-inch by eleven-inch black and white map suitable for newspaper publication depicting the site area.	Provided on CD
m.	A discussion of present and future natural resource development in the area.	7.3.1, 10.8, 10.11
n.	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.	Figures 1-1 through 7-7
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.	1.3.1, 4.0, Table 1-4
b.	A summary of any studies which have been made of the environmental impact of the facility.	7.0
c.	A statement explaining the need for the facility.	2.1
d.	An identification of the location of the preferred site for any energy conversion facility.	1.3.1, Figures 1-2 and 1-3
e.	An identification of the location of the preferred corridor for any transmission facility.	Not applicable
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.	7.0
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.	7.2.3, 7.3.3, 7.4.3, 7.5.3, 7.6.3, 7.7.3, 7.8.3, 7.9.3, 7.10.3, 7.11.3, 7.12.3, 7.13.3, 7.14.3, 7.15.3, 7.16.3, 7.17
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.	10.0
i.	Such other information as the applicant may consider relevant or the commission may require.	Appendix C
NDCC 49-22-09	**Factors to be considered in evaluating applications and designation of sites, corridors, and routes.**	**10.0**
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.	10.1
2.	The effects of new energy conversion and transmission technologies and systems designed to minimize adverse environmental effects.	10.2
3.	The potential for beneficial uses of waste energy from a proposed energy conversion facility.	10.3
4.	Adverse direct and indirect environmental effects which cannot be avoided should the proposed site or route be designated.	10.4
5.	Alternatives to the proposed site, corridor, or route which are developed during the hearing process and which minimize adverse effects.	10.5
6.	Irreversible and irretrievable commitments of natural resources should the proposed site, corridor, or route be designated.	10.6
7.	The direct and indirect economic impacts of the proposed facility.	10.7
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.	10.8

State Authority	Description	Section
9.	The effect of the proposed site or route on existing scenic areas, historic sites and structures, and paleontological or archaeological sites.	10.9
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.	10.10
11.	Problems raised by federal agencies, other state agencies, and local entities.	10.12

1.2 Flexibility in Siting

When considering where to locate the Project, Emmons-Logan Wind identified the Project Area (see **Figures 1-1** through **1-3**) for further investigation based on the modeled wind resource and potential offtaker, as outlined in Section 1.3 below. Emmons-Logan Wind seeks a Certificate for the Project Area, as opposed to specific turbine locations, which facilitates flexibility in siting the Project and allows Emmons-Logan Wind to quickly adjust the Project site plan to constraints as they are identified. At this time, only minor turbine and/or access road and collection line shifts are anticipated. If any changes to the current Project site plan are made after submission of this application, a final Project site plan for the Project will be submitted to the Commission prior to construction and a pre-construction conference call will be held with Commission staff to ensure that the final Project site plan conforms to the Certificate requirements. Emmons-Logan Wind believes that this siting process is consistent with North Dakota siting rules and provides Emmons-Logan Wind with the flexibility necessary to develop a timely, cost-effective project in an environmentally responsible manner.

Initially, Emmons-Logan Wind analyzed the Project Area and initiated discussions with landowners and applied setbacks required by Emmons and Logan Counties, the Commission, and Emmons-Logan Wind's internal setbacks. Emmons-Logan Wind then conducted environmental desktop and field studies in the Project Area, the results of which are incorporated in the appropriate sections of this application.

Emmons-Logan Wind then entered into agreements with landowners that agreed to have wind turbines and associated infrastructure placed on their property (**Figure 1-5**). There are a total of 153 landowners within the Project Area; 145 landowners are participating in the Project. Simultaneously, Emmons-Logan Wind identified preliminary turbine locations based on initial site inspection, topographic maps, known environmentally sensitive areas, review of North Dakota's energy conversion facility siting exclusion and avoidance areas, and communications with local, state, and federal agencies. Emmons-Logan Wind has completed required studies, including cultural resource surveys and wetland delineations, and has evaluated the Project Area based on efficient construction of the Project. In addition, Emmons-Logan Wind has sought input from landowners regarding the location of wind turbines and associated infrastructure.

1.3 Project Summary

Emmons-Logan Wind proposes locating, constructing, and operating a 298.1 MW wind generation facility. The Project is located in Emmons and Logan Counties in south central North Dakota, a primarily rural agricultural area located approximately 41 miles southeast of the city of Bismarck and 5 miles northeast of the city of Linton. The Project Area was identified as an optimal location for wind resources, transmission interconnections, environmental, and economic perspectives. The Project Area was selected considering the exclusion and avoidance area criteria and selection and policy criteria outlined in NDAC Section 69-06-08-01.

1.3.1 Project Area

The Project Area encompasses approximately 64,563 acres (101 square miles) in northeastern Emmons County and southwestern Logan County (**Table 1-2**). Approximately 55,308 acres (85.7 percent) of the Project Area is in Emmons County and approximately 9,255 acres (14.3 percent) of the Project Area is in

Logan County. The Project Area is situated between the communities of Linton, Hazelton, Braddock, Kintyre, Napoleon, and Wishek. Currently 145 different landowners on 61,862 acres are participating in the Project (**Figure 1-5**), and 92.4 percent of participating landowners have signed leases for a total of 60,284 leased acres (93.4% of the Project Area). The Project Area was selected to include all areas necessary for Emmons-Logan Wind to optimize the wind resource while avoiding and minimizing impacts to environmental resources.

Table 1-2 Project Area Location

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

Note that locations within the Project Area may be located within the Section but may not encompass the entire Section.

Although the turbines and associated facilities have been sited throughout the participating land within the Project Area, the permanent Project structures will occupy up to 86.7 acres during operation (see **Tables 1-3** and **1-4** below), or less than one percent of the total participating land. **Table 1-3** summarizes the assumptions used to calculate impacts by Project infrastructure. 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 1-4** summarizes the estimated impact for each Project component during construction, reclamation (or the Project temporary impacts), and operation (or the permanent Project impacts). The Project Area is shown on **Figures 1-1** through **1-3** and the Project layout is shown on **Figure 1-4**.

Table 1-3 Project Impact Assumptions

Project Component	Total Construction Disturbance	Construction Disturbance to be Reclaimed	Permanent Disturbance during Operations [f]
Wind Turbines [a]	4.5 acres per turbine	4.44 acres per turbine	0.06 acres per turbine
Access Roads [b]	50 feet wide per linear foot of road	34 feet wide per linear foot of road	16 feet wide per linear foot of road
Collection Lines [c]	50 feet wide per linear foot	50 feet wider per linear foot minus 12 feet by 8 feet per junction box	12 feet by 8 feet for each junction box
Met Towers [d]	1.25 acres per tower	1.25 acres per tower minus 5 square feet per tower	5 square feet per tower
Crane Paths	50 feet wide per linear foot	50 feet wide per linear foot	0 acres
O&M Building	5 acres	2 acres	3 acres
Collection Substation – 115 kV	5 acres	2 acres	3 acres

Project Component	Total Construction Disturbance	Construction Disturbance to be Reclaimed	Permanent Disturbance during Operations [f]
Collection Substation – 250 kV	5 acres	2 acres	3 acres
Batch Plant [e]	4 acres	4 acres	0 acres
Construction Laydown Area [e]	20 acres	20 acres	0 acres

[a] Construction impacts assumed a 250-foot construction radius around the turbine, which equates to approximately 4.5 acres per turbine. Impacts during operation account for an 18-foot diameter turbine base with a 20-foot buffer for the gravel pad, or 0.06 acres per turbine.

[b] Easement width necessary for construction based on turbine types. Temporary and permanent impacts represent a conservative estimate of disturbance. Roads required to support crane access to turbines during operation would remain up to 38 feet wide; other access roads may be built at 16 feet or reduced later to 16 feet. Access road impacts also assume all proposed roads are new access roads and do not consider improvements to existing roads separately.

[c] 50 feet is the average width needed for construction with a maximum width of 80 feet.

[d] Area of impact is 1.25 acres for one guyed tower during installation. Once installed, the tower has a 1 square-foot base plate and four 1 square-foot anchor points, or 5 square feet.

[e] Assumes one 4-acre batch plant and one 20-acre construction laydown area.

[f] Permanent disturbance during the life of the Project; following decommissioning all areas will be reclaimed per landowner preference.

Table 1-4 Total Project Impacts

Project Component	Total Construction Disturbance	Construction Disturbance to be Reclaimed	Permanent Disturbance during Operations [h]
Wind Turbines [a] (123 turbines, excluding 8 alternates)	553.49 acres	546.11 acres	7.38 acres
Access Roads [b]	218.85 acres	148.61 acres	70.24 acres
Collection Lines [c]	331.74 acres	331.66 acres	0.08 acres
Met Towers [d]	2.5 acres	Approximately 2.5 acres	10 square feet
Crane Paths [e]	56.88 acres	56.88 acres	0 acres
O&M Building	5 acres	2 acres	3 acres
Collection Substation – 115 kV	5 acres	2 acres	3 acres
Collection Substation – 250 kV	5 acres	2 acres	3 acres
Batch Plant	4 acres	4 acres	0 acres
Construction Laydown Area	20 acres	20 acres	0 acres
Total	1,202.46 acres	1,115.76 acres [f]	86.7 acres [g]

[a] Assumes 123 turbines times 4.5 acres of ground disturbance during construction; 0.06 acre/turbine of that remaining as permanent. Seven alternate turbine locations have been identified to allow siting flexibility, but were not included in the calculation; calculations for associated roads and collection lines included all roads and collection lines shown in the layout because these facilities may be needed to access the proposed turbine locations.

[b] Assumes a 50-foot wide easement for roads during construction; 16 feet of that remaining during operation. Assumes a total of approximately 46 linear miles of service roads. The overlapping areas for turbines were excluded from the road impact calculations to avoid double counting the same footprint.

[c] The overlapping areas between the collection line corridor buffer and the turbine and access road buffers were removed from impact calculation to avoid double counting the same footprint. The layout includes approximately 140 miles of collection lines. Junction boxes will be located on the ground throughout the Project Area and will each require approximately 12 feet by 8 feet. Currently 35 junction boxes are anticipated to be required.

[d] Two permanent Met towers x 1.25 acres = 2.5 acres disturbance during construction; assuming guyed, 10 square feet.

[e] The overlapping areas between the crane path buffer and turbines, access roads, and collection line corridor buffers were removed from the impact calculation to avoid double counting the same footprint.

[f] Assumed temporary impacts for the Project.

[g] Assumed permanent impacts for the Project.

[h] Permanent disturbance during the life of the Project; following decommissioning all areas will be reclaimed per landowner preference.

1.3.2 Projected Output

The Project will have a nameplate (gross) capacity of approximately 298.1 MW with a net capacity factor of 49.7 percent. As with all wind projects, output is dependent upon wind resource, final design, site-specific features, and equipment.

1.4 Project Schedule

The commercial operation date is dependent upon permitting, equipment deliveries, and other development activities. Emmons-Logan Wind is requesting the approval of the Certificate by December 2018 to meet a targeted start date for construction of April 2019 provided all other pre-construction permits and approvals have been obtained. Key schedule milestones include the items described below.

1. **Certificate of Site Compatibility**: Emmons-Logan Wind anticipates and has requested with this filing that the Certificate be issued by December 2018.

2. **Land Acquisition**: All land easement agreements for the wind generation facility will be completed prior to construction.

3. **Permits**: Emmons-Logan Wind is responsible for undertaking all environmental studies required for the issuance of the Certificate. Emmons-Logan Wind will also obtain all permits and licenses that are required to initiate construction following issuance of the Certificate.

4. **Equipment Procurement, Manufacture, and Delivery**: Emmons-Logan Wind is in the process of ordering all long-lead equipment, including substation equipment and transformers and has a purchase order in place with GE for the wind turbines.

5. **Construction**: Construction is targeted to begin as soon as weather permits in spring 2019, subject to road restrictions, weather, and permitting. The engineering, procurement, and construction (EPC) contractor will be responsible for completing all construction, including roads, wind turbine assembly, electrical, and communications work. Construction of the Project is scheduled to be completed in approximately seven months.

6. **Testing Operations**: Emmons-Logan Wind anticipates testing to begin in October 2019 after all construction is complete.

7. **Commercial Operation**: Emmons-Logan Wind anticipates commercial operation to begin by November 2019.

8. **Expansions or Additions**: Emmons-Logan Wind has no specific plans for expansions of the Project at this time.

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 EPC contractor to perform the majority of the engineering and construction. Emmons-Logan Wind will procure the turbine/tower equipment directly from a manufacturer.

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2.0 NEED FOR FACILITY

2.1 Need Analysis

In January 2017, GRE signed a 25-year PPA with Emmons-Logan Wind for the Project. Pursuant to this agreement, GRE will purchase all of the electrical output generated by the Project for 25 years. GRE aims for 50 percent of its power to come from renewable sources within the next 12 years (Bismarck Tribune 2018). The 50 percent goal also comes with interim renewable energy goals of 30 percent renewable generation capacity by 2020 and 40 percent by 2025. GRE's renewable portfolio includes 468 MW of wind energy, 50 MW of which are produced in North Dakota. The Project will help to increase the renewable portion of GRE's generating portfolio and help meet GRE's energy needs while keeping rates low.

According to the Comprehensive State Energy Policy report for 2010-2025 prepared by the EmPower ND Commission, one of the state's energy goals is to increase installed wind energy capacity to 5,000 MW by 2020 (EmPower ND 2010). Additionally, North Dakota's energy-related goals include the following:

- General economic development and help the nation achieve greater energy independence
- Derive 25 percent of all energy produced in America from renewable sources by 2025
- Provide a fair and responsible regulatory environment that promotes energy development

A regional need exists for renewable energy produced in North Dakota. Nearly every state in the MISO west, central, and east regions currently has renewable portfolio standards or a voluntary renewable energy standard or target (MISO 2017). According to the MISO Transmission Expansion Plan for 2017, the MISO region needs to add between 29,600 and 93,800 MW to maintain planning reliability targets through 2031. Additionally, depending on the projection scenario, MISO assumes anywhere from 4,800 to 51,600 MW of renewable energy additions during this period. The Project will allow North Dakota to continue to provide capacity to meet these forecasts with clean, efficient, renewable energy for at least the projected 25-year PPA term.

2.2 Alternatives

Feasible technology alternatives to wind include electricity generation using coal, natural gas, or biomass. None of these alternatives were considered because these technologies do not meet the state's goal of adding new wind energy. In addition, as stated above in Section 2.1, Emmons-Logan Wind has negotiated a 25-year PPA with GRE for the proposed Project.

Although the Project includes 123 turbine locations, an additional seven alternate turbine locations have been included in the Project layout to provide siting flexibility based on on-going environmental studies, landowner preferences, and unforeseen circumstances identified during construction. The Project also includes two Met towers as well as an alternate Met tower.

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 evaluated the Project Area to determine optimal locations for up to 123 wind turbines. Siting turbines is an iterative process through which input from several different entities is considered. The Project Area was identified as an optimal site for wind resources, transmission, landowner participation, economic, and environmental perspectives. An additional seven alternate turbine locations have been included in the Project layout in order to provide siting flexibility based on environmental studies, landowner preferences, and unanticipated discoveries during construction; however, only up to 123 wind turbines will be constructed.

Emmons-Logan Wind has secured voluntary wind option agreements with landowners and identified preliminary turbine locations based on site inspection, topographic maps, known environmentally sensitive areas, review of North Dakota's energy conversion facility siting exclusion and avoidance areas, review of Logan County and state wind siting requirements, and communications with local, state, and federal agencies. NEER has used this siting process in developing recent wind turbine projects, including 15 projects in North Dakota. Through this process, NEER addresses environmental issues that commonly arise during project development and works within the parameters of state rules. North Dakota has several site selection criteria that are considered by the Commission to determine suitability of the site. 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.

3.1 Exclusion Areas

In accordance with NDAC Section 69-06-08-01(1) and (2), the geographical areas listed in **Table 3-1** shall be excluded in the consideration of a site for an energy conversion facility. **Figure 3-1** depicts the exclusion areas.

Table 3-1 Exclusion Areas

Exclusion Area	Present within Project Area?	Description	Section Addressed
Designated or registered national: parks; memorial parks; historic sites and landmarks; natural landmarks; historic districts; monuments; wilderness areas; wildlife areas; wild, scenic, or recreational rivers; wildlife refuges; and grasslands.	None	Not applicable	3.5, 7.3, 7.8, Figure 3-1
Designated or registered state parks; forests; forest management lands; historic sites; monuments; historical markers; archaeological sites; grasslands; wild, scenic, or recreational rivers; game refuges; game management areas; management areas; and nature preserves.	Present	Archaeological sites have been identified through a Class I Literature Search and a Class III Cultural Resources Inventory. Known archaeological sites are not shown on Figure 3-1 due to confidentiality.	7.7, 7.8, 7.9, 7.15, 7.17, Figure 3-1
County parks and recreational areas; municipal parks; parks owned or administered by other governmental subdivisions; hardwood draws; and enrolled woodlands.	None	Not applicable	7.8, 7.14, 7.17

Exclusion Area	Present within Project Area?	Description	Section Addressed
Prime farmland and unique farmland, as defined by the land inventory and monitoring division of the Natural Resources Conservation Service (NRCS), United States Department of Agriculture (USDA), in 7 C.F.R. part 657; provided, however, that if the commission finds that the prime farmland and unique farmland that will be removed from use for the life of the facility is of such small acreage as to be of negligible impact on agricultural productions, this exclusion does not apply.	Present	The Project Area contains 45,798 acres (71 percent) that is classified as farmland of statewide importance or prime farmland. Of this, 4,372 acres or 6.8 percent of the Project Area is prime farmland. Prime farmland has been avoided to the extent practical. Permanent impacts to farmland of statewide importance and prime farmland are negligible and expected to be 75.16 acres, which is 0.12 percent of the Project Area.	7.9, 7.10, Figure 3-1, Figure 7-5
Irrigated land.	None	Not applicable	7.9
Areas critical to the life stages of threatened or endangered animal or plant species.	None	The Project Area is within the whooping crane migration corridor, but there is no designated critical habitat within the Project Area for any species.	7.16, 7.17
Areas where animal or plant species that are unique or rare to this state will be irreversibly damaged.	None	Not applicable	7.13, 7.14, 7.15, 7.16, 7.17
Areas within 1,200 feet of the geographic center of an intercontinental ballistic missile launch or launch control facility.	None	Not applicable	7.3.1
Wind-energy specific exclusion areas	None	The Project complies with the following exclusion areas: • 1.1 x height of turbine from interstate or state roadway right-of-way • 1.1 x height of turbine + 75 feet from center line of county or maintained township roadway • 1.1 x height of turbine from railroad right-of-way • 1.1 x height of turbine from 115kV or higher transmission lines • 1.1 x height of turbine from property line of non-participating landowners • 3 x height of turbine from residences of non-participating landowners	4.1.1

3.2 Avoidance Areas

In accordance with NDAC Section 69-06-08-01(3) and (4), the geographical areas listed in **Table 3-2** shall not be approved as a site for an energy conversion facility unless the applicant shows that, under

the circumstances, there is no reasonable alternative. In determining whether an avoidance area should be designated for a facility, the Commission may consider, among other things: the proposed management of adverse impacts, the orderly siting of facilities, system reliability and integrity, the efficient use of resources, and alternative sites. The area of avoidance shall include a buffer zone of a reasonable width to protect the integrity of the area. Avoidance areas are also mapped for the Project Area on **Figure 3-1**.

Table 3-2 Avoidance Areas

Avoidance Area	Present within Project Area?	Description and Proposed Buffer	Section Addressed
Historical resources which are not designated as exclusion areas	Present	Historic farmsteads are present within the Project Area. Emmons-Logan Wind will avoid directly impacting all historic farmsteads.	7.7, 7.17, Figure 3-1
Areas within the city limits of a city or the boundaries of a military installation	None	Not applicable	7.3, Figures 1-1 through 1-3
Areas within known floodplains as defined by the geographical boundaries of the hundred-year flood	None	Not applicable	7.12, 7.17
Areas that are geologically unstable	None	No active sand, gravel, or coal mines are located within the Project Area and no known underground mining has taken place. The Project Area is located in an area of very low seismic risk, and there are no known active tectonic features or faults. The North Dakota Geological Survey landslide mapping program does not have any available data for the Project Area but review of available data indicates that landslide areas are not located in the Project Area.	7.11, 7.17
Woodlands and wetlands	Present	Permanent impacts to jurisdictional wetlands will be avoided and minimized as practicable. Few woodland impacts are anticipated and all trees and shrubs that are removed will be replaced as required by the Commission.	7.13, 7.14, 7.17, Figure 3-1, Figures 7-1 and 7-6
Areas of recreational significance which are not designated as exclusion areas	None	Not applicable	7.3, 7.8
Geographic area where, due to operation of the facility, the sound levels within 100 feet of an inhabited residence or a community building will exceed 50 decibel, A-weighted (dBA)	Present	Emmons-Logan Wind is working to obtain waivers from nine residences where 50 dBA will be exceeded. If a waiver cannot be obtained Emmons-Logan Wind will ensure that the 50 dBA requirement is met.	7.6

3.3 Selection Criteria

In accordance with NDAC Section 69-06-08-01(5), 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

Selection Criteria	Potential Adverse Effects	Section Addressed
The impact upon agriculture:		
Agricultural production	Only land needed during operations will be permanently affected. Permanent impacts to cropland are expected to be 38.62 acres. 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. As a result, the Project will not result in significant impacts to agricultural production.	7.3, 7.9
Family farms and ranches	Some land area will be converted to permanent Project footprint during operation; however, wind lease payments to farmers will provide a supplemental source of income. As stated above, landowner agreements also include compensation for crop damage, if any, during surveys and construction. Wind development is a compatible use with existing family farms and ranches and will not displace any farms or ranches.	4.1.1, 7.2, 7.3, 7.10, Table 4-1, Figure 3-1
Land which the owner demonstrates has soil, topography, drainage, and an available water supply that cause the land to be economically suitable for irrigation	Participating landowners have not expressed concerns related to economically suitable irrigation on their land. Currently no irrigation is occurring within the Project Area.	7.9, 7.10
Surface drainage patterns and ground water flow patterns	A wetlands and waters survey was completed in 2017 and 2018. 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.	7.11, 7.12, 7.13, Figure 7-6
The agricultural quality of the cropland	Minimal impacts to the agricultural quality of the cropland are anticipated. Landowner agreements include compensation for crop damage, if any, during surveys and construction. If compaction of soils occurs during construction, Emmons-Logan Wind will work with landowners to alleviate the compaction.	7.9, 7.10
The impact upon the availability and adequacy of:		
Law enforcement	No adverse impacts to law enforcement are anticipated.	7.4
School systems and education programs	No adverse impacts to school systems and education programs are anticipated.	7.4

Selection Criteria	Potential Adverse Effects	Section Addressed
Governmental services and facilities	No adverse impacts to governmental services and facilities are anticipated.	7.4
General and mental health care facilities	No adverse impacts to general and mental health care facilities are anticipated.	7.4
Recreational programs and facilities	No recreational programs or facilities will be directly affected. Recreational impacts will be auditory and visual in nature and limited to individuals using land in and near the Project Area for hunting, fishing, or nature observation.	7.4, 7.8, 7.17
Transportation facilities and networks	An increase in vehicle trips per day is anticipated for the duration of Project construction, but is expected to be temporary and not significant. During facility operation, no significant impacts are anticipated.	7.4, Figure 7-3
Retail service facilities	No adverse impacts are anticipated. Local services such as motels, restaurants, and convenience stores are likely to experience an increase in business during Project construction.	7.4
Utility services	The Project will utilize station service from KEM Electric Cooperative, Inc., which will suggest appropriate configurations for the electrical system, and Emmons-Logan Wind will abide by the recommendations to prevent impacts to the transmission system.	1.0, 2.0, 6.0, 7.4
The impact upon:		
Local institutions	No adverse impacts are anticipated.	7.4
Noise-sensitive land uses	Emmons-Logan Wind is working to obtain waivers from any residences where 50 dBA will be exceeded. If a waiver cannot be obtained Emmons-Logan Wind will ensure that the 50 dBA requirement is met	7.6, 7.17
Light-Sensitive land uses	Subject to Federal Aviation Administration (FAA) approval, Emmons-Logan Wind will use commercially reasonable efforts to install a light-mitigating technology that is consistent with the requirements of North Dakota Administrative Code (NDAC) Chapter 69-06-11.	6.1, 7.4
Rural residences and businesses	The Project will comply with state and local setbacks.	4.1.1, 7.2, 7.3, Figure 3-1
Aquifers	Based on the small amount of increased impervious surface area, which will be created by Project components, relative to the separation of these components and the size of the entire Project Area, the Project would likely have minimal impacts to regional groundwater recharge.	7.11
Human health and safety	No impacts to human health and safety are anticipated based on the implementation of the mitigative measures discussed in Section 7.5.3 and maintenance schedules.	4.1.1, 6.3, 6.5, 7.5

Selection Criteria	Potential Adverse Effects	Section Addressed
Animal health and safety	No impacts to livestock are anticipated from construction or operation of the facility. Emmons-Logan Wind will implement measures to avoid and minimize effects to wildlife by siting turbines at least 300 feet from active raptor nests and one half mile from leks. Emmons-Logan Wind will prepare a Wildlife Conservation Strategy (WCS). In addition, Emmons-Logan Wind will implement a Wildlife Response and Reporting System (WRRS) once wind turbine construction has been completed which will remain active for the duration of the Project life and will conduct one year of Post-Construction Mortality Monitoring (PCMM) for birds and bats.	7.15, 7.16
Plant life	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.	7.14, Figure 7-1
Temporary and permanent housing	Existing temporary housing, such as hotels, will be utilized during construction. No adverse impacts are anticipated.	7.2
Temporary and permanent skilled and unskilled labor	No adverse effects are anticipated. Local contractors employed for construction will result in increased wages.	7.2
The cumulative effects of the location of the facility in relation to existing and planned facilities and other industrial development	Wind energy development is anticipated to have a positive cumulative impact on air quality and minimal impacts to geology, soils, water, sound, safety and health issues, and cultural resources. Socioeconomic impacts are anticipated to be positive, as the rural economy and energy production is diversified in the form of new income for landowners, employment during construction, and new property tax revenue. A 2015 study of property values in North Dakota concluded that property values were not diminished by wind farms or turbines (Hoefs 2015). Wind energy development removes less total land from agricultural use than other forms of energy generation development.	7.2, 10.11

3.4 Policy Criteria

In accordance with NDAC Section 69-06-08-01(6), 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

Policy Criteria	Potential Adverse Effects	Section Addressed
Recycling of the conversion byproducts and effluents	Not applicable.	N/A
Energy conservation through location, process, and design	Emmons-Logan Wind is developing the site to maximize energy output and will develop a site layout that optimizes wind resources while minimizing the impact on land resources and any potentially sensitive areas.	4.2

Policy Criteria	Potential Adverse Effects	Section Addressed
Training and utilization of available labor in this state for the general and specialized skills required	Emmons-Logan Wind will use local labor to the extent practicable.	7.2
Use of a primary energy source or raw material located within the state	The energy generated at the site will utilize the wind resources in North Dakota.	5.2
Not relocating residents	No residents will be relocated.	7.2.2
The dedication of an area adjacent to the facility to land uses such as recreation, agriculture, or wildlife management	The Project will not interfere with adjacent land uses. As such, it is not anticipated that areas adjacent will be dedicated to recreation, agriculture, or wildlife management, although much of the Project Area is already used for agriculture.	7.3, 7.8, 7.9, 7.15, Figure 3-1
Economies of construction and operation	Emmons-Logan Wind will utilize local contractors to the extent practicable.	7.2
Secondary uses of appropriate associated facilities for recreation and the enhancement of wildlife	None.	N/A
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.	8.0
A commitment of a portion of the energy produced for use in this state	Great River Energy (GRE) will purchase all of the electrical output generated by the Project for 25 years. Emmons-Logan Wind expects that the energy generated will serve customers that include North Dakota residents.	6.3
Labor relations	Some trades may be part of unions. No labor relations will be affected.	6.5, 7.2
The coordination of facilities	Existing facilities and facility corridors were considered in the location of the wind farm and associated facilities.	3.0, 3.6
Monitoring of impacts	The engineering, procurement, and construction (EPC) contractor will employ best management practices during construction to monitor soil impacts and segregate topsoil. A storm water pollution prevention plan will be prepared for the Project. Emmons-Logan Wind will implement a Wildlife Response and Reporting System (WRRS) once wind turbine construction has been completed which will remain active for the duration of the Project life and will conduct one year of PCMM for birds and bats.	7.10, 7.11, 7.12, 7.15, 7.16

Policy Criteria	Potential Adverse Effects	Section Addressed
A commitment to installing light mitigation technology for wind energy conversion facilities subject to commercial availability and Federal Aviation Administration (FAA) approval	Emmons-Logan Wind will utilize a light-mitigating technology system that is consistent with North Dakota Administrative Code (NDAC) Chapter 69-06-11, subject to FAA approval and commercial availability.	6.1, 7.4.2

3.5 Design and Construction Limitations

Key design and construction limitations when building a wind farm are wind resources, landowner easements, regulatory setbacks (local and state), environmental and cultural exclusion and avoidance areas, and available transmission. The wind resource is essential to selecting and designing a wind farm. Emmons-Logan Wind has conducted an analysis to ensure that the site has ample wind energy to generate revenue for the wind farm. Easements allowing construction of turbine towers and transmission facilities are also critical to the Project. Emmons-Logan Wind has secured voluntary land agreements with landowners necessary to develop the Project. The Project complies with all Commission setbacks and exclusion areas (see Section 4.1.1). The Project's generated power will interconnect to the electrical grid via a tap to two planned interconnecting gen-tie transmission lines (**Figure 1-1**). The planned 6.85-mile-long Emmons-Logan 230 kV overhead transmission line would convey 200 MW to the existing 230 kV Heskett-Wishek transmission line. The planned 115 kV double circuit overhead transmission line would convey approximately 50 MW from each circuit to a new substation near Linton, ND.

3.6 Economic Considerations

Economics were considered when selecting a location for the Project. As discussed above, it is important to select a site with a wind resource capable of generating energy. The Project Area takes advantage of the wind resource in the area. Information on the wind resource at the site is discussed in Sections 5.2 and 5.3.

One of the most important economic considerations related to the Project is the need to qualify for the Federal Production Tax Credit (PTC). For wind facilities commencing construction in 2019, the PTC is an income tax credit of 0.92 cents/kilowatt-hour allowed for the production of electricity from utility-scale wind turbines (USDOE 2018). This incentive was created under the Energy Policy Act of 1992, and has been renewed and expanded many times, most recently in the 2016 spending package passed by Congress on December 18, 2015 (AWEA 2015). The wind energy PTC was extended through 2016, and then continues at a decreased value through 2019. Wind projects qualify for the PTC if construction is started before the end of 2019.

3.7 County Criteria

3.7.1 Emmons County

In May 2018, Emmons-Logan Wind submitted the Wind Energy Facility Siting Permit application to construct and operate the Project to Emmons County. The application included Conditional Use Permits (CUPs) for the Wind Energy Facility Siting Permit, the 230 kV Transmission Line, the 230 kV Collector Substation, the 115 kV Collector Substation, and the O&M Building to the Emmons County Planning Commission to construct and operate the Project. The application also includes a list of all land owners with Project easements, site plan, CUP application fees, setback lists, Decommissioning Plan for the Project, and list of landowners with Project 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 CUPs. On June 19, 2018, an Emmons County Commission Special Meeting was held, and the CUPs submitted by Emmons-Logan Wind were approved.

3.7.2 Logan County

In May 2018, Emmons-Logan Wind submitted the Wind Energy Facility Siting Permit application to construct and operate the Project. The application included a site plan, CUP application fees, setback lists, Decommissioning Plan for the Project, and list of landowners with Project easements. The Logan County CUP was approved on May 8, 2018.

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4.0 GENERAL DESCRIPTION OF THE PROPOSED FACILITY

4.1 Wind Power Technology

As the wind passes over the blades of a wind turbine, it creates lift and causes the rotor to turn. The rotor is connected by a hub and main shaft to a system of gears, which are connected to a generator. Emmons-Logan Wind is proposing to install 123 wind turbines. The current layout includes 111 GE 2.5 MW wind turbines and 12 GE 1.715 MW wind turbines. Exact turbine models for the Project are subject to change to ensure selection of a turbine that is both cost effective and optimizes land and wind resources. Emmons-Logan Wind is seeking flexibility from the Commission to select the most appropriate technology for the Project at the time of construction.

The GE 2.5 MW wind turbines have a nominal nameplate rating of 2.5 MW with a 90-meter (295-foot) hub height and a 116-meter (381-foot) rotor diameter (**Figure 4-1**). The GE 1.715 MW wind turbines have a nominal nameplate rating of 1.715 MW with an 80-meter (262-foot) hub height and a 103-meter (338-foot) rotor diameter. Both turbine models begin operation in wind speeds of 6.7 miles per hour (mph); the GE 2.5 MW wind turbines are designed to operate in wind speeds of up to 69.3 mph and the GE 1.715 MW wind turbines are designed to operate in wind speeds of up to 44.7 mph.

Each tower will be secured by a concrete foundation that can vary in design depending on soil conditions. A control panel inside the base of each turbine tower houses communication and electronic circuitry. Each turbine is equipped with a wind speed and direction sensor that communicates to the turbine's control system to signal when sufficient winds are present for operation. Turbines feature variable-speed control and independent blade pitch to assure aerodynamic efficiency.

The electricity generated by each turbine is brought to a pad-mounted transformer where the voltage will be raised (stepped up) to power collection line voltage of 34.5 kV. The electricity will be collected by a system of underground power collection lines within the Project Area (**Figure 4-2**). Both power collection lines and communication cables will be buried on private property or public rights-of-way along public roads. The collection lines and communication cables distribute power to the collection substations.

Each wind turbine will be accessible via all-weather, aggregate-surfaced roads between 16 and 38 feet in width that will connect with public roads. **Figure 4-2** is a diagram of the path of energy from a wind energy center to energy users, and **Figure 4-3** shows a typical wind energy center layout. The power generated by the Project will be stepped up to either 230 kV or 115 kV at the collection substations. The planned 6.85-mile-long Emmons-Logan 230 kV transmission line will convey 200 MW from 80 turbines to the existing 230 kV Heskett-Wishek transmission line. The planned 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.

4.2 Wind Energy Center Layout

Emmons-Logan Wind has developed a wind farm layout that optimizes the wind resource while minimizing the impact on land resources and any potentially sensitive areas. Wind-powered electric generation is entirely dependent on the availability of the wind resource at a specific location. The energy available from the wind increases at the third power of the wind speed. In other words, a doubling of the wind speed will increase the available energy by a factor of eight times. Analysis of wind direction data within the Project Area suggests that the optimal turbine string alignments are generally from southwest to northeast. Design of the turbine array and collection system will minimize energy loss due to wind turbine wakes (e.g., adverse impacts of one turbine on an adjacent turbine) and turbulence, and electrical line losses.

The setbacks used in designing the Project complies with or exceeds those required by the Commission, Emmons-Logan Wind's internal setbacks, vendor standards, and local setbacks. The Project complies with or exceeds the following wind energy-specific exclusion areas provided in NDAC Section 69-06-08-01(2):

- 1.1 x height of turbine from interstate and state road right-of-way
- 1.1 x height of turbine plus 75 feet centerline of any county or maintained township roadway
- 1.1 x height of turbine from railroad right-of-way
- 1.1 x height from 115kV or higher transmission lines
- 1.1 x height from property line of non-participating landowners
- 3 x height from residences of non-participating landowners

Logan County also has the following established setbacks relevant to the components of the wind energy facility. The Project also complies with or exceeds the following setbacks:

- 1.25 x height of turbine or 750 feet, whichever is greater, from nearest occupied dwelling, commercial building, or publicly-used structure or facility
- 200 feet from the nearest public road or above ground communication and electrical lines
- 2.5 x the rotor diameter from landowners who do not receive compensation type payments or other forms of revenue derived from the wind energy facility

Emmons County does not currently have established setbacks relevant to the components of the wind energy facility.

Table 4-1 lists the setbacks utilized in designing the Project layout. The distances are based on the GE 2.5 MW wind turbine model, which has a larger rotor diameter than the GE 1.715 MW wind turbine model, and has a total turbine height (from the base of the tower to the tip of the upright blade) of 485.5 feet. Emmons-Logan Wind will comply with all applicable Commission and Logan County setbacks.

Table 4-1 Setback Distances for Wind Turbines

Setback Type	Distance
Commission Exclusion Areas	
Interstate and state road right-of-way	1.1 x height of turbine
Centerline of any county or maintained township roadway	1.1 x height of turbine plus 75 feet
Railroad right-of-way	1.1 x height of turbine
115kV or higher transmission lines	1.1 x height of turbine
Property line of non-participating landowners	1.1 x height of turbine
Non-participating residences	3 x height of turbine
Emmons-Logan Wind's Internal Setbacks	
Participating residences	1,400 feet
Non-participating residences	1,457 feet
Receptors (barns, sheds, etc.)	534 feet
Roads (public)	609 feet
Railroads	609 feet
Transmission lines	534 feet
Distribution lines	534 feet
Non-participating parcels	534 feet
Participating parcels	223 feet

Setback Type	Distance
Underground cable or pipeline	223 feet
Section lines	572 feet

4.3 Associated Facilities

In addition to wind turbines, the Project includes access roads, underground electrical collection systems, collection substations, an O&M building, Met towers, a construction laydown area, and a batch plant. The electricity generated by each turbine is stepped up to a power collection line voltage of 34.5 kV via a pad-mounted transformer at the base of each turbine. The electricity generated at each turbine will be collected by a system of underground power collection lines and brought to either collection substation.

Equipment will be added within the five-acre footprint of the collection substations to accommodate Project needs. The five-acre O&M facility, five-acre batch plant, and temporary construction laydown area will also be used for the Project. The Project does have a transmission line that will require separate permitting, but an overhead wire tap will connect the collection substations to the points of interconnect.

4.4 Land Rights

Emmons-Logan Wind has secured easements in Emmons and Logan Counties for the Project (**Figure 1-5**). Land rights will encompass the wind farm and all associated facilities, including but not limited to, wind and buffer easements, wind turbines, access roads, underground collection lines, and Met towers. The land for the Project collection substations and O&M building has been purchased.

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5.0 PROPOSED SITE

5.1 Identification of Project Area

Emmons-Logan Wind selected the Project Area based on its wind resource, land-use patterns, and low presence of environmentally sensitive features. The Project Area encompasses an area of 64,563 acres (101 square miles). See **Table 1-4** in Section 1.3.1 and Section 7.0 for a detailed description of the Project Area impacts. **Figure 1-4** shows the turbine locations, which are subject to shifts to avoid sensitive resources, pending completion of environmental and cultural resources surveys.

5.2 Wind Resource Areas

The U.S. Department of Energy's Wind Program and the National Renewable Energy Laboratory published a wind resource map for the state of North Dakota. This resource map shows wind speed estimates at 50 meters above the ground and depicts the resource that could be used for utility-scale wind development (USDOE 2014). As a renewable resource, wind is classified according to wind power classes, which are based on typical wind speeds. These classes range from Class 1 (the lowest) to Class 7 (the highest). In general, at 50 meters above ground, wind power Class 4 or higher can be useful for generating wind power with large turbines. The map indicates that North Dakota has wind resources consistent with utility-scale production. Good-to-excellent wind resource areas are located throughout North Dakota; winds within the vicinity of the Project Area range from Class 3 to Class 5 winds, with turbine locations in areas with Class 4 and 5 winds.

5.3 Wind Characteristics in Study Area

Emmons-Logan Wind has utilized wind data from Met towers in the Project Area to characterize the wind resource. Emmons-Logan Wind has secured information from other long-term references to aid in correlating the wind data on site, including 30-year re-analysis data processed by the National Aeronautics and Space Administration (NASA) and processed by Emmons-Logan Wind. Industry standard software, such as Windographer, Openwind, WRF, and ArcGIS as well as internal Emmons-Logan Wind tools were used to analyze the available wind data and make corrections for site effects (topography, surface roughness, and obstacles) to produce a site independent characterization of the local wind climate. The resulting local wind climate was applied in conjunction with the Project Area effects to predict the spatial wind variations. Various site layouts and wind turbine generator parameters can be tested to predict energy production and array efficiency in order to optimize the site layout and turbine selection. Project site data have been compared to regional wind measurements using a parallel time period. Based on analysis by Emmons-Logan Wind's internal wind resource group, WindLogics, there is good correlation between the long-term wind measurements and the short-term Project-specific wind.

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6.0 ENGINEERING AND OPERATIONAL DESIGN ANALYSIS

This section provides a summary description of the Project, which includes a description of the Project layout, turbines, electrical system, and associated facilities. Additional design components addressed in this section are Project construction, schedule, operation, and decommissioning of the site. There are other turbines that are feasible choices for the Project Area that are available from various manufacturers and Emmons-Logan Wind wishes to reserve the right to select alternative turbines representative of the GE 2.5 MW and GE 1.715 MW class of wind turbines. Turbine type may affect the number and configuration of the turbine array. Details for the GE 2.5 MW and GE 1.715 MW wind turbines are presented below. However, if an alternative but comparable turbine model is selected, the engineering and operational design considerations and procedures would be expected to be consistent with the description below for the GE 2.5 MW and GE 1.715 MW wind turbines.

6.1 Project Layout and Associated Facilities

The Project consists of an array of wind turbines and transformers (**Figure 1-4**). The wind turbines will be interconnected by power collection cables and co-located fiber optic communication cables within the wind farm. Land will be graded on site for the turbine pads. Access roads, storage areas, and construction laydown/turbine storage areas will be installed as necessary to fully accommodate all aspects of construction, operation, and maintenance.

Electrical system design and interconnection details will be determined as a result of studies and design specifications. The Project includes a computer-controlled communications system, the Supervisory Control and Data Acquisitions System (SCADA), which permits automatic independent operation and remote supervision, thus allowing the simultaneous control of many wind turbines. Additionally, subject to Federal Aviation Administration (FAA) approval, Emmons-Logan Wind will use commercially reasonable efforts to install a light-mitigating technology, consistent with NDAC Chapter 69-06-11. Emmons-Logan Wind will be responsible for O&M or will contract with an appropriate supplier of O&M services at the time of operation, to ensure high quality operations.

6.2 Description of Wind Turbines

The Project is designed to include a total of 123 wind turbines (111 GE 2.5 MW wind turbines and 12 GE 1.715 MW wind turbines). As previously stated, Emmons-Logan Wind is seeking flexibility from the Commission to select the most appropriate technology for the Project at the time of construction to ensure optimization of wind and land resources and cost efficiency.

6.2.1 Turbine

The GE 2.5 MW wind turbines have 90-meter (295-foot) hub height and will measure 148-meters (485.5-feet) from the base of the tower to the tip of the upright blade (**Figure 4-1**). The GE 1.715 MW wind turbines will have an 80-meter (262-foot) hub height and will measure 131.5-meters (431.5-feet) from the base of the tower to the tip of the upright blade. The turbines have active yaw and pitch regulation and asynchronous generators. The turbines use a bedplate drive train design, where all nacelle components are joined on common structures to improve durability.

The turbines have SCADA communication technology to allow control and monitoring of the wind farm. The SCADA communications system permits automatic, independent operation and remote supervision, thus allowing the simultaneous control of many wind turbines. Operations, maintenance, and service will be structured so as to provide for timely and efficient operations. The computerized data network will provide detailed operating and performance information for each wind turbine. Emmons-Logan Wind will maintain a computer program and database for tracking each wind turbine's operational history.

Other specifications of the turbines include:

- Rotor blade pitch regulation
- Gearbox with three-stage planetary/helical system
- Double fed three-phase asynchronous 6-pole generator with a wound rotor
- A braking system for each blade (three self-contained systems) and a fail-safe disc brake
- Electromechanically driven yaw systems

6.2.2 Rotor

The rotor consists of three blades mounted to a rotor hub. The hub is attached to the nacelle, which houses the gearbox, generator, brake, cooling system, and other electrical and mechanical systems. The GE 2.5 MW wind turbines have a 116-meter (approximately 381 feet) rotor diameter, with a swept area of 10,660 square meters. The GE 1.715 MW wind turbines have a 103-meter (approximately 338 feet) rotor diameter, with a swept area of 8,332 square meters. Both turbine models begin operation in wind speeds of 6.7 mph; the GE 2.5 MW wind turbines are designed to operate in wind speeds of up to 69.3 mph and the GE 1.715 MW wind turbines are designed to operate in wind speeds of up to 44.7 mph.

6.2.3 Turbine Tower

The turbine towers will be conical or cylindrical tubular steel with a hub height of up to 90 meters (295 feet) for the GE 2.5 MW wind turbines and 80 meters (262 feet) for the GE 1.715 MW wind turbines. The portion of the foundation that is above ground will be approximately 16 to 18 feet wide at the base of the tower. The turbine towers, on which the nacelle is mounted, consist of three to four sections manufactured from certified steel plates. All welds will be made by automatically controlled power welding machines and ultrasonically inspected during manufacturing per American National Standards Institute specifications. All surfaces will be sandblasted and multi-layer coated for protection against corrosion. Corrosion Protection Classification for external areas of tower components is C5-1. Access to the turbine will be provided through a lockable steel door at the base of the tower.

6.2.4 Lightning Protection

Each turbine will be grounded and shielded to protect against lightning. The grounding system will be installed during foundation work, must be designed for local soil conditions, and must be in accordance with local utility or code requirements. Lightning receptors will be placed in each rotor blade and in the turbine tower. The electrical components will also be protected.

6.3 Description of Electrical System

In the nacelle of each turbine, a step-up transformer will step up the voltage to the power collection line voltage of 34.5 kV. The power from these transformers will be run through an underground collection system consisting of various sized buried cables. Collection lines will be buried 48 inches deep and will not affect farming equipment. All the collection system cables will terminate at the Project substations. The substations will include power transformers to step up the voltage from either 34.5 kV to 230 kV or 34.5 kV to 115 kV and provide the necessary protection and control for interconnection to the transmission grid.

Collection corridors are shown on **Figure 1-4** and have been surveyed for environmental, cultural, and Tribal constraints. These corridors provide enough area for the final design of the collection lines to avoid all environmental, cultural, and Tribal constraints during construction while still meeting design specifications. The actual area disturbed during construction will be approximately 50 feet wide per linear foot of collection line, which is less than the collection corridors depicted on **Figure 1-4**.

All utility protection and metering equipment will meet Emmons-Logan Wind and National Electrical Safety Code standards for parallel operations. The construction manager will ensure that proper interconnection protection is established.

6.4 Project Construction

Several activities must be completed prior to the commercial operation date. The majority of the activity relates to equipment ordering lead-time, as well as design and construction of the facility. Below is a preliminary schedule of activities necessary to develop the Project. Pre-construction, construction, and post-construction activities for the Project include:

- Ordering of all necessary components including turbine towers, nacelles, blades, foundations, and transformers
- Final turbine siting
- Complete survey to site locations of structures and roadways
- Complete soil borings, testing, and analysis for proper foundation design and materials
- Complete construction of access roads, to be used for construction and maintenance
- Construct underground feeder lines
- Design and construction of the Project collection substation facilities
- Installation of turbine tower foundations
- Installation of underground and aboveground junction boxes
- Turbine tower placement and wind turbine setting
- Acceptance testing of facility
- Commencement of commercial operation

Turbine access roads will be built adjacent to the turbine towers, allowing access to the turbines during and after construction. Access roads will be typically 16 feet wide, will have an aggregate surface as cover, and will be adequate to support the size and weight of maintenance vehicles. The specific turbine placement will determine the amount of private roadway that will be constructed for the Project.

During the construction phase, several types of light, medium, and heavy-duty construction vehicles will travel to and from the site, as well as private vehicles used by construction personnel. Emmons-Logan Wind estimates that there will be approximately 1,000 additional trips per day in the area during peak construction periods. That volume will occur during the peak time when the majority of the road, foundation, and turbine tower assembly are taking place. At the completion of each construction phase, this equipment will be removed from the site or reduced in number.

6.4.1 Construction Management

Emmons-Logan Wind's EPC contractor will be primarily responsible for construction management. The EPC contractor will use the services of local contractors, where possible, to assist in construction. The EPC contractor, in coordination with local contractors, will undertake the following activities:

- Securing building, electrical, grading, road, and utility permits
- Performing detailed civil, structural, and electrical engineering
- Scheduling and execution of construction activities
- Forecasting labor requirements and budgeting

The EPC contractor will also serve as key contact and interface for subcontractor coordination. The EPC contractor will oversee the installation of communication and power collection lines as well as substation modifications. The EPC contractor will also oversee the installation of roads, concrete foundations, turbine towers, and blades, as well as the coordination of materials receiving, inventory, and distribution. The Project will be constructed under the direct supervision of an on-site construction manager with the assistance of local contractors. Project construction will consist of the following tasks:

- Site development, including roads
- Foundation excavation
- Concrete foundation installations
- All electrical and communications installation
- Turbine tower assembly and machine erection
- System testing

The construction team will be on site to handle materials purchasing, construction, quality control, testing, and start-up. The EPC contractor will manage subcontractors to complete all aspects of construction. Throughout the construction phase, ongoing coordination will occur between the development and the construction teams. The on-site construction manager will help to coordinate all aspects of the Project, including ongoing communication with local officials, citizens groups, and landowners. Even before the Project becomes fully operational, the O&M staff will be integrated into the construction phase. The construction manager and the O&M staff manager will work together continuously to ensure a smooth transition from construction through wind farm commissioning and operations.

6.4.2 Foundation Design

Each freestanding 295-foot and 262-foot and cylindrical or tubular wind turbine tower will be connected by anchor bolts to an underground concrete foundation. Geotechnical surveys, turbine tower load specifications, and cost considerations will dictate final design parameters of the foundations. Foundations for similar sized turbines are generally octagonal or circular, approximately 40 to 60 feet across at the base, and extend seven to 10 feet below grade. The wind turbine foundation design will be prepared by a professional engineer licensed to practice in the State of North Dakota.

6.4.3 Civil Works

Construction will require various types of civil works and physical improvements to the land. These civil works may include the following:

- Improvement of existing public access roads
- Construction of roads adjacent to the wind turbine strings (turbine access roads) to allow construction and continued servicing of the wind turbines
- Clearing and grading for wind turbine tower foundation installations
- Installation of underground electrical collection system for connecting the individual wind turbines
- Installation of an on-site feeder system for connecting wind turbine strings for delivery to the electricity collection/metering location
- Installation of site fencing and security where necessary
- Restoration and revegetation of disturbed land when construction activities have been completed

Any improvements to existing public access roads will consist of re-grading and filling the surface to allow access in inclement weather. No asphalt or other paving is anticipated. Turbine access roads will be constructed along turbine strings or arrays. These roads will be sited in consultation with local landowners and completed in accordance with local building requirements where these roads intersect with public roads. Turbine access roads will be located to facilitate both construction (cranes) and continued operation and maintenance. Siting roads in areas with unstable soil will be avoided wherever possible. All roads will include appropriate drainage and culverts while still allowing for the crossing of farm equipment. The roads will be 16 feet wide and will be covered with road base designed to allow passage under inclement weather conditions. The roads will consist of graded dirt and will be covered with an aggregate surface. Once construction has been completed, the roads will be re-graded, filled, and dressed as needed.

6.4.4 Commissioning

The Project will be commissioned after completion of the construction phase. The Project will undergo detailed inspection and testing procedures prior to final turbine commissioning. Inspection and testing will occur for each component of the wind turbines, as well as the communication system, meteorological system, obstruction lighting, high voltage collection and feeder system, and the SCADA system.

6.4.5 Project Operation and Maintenance

Emmons-Logan Wind will operate the wind energy facility. Nine full-time O&M employees will be employed on site to operate and maintain the facility. The O&M staff will have full responsibility for the facility to ensure O&M are conducted consistent with the applicable permits, prudent industry practice, and equipment manufacturer recommendations for the turbines.

In addition to the on-site O&M staff, remote staff will control, monitor, operate, and maintain the Project by means of a SCADA computer software program. The operation of the entire wind farm, including discrete settings for individual turbines, will be managed by the on-site operations staff and remotely via the SCADA system.

The SCADA system offers access to wind turbine generation or production data, availability, meteorological, and communications data, as well as alarms and communication error information. Performance data and parameters for each machine (generator speed, wind speed, power output, etc.) can also be viewed, and machine status can be changed. There is also a “snapshot” facility that collects frames of operating data to aid in diagnostics and troubleshooting of problems.

The primary functions of the SCADA system are to:

- Monitor wind farm status
- Allow for autonomous turbine operation
- Alert operations personnel to wind farm conditions requiring resolution
- Provide a user/operator interface for controlling and monitoring wind turbines
- Collect meteorological performance data from turbines
- Monitor field communications
- Provide diagnostic capabilities of wind turbine performance for operators and maintenance personnel
- Collect wind turbine and wind farm material and labor resource information
- Provide information archive capabilities
- Provide inventory control capabilities
- Provide information reporting on a regular basis

6.4.6 Maintenance Schedule

Emmons-Logan Wind’s on-site operations staff will be responsible for the maintenance on a daily basis. This monitoring will be accompanied by visual inspections by the on-site operating staff. Several daily checks will be made in the first few months of commercial operation to verify that the Project is operating within expected parameters.

Once installed, service and maintenance will be carefully planned and will be consistent with prudent industry practices. An initial maintenance inspection of each turbine will be performed after turbine commissioning. Following this initial inspection, each turbine will receive annual visits that will include inspections of the various systems and components such as the gearbox, generator, brake, pitch, lubricant, bolts, and transformer.

6.4.7 General Maintenance Duties

O&M field duties include performing all scheduled and unscheduled maintenance, including periodic operational checks and tests, regular preventive maintenance on all turbines, related plant facilities and equipment, safety systems, controls, instruments, and machinery, including:

- Maintenance of the wind turbines and of the mechanical, electrical power, and communications system
- Performance of all routine inspections
- Maintenance of all oil levels and changing oil filters
- Maintenance of the control systems, all structures, access roads, drainage systems and other facilities necessary for operation
- Maintenance of all O&M field maintenance manuals, service bulletins, revisions, and documentation
- Maintenance of all parts, price lists, and computer software
- Maintenance and operation of substation facilities
- Provision of all labor, services, consumables, and parts required to perform scheduled and unscheduled maintenance on the wind farm, including repairs and replacement of parts and removal of failed parts
- Cooperation with avian and other wildlife studies as may be required, to include reporting and monitoring
- Management of lubricants, solvents, and other hazardous materials as required by local and/or state regulations
- Maintenance of appropriate levels of spare parts to maintain equipment; order and maintain spare parts inventory
- Provision of all necessary equipment including industrial cranes for removal and reinstallation of turbines
- Hiring, training, and supervision of a work force necessary to meet the general maintenance requirements
- Implementation of appropriate security methods
- Remote monitoring on a daily basis

6.5 Decommissioning and Restoration

Emmons-Logan Wind will develop a Decommissioning Plan in accordance with NDAC Chapter 69-09-09. Additionally, Emmons-Logan Wind has a contractual obligation to the landowners to remove the wind facilities, including foundations to a depth of four feet below ground, when the wind easement expires and to restore the area to the same physical condition that existed immediately before the construction of the turbines. Emmons-Logan Wind also reserves the right to explore alternatives regarding decommissioning at the end of the Project's term. For example, retrofitting the turbines and power system with upgrades based on new technology may allow the wind farm to produce efficiently and successfully for many more years.

7.0 ENVIRONMENTAL ANALYSIS

This section provides a description of the environmental conditions that exist within the Project Area. 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 site. To support this siting process, maps of the Project Area were generated that indicate the presence or absence of many of the criteria designated in NDAC Chapter 69-06-08. The analysis was based on a layout including GE 2.5 MW and GE 1.715 MW turbine models; however, if an alternative but comparable turbine model is selected, it is assumed that environmental impacts would be within the range of those discussed herein.

7.1 Description of Environmental Setting

The Project Area is located in Emmons and Logan Counties in south central North Dakota, a primarily rural agricultural area located approximately 41 miles southeast of Bismarck, North Dakota and approximately five miles northeast of Linton, North Dakota.

7.2 Socioeconomics

7.2.1 Description of Resources

The Project is located in a primarily rural agricultural region in Emmons and Logan Counties, North Dakota. The Project Area 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 Area. The Project Area is located approximately four miles east of Temvik (no census data available), five miles northeast of Linton (2016 population 1,022), seven miles southwest of Napoleon (2010 population 787), seven miles south of Kintyre (no census data available), and eight miles southeast of Hazelton (2010 population 221).

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 2016). 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 5 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 2016). 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 5 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, health care, and social assistance (U.S. Census Bureau 2016). 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 2012). 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.

7.2.2 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 will provide over $45 million in tax revenue to Emmons and Logan Counties over 25 years. In addition, the Project will create approximately 200 to 300 temporary construction jobs and nine full-time O&M jobs. The Project 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. A 2015 study of property values in North Dakota concluded that property values were not diminished by wind farms or turbines (Hoefs 2015). In general, agricultural areas surrounding each turbine can still be farmed. Additionally, in an environment of uncertain and often declining agricultural prices and yields, the supplemental income provided to farmers from wind energy leases is expected to provide stability to farm incomes and thus will help assure the continued viability of farming in the Project Area. Project construction will not cause additional impacts to leading industries within the Project Area. There is no indication that any minority or low-income population is concentrated in any one area of the Project, or that the wind turbines 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 temporary construction workers are expected to be required for approximately six 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 wind farm development. 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 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 counties' tax base as a result of the construction and operation of the wind farm 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).

7.2.3 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 operation of the wind turbines and associated infrastructure. In addition, the lease payments paid to landowners will diversify the revenue stream for farmers and ranchers.

7.3 Land Use

7.3.1 Description of Resources

The Project Area is located on private land in rural Emmons and Logan Counties, North Dakota with the predominant land use being agriculture, supporting both livestock grazing and crops (**Figure 7-1**). The Project Area is not within any city limits or within an area of any known military installments. Land classifications, including acreage within the Project Area and participating land, are shown in **Table 7-1**.

Table 7-1 Land Cover within the Project Area and Participating Land

Land Cover	Acreage in Project Area	Participating Land			
		Acreage	Percentage	Temporary Impact Acres	Permanent Impact Acres
Grassland/ Herbaceous	36,064.33	35,025.91	56.62%	387.40	33.06
Cultivated Crops	20,671.91	19,475.02	31.48%	550.77	38.62
Pasture/Hay	5,352.41	5,135.96	8.30%	135.84	9.11
Developed, Open Space	1,961.37	1,781.46	2.88%	36.00	5.34
Scrub/Shrub	197.25	190.26	0.31%	4.94	0.49
Developed, Low Intensity	163.65	101.71	0.16%	0.80	0.08
Open Water	69.39	69.39	0.11%	0.01	0.00
Emergent Herbaceous Wetlands	59.52	59.52	0.10%	0.00	0.00
Deciduous Forest	13.12	13.12	0.02%	0.00	0.00
Developed, Medium Intensity	7.21	6.99	0.01%	0.00	0.00
Woody Wetlands	2.22	2.22	0.01%	0.00	0.00
Developed, High Intensity	0.44	0.44	0.00%	0.00	0.00
Barren Land (Rock/Sand/Clay)	0.00	0.00	0.00%	0.00	0.00
Evergreen Forest	0.00	0.00	0.00%	0.00	0.00
TOTAL	**64,562.84**	**61,862**	**100.00%**	**1,115.76**	**86.7**

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

In addition to the general land uses listed above, the U.S. Fish and Wildlife Service (USFWS) manages lands including their easements within the Project Area (**Figure 7-2**). There are no USFWS Waterfowl Production Areas (WPAs) or National Wildlife Refuges (NWRs) within the Project Area. The nearest NWR is the Springwater NWR, which is located approximately 0.5 miles south of the Project Area. The Springwater NWR is managed by the Long Lake Wetland Management District.

The USFWS does hold wetland and grassland easements within the Project Area. These easements are legal agreements between landowners and the USFWS to protect wetlands and grasslands 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. The USFWS owns the perpetual rights to the entire grassland easements, and plowing, grading, and development within an easement are not allowed without authorization under a Special Use Permit. Approximately 3,600 acres of wetland easements and 65 acres of grassland/wetland combination easements exist within the Project Area. Emmons-Logan Wind will not place infrastructure on any USFWS grassland/wetland combination easement.

The North Dakota Game and Fish Department (NDGFD) holds Private Land Open to Sportsmen (PLOTS) agreements with private landowners within the Project Area, and allows walk-in public hunting access to otherwise private land. Normal farming and ranching activities are allowed in these PLOTS agreements. Three areas within the Project Area, totaling approximately 1,140 acres, are enrolled in the PLOTS program.

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.

7.3.2 Impacts

The development will not result in a significant change in land use. Approximately 0.14 percent, or 86.7 acres, of the total participating land within the Project Area will be permanently converted into a renewable energy generation facility and its associated infrastructure. No residents or farms will be displaced due to construction activities or Project O&M. No turbines or associated infrastructure will be located within USFWS grassland easements or within wetland basins of USFWS wetland easements. One collection line will be located on land in a PLOTS agreement; this agreement will be negotiated between the individual landowner and the NDGFD. Similarly, any land taken out of CRP will be negotiated between the individual landowner and the FSA.

7.3.3 Mitigative Measures

Emmons-Logan Wind is working closely with landowners and seeking input from local, state, and federal agencies in locating wind turbines and access roads to minimize land use disruptions and impacts to environmentally sensitive areas to the greatest extent possible. The wind farm land use will not involve any ongoing industrial use of non-renewable resources or emissions to the environment.

7.4 Public Services

7.4.1 Description of Resources

Local Government Services

The Project is located in a sparsely populated, rural area in south central North Dakota, in Emmons and Logan Counties. Around the Project Area 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 Area. The incorporated cities nearest to the Project Area are Linton (approximately 5 miles southwest), Napoleon (approximately 7 miles northeast), and Hazelton (approximately 8 miles northwest). The unincorporated communities nearest to the Project Area are Temvik (approximately 4 miles west) and Kintyre (approximately 7 miles north). 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. Ellendale's local services include emergency management, ambulance service, clinics, a landfill, fire department, and a police department. The Project Area is located in the Ellendale and Kulm School Districts.

Electrical Service

KEM Electric Cooperative, Inc. provides rural electrical service in the Project Area.

Roads

Roads located within and adjacent to the Project Area are U.S. Highway 83, State Highway 13, State Highway 3, State Highway 34, county roads (gravel graded and drained roads), township roads, and section lines. Roads within the Project Area 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 the major roadways are documented in **Table 7-2**. Additional county and township roads run through the Project Area and are documented in **Table 7-2 and** displayed on **Figure 7-3**. 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 7-2 Existing Daily Traffic Levels

Roadway Segment	Average Annual Daily Traffic	Commercial Truck Traffic
Roadways Outside of the Project Area		
U.S. Highway 83 south of State Highway 34	1,805	410
U.S. Highway 83 north of State Highway 13	1,785	410
State Highway 34 east of U.S. Highway 83	500	80
State Highway 34 west of State Highway 3	540	155
State Highway 13 east of U.S. Highway 83	615	80
State Highway 13 west of State Highway 3	395	65
State Highway 3 north of State Highway 13	285	50
State Highway 3 south of State Highway 34	1,325	115

Roadway Segment	Average Annual Daily Traffic	Commercial Truck Traffic
Roadways within the Project Area		
21st Avenue Southeast	60	-
68th Street Southeast	25	-
72nd Street Southeast	20	-

Source: 2016 Traffic Volume Map (NDDOT 2016)

Air Traffic

There are no public airports or private airports/airstrips within the Project Area. The closest airport/airstrip is the Saville Private Airport southeast of Hazelton, ND which is located approximately 1.9 nautical miles (2.2 miles) north of the Project Area. Nautical miles are the standard measure for aviation; one nautical mile is equal to 1.15 statute miles. The nearest airport certified for commercial carrier operations is the Bismarck Municipal Airport, located in Bismarck, ND approximately 32 nautical miles (37 miles) northwest of the Project Area. Existing public and private airports are documented in **Table 7-3**.

Table 7-3 Public/Private Airports

Airport	Type	Direction from the Project Area
Linton Municipal	Public	Southwest
Napoleon Municipal	Public	Northeast
Wishek Municipal	Public	Southeast
Hazelton Municipal	Public	Northwest
Humann Private Airstrip	Private	Northwest
McLeish Landing Strip	Private	North
Saville Private	Private	North
Schirmeister Private	Private	Northwest
Voller	Private	Southwest

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

Water Supply

The South Central Regional Water District supplies potable water to communities within and near the Project Area. Emmons-Logan Wind would 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.

Communications

With the switch to digital television in 2009 throughout the United States, the concern of ghost images and flickering that may be caused by wind turbine interference with analog signals is no longer an issue (Angulo et al. 2014). Emmons-Logan Wind conducted a preliminary telecommunications study to identify all non-federal microwave telecommunication systems within the Project Area. There are no beam paths crossing the Project Area.

7.4.2 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.

Electrical Service

The Project will require station service from KEM Electric Cooperative, Inc. when the Project is not generating electricity.

Roads

Construction of the Project will require approximately 46 miles of new aggregate-surfaced access roads. During operation of the Project, the access roads will be used by operation and maintenance crews while inspecting and servicing the wind turbines. The access roads will be between towers and offset as necessary to allow for adequate crane access. One road will be required for each string of turbines. Although a 50-foot wide temporary disturbance area is likely during construction, the permanent access roads will primarily be 16 feet wide with a low profile to allow cross-travel by farm equipment.

Traffic

There will be a temporary increase in truck traffic during construction activities. The maximum construction workforce is expected to generate approximately 1,000 additional vehicle trips per day on each road within the Project Area. Using any combination of state and county highways and other township roads throughout the Project Area, the traffic impacts are considered negligible. Approximately 45 concrete trucks will be required to pour the foundation for each turbine. This is typically completed in two days per 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 Area, which includes U.S. Highway 83, State Highway 13, State Highway 3, and State Highway 34. Roads located within the Project Area are county roads (gravel graded and drained roads), township roads, and section lines. No highways are located within the Project Area. 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 installation of wind turbines creates a potential for air traffic collision. The wind turbines and the Met towers will have lighting and markings that comply with FAA requirements and the FAA's review will include the evaluation of any potential interference with air traffic. Emmons-Logan Wind will submit Notices of Construction or Alteration to the FAA for all Project turbines and will install an FAA-approved lighting system that is consistent with the Commission's requirements in NDAC Chapter 69-06-11.

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; nine million gallons of water for road construction and civil infrastructure; and 18 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 turbine foundations.

Communications

Existing telephone and fiber optic cables within the Project Area 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. Federally operated communications systems can be identified through consultation with the National Telecommunications and Information Administration (NTIA). Emmons-Logan Wind has contacted the NTIA regarding the Project, and no agencies within the Interdepartment Radio Advisory Committee had issues with turbine placement within the Project Area (**Appendices B** and **C**). No impacts to Federal Communications Commission (FCC) licensed microwave beams are anticipated because none are located within the Project Area.

The extent of the interference created by wind turbines on AM and FM radio and television has been gradually diminished over the past decade due to advances in turbine manufacturing and transmitter/receiver antenna design. This has reduced the impact on AM and FM radio systems to the point where only small degradation of signal is noticed a few feet from a turbine location. Coverage of AM and FM radio services are not expected to be impacted by the wind farm because turbines will be constructed a sufficient distance from each dwelling. With the switch to digital television in 2009, the concern of ghost images and flickering caused by wind turbine interference with analog signals is no longer an issue (Angulo et al. 2014).

7.4.3 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.

Electrical Service

Emmons-Logan Wind will purchase station service from KEM Electric Cooperative, Inc., which will suggest appropriate configurations for the electrical system that Emmons-Logan Wind will abide by to prevent impacts to the transmission system. Emmons-Logan Wind has established a setback of 534 feet from existing transmission lines (**Table 4-1**). No additional mitigation is necessary.

Roads

Emmons-Logan Wind is working closely with local landowners to locate access roads in order to minimize land-use disruptions to the extent possible. The preliminary layout of the turbines and access roads is shown in **Figure 1-4**.

Traffic

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

Emmons-Logan Wind submitted Form 7460-1 to FAA for each turbine to determine whether the Project layout and lighting will impact navigable airspace or communications technology used in aviation operations. The response from FAA will be submitted to the Commission when received. Subject to FAA approval, Emmons-Logan Wind will use commercially reasonable efforts to install a light-mitigating technology that is consistent with the Commission's requirements in NDAC Chapter 69-06-11.

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.

Communications

Collection and telecommunication lines will be buried underground to avoid collisions, to the extent practicable. An underground utilities locator company will be contacted prior to construction to locate and avoid underground facilities. To the extent Project facilities cross or otherwise affect existing communications systems, Emmons-Logan Wind will enter into agreements with service providers as necessary to avoid interference with their facilities.

7.5 Human Health and Safety

7.5.1 Description of Resources

Federal Radar Interference

Wind turbines may interfere with radar systems and airspace navigation. AECOM queried the online Department of Defense (DoD) Preliminary Screening Tool to obtain a preliminary review of potential impacts to Long Range Radar and Weather Radars, Military Training Routes and Special Airspaces (FAA 2018). The DoD Preliminary Screening Tool then produces a map relating the structure to any of the DoD/U.S. Department of Homeland Security (DHS), and National Oceanic and Atmospheric Administration (NOAA) resources listed above.

The FAA reviews potential impacts to DoD radar as part of its aviation hazard review of structures that file a Notice of Construction or Alteration (FAA Form 7460-1). The FAA will request that the DoD and the DHS review the filing and may issue a Notice of Presumed Hazard if the DoD and DHS determine that impacts to radar are considered significant. The impact of a wind energy project on radar systems primarily depends on the distance to the radar, and the number and configuration of the turbines.

Air Defense and Homeland Security Radars (Long Range Radar)

The results of the Preliminary Screening Tool indicated no anticipated impacts to Air Defense and Homeland Security radars (FAA 2018). The entire search area appears as green on the map produced by the screening tool, which indicates there will be no anticipated impact to Air Defense and Homeland Security radars (**Appendix B**).

Weather Surveillance Radar

The results of the Preliminary Screening Tool indicated that impacts are not likely for the Project Area, (shown as green on the map in the screening tool) (**Appendix B**). The results of the Preliminary Screening Tool indicate that because the Weather Surveillance Radar-1988 Doppler radar (WSR-88D, also known as NEXRAD) can detect wind turbines occasionally at great distances, NOAA would like to know the location of all wind farm projects so that corrupted radar data can be flagged (FAA 2018).

Military Training Routes and Special Use Airspace

The Project's four boundary locations, in degrees, minutes, and seconds, encompassing the Project Area were utilized for review in the Preliminary Screening Tool (FAA 2018). The results of the Preliminary Screening Tool indicate impacts to military airspace are not likely (**Appendix B**).

Electromagnetic Fields

Power frequency electric and magnetic fields (EMF) are created wherever electricity flows, which includes the wiring in our homes and schools, power lines, and the electrical equipment and devices we use at work and home. 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).

Shadow Flicker

A wind turbine's moving blades can cast a moving shadow on locations within a certain distance of a turbine. These moving shadows are called shadow flicker and can be a temporary phenomenon experienced by people at nearby residences or public gathering places. The impact area depends on the time of year and day (which determines the sun's azimuth and altitude angles) and the wind turbine's physical characteristics (height, rotor diameter, blade width, and orientation of the rotor blades). Shadow flicker generally occurs during low angle sunlight conditions, typical during sunrise and sunset times of the day.

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 Area. 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 Area prior to construction to identify any recognized environmental conditions that may exist.

Potentially hazardous materials associated with the Project include fluids found in association with turbines and substation/transformer equipment. There will be three types of fluids used in the operation of the wind turbines, all of which are petroleum products. These fluids are necessary for the operation of each turbine and include gear box oil, hydraulic fluid, and gear grease. The transformers contain mineral oil. When more than 1,320 gallons of oil storage is located on-site, then a Spill Prevention, Control, and Countermeasures (SPCC) Plan is required to address the safe and secure containment of oil as well as procedures for operations and spill prevention practices.

Security

The Project Area 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.

7.5.2 Impacts

Air Defense and Homeland Security Radars (Long Range Radar)

The Project is not anticipated to impact Air Defense and Homeland Security radars. The results of the Preliminary Screening Tool indicate that the entire Project Area appears as green on the map produced by the screening tool (**Appendix B**).

Weather Surveillance Radar

No impacts to weather radar operations are expected. The results of the Preliminary Screening Tool indicate that the entire Project Area appears as green on the map produced by the screening tool (**Appendix B**). Emmons-Logan Wind will notify NOAA of the Project so that any potential impacts can be tracked.

Military Training Routes and Special Use Airspace

No impacts to military airspace are expected.

Electromagnetic Fields

Low-level power frequency EMF will occur around the wind turbine generators (in the nacelles), around the generator step-up transformers, along the collector lines, and at the Project substations. All Project facilities will be set back from residences as required by state and county regulation. At these distances EMF levels will not be above background levels. The only exposure will be brief exposure to maintenance workers, primarily at the substations. Based on the above, no significant adverse impacts are anticipated.

Shadow Flicker

Shadow flicker impacts are not regulated in applicable county, state, or federal law, and there is no permitting threshold with regard to hours per year of anticipated impacts to a receptor from a wind energy project. Thirty hours per year of shadow flicker is the industry's generally accepted standard and the standard that has been utilized by the Commission.

An analysis of potential shadow flicker impacts from the Project turbine layout was conducted using the WindFarm software package. The WindFarm analysis was conducted to determine shadow flicker impacts under realistic impact conditions (actual expected shadow flicker, which accounts for historical sunshine probability, wind speed, and wind direction). This analysis calculated the total amount of time (hours and minutes per year) that shadow flicker could occur at receptors out to 4,856 feet. The analysis assumes that the receptors all have a direct in line view of the incoming shadow flicker sunlight and does not account for trees or other obstructions which may block sunlight. In reality, the windows of many houses will not face the sun directly to be affected by the key shadow flicker impact times.

A total of 95 occupied residences were identified within and near the Project Area and are considered potential shadow flicker receptors for the purpose of this analysis. The predicted shadow flicker impacts are less than 30 hours per year at all but 15 occupied residences (the model includes both primary and alternative turbine locations); these residences are owned by landowners that are participating in the Project. The maximum predicted shadow flicker impact at any occupied residence receptor is 58.6 hours per year. The analysis was deliberately conservative and actual shadow flicker is expected to occur for less than the modeled durations; however, Emmons-Logan Wind is working with landowners to sign waivers for any potential impacts in excess of the Commission's standard. If a waiver cannot be obtained, Emmons-Logan Wind will ensure that the Commission's standard is met.

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 would be minimized through implementation of a SPCC Plan, which would 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 would ensure that surface and groundwater quality would 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.

7.5.3 Mitigative Measures

Air Defense and Homeland Security Radars (Long Range Radar)

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

Weather Surveillance Radar

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

Military Training Routes and Special Use Airspace

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

Electromagnetic Fields

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

Shadow Flicker

The primary mitigation measure used to minimize shadow flicker from wind turbines is setback distance. Emmons-Logan Wind is committed to at least a setback distance of three times the turbine height from all existing occupied residential structures, as required by the Commission. Emmons-Logan Wind is working with landowners to sign waivers for potential impacts in excess of the Commission's standard. If a waiver cannot be obtained, Emmons-Logan Wind will ensure that the Commission's standard is met. Because no other significant impacts are anticipated, no additional mitigation is proposed at this time.

Hazardous Materials/Hazardous Waste

Because no significant findings are anticipated, no mitigation is proposed at this time. All petroleum fluids will be contained within the wind turbines and electrical equipment. 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 towers will be placed at least 1.1 times the turbine height plus 75 feet from public road centerlines and three times the turbine height from occupied residences. These distances meet or exceed the required local setbacks.
- 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 and wind power facilities.
- Turbines will sit on solid steel-enclosed tubular towers in which all electrical equipment will be located, except for the pad-mounted transformer. Access to the tower is only through a solid steel door that will be locked when not in use.
- Where necessary or requested by landowners, Emmons-Logan Wind will construct gates or fences such as those around the collection substation.
- Emmons-Logan Wind will provide educational materials to landowners within the site boundaries and upon request to interested persons about the Project.

7.6 Sound

7.6.1 Description of Resources

The Project Area is primarily rural and agricultural. There are no populated towns within the Project Area. The nearest planned Project turbine is approximately six miles from the city of Linton, the closest

incorporated city. The existing acoustic environment is defined primarily by distant traffic sounds 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 and wind interaction with natural or man-made formations/structures.

7.6.2 Impacts

The Commission's rules (NDAC Section 69-06-08-01(4)) specify that sound levels from a wind facility may not exceed 50 A-weighted (dBA) within 100 feet of an inhabited residence or a community building, unless waived in writing by the owner. Wind turbine generators produce sound through a number of different mechanisms roughly grouped into mechanical and aerodynamic sources. Modern wind turbines include design features that minimize sound emission from mechanical sources. The interaction of air and the turbine blades produces aerodynamic sound through a variety of processes as air passes over and past the blades. Unlike other sound sources, wind turbines generally radiate more sound as wind speed increases. However, at elevated wind speeds the wind tends to generate significant background sound by moving trees and grasses, which can create a masking effect and may aid in reducing the audibility of wind turbine sound.

An acoustic engineering analysis was developed to assess potential sound levels resulting from wind turbine operations. Wind turbine operation was analyzed for the Project employing the GE 2.5 MW and GE 1.715 MW wind turbine models and the substations. The GE 2.5 MW and GE 1.715 MW wind turbine sound specifications were used for their respective turbine locations. Acoustic modeling was completed at both wind turbine cut-in and maximum rotational conditions, inclusive of the entire range of future Project operational conditions. Project compliance was assessed at a total of 95 occupied residences in and near the Project Area. Acoustic modeling results indicated that received sound levels will be above 50 dBA within 100 feet of nine residences. Emmons-Logan Wind is working to obtain waivers from any residences where 50 dBA is exceeded. If a waiver cannot be obtained Emmons-Logan Wind will ensure that the 50 dBA requirement is met.

Project construction may cause short-term, but unavoidable sound impacts. The sound levels resulting from construction activities vary significantly depending on several factors such as the type and age of equipment, the specific equipment manufacturer and model, the operations being performed, and the overall condition of the equipment and exhaust system mufflers. Sounds generated by construction activities are typically exempt from state and local sound oversight provided that they occur within weekday, daytime periods as may be specified under local zoning or legal codes. Reasonable efforts will be made to minimize the impact of sound resulting from construction activities.

Construction activity will generate traffic having potential sound effects, such as trucks traveling to and from the site on public roads. At the early stage of the construction phase, equipment and materials will be delivered to the site, such as hydraulic excavators and associated spreading and compacting equipment needed to form access roads and foundation platforms for each turbine. Once the access roads are constructed, equipment for lifting the towers and turbine components will arrive. Traffic sound is categorized into two categories: (1) the sound that will occur during the initial temporary traffic movements related to turbine delivery, haulage of components, and remaining construction; and (2) maintenance and ongoing traffic from staff and contractors, which is expected to be minor.

7.6.3 Mitigative Measures

The primary mitigation measure used for wind turbine sound is setback distance. Emmons-Logan Wind is committed to a minimum three times the turbine height setback distance from all existing occupied residential structures, as required by the Commission. It should be noted that the acoustic model conservatively predicts outdoor sound levels and assumes no shielding or attenuation by trees or other

vegetation. Emmons-Logan Wind is working to obtain waivers from the owners of residences where 50 dBA will be exceeded. If a waiver cannot be obtained Emmons-Logan Wind will ensure that the 50 dBA requirement is met.

7.7 Cultural Resources

7.7.1 Description of Resources

Class I Literature Review

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

The literature review identified nine previously recorded archaeological sites, five site leads, and 22 architectural sites within the Project Area (**Table 7-4**). 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.

Of the 36 previously recorded cultural resources, six are Native American sites or site leads, 28 are Euro-American sites or site leads, and two are archaeological sites of unknown cultural affiliation. All of the Native American sites are stone circles, cairns, or a combination of these feature types. The Euro-American sites include churches and cemeteries, post offices, and former farmstead locations. One of the sites with an unknown cultural affiliation contains faunal remains (**Table 7-4**).

Within a one-mile study area around the Project Area, there are 10 recorded archaeological sites and nine site leads, and 29 architectural sites (**Table 7-4**). These include eight Native American sites or site leads, 38 Euro-American sites, and two archaeological sites of unknown cultural affiliation. All of the Native American sites are stone circles, cairns, cultural scatters or a combination of these site types. The Euro-American sites include churches and cemeteries, two site leads for a post offices, and sites or site leads associated with former farmsteads. One of the sites with an unknown cultural affiliation contains faunal remains.

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

Table 7-4 Previously Recorded Sites within the Project Area and within One-Mile of the Project Area

Site Number	Site Type	NRHP Status	Cultural Affiliation
Sites within the Project Area			
32EM132*	Farmstead	Unevaluated	Euro-American
32EM134*	Farmstead	Unevaluated	Euro-American
32EM323*	Bethlehem Cemetery	Eligible	Euro-American
32EM324*	Farmstead	Unevaluated	Euro-American
32EM328*	Farmstead	Unevaluated	Euro-American

Site Number	Site Type	NRHP Status	Cultural Affiliation
32EM329*	Farmstead	Not Eligible	Euro-American
32EM333*	Historical Scatter	Unevaluated	Euro-American
32EM382*	Cairn	Eligible	Native American
32EM386*	Farmstead	Not Eligible	Euro-American
32EM398*	Stone Circle	Unevaluated	Native American
32EM400*	Stone Circle	Unevaluated	Native American
32EM467*	Stone Circle and Cultural Scatter	Unevaluated	Native American
32EM494*	Depression or Possible Grave	Unevaluated	Euro-American
32EM495*	Stone Circle	Not Eligible	Native American
32EM883*	Farmstead	Unevaluated	Euro-American
32EM884*	Farmstead	Unevaluated	Euro-American
32EM940*	Farmstead	Unevaluated	Euro-American
32EM946*	Farmstead	Unevaluated	Euro-American
32EM995*	Farmstead	Unevaluated	Euro-American
32EM997*	Farmstead	Unevaluated	Euro-American
32EM998*	Schoolhouse	Unevaluated	Euro-American
32EM1013*	Finish Church and Cemetery	Unevaluated	Euro-American
32EM1017*	Church	Not Eligible	Euro-American
32EM1023*	Farmstead	Unevaluated	Euro-American
32EM1039*	Farmstead	Unevaluated	Euro-American
32EM1040*	Farmstead	Unevaluated	Euro-American
32EM1043*	Farmstead	Unevaluated	Euro-American
32EM1050*	Farmstead	Eligible	Euro-American
32EMX45*	Site Lead – Marie Post Office	Unevaluated	Euro-American
32EMX144*	Site Lead – Faunal Scatter	Unevaluated	Unknown
32EMX1355*	Site Lead – Richard Sandwick Farmhouse	Unevaluated	Euro-American
32EMX1356*	Site Lead – Farmstead	Unevaluated	Euro-American
32EMX1357*	Site Lead – Farmstead	Unevaluated	Euro-American
32LO22*	St. Boniface Church and Cemetery	Eligible	Euro-American
32LO36*	Stone Circle	Unevaluated	Native American
32LOX51*	Unknown	Unevaluated	Unknown
Sites within the one-mile study area around the Project Area			
32EM132*	Farmstead	Unevaluated	Euro-American
32EM134*	Farmstead	Unevaluated	Euro-American
32EM162	Stone Circle and Cairn	Unevaluated	Native American
32EM225	St. Michaels Church and Cemetery	Eligible	Euro-American
32EM289	Farmstead	Unevaluated	Euro-American
32EM323*	Bethlehem Cemetery	Eligible	Euro-American
32EM324*	Farmstead	Unevaluated	Euro-American
32EM328*	Farmstead	Unevaluated	Euro-American
32EM329*	Farmstead	Not Eligible	Euro-American

Site Number	Site Type	NRHP Status	Cultural Affiliation
32EM333*	Historical Scatter	Unevaluated	Euro-American
32EM382*	Cairn	Eligible	Native American
32EM386*	Farmstead	Not Eligible	Euro-American
32EM387	Farmstead	Unevaluated	Euro-American
32EM394	Farmstead	Unevaluated	Euro-American
32EM398*	Stone Circle	Unevaluated	Native American
32EM400*	Stone Circle	Unevaluated	Native American
32EM467*	Stone Circle and Cultural Scatter	Unevaluated	Native American
32EM494*	Depression or Possible Grave	Unevaluated	Euro-American
32EM495*	Stone Circle	Not Eligible	Native American
32EM883*	Farmstead	Unevaluated	Euro-American
32EM884*	Farmstead	Unevaluated	Euro-American
32EM940*	Farmstead	Unevaluated	Euro-American
32EM946*	Farmstead	Unevaluated	Euro-American
32EM947	Farmstead	Unevaluated	Euro-American
32EM993	Farmstead	Unevaluated	Euro-American
32EM995*	Farmstead	Unevaluated	Euro-American
32EM997*	Farmstead	Unevaluated	Euro-American
32EM998*	Schoolhouse	Unevaluated	Euro-American
32EM1013*	Finish Church and Cemetery	Unevaluated	Euro-American
32EM1017*	Church	Not Eligible	Euro-American
32EM1023*	Farmstead	Unevaluated	Euro-American
32EM1039*	Farmstead	Unevaluated	Euro-American
32EM1040*	Farmstead	Unevaluated	Euro-American
32EM1042	Farmstead	Unevaluated	Euro-American
32EM1043*	Farmstead	Unevaluated	Euro-American
32EM1050*	Farmstead	Eligible	Euro-American
32EMX45*	Site Lead – Marie Post Office	Unevaluated	Euro-American
32EMX46	Site Lead – Omio Post Office	Unevaluated	Euro-American
32EMX54	Site Lead – Unknown Historical	Unevaluated	Euro-American
32EMX144*	Site Lead – Faunal Scatter	Unevaluated	Unknown
32EMX1355*	Site Lead – Richard Sandwick Farmhouse	Unevaluated	Euro-American
32EMX1356*	Site Lead – Farmstead	Unevaluated	Euro-American
32EMX1357*	Site Lead – Farmstead	Unevaluated	Euro-American
32EMX1426	Site Lead – Cultural Scatter	Unevaluated	Native American
32LO22*	St. Boniface Church and Cemetery	Eligible	Euro-American
32LO36*	Stone Circle	Unevaluated	Native American
32LOX51*	Unknown	Unevaluated	Unknown
32LOX60	Site Lead – Grain Bins	Unevaluated	Euro-American

* Located in both the Project Area and the one-mile study area around the Project Area

Class III Cultural Resources Inventory for Archaeological Resources

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

Class III Cultural Resources Inventory for Architectural Resources

Based on SHSND regulations, a Class III Cultural Resources Inventory for Architectural Resources is required for architectural resources within two miles of the Project Area. An architectural historian completed a survey of architectural resources within two miles of proposed Project turbines in spring of 2018. Additional surveys will be completed, if necessary, for changes to the turbine locations. A report will be submitted to the SHSND for review and concurrence. Upon completion of the report, a management summary will 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 focused on micrositing proposed turbine locations. During this stage, representatives from the Standing Rock Sioux Tribe and the Rosebud Sioux Tribe 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 Project layout 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 Project 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 Project layout in late October.

The revised Project 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. Tribal 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.

7.7.2 Impacts

Archaeological Resources

Emmons-Logan Wind will avoid newly documented sites and the previously documented cultural resources within the Project footprint. Avoidance buffers will be created for these sites and the buffers will be delineated prior to construction to ensure that archaeological resources are avoided; therefore, no significant impacts to archaeological resources are anticipated. The pedestrian survey and shovel probing will be completed as weather permits and 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.

Architectural Resources

An architectural historian conducted a survey of architectural resources within two miles of Project turbines. The Project will not directly impact any architectural resources. The Class III Architectural Inventory Report is currently underway. This report will be submitted to the SHSND when complete for review and concurrence, and will also be submitted to the Commission.

7.7.3 Mitigative Measures

Sites adjacent to construction areas will be fenced to reduce the potential that they are inadvertently disturbed. 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 and Logan Counties Sheriffs' offices 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.

7.8 Recreational Resources

7.8.1 Description of Resources

There are no designated recreational areas such as state or federal parks, NWRs, WPAs, or designated scenic trails within the Project Area; however, a number of recreational opportunities exist within and around the Project Area. As stated above in Section 7.3 Land Use, the nearest NWR is the Springwater NWR, located approximated 0.5 miles south of the Project Area. NWRs are open to a variety of public uses including hunting, fishing, wildlife observation, photography, and cultural and environmental education.

There are three one half-sections (320 acres each) and one quarter-section (160 acres), within the Project Area that are school trust land. School trust land is managed by the North Dakota Department of Trust Lands (NDDTL). These lands are dedicated to producing income for the schools and designated trust funds of North Dakota. Ninety-nine percent of North Dakota's school trust lands are leased to farmers and ranchers (NDDTL 2018). School trust land is generally open to walk-in public use; however, lessees may restrict access if livestock are present.

The 1,140 acres within the Project Area enrolled in the PLOTS program, as described in Section 7.3 Land Use, allow walk-in public access for hunting purposes only and are not open to horseback riding, camping, ATV riding, dog training, or other activities without landowner permission. These regulations are enforced year-round, but do not restrict the landowners from participating in these activities on their own lands.

7.8.2 Impacts

No recreational resources will be directly impacted as impacts to recreational resources would mainly be visual in nature. Sportsman, landowners, and sightseers that make use of private land, NWRs, fishing waters, and school trust lands could potentially be temporarily impacted by construction activities. Areas close to permanent turbine locations could potentially be impacted by possible sound of wind turbines. One collection line will be located on land in a PLOTS agreement; this agreement will be negotiated between the individual landowner and the NDGFD.

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.

7.8.3 Mitigative Measures

No turbines, access roads, or associated facilities will be placed on NWR, WPA, or school trust lands. Construction of the collection line on land in a PLOTS agreement will result in temporary impacts during

construction. Following construction, disturbed areas will be mitigated by reseeding with a weed-free seed mixture consistent with the surrounding vegetation and landowner preference.

7.9 Effects on Land-Based Economies

7.9.1 Description of Resources

Agriculture/Farming

The majority of the Project Area is classified as herbaceous grasslands (Homer et al. 2015) (**Figure 7-1**). Grasslands encompass 35,025.91 acres (approximately 57 percent) of the participating land within the Project Area; pasture or hayland comprises 5,135.96 acres (approximately 8 percent) of the participating land within the Project Area; and cultivated crops comprises 19,475.02 acres (approximately 31 percent) of the participating land within the Project Area (**Figure 7-4**).

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.

As described further in Section 7.10 below, 63.8 percent of soils in the Project Area are classified as farmland of statewide importance and 7.5 percent of the Project Area is classified as prime farmland (Soil Survey Staff 2018) (**Figure 7-5**). These areas have been identified by the USDA and Natural Resources Conservation Service (NRCS) as lands that may produce highest crop yields.

Woodlands

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

7.9.2 Impacts

Agriculture/Farming

Construction of the Project will permanently take 47.73 acres (0.07 percent of Project Area and 0.08 percent of participating land), and temporarily take 686.61 acres (1.06 percent of Project Area and 1.11 percent of participating land), of crop and hayland out of production. Of the land that will be permanently taken out of production, 5.76 acres are within prime farmland and 69.40 acres are within farmland of statewide importance (0.12 percent of Project Area and 0.12 percent of participating land). Areas of cropland temporarily impacted will be restored to cropland based on landowner preference.

A total of 33.06 acres of grassland (0.05 percent of Project Area and 0.05 percent of participating land), some of which is used for livestock grazing, will be permanently taken out of use; 387.4 acres of grassland (0.60 percent of Project Area and 0.63 percent of participating land) will be temporarily taken out of use. No impacts to physical livestock are expected. Areas of grassland temporarily impacted will be restored based on landowner preference.

Woodlands

No economically important forestry resources are found within the Project Area. Trees and shrubs in the Project Area 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.

7.9.3 Mitigative Measures

Agriculture/Farming

The Project will result in direct, permanent impacts to farmland during operations by turbines, access roads, collection lines, collection substations, Met towers, and an O&M building. Economic losses to producers of the farmland are anticipated to be minimal in comparison to the additional income provided by the Project. Emmons-Logan Wind will work with landowners to minimize impacts to their land. Where feasible, turbine and access road locations were positioned along section lines and field edges to lessen the fragmentation of land. 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. Construction sites will utilize a stormwater pollution prevention plan (SWPPP) to mitigate disturbed soils and prevent erosion and contamination of surface waters.

Woodlands

No significant impacts are anticipated to woodlands. Trees and shrubs in the Project Area 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.

7.10 Soils

7.10.1 Description of Resources

Within the Project Area, the USDA has mapped 108 soil map units (Soil Survey Staff 2018). Of this, 4,372 acres or 6.77 percent of the Project Area is prime farmland. Prime farmland has been avoided to the extent practical. Permanent impacts to farmland of statewide importance and prime farmland are negligible and expected to be 75.16 acres, which is 0.12 percent of the Project Area and 0.12 percent of participating land. Farmland of statewide importance includes lands that are nearly prime and that produce high yields of crops when treated and managed according to acceptable farming practices. **Table 7-5** provides a summary of the soil map units within the Project Area, including their acreage, percentage of the Project Area, and farmland rating.

Table 7-5 Soil Map Units within the Project Area

Map Unit Name	Area (acres)	Approximate Percent (%) of Project Area	Farmland Rating
Williams-Bowbells loams, 3 to 6 percent slopes	7,503.15	11.62%	Farmland of statewide importance
Vebar-Parshall fine sandy loams, 3 to 6 percent slopes	6,768.26	10.48%	Farmland of statewide importance
Vebar-Cohagen fine sandy loams, 6 to 9 percent slopes	4,985.29	7.72%	Not prime farmland
Amor-Werner loams, 3 to 6 percent slopes	3,827.68	5.93%	Farmland of statewide importance
Williams-Reeder loams, 3 to 6 percent slopes	2,716.44	4.21%	Farmland of statewide importance
Temvik silt loam, 3 to 6 percent slopes	2,707.02	4.19%	Farmland of statewide importance

Map Unit Name	Area (acres)	Approximate Percent (%) of Project Area	Farmland Rating
Williams-Bowbells loams, 0 to 3 percent slopes	2,566.95	3.98%	Farmland of statewide importance
Wilton silt loam, 0 to 3 percent slopes	2,098.16	3.25%	All areas are prime farmland
Williams-Zahl-Zahill complex, 6 to 9 percent slopes	2,031.29	3.15%	Not prime farmland
Amor-Arnegard loams, 0 to 3 percent slopes	1,977.15	3.06%	Farmland of statewide importance
Omio-Amor silt loams, 3 to 6 percent slopes	1,872.23	2.90%	Farmland of statewide importance
Vebar-Cohagen fine sandy loams, 9 to 15 percent slopes	1,668.29	2.58%	Not prime farmland
Williams-Reeder loams, 6 to 9 percent slopes	1,626.05	2.52%	Farmland of statewide importance
Omio-Grassna silt loams, 0 to 3 percent slopes	1,625.23	2.52%	Farmland of statewide importance
Arnegard loam, 0 to 2 percent slopes	1,348.38	2.09%	All areas are prime farmland
Flasher-Vebar complex, 15 to 70 percent slopes	1,218.25	1.89%	Not prime farmland
Telfer-Parshall-Vebar complex, 6 to 15 percent slopes	1,191.25	1.85%	Not prime farmland
Cohagen-Vebar-Parshall fine sandy loams, 9 to 35 percent slopes	979.43	1.52%	Not prime farmland
Reeder-Farnuf loams, 3 to 6 percent slopes	833.83	1.29%	Farmland of statewide importance
Parshall-Lihen fine sandy loams, 0 to 6 percent slopes	770.67	1.19%	Farmland of statewide importance
Lihen-Parshall complex, 0 to 6 percent slopes	705.48	1.09%	Not prime farmland
Amor-Arnegard loams, 3 to 6 percent slopes	692.02	1.07%	Farmland of statewide importance
Vebar fine sandy loam, 6 to 9 percent slopes	658.88	1.02%	Not prime farmland
Flaxton-Williams complex, 0 to 6 percent slopes	655.67	1.02%	Farmland of statewide importance
Williams-Reeder loams, 0 to 3 percent slopes	620.19	0.96%	Farmland of statewide importance
Krem-Lihen loamy fine sands, 0 to 6 percent slopes	600.07	0.93%	Not prime farmland
Amor loam, 6 to 9 percent slopes	573.88	0.89%	Farmland of statewide importance
Flaxton fine sandy loam, 3 to 6 percent slopes	557.00	0.86%	Farmland of statewide importance
Arnegard loam, 2 to 6 percent slopes	547.46	0.85%	All areas are prime farmland
Amor-Werner-Farnuf loams, 6 to 9 percent slopes	448.89	0.70%	Not prime farmland
Parshall-Lihen fine sandy loams, 2 to 6 percent slopes	379.19	0.59%	Farmland of statewide importance
Vebar fine sandy loam, 9 to 15 percent slopes	378.33	0.59%	Not prime farmland
Amor-Werner loams, 9 to 15 percent slopes	374.66	0.58%	Not prime farmland
Vebar fine sandy loam, 3 to 6 percent slopes	364.96	0.57%	Farmland of statewide importance
Reeder-Arnegard loams, 3 to 6 percent slopes	350.64	0.54%	Farmland of statewide importance

Map Unit Name	Area (acres)	Approximate Percent (%) of Project Area	Farmland Rating
Williams loam, 6 to 9 percent slopes	327.49	0.51%	Farmland of statewide importance
Lihen-Telfer loamy fine sands, 0 to 6 percent slopes	316.25	0.49%	Not prime farmland
Regent-Savage silty clay loams, 3 to 6 percent slopes	315.91	0.49%	Farmland of statewide importance
Omio-Amor silt loams, 6 to 9 percent slopes	286.92	0.44%	Farmland of statewide importance
Zahl-Williams loams, 9 to 15 percent slopes	283.27	0.44%	Not prime farmland
Bowdle-Lehr loams, 0 to 2 percent slopes	267.96	0.42%	Not prime farmland
Flaxton-Livona fine sandy loams, 3 to 6 percent slopes	255.21	0.40%	Farmland of statewide importance
Vebar-Flasher complex, 9 to 15 percent slopes	250.57	0.39%	Not prime farmland
Telfer loamy fine sand, 6 to 15 percent slopes	242.41	0.38%	Not prime farmland
Parshall fine sandy loam, 0 to 2 percent slopes	234.36	0.36%	Farmland of statewide importance
Grassna silt loam, 0 to 2 percent slopes	226.65	0.35%	All areas are prime farmland
Flasher-Telfer loamy fine sands, 15 to 35 percent slopes	216.06	0.33%	Not prime farmland
Werner-Amor-Arnegard loams, 9 to 50 percent slopes	188.18	0.29%	Not prime farmland
Parnell silty clay loam, 0 to 1 percent slopes	156.20	0.24%	Not prime farmland
Williams-Falkirk loams, 0 to 3 percent slopes	150.21	0.23%	Farmland of statewide importance
Parshall fine sandy loam, 2 to 6 percent slopes	117.14	0.18%	Farmland of statewide importance
Werner-Amor loams, 9 to 15 percent slopes	115.57	0.18%	Not prime farmland
Vebar fine sandy loam, 0 to 3 percent slopes	114.18	0.18%	Farmland of statewide importance
Bowdle-Lehr loams, 2 to 6 percent slopes	112.65	0.17%	Not prime farmland
Vebar-Parshall fine sandy loams, 0 to 3 percent slopes	107.14	0.17%	Farmland of statewide importance
Zahl-Max-Arnegard loams, 9 to 25 percent slopes	105.77	0.16%	Not prime farmland
Tonka silt loam, 0 to 1 percent slopes	105.57	0.16%	Not prime farmland
Seroco-Telfer complex, 2 to 35 percent slopes	103.82	0.16%	Not prime farmland
Lehr-Bowdle loams, 2 to 6 percent slopes	102.05	0.16%	Not prime farmland
Temvik silt loam, 6 to 9 percent slopes	101.08	0.16%	Farmland of statewide importance
Temvik-Wilton-Williams silt loams, 3 to 6 percent slopes	100.90	0.16%	Farmland of statewide importance
Shambo loam, 0 to 2 percent slopes	80.84	0.13%	Farmland of statewide importance
Krem-Lihen loamy fine sands, 6 to 9 percent slopes	73.29	0.11%	Not prime farmland
Appam sandy loam, 2 to 6 percent slopes	72.24	0.11%	Not prime farmland
Amor loam, 9 to 15 percent slopes	63.02	0.10%	Not prime farmland

Map Unit Name	Area (acres)	Approximate Percent (%) of Project Area	Farmland Rating
Grassna silt loam, loess, 0 to 2 percent slopes	61.90	0.10%	All areas are prime farmland
Amor-Cabba loams, 6 to 9 percent slopes	55.53	0.09%	Not prime farmland
Telfer loamy fine sand, 0 to 6 percent slopes	44.56	0.07%	Not prime farmland
Lehr-Bowdle loams, 6 to 9 percent slopes	42.51	0.07%	Not prime farmland
Reeder-Werner loams, 9 to 15 percent slopes	41.86	0.06%	Not prime farmland
Regent-Cabba complex, 6 to 9 percent slopes	41.84	0.06%	Not prime farmland
Lihen-Telfer loamy fine sands, 6 to 9 percent slopes	40.79	0.06%	Not prime farmland
Flaxton fine sandy loam, 0 to 3 percent slopes	39.97	0.06%	Farmland of statewide importance
Southam silty clay loam, 0 to 1 percent slopes	39.20	0.06%	Not prime farmland
Regent-Savage silty clay loams, 0 to 3 percent slopes	37.62	0.06%	Farmland of statewide importance
Telfer-Flasher loamy fine sands, 6 to 15 percent slopes	37.52	0.06%	Not prime farmland
Flaxton-Williams complex, 6 to 9 percent slopes	37.39	0.06%	Not prime farmland
Reeder-Arnegard loams, 6 to 9 percent slopes	35.78	0.06%	Farmland of statewide importance
Reeder-Cabba loams, 6 to 9 percent slopes	35.54	0.06%	Farmland of statewide importance
Grail silty clay loam, 0 to 2 percent slopes	35.08	0.05%	All areas are prime farmland
Grail silty clay loam, till, 2 to 6 percent slopes	34.02	0.05%	All areas are prime farmland
Lehr loam, 6 to 9 percent slopes	28.83	0.04%	Not prime farmland
Wabek-Appam complex, 6 to 9 percent slopes	28.50	0.04%	Not prime farmland
Livona-Williams fine sandy loams, 9 to 15 percent slopes	27.34	0.04%	Not prime farmland
Belfield-Daglum complex, 0 to 2 percent slopes	26.37	0.04%	Not prime farmland
Williams-Zahl loams, 6 to 9 percent slopes	25.94	0.04%	Not prime farmland
Reeder-Farnuf loams, 0 to 3 percent slopes	25.83	0.04%	Farmland of statewide importance
Zahl-Max loams, dissected, 15 to 45 percent slopes	22.74	0.04%	Not prime farmland
Dimmick clay, ponded, 0 to 1 percent slopes	22.34	0.03%	Not prime farmland
Flaxton fine sandy loam, 6 to 9 percent slopes	21.98	0.03%	Not prime farmland
Seroco-Telfer complex, 2 to 15 percent slopes	20.97	0.03%	Not prime farmland
Harriet loam, 0 to 2 percent slopes, occasionally flooded	20.97	0.03%	Not prime farmland
Daglum-Belfield loams, 0 to 2 percent slopes	19.88	0.03%	Not prime farmland
Regent-Savage silty clay loams, 6 to 9 percent slopes	18.43	0.03%	Farmland of statewide importance

Map Unit Name	Area (acres)	Approximate Percent (%) of Project Area	Farmland Rating
Schaller loamy sand, 6 to 15 percent slopes	17.71	0.03%	Not prime farmland
Shambo loam, 2 to 6 percent slopes	17.62	0.03%	Farmland of statewide importance
Karlsruhe coarse sandy loam, 0 to 2 percent slopes	16.98	0.03%	Not prime farmland
Flaxton-Livona fine sandy loams, 0 to 3 percent slopes	13.73	0.02%	Farmland of statewide importance
Grail silty clay loam, 2 to 6 percent slopes	11.47	0.02%	All areas are prime farmland
Farnuf loam, 0 to 2 percent slopes	11.21	0.02%	Farmland of statewide importance
Belfield-Savage-Daglum complex, 2 to 6 percent slopes	10.74	0.02%	Farmland of statewide importance
Vallers loam, 0 to 1 percent slopes	9.51	0.01%	Prime farmland if drained
Noonan-Niobell-Williams loams, 0 to 6 percent slopes	7.52	0.01%	Not prime farmland
Wabek-Lehr complex, 2 to 6 percent slopes	6.18	0.01%	Not prime farmland
Grassna silt loam, 2 to 6 percent slopes	5.36	0.01%	All areas are prime farmland
Grail silty clay loam, till, 0 to 2 percent slopes	3.40	0.01%	All areas are prime farmland
Korchea-Fluvaquents complex, channeled, 0 to 2 percent slopes, frequently flooded	2.24	0.00%	Not prime farmland

Source: Web Soil Survey (Soil Survey Staff 2018)

7.10.2 Impacts

Impacts to soils within the Project Area will be limited to areas removed from their current use by the occupancy of Project structures. Soil disturbance activities including grading for the roads, turbine pads, and associated facilities, and excavation activities for turbine foundations and underground utilities has the potential to contribute to soil erosion through the exposure of soils that were previously vegetated and stable. It is estimated that only 5.76 acres of prime farmland, or 0.01 percent of the Project Area and 0.01 percent of participating land, will be permanently impacted.

7.10.3 Mitigative Measures

Prime farmland has been avoided to the extent practical, and permanent impacts are expected to be negligible. Wind and water erosion are potential hazards within the Project Area during and after construction. Soil compaction can also occur by the use of heavy equipment such as cranes. To minimize these impacts, best management practices (BMPs) will be implemented. BMPs may include the separation of topsoil and subsoil, use of silt fences, erosion blankets, temporary seeding and straw wattles during construction with the addition of permanent seeding and noxious weed control once construction is complete. In addition, during construction and operation, vehicle speed will be limited on Project roads to minimize dust. Construction sites will utilize a SWPPP to mitigate disturbed soils and prevent erosion and contamination of surface waters.

7.11 Geologic and Groundwater Resources

7.11.1 Description of Resources

The Project Area is in the northeastern portion of Emmons County and southwestern portion of Logan County and lies on the Coteau Slope. 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 Area.

The Coteau Slope and the Project Area 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 Area 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 Area (Anderson 2012). There are also no active oil and gas wells or coal mines within or near the Project Area (NDDMR 2018).

The Braddock aquifer, an aquifer deposited in a small glacial lake, is located on the north side of the Project Area (NDSWC 2018). This aquifer is approximately 9,010 acres with water depths ranging from at land surface to 110 feet below ground surface (bgs) (USGS 1978). There are approximately 65 water wells located within the Project Area (NDSWC 2018). These wells range from 40 to 280 feet bgs and contain static water between 30 and 150 feet bgs.

7.11.2 Impacts

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 Area (NDDMR 2018). Viable sand and gravel resources occur within and around the Project Area. 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 turbine foundation, the Project would not contribute to significant impacts on groundwater flow or recharge. If groundwater is disturbed by the construction of turbine foundations, it is anticipated that it would resume its natural course of flow upon construction completion. Additionally, each turbine would be located a minimal distance of three times the turbine height from existing occupied residences, consequently minimizing impacts to private wells, which are assumed to be in the near vicinity to residences.

7.11.3 Mitigative Measures

Wind turbines will be sited to avoid any sand and gravel resources identified within the Project Area. 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 foundation construction and as long as the water is known to be uncontaminated, all water would 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, application for a temporary discharge permit (NDG-070000) would be completed. If subsurface blasting is required, a blasting plan will be developed and implemented to localize impacts and fracture the minimal amount of bedrock required for construction.

7.12 Surface Water and Floodplain Resources

7.12.1 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 Area (USFWS 2018, USGS 2018, **Figure 7-6**). The data were used as a precursor for field delineations. Small

drainages and streams are found within the Project Area. The Project Area is divided into two watersheds; the Apple Watershed (USGS Cataloging Unit: 10130103) on the north side and the Beaver Watershed (USGS Cataloging Unit: 10130104) on the south side (USGS 2018). Both watersheds drain west into the Missouri River. These water complexes may be used for hunting and bird watching.

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

7.12.2 Impacts

Construction of wind turbines, access roads, and associated facilities will temporarily and permanently disturb land within the Project Area and, as a result, have the potential to impact surface water resources. Field wetland delineations are currently underway and were conducted in September, October, and November 2017 and May, June, and July 2018.

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

7.12.3 Mitigative Measures

The turbines and associated facilities will be built to avoid the intermittent streams, drainages, and ponds as much as possible. Access roads to turbines will be built to avoid surface water impacts to the maximum extent possible and to allow runoff from the upper portions of the watershed to still flow, unrestrictedly, to the lower portions of the watershed. Construction zones will be minimized crossing the delineated streams to ensure permanent impacts are kept under 0.10 acres, as described in 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 BMPs outlined in the accompanying SWPPP.

7.13 Wetlands

7.13.1 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, using NWI, NHD, and aerial photography data, was performed to identify probable locations of wetlands and waterbodies prior to field work. The initial desktop analysis was followed by a site visit to microsite turbine locations. Three separate rounds of micrositing were completed in August,

October, and November 2017 and April 2018. Micrositing provided a preliminary field review to identify potential critical issues regarding the turbine locations. Field wetland delineations were completed in September, October, and November 2017 and May, June, and July 2018.

The wetland 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 U.S. (WOUS) under Section 404 of the CWA and navigable waters under Sections 9 and 10 of the Rivers and Harbors Act of 1899 (RHA). The USACE Nationwide Permits (NWPs) 12: Utility Line Activities and 14: Linear Transportation Projects, authorize the discharge of dredged or fill material into non-tidal WOUS given that there is not a loss of greater than one-half acre of WOUS for any "single and complete project" or that permanent access roads are not constructed above grade in WOUS for a distance of more than 500 feet. "Single and complete project" refers to each discrete intersection between Project infrastructure and jurisdictional wetlands and other WOUS. Both NWPs require a preconstruction notification (PCN) to the USACE. However, for NWP 12, no PCN will be required for all permanent impacts less than 0.10 acre. Similarly, no PCN for NWP 14 will be required for stream and pond impacts less than 0.10 acre. Based on current wetland and other WOUS surveys, all permanent impacts are minimized to less than 0.10 acres per each single and complete crossing.

7.13.2 Impacts

Emmons-Logan Wind has committed to minimizing impacts to jurisdictional wetlands and other WOUS to the extent practicable. Based on desktop analysis and 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. Horizontal directional drilling may be used where necessary to avoid impacts to wetlands from collection line trenching during construction.

Based on discussions with the USACE, the Project would likely meet the authorization criteria for a Section 404 NWP 12 (Utility Line Activities) and/or NWP 14 (Linear Transportation Projects). 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 requirements for the PCN 0.10-acre threshold for NWP 12 or NWP 14. Nevertheless, if the Project does cause minor impacts less than 0.10-acre in jurisdictional wetlands/WOUS, then NWP requirements will be adhered to.

7.13.3 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, access roads and turbine placements 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 7.3.1, Emmons-Logan Wind has avoided placing infrastructure on any USFWS grassland/wetland combination easement.

7.14 Vegetation

7.14.1 Description of Resources

The Project Area is in a rural location where farming and livestock grazing are the dominant land use. This area is associated with mixed-grass prairie (Dyke et al. 2015). Vegetation of the mixed-grass prairie

consists mainly of Western wheatgrass (*Pascopyrum smithii*), little bluestem (*Schizachyrium scoparium*), purple prairie clover (*Dalea purpurea*), and common yarrow (*Achillea millefoium*) with prairie cordgrass (*Spartina pectinata*), and reed canary grass (*Phalaris arundinacea*) occurring in low areas. Much of the native prairie within the Project Area has been replaced by wheat, corn, and other commercial crops.

Approximately 56 percent of the Project Area and 57 percent of participating land consists of grasslands and other herbaceous vegetation. Grasslands within the Project Area consist of areas of native prairie and tame grasslands (WEST 2018a). Native prairie is typically found on unbroken soils whereas tame grasslands occur on tilled soil that has been replanted into grassland. The grasslands within and surrounding the Project Area provide valuable habitat to a wide variety of upland bird species as well as nesting and brooding habitat for many species of waterfowl.

On previous projects, native prairie was assessed and avoided based on quality by evaluating plant diversity, grazing level, dominant vegetation composition (native, non-native, or woody species), and fragmentation. High quality native prairie included grasslands that were lightly grazed or ungrazed, had little to no invasion from non-native species and woody plants, and was surrounded by similar high quality native prairie. Using this methodology, impacts to high quality and diverse grassland habitats were avoided, and placing infrastructure on low quality native prairie allowed for flexibility in avoiding impacts to other resources such as wetlands, raptor nests, shelter belts, and prime farmland. Per NDGFD recommendation, for this Project Emmons-Logan Wind applied the NDGFD's more conservation definition of native prairie, which included all areas of unbroken grassland greater than 160 acres regardless of quality or diversity. However, Emmons-Logan Wind agrees with assessing native prairie based on quality and with avoiding high quality native prairie (**Appendix C**).

Hayland, cropland, and pasture comprise approximately 40 percent of the Project Area and 42 percent of participating land collectively, and are managed for the production of cereal crops and livestock forage. Management practices in the Project Area may include reseeding, fertilization, weed control through herbicide application, and allowing land to go fallow. These management practices can often introduce non-native grasses and forbs. During field visits in the fall of 2017 and summer of 2018, croplands within the Project Area were planted in corn, wheat, and sunflowers, with evidence of hayland rotation. Haylands were mainly planted in alfalfa and mixed grasses. Crop species in the area may fluctuate from year to year depending on market demands.

Less than one percent of the Project Area and participating land consists of scrub/shrub vegetation, and less than one percent consists of deciduous forest. Trees and shrubs in the Project Area are sparse and limited to shelterbelts between fields, windbreaks surrounding farmsteads, along drainages, and near wetlands.

7.14.2 Impacts

The Project will result in direct, permanent impacts to vegetation communities during operations by wind turbines, access roads, collection lines, collection substations, Met towers, and an O&M building. The Project will result in temporary impacts at the batch plant, construction laydown area, the portions of Project access roads used for construction and then reclaimed, temporary construction areas surrounding each turbine, and the majority of the collection lines. The Project will have approximately 86.7 acres of permanent impacts and 1,115.76 acres of temporary impacts. These impacts will be mainly distributed between cropland, grassland, and pasture/haylands.

7.14.3 Mitigative Measures

There are 11 state noxious weeds for Emmons and Logan Counties: absinth wormwood (*Artemisia absinthium*), Canada thistle (*Cirsium arvense*), dalmatian toadflax (*Linaria genistifolia*), diffuse knapweed (*Centaurea diffusa*), leafy spurge (*Euphorbia esula*), musk thistle (*Carduus nutans*), purple loosestrife (*Lythrum salicaria*), Russian knapweed (*Acroptilon repens*), Saltcedar (*Tamarix chinensis, T. parviflora,*

T. ramosissima), spotted knapweed (*Centaurea maculosa*), yellow toadflax (*Linaria vulgaris*), and one additional noxious weed listed for Logan County, black henbane (*Hyoscyamus niger L.*) (NDDA 2016). Absinth wormwood and Canada thistle were observed during surveys, often in invaded grasslands, along roadsides, and on the edge of croplands. Invasive or noxious species will be replaced by similar non-invasive or non-noxious species suitable for North Dakota growing conditions as recommended by the North Dakota Forest Service and in coordination with landowner preferences.

Where feasible, access roads were positioned along section lines and field edges. Following construction, impacts to temporarily disturbed grassland areas will be mitigated by reseeding with a weed-free seed mixture consistent with the surrounding vegetation and landowner preference. Proper BMPs will be utilized to ensure successful revegetation. Areas currently in cropland or hayland will be replaced in coordination with landowner preferences. Once revegetated, these areas will be available to return to their present use.

Trees and shrubs in the Project Area 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.

7.15 Wildlife

7.15.1 Description of Resources

Wind energy provides a clean, renewable energy source. In order to minimize the potential to negatively impact wildlife during construction and/or operations, the following desktop assessments and field studies to document wildlife and habitat within the Project Area in accordance with the voluntary USFWS Land-Based Wind Energy Guidelines (USFWS 2012b), are currently completed:

- 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 B**)
- 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 B**)
- Northern Long-eared Bat Habitat Mapping, desktop assessment completed fall 2017 (**Appendix B**)
- Desktop and parcel-level identification of native prairie tracts completed 2017 (**Appendix B**)

Avian Species

Based on the location of the Project Area and field observations of the habitat present, it is expected that the majority of avian species present within the Project Area will be those typically associated with grassland and agriculture habitats. Thirty unique bird species were identified during the grassland breeding bird surveys, with 883 individual bird observations within 817 separate groups recorded (Derby et al. 2018a). Cumulatively, three species comprised 77.5 percent 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 percent of the observations individually. Additionally, large bird use surveys were completed to estimate the use of the Project Area 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 percent and 3.3 percent of the individual observations, respectively. Birds migrating between breeding and wintering grounds may pass through the Project

Area given its position within the Central Flyway (USFWS 2015b). However, no federally listed species were recorded during grassland and breeding bird surveys or large bird use surveys.

Sharp-tailed grouse (*Tympanuchus phasianellus*) lek surveys identified one confirmed (birds observed in courtship behavior at the same location during more than one survey) and one possible (birds observed in courtship behavior during only one survey) lek within the Project Area (Moratz and Thorn 2018, **Appendix B**). The one confirmed lek within the Project Area yields an approximate density of one lek per 131 mi^2.

Bat Species

Eleven bat species are found in North Dakota (Gullickson 1999, Gullickson n.d., BCI 2017). Based on the presence of suitable habitat, known distribution ranges, and documented occurrences, five of these species are expected to have a moderate to high potential to occur within the Project Area: the little brown bat (*Myotis lucifugus*), the big brown bat (*Eptesicus fuscus*), the silver-haired bat (*Lasioncycteris noctivagans*), the Eastern red bat (*Lasiurus borealis*), and the hoary bat (*Lasiurus cinereus*). These bat species are often found roosting in attics, barns, or in trees underneath a canopy of leaves. The remaining six species including the federally threatened northern long-eared bat (NLEB) (*Myotis septentrionalis*) are expected to have a low potential for occurrence in the Project Area. Western EcoSystems Technology, Inc. (WEST) completed a desktop review of potential NLEB summer habitat (Derby et al. 2018b, **Appendix B**). The analysis found limited to no potential NLEB summer habitat within the Project Area. Additionally, given lack of known caves or other features that could serve as hibernacula, wintering use is not expected in the Project Area. Migration of NLEB through the Project Area is possible, but unlikely given overall lack of woodlands in the Project Area and surrounding area. Migration may be more likely along the Missouri River to the west or potentially Beaver Creek to the south.

Suitable natural roosting habitats in the Project Area are limited to individual trees, windrows, woodlots, buildings, bridges, and riparian zones. The availability of tree-roosting habitat in the Project Area is limited due to the small size and fragmented nature of the wooded habitat and accounts for less than 1 percent of the Project Area. Farmstead buildings (houses, barns, etc.) could also provide potential roosting locations within the Project Area; however, the suitability of these man-made structures has not been evaluated. Consideration was made to completing pre-construction bat acoustic surveys within the Project Area. However, since pre-construction bat acoustic surveys do not necessarily predict direct impacts to bats (Hein et al. 2013), and low direct impacts have been measured at past wind projects in North and South Dakota, bat acoustic surveys were not conducted. Bat use of the Project Area and impacts are likely to be low given the limited availability of roosting habitat and expected use.

7.15.2 Impacts

Potential impacts from the Project to avian and bat species include collisions with wind turbines and guyed Met towers, as well as loss of and fragmentation of habitat. Potential impacts to sensitive species are discussed in more detail in Section 7.16.2 below.

Avian Species

The collision risk for birds at the Project will likely be low based on records of fatalities at other wind energy facilities in the region. Recent meta-analyses relevant to the Project have estimated an average all-bird fatality rate of 1.81 birds/MW/year in the Great Plains (Loss et al. 2013) and 2.29 small birds/MW/year in the Prairie biome (Erickson et al. 2014). Discrepancies between the two rates are most likely due to differences in the way geographic areas were defined in the studies; however, both regions encompassed the Project Area and it is likely that rates of collision at the Project will be similar to rates reported by these studies. 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. No leks will be directly impacted by construction activities as no turbines or other infrastructure is located within one half mile of leks.

Bat Species

According to the Bat Habitat Assessment (Derby et al. 2018b), highly suitable habitats for NLEB and other bats are largely absent from the Project Area. Natural roosting habitat (individual trees, windrows, woodlots, and riparian zones) is limited to less than one percent of the Project Area and is highly fragmented. Lower quality habitat in the form of grasslands and agriculture lands compose the majority (approximately 80 percent) of the Project Area. The Eastern red bat, silver-haired bat, and the hoary bat are migratory tree roosting species and have been the predominant species found during post-construction mortality monitoring studies at operational wind energy facilities in North America. The precise reason as to why these species comprise the majority of bat fatalities is unknown. The NLEB, little brown bat, and other species make short distance seasonal movements between summer roosts and winter hibernacula. NLEB and other bat species may transit through the Project Area during spring and fall migration; however, identifiable migration and movement corridors for bats are not known in the Project Area. There are no large forested riparian corridors for bat species to follow or utilize as stopover day roosting sites. Forested areas within the Project Area consist of a few small wooded parcels that are disconnected from each other. Given the lack of large, forested riparian corridors and limited roosting habitat within the Project Area, use of the Project Area by migrating bats, and thus risk of collision, is likely to be low.

Specifically, the NLEB is expected to have a low likelihood of occurrence within the Project Area during the summer residency period and during migration due to lack of suitable habitat, which consists of a wide variety of wooded habitats used for roosting, foraging, and travel (Derby et al. 2018b). Although the species is believed to occur statewide in suitable habitats, there are no known occurrences of NLEB within Emmons or Logan Counties and no known hibernacula in the state (USFWS 2015a). This species is addressed in greater detail below.

Habitat Loss

As stated in the USFWS voluntary wind energy guidelines, a species of habitat fragmentation concern is a species “for which a relevant federal, state, tribal, and/or local agency has found that separation of their habitats into smaller blocks reduces connectivity such that the individuals in the remaining habitat segments may suffer from effects such as decreased survival, reproduction, distribution, or use of the area” (USFWS 2012b). The USFWS North Dakota field office has developed a list of species of habitat fragmentation concern for several avian species in the state (USFWS 2013c). Habitat fragmentation from the construction of a wind energy project may potentially reduce habitat available for these species. Some short-term displacement in grassland areas will be expected, but the effects will be mostly limited to the construction period (Pearce-Higgins et al. 2012). Additionally, turbine locations have been sited outside of native prairie during micrositing surveys, thus, minimizing habitat fragmentation in native prairie (Derby et al. 2018c, **Appendix B**). For bats, the limited and highly fragmented nature of existing habitat in the Project Area suggests that development of the Project will be unlikely to reduce or fragment bat habitat.

7.15.3 Mitigative Measures

Emmons-Logan Wind conducted environmental studies of the Project Area to assist in the siting of turbines, roads, and associated facilities to minimize and avoid impacts to wildlife and native habitat. Based on these studies, Emmons-Logan Wind moved a total of 49 turbine and alternate turbine locations. The following measures will be used, to the extent practicable, by Emmons-Logan Wind to help avoid potential impacts to wildlife in the Project Area during selection of the turbine locations and subsequent development and operation:

- Siting turbines and access roads away from wetlands and waterbodies to the greatest extend possible.
- All turbines will sit on cylindrical or tubular tower, and not a lattice structure, to minimize perching opportunities for raptors such as eagles and other birds.
- All guy lines on permanent Met towers will be marked with bird diverters to minimize bird collision hazards following the Avian Power Line Interaction Committee (APLIC) suggested practices, if practicable (APLIC 2012). In addition, the Met towers will not be located in sensitive habitats or in areas where ecological resources known to be sensitive to human activities are present.
- Burying collection lines from the turbines to the collection substation to avoid collision risk following the APLIC suggested practices, if practicable (APLIC 2012).
- To protect birds from electrocution, Emmons-Logan Wind will use pad-mounted transformers following APLIC suggested practices (APLIC 2012).
- Temporarily disturbed areas will be reseeded or restored to crop, depending on original conditions and landowner preference.
- Unbroken grasslands will be avoided to the extent practicable, and will be reseeded using mix in accordance with landowner preferences.
- Utilizing BMPs to prevent the spread of noxious weeds, such as leafy spurge, Canada thistle, and absinth wormwood, which take over native habitat.
- Siting turbines at least 300 feet from active raptor nests and one half mile from leks. Turbines were specifically sited to avoid active raptor nests and leks.
- Conducting post construction mortality surveys for one year following construction of the Project.
- Implementing a Wildlife Response and Reporting System (WRRS) once turbine construction has been completed. The WRRS will include protocols for field technicians to report and document bird and bat mortalities during routine maintenance operations. If any dead or injured birds or bats are found within the Project boundaries by Project personnel, its location will be marked and reported promptly to the on-duty Plant Lead/Site Supervisor. Dead or injured birds or bats will not be moved by any unpermitted individual.
- Developing a voluntary Wildlife Conservation Strategy (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 at the Project.
- Proposing to minimize the number of aviation hazard lights acceptable to the FAA to avoid attracting avian and bat species to turbines.
- During construction, limiting road speeds to 25 mph within the Project Area to minimize wildlife collisions.

7.16 Federally-Protected Species

7.16.1 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 2015c), indicated that seven T&E species could potentially occur within the Project Area. 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 Area; Dakota skippers are not currently believed to be present in Emmons or Logan Counties. No federally endangered or threatened species were observed during grassland breeding bird surveys or large bird use surveys conducted at Wind Energy Center.

Additionally, bald and golden eagles (*Haliaeetus leucocephalus* and *Aquila chrysaetos*, respectively) are protected under the Bald and Golden Eagle Protection Act (BGEPA). 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, which can be caused by impacts to habitat. No bald or golden eagles were observed within the Project Area during the grassland breeding bird surveys (Derby et al. 2018a); however, one bald and one golden eagle were observed within the Project Area during large bird use surveys (Moratz et al. 2018). 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 2018). 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 2015d). The piping plover is a federally threatened species, likely to become endangered within the foreseeable future.

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 Area, and no suitable piping plover habitat was observed in the Project Area during the onsite surveys. The closest designated critical habitat is located approximately 16 miles north, 17 miles west, and 17 miles east so it is unlikely, although possible, the piping plover will occur within the Project Area. However, the piping plover could migrate through the area during spring and fall migration periods.

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 2018). 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 Area during the onsite surveys. However, it is possible, but unlikely, that red knots will occur within the Project Area 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 and 493 birds) as of the 2017/2018 winter whooping crane survey conducted by USFWS (USFWS 2017). At the time of this writing, results of the 2016/2017 USFWS winter survey are pending. 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). Wind energy development has been identified as a threat to the species due to the potential for displacement due to the presence of the turbines, and potential for collisions with operational wind turbines and new power lines.

A whooping crane habitat review and analysis was completed for the Wind Energy Center (Derby and Thorn 2018, **Appendix B**). The methods used to determine potential whooping crane habitat suitability within and around the Project were designed by The Watershed Institute (TWI), and adapted to fit non-linear projects such as wind energy facilities (Watershed Institute 2012). The habitat review and analysis evaluates whether or not the Wind Energy Center 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. The analysis also included a review of the USFWS Habitat and Population Evaluation Team's habitat suitability model (Niemuth et al. 2018). While there is potential whooping habitat within the Project Area, impacts resulting from Project activities are unlikely given low historic use and similar or more wetland roosting habitat in adjacent areas.

To date, no whooping crane fatalities have been recorded as a result of collisions with wind turbines and no sandhill cranes (often used as surrogate for whooping cranes but number over 600,000) fatalities have been found in the migratory corridor (Derby et al. 2012). Although flying at the height of the rotor swept area represents a collision risk, sandhill and whooping cranes have been documented altering flight direction in response to turbines at wind facility in South Dakota (Nagy et al. 2012). The marking of overhead utility and power lines has been shown to reduce the risk of collisions as the marked utility lines are more visible to birds. Studies have documented sandhill cranes gradually climbing as they approach marked power lines (Morkill and Anderson 1991, Murphy et al. 2009). The avoidance behavior observed and lack of documented turbine-related fatalities of whooping and sandhill cranes suggests a low risk of Project-related fatalities.

Least Tern (Federally Endangered)

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

Gray Wolf (Federally Endangered)

The gray wolf was listed as endangered in 1974 (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 2018). 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 Area lacks forested areas known to support wolf pack establishment and persistence (USFWS 2012a). Therefore, it is unlikely this species will occur within the Project Area.

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 and has the largest ears of the Myotis genus (NDGFD 2015). The NLEB either roost singularly or in colonies underneath bark, in cavities, or in crevices of trees. During the winter, the NLEB hibernate in cool caves or mines. The NLEB is a federally listed threatened species and is considered a Level I Species of Conservation Priority species of conservation priority.

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 Area is located within the WNS Zone (i.e., it is within 150 miles of documented WNS). However, under the final 4(d) rule, incidental take by wind turbine collision is not prohibited. Regulatory mechanisms for wind energy facilities were not included in the final 4(d) rule because the primary factor causing the rapid population decline in NLEB is WNS, and the best available information suggests that NLEB fatalities caused by wind facilities are not contributing significantly to the species' decline. 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). However, as noted above there are no known NLEB hibernacula or maternal roost sites within or in the vicinity of the Project.

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 Area are limited to individual trees, wind breaks, and woodlots. 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, the closest likely being in the Black Hills of South Dakota or in caves in Minnesota.

NLEB have been found during post-construction mortality monitoring studies at wind energy facilities (Arnett et al. 2005, Jacques Whitford 2009), and take is possible if NLEB migrate through the Project Area during operation. However, 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 Area during the summer residency period is low due to the lack of potentially suitable roosting and foraging habitat. . 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 Area. 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 Area.

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 in the Project Area during large bird use surveys (Moratz et al. 2018). No eagle nests were located within the Project Area during aerial surveys conducted in 2017. 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. 2018d). However, bald eagles are unlikely to breed within the Project Area 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 (NDFG 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 in the Project Area during large bird use surveys (Moratz et al. 2018). No eagle nests were located within the Project Area 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. 2018d). Golden eagles may potentially occur in the Project Area during any time of the year, but are unlikely to be breeding within the Project Area due to a lack of suitable habitat.

7.16.2 Impacts

Based on operational data from the WRRS protocol in use at NEER's operating wind farms in North Dakota, there have been no fatalities of any federally-listed species. Per the WRRS protocol, if a dead or injured federally protected species is found, it must be left undisturbed and reported to USFWS. 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 (Derby et al. 2018a). The species is known to occur in Emmons and Logan County; however the closest designated critical habitat is located approximately 16 miles away. Collisions with turbines, Met towers, or transmission lines are potential impacts on piping plovers from the Project; however, the probability of such impacts is low given that the species has not been recorded within the Project Area. 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 Area (Derby et al. 2018a). With the lack of red knot observations during avian surveys and since there is no preferred stopover habitat identified within the Project Area, it is unlikely that the Project will affect the red knot.

Whooping Crane

Collisions with turbines, Met towers, or transmission lines and the complete avoidance of the area around the Project are the two most likely impacts of wind development on whooping cranes. In South Dakota, sandhill cranes, which whooping cranes often fly with, have been observed altering flight paths in response to turbines (Nagy et al. 2012), and have been documented gradually climbing in altitude as they approach marked power lines (Morkill and Anderson 1991). This avoidance behavior could minimize potential collisions.

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

Project Area within the migration corridor and the avoidance and minimization measures discussed in Section 7.16.13 (e.g., buried collection systems), the Project is not likely to impact the whooping crane. Furthermore, no whooping crane fatalities have been recorded at wind facilities, suggesting that likelihood of collision may be low (USFWS 2009).

Least Tern

There were no least tern observations during onsite surveys within the Project Area (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 north eastern part of the state, far away from the Project Area. Additionally, there is a high degree of agricultural use within the Project Area 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 be affected by the Project.

Northern Long-Eared Bat

There is little suitable roosting or foraging habitat in the Project Area and no known hibernacula in North Dakota for the NLEB. The species could potentially collide with operational turbines 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 Area. Due to the limited amount of forested habitat within the Project Area, 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 Area is low; therefore, likelihood of Project-related impacts is also low.

Pallid Sturgeon

It is highly unlikely pallid sturgeon will occur within or around the Project Area, and therefore it is unlikely to be affected by the Project.

Bald Eagle

Six bald eagle mortalities associated with wind energy facilities within the U.S. were reported from 1997 through June 2012 (Pagel et al. 2013). To date, one bald eagle mortality has been reported at a wind energy facility in North Dakota (Public Prairie Broadcasting 2015). Bald eagles are believed to be at less risk of turbine collision than golden eagles because they tend to focus their hunting efforts for fish and waterfowl in lakes and rivers (Buehler 2000). No bald eagles were recorded during grassland breeding bird surveys (Derby et al. 2018a), one bald eagle was recorded during large bird use surveys (Moratz et al. 2018), and no bald eagle nests were located within the Project Area during aerial surveys conducted in 2017 (Derby et al. 2018d). Bald eagles may potentially occur in the Project Area during any time of the year, but are unlikely to be breeding within the Project Area due to a lack of suitable habitat.

Golden Eagle

Seventy-nine golden eagle mortalities associated with wind energy facilities within the United States were reported from 1997 through June 2012, excluding the Altamont Pass Wind Resource Area in California (Pagel et al. 2013.); however, to date no golden eagle mortalities have been reported at wind energy facilities in North Dakota. Golden eagles are believed to be more at risk of turbine collision than bald eagles because they hunt for land-based prey along topographic contours where turbines are often located (Kochert et al. 2002).

No golden eagles were recorded during grassland breeding bird surveys (Derby et al. 2018a), one golden eagle was recorded during large bird use surveys (Moratz et al. 2018), and no golden eagle nests were located within the Project Area during aerial surveys conducted in 2017 (Derby et al. 2018d). Golden eagles may potentially occur in the Project Area during any time of the year, but are unlikely to be breeding within the Project Area due to a lack of suitable habitat.

7.16.3 Mitigative Measures

General avoidance and minimization practices for vegetation and wildlife are discussed in Sections 7.14 and 7.15, respectively; however, Emmons-Logan Wind is committed to the following additional avoidance and minimization measures more specific to T&E species.

- In addition to the training provided via the WRRS (see Section 7.15.3), Emmons-Logan Wind will provide all construction and maintenance staff with training in federally listed species identification and will provide identification guides for whooping cranes to be kept in all vehicles.
- If an injured or dead endangered or threatened animal is found in the Project Area, Emmons-Logan Wind employees will promptly immediately notify the USFWS after completing the WRRS documentation process.

7.17 Summary of Impacts

Table 7-6 summarizes the resources that will be affected as a result of the Project and the appropriate mitigation.

Table 7-6 Summary of Impacts and Mitigation

Resource	Impact	Mitigation
Socioeconomics	Primarily positive due to increased expenditures during construction and the long term benefits of lease payments and an increased tax base of the county due to property taxes.	None proposed.
Land Use	Up to 86.7 acres of land will be permanently affected by turbines, associated access roads, and a substation during operation. Temporary impacts during construction for turbine installation, road construction, cable trenching, laydown and contractor staging, and turbine storage will require an additional 1,115.76 acres.	Emmons-Logan Wind will work with landowners and regulatory agencies to minimize impacts of the Project.
Public Services	No impacts to public services are anticipated.	The Project will utilize station service from the local electrical utility and will abide by the recommendations to prevent impacts to the transmission system.

Resource	Impact	Mitigation
Human Health and Safety	Minor impacts are anticipated for up to 15 residences that have more than 30 hours per year of shadow flicker. No other impacts to human health and safety are anticipated.	Emmons-Logan Wind is working to obtain waivers from any residences where shadow flicker exceeds 30 hours per year. If a waiver cannot be obtained, Emmons-Logan Wind will ensure that the Commission's standard is met. A variety of security measures will be implemented to reduce the chance of physical and property damage.
Sound	Impacts are anticipated to sound-sensitive resources (inhabited residences). Acoustic modeling results indicated that received sound levels will be above 50 A-weighted (dBA) within 100 feet of nine residences.	Emmons-Logan Wind is working to obtain waivers from any residences where 50 dBA will be exceeded. If a waiver cannot be obtained Emmons-Logan Wind will ensure that the 50 dBA requirement is met
Cultural Resources	No impacts to cultural resources are anticipated as the Project layout avoids all documented sites. The sites are not shown on **Figure 3-1** due to confidentiality.	Sites near the Project will be fenced prior to construction. An unanticipated discoveries plan will be prepared prior to construction.
Recreational Resources	Impacts to recreational resources will be mainly visual in nature.	No turbines, access roads, or associated facilities will be placed on Waterfowl Production Areas (WPAs), National Wildlife Refuges (NWRs), or parks.
Land Based Economies	Up to 86.7 acres of land will be permanently impacted by access roads, turbines, and the Met towers. An additional 1,115.76 acres will be temporarily disturbed for turbine installation, road construction, cable trenching, laydown and contractor staging, and turbine storage.	Emmons-Logan Wind has worked with landowners to minimize impact to their land. Only land needed for the facility will be permanently affected. Temporarily disturbed areas will be restored.
Soils	Up to 86.7 acres of land will be permanently impacted by access roads, turbines, and Met towers. An additional 1,115.76 acres will be temporarily disturbed for turbine installation, road construction, cable trenching, laydown and contractor staging, and turbine storage.	Best management practices (BMPs) for erosion and sediment control will be utilized to minimize wind and water erosion at the site in association with the project stormwater pollution prevention plan (SWPPP). Only land needed for the facility will be permanently affected. Temporarily disturbed areas will be restored.
Geologic and Groundwater Resources	No impacts to groundwater resources are anticipated.	None proposed.
Surface Water and Floodplain Resources	Access roads, turbines, and other Project facilities will be located and constructed in such a manner that no impacts are anticipated.	Impacts to surface waters will be avoided. Emmons-Logan Wind will implement BMPs to minimize erosion and sedimentation at the site in association with the project SWPPP.

Resource	Impact	Mitigation
Wetlands	Impacts to wetlands and waters of the U.S. (WOUS) will be avoided and minimized to the maximum extent practicable.	Wetlands in close proximity to the construction easement will be delineated and flagged prior to construction. Horizontal directional drilling will be used where necessary to avoid permanent impacts to wetlands from collection line trenching during construction.
Vegetation	Up to 86.7 acres of land will be permanently impacted. An additional 1,115.76 acres will be temporarily disturbed during construction.	Trees and shrubs will be avoided as practicable. Temporarily disturbed areas will be reseeded or restored to crop, depending on original conditions and landowner preference. Unbroken grasslands have been avoided and will be reseeded using a mix in accordance with landowner preferences.
Wildlife	Potential avian and bat collisions may occur, but are anticipated to be minimal based on avian and bat studies conducted within the Project Area. No eagle nests were observed within the Project Area during raptor nest surveys.	A variety of mitigative measures will be implemented, as discussed in Section 7.15.3. A Wildlife Conservation Strategy (WCS) will be developed and implemented for the Project. The Project's Wildlife Response and Reporting System (WRRS) will be implemented after construction of the wind turbines as described in Section 7.15.3, and the Project will complete one year of post construction mortality monitoring.
Federally-protected Species	Bald and golden eagles may occur seasonally within the Project Area, and are unlikely to be breeding within the Project Area due to a lack of suitable habitat. While there is also potential whooping crane 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.	A variety of mitigative measures will be implemented as discussed in Sections 7.15.3 and 7.16.3. A WCS will be developed and implemented for the Project.

8.0 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 and for assistance in identifying concerns or issues within the Project Area. Public and agency correspondence and responses received as of July 17, 2018 are included in **Appendix C**; **Table 8-1** 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, 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 C**). 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 agreements with Emmons-Logan Wind to provide wind rights 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 C**. 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 7.7 for more details).

Table 8-1 Summary of Agency Responses

Agency	Response Date	Response Summary
National Telecommunications and Information Administration	March 10, 2017	After a 45+ day period of review, no agencies in the National Telecommunications and Information Administration had issues with turbine placement in the Project Area.
Federal Aviation Administration	May 3, 2018	No objection provided the Federal Aviation 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.

Agency	Response Date	Response Summary
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 area of potential effects; 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.
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 Area.
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 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.

9.0 POTENTIAL PERMITS/APPROVALS

Table 9-1 shows the federal, state, and county 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 9-1 Potential Permits and Approvals Required for Construction and Operation of the Facility

Agency	Type of Approval	Status*	Need
Federal Approvals			
United States Army Corps of Engineers (USACE)	Nationwide Permit (NWP) 12 and 14	4	Wetland delineations are currently underway to ensure that the Project minimizes impacts to waters of the United States (WOUS) and stays below the Pre-Construction Notification (PCN) threshold.
Federal Aviation Administration (FFA)	Form 7460-1, Notice of Proposed Construction	2	Notice and approval are required for structures over 200 feet in height. FAA approval of lighting and marking of turbines is required.
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 all Project infrastructure outside of USWFS easements.
State of North Dakota			
North Dakota Public Service Commission (Commission)	Certificate of Site Compatibility	2	Required for construction of generation facility over 0.5 megawatt (MW) in size.
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.

Agency	Type of Approval	Status*	Need
Logan County			
County Commission	Wind Energy Facility Siting Permit Application (Conditional Use Permit)	1	A construction and operating permit granted in accordance with the provisions of the Logan County Zoning Ordinance.
County Commission	Decommissioning Plan	1	Presented in support of the Wind Energy Facility Siting Permit Application to Logan County.
Emmons County			
County Planning Commission	Wind Energy Facility Siting Permit Application (Conditional Use Permit)	1	Required to construct and operate the Emmons-Logan Wind Energy Center.
County Planning Commission	Conditional Use Permit	1	Required to construct and operate the Operation and Maintenance (O&M) Building and Collection Substations.

*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

10.0 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.

10.1 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 7.17.

10.2 Technologies to Minimize Adverse Environmental Effects

Emmons-Logan Wind will utilize BMPs that minimize impacts to the environment. Current wind turbine technologies, including the equipment and siting tools, optimize the wind and land resources.

10.3 Potential for Beneficial Uses of Waste Energy

This factor is not applicable to this Project. No waste energy is created using wind energy.

10.4 Unavoidable Adverse Environmental Effects

Unavoidable adverse environmental effects are described for each resource area in Section 7. The Project is expected to impact up to 86.7 acres of land during operation, which will not be available for other uses. An additional 1,115.76 acres of land will be temporarily affected due to turbine pad construction, road construction, collection line trenching, laydown and contractor staging areas, and construction of the Met towers. Additional unavoidable effects include visual effects and increased habitat fragmentation.

10.5 Alternatives to Proposed Site

Emmons-Logan Wind believes that the proposed site is the most viable alternative. Emmons-Logan Wind is committed to being flexible on the preliminary site layout and will work closely with landowners to examine all reasonable alternatives to the preliminary site layout.

10.6 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 steel turbine requires the construction of a concrete base 16 to 18 feet across. Access roads will require aggregate resources for their construction and maintenance. 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 overall anticipated environmental and economic benefits of the Project will balance the irretrievable commitment of resources resulting from the construction of the Project (see Section 10.7).

10.7 Direct and Indirect Economic Impacts

Economic impacts include impacts associated with the temporary disturbance of up to 1,115.76 acres of land during construction, which could potentially interrupt farming and ranching for landowners. Permanent impacts will be lower, at approximately 86.7 acres. In general, agricultural areas surrounding each turbine can still be farmed, and landowner compensation has been established in individual lease agreements.

The remaining direct and indirect economic impacts are primarily positive. Wind energy development removes less total land from agricultural use than other forms of development. 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 wind farm will contribute to improving the local economy in this area of North Dakota. The development of wind energy 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. Continuing to establish the south central region of North Dakota as an important producer of alternative energy sources may spur the development of wind-related businesses in the area, in turn contributing to economic growth in the region.

10.8 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.

10.9 Effect of Site on Cultural Resources

As described in Section 7.7, a Class I Literature Review was conducted and a Class III Cultural Resources Inventory for archaeology was completed in the fall of 2017 and spring of 2018. The literature review results identified nine previously recorded archaeological sites, five site leads, and 22 architectural sites within the Project Area. 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.

10.10 Effect of Site on Biological Resources

The impact of the Project on wildlife is expected to be low. 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.

Emmons-Logan Wind has sited the Project following the voluntary USFWS Wind Energy Guidelines (USFWS 2012b) and designed the Project following suggested APLIC practices (APLIC 2012). There is

potential for avian and bat collisions with facility turbines and Met towers, as well as the potential for habitat loss and fragmentation; however, Emmons-Logan Wind will implement measures to avoid and minimize potential impacts to biological resources from the Project. Collection lines will be buried to avoid collision risk (APLIC 2012). Risks of collision will be minimized by siting facilities away from wetlands, and burying collection lines. Similarly, risk of impacts to habitat will be avoided and minimized by reseeding or planting disturbed areas with native plant species, if approved by the landowner.

The Project is unlikely to affect the northern long-eared bat, piping plover, red knot, gray wolf, Dakota skipper, or whooping crane. Eagle use surveys and raptor nest surveys were conducted in 2017 to evaluate the risk of Project activities to bald and golden eagles; no bald or golden eagle nests found were found within the Project Area and two active and three potential eagle nests were recorded within the 10-mile buffer surrounding the Project Area. Emmons-Logan Wind develop 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.

Detailed discussion of potential impacts and proposed mitigation measures on biological resources is provided in Section 7.14 (Vegetation), Section 7.15 (Wildlife), and Section 7.16 (Federally-Protected Species).

10.11 Cumulative Effects

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

Wind energy development is anticipated to have a positive cumulative impact on air quality and minimal impacts to geology, soils, water, sound, safety and health issues, and cultural resources. 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.

There will be a slight shift in land use where wind energy facilities are installed; however, the additional income to farmers from wind development 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, wind energy 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 wind turbines 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 and location of existing and planned facilities, it is expected that the Project will have minimal cumulative impacts to wildlife.

10.12 Agency Comments

Public and agency coordination and potential permits/approvals are discussed in Section 8 and Section 9, respectively. Public and agency correspondence and responses received as of July 17, 2018 are included in **Appendix C**.

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11.0 QUALIFICATIONS OF CONTRIBUTORS

Table 11-1 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 wetland 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 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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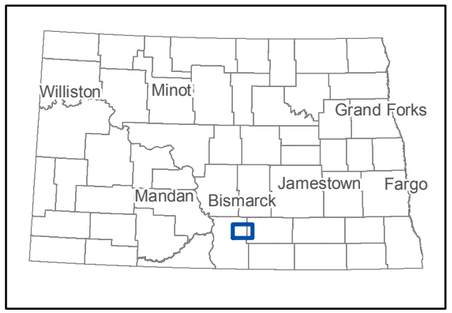
13.0 ACRONYMS AND ABBREVIATIONS

AADT	Average Annual Daily Traffic
APLIC	Avian Power Line Interaction Committee
AWEA	American Wind Energy Association
BGEPA	Bald and Golden Eagle Protection Act
bgs	below ground service
BMPs	Best Management Practices
Certificate	Certificate of Site Compatibility
Commission	North Dakota Public Service Commission
CUP	Conditional Use Permit
CRP	Conservation Reserve Program
CWA	Clean Water Act
CWS	Canadian Wildlife Service
dBA	decibel, A-weighted
DoD	Department of Defense
DHS	U.S. Department of Homeland Security
DPP	Definitive Planning Phase
EMF	electromagnetic fields
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
GE	General Electric
GRE	Great River Energy
IPaC	Information for Planning and Conservation
kV	kilovolt
LIDC	Linton Industrial Development Corporation
MDU	Montana-Dakota Utilities
Met	meteorological evaluation tower
mph	miles per hour
MW	megawatt
MISO	Midcontinent Independent System Operator
NASA	National Aeronautics and Space Administration
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
NDDTL	North Dakota Department of Trust Lands
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
NHD	National Hydrography Dataset
NIEHS	National Institute of Environmental Health Sciences
NLEB	northern long-eared bat
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NTIA	National Telecommunications and Information Administration
NWI	National Wetlands Inventory
NWP	Nationwide Permit
NWR	National Wildlife Refuge
O&M	operations and maintenance
PCN	preconstruction notification
PCMM	Post-Construction Mortality Monitoring
PLOTS	Private Land Open to Sportsmen
PPA	power purchase agreement
Project	Emmons-Logan Wind Energy Center
PTC	Production Tax Credit
RHA	Rivers and Harbors Act
SCADA	Supervisory Control and Data Acquisitions
SHSND	State Historical Society of North Dakota
SPCC	Spill Prevention, Control, and Countermeasures
SWPPP	Storm Water Pollution Prevention Plan
T&E	threatened and endangered
TWI	The Watershed Institute
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USDOE	U.S. Department of Energy
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WCS	Wildlife Conservation Strategy
WEST	Western EcoSystems Technology, Inc.
WNS	White Nose Syndrome
WOUS	waters of the United States
WPA	Waterfowl Production Area
WRRS	Wildlife Response and Reporting System

Figures



Legend

- Existing 115 kV Transmission Line
- Existing 230 kV Heskett-Wishek Transmission Line
- Municipal Boundary
- County Boundary
- State Highway
- County Road
- Railroad

Project Features

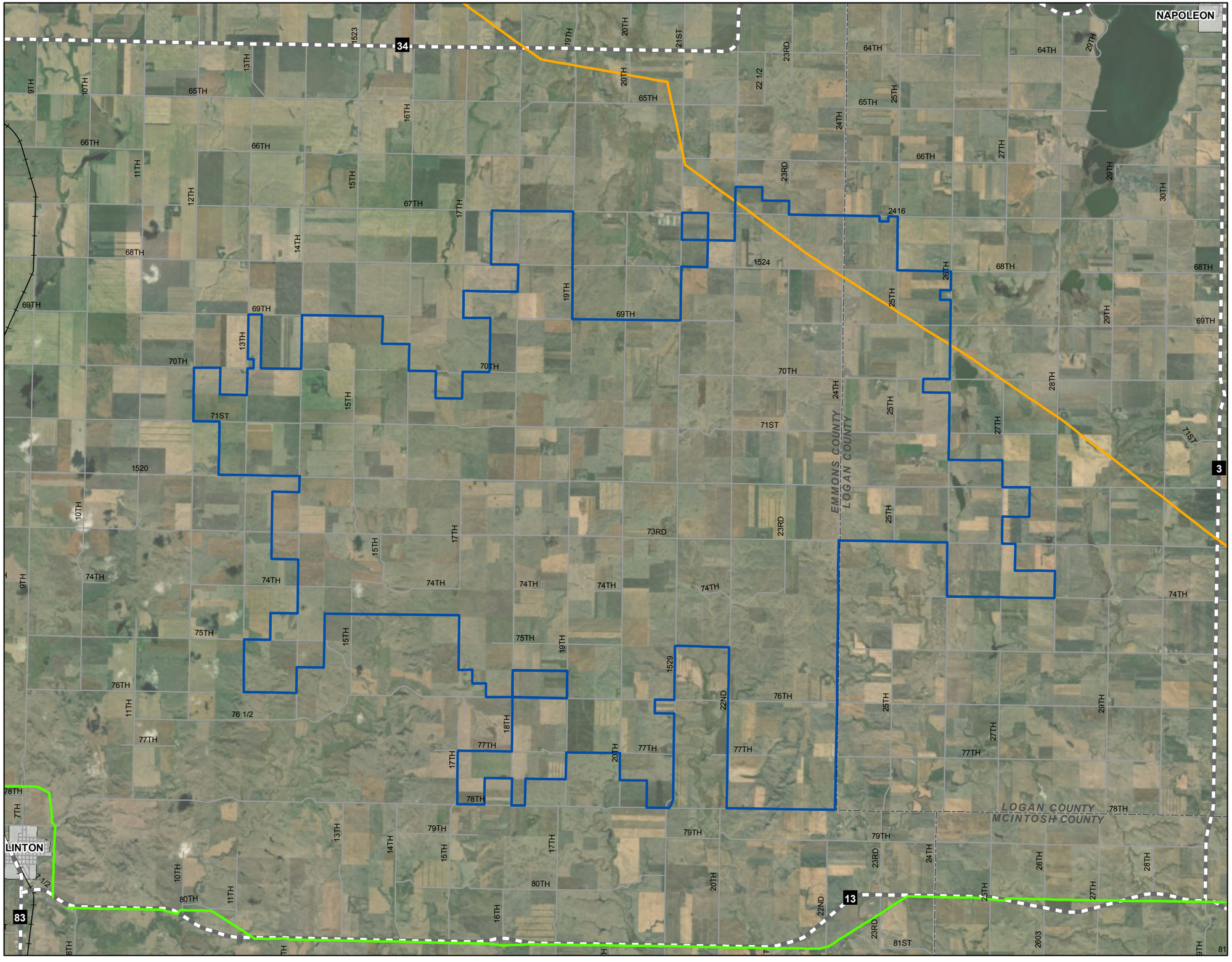
- Emmons-Logan Wind Energy Center Project Area

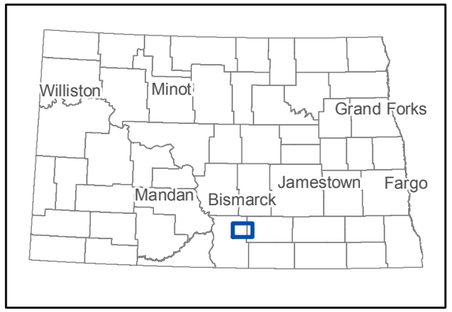
0 1 2 3 Miles

Figure 1-1
Project Location
Emmons-Logan Wind Energy Center
Emmons and Logan Counties, ND

N W E S

AECOM





Legend

- Existing 115 kV Transmission Line
- Existing 230 kV Heskett-Wishek Transmission Line
- Municipal Boundary
- County Boundary
- State Highway
- County Road
- Railroad

Project Features

- Emmons-Logan Wind Energy Center Project Area

0 1 2 3 Miles

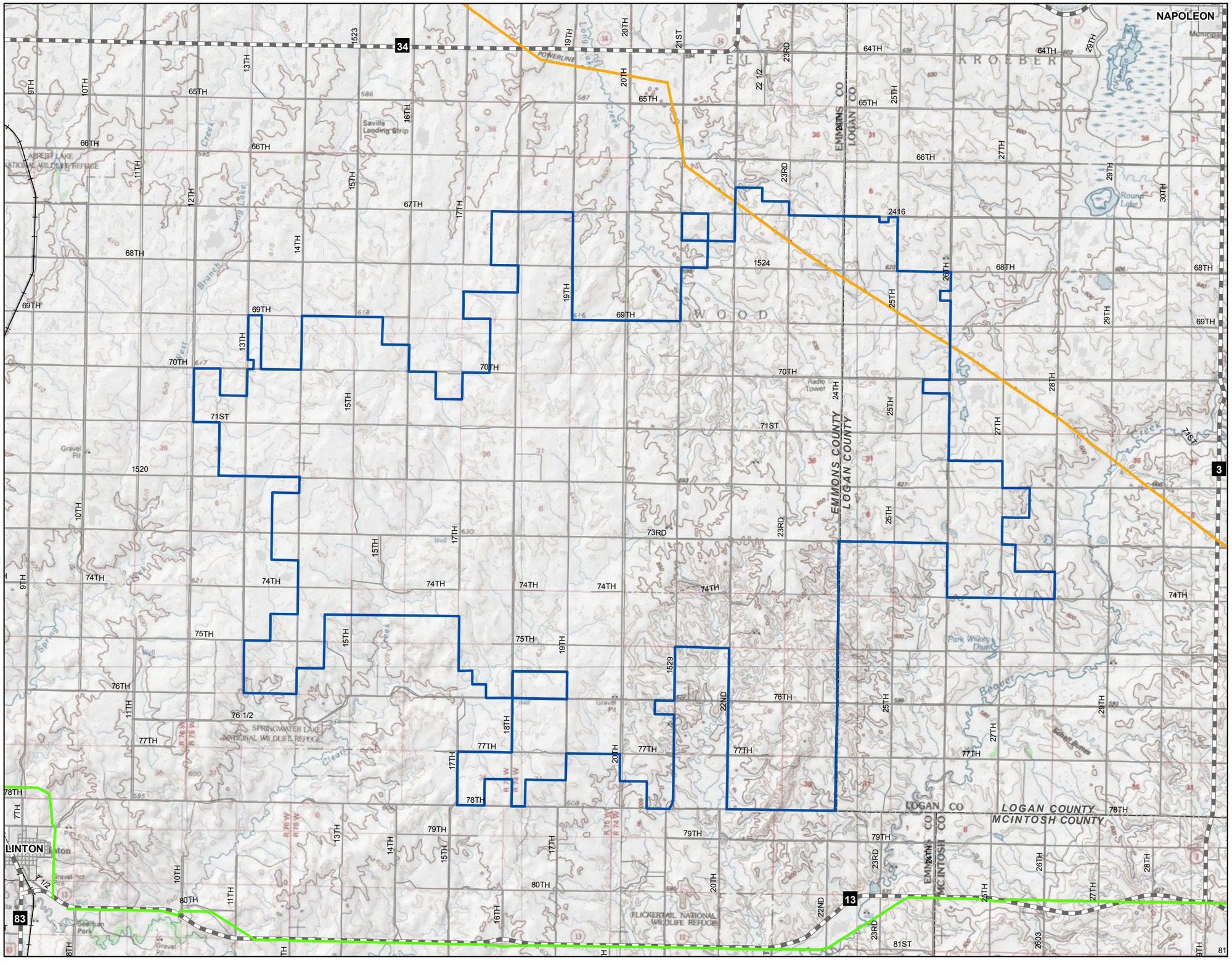
Figure 1-2

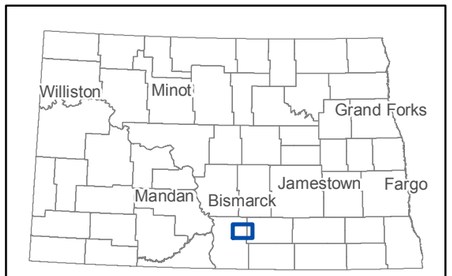
Project Location (Aerial)

Emmons-Logan Wind Energy Center
Emmons and Logan Counties, ND

N W E S

AECOM





Legend

- Existing 115 kV Transmission Line
- Existing 230 kV Heskett-Wishek Transmission Line
- Municipal Boundary
- County Boundary
- State Highway
- County Road
- Railroad

Project Features

- Emmons-Logan Wind Energy Center Project Area

0 1 2 3 Miles

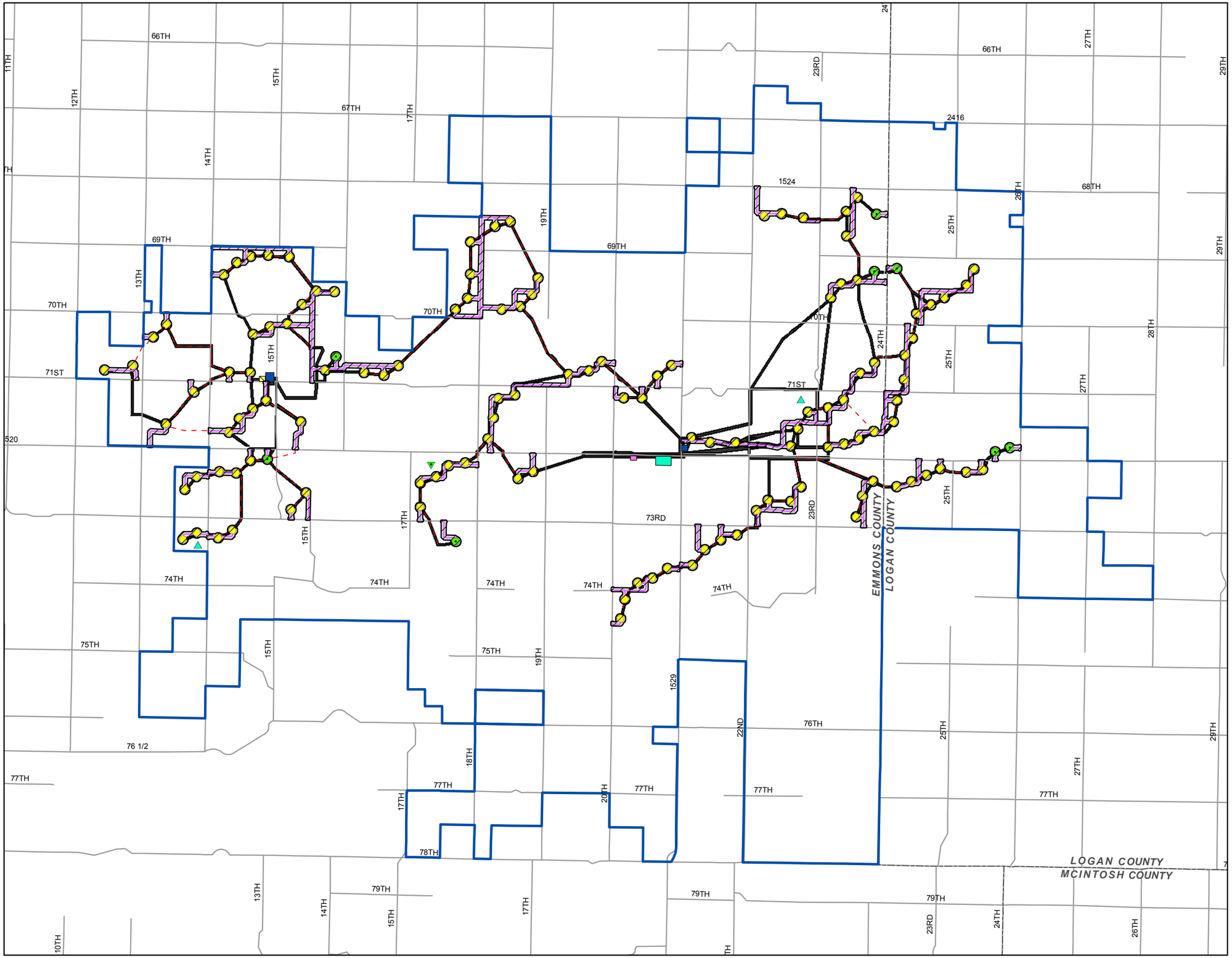
Figure 1-3

Project Location (Topographic)

Emmons-Logan Wind Energy Center
Emmons and Logan Counties, ND

N W E S

AECOM



Legend

- County Boundary
- County Road

Project Features

- Emmons-Logan Wind Energy Center Project Area
- Met Tower
- Alternative Met Tower
- Turbine
- Alternative Turbine
- Service Road
- Crane Path
- Construction Easement
- Proposed Substation
- Proposed O&M Building
- Proposed Batch Plant
- Proposed Laydown Yard
- Collection Corridor

0 1 2 3 Miles

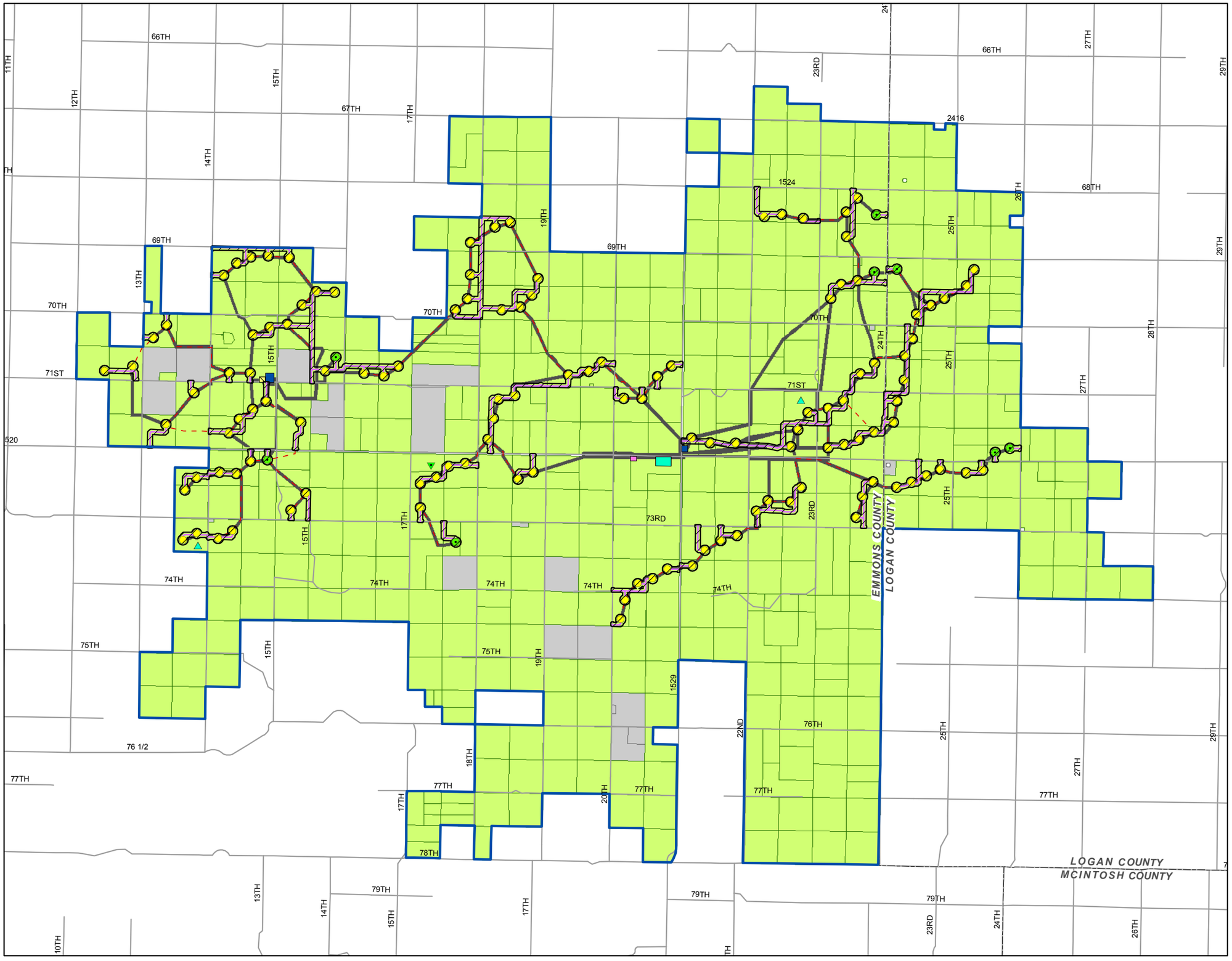
Figure 1-4

Project Features

Emmons-Logan Wind Energy Center
Emmons and Logan Counties, ND

N W E S

AECOM



Legend

- County Boundary
- County Road
- Participating Landowner
- Non-Participating Landowner

Project Features

- Emmons-Logan Wind Energy Center Project Area
- Met Tower
- Alternative Met Tower
- Turbine
- Alternative Turbine
- Service Road
- Crane Path
- Construction Easement
- Proposed Substation
- Proposed O&M Building
- Proposed Batch Plant
- Proposed Laydown Yard
- Collection Corridor

0 1 2 3 Miles

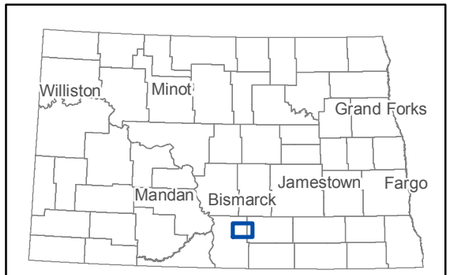
Figure 1-5

Participating Landowners

Emmons-Logan Wind Energy Center
Emmons and Logan Counties, ND

N W E S

AECOM



Legend

- County Boundary
- County Road
- Non-Participating Landowner

Project Features

- Emmons-Logan Wind Energy Center Project Area
- Turbine
- Alternative Turbine
- Met Tower
- Alternative Met Tower
- Service Road
- Crane Path
- Construction Easement
- Proposed Substation
- Proposed O&M Building
- Proposed Batch Plant
- Proposed Laydown Yard
- Collection Corridor

Exclusion Areas*

- Prime Farmland
- USFWS Grassland/Wetland Easement
- Wildlife Refuge

Avoidance Areas

- Historical Resource
- NLCD Forest (Homer et al. 2015)
- National Wetlands Inventory (USFWS 2018)
- Surveyed Wetlands

** Archaeological sites not shown due to confidentiality.*

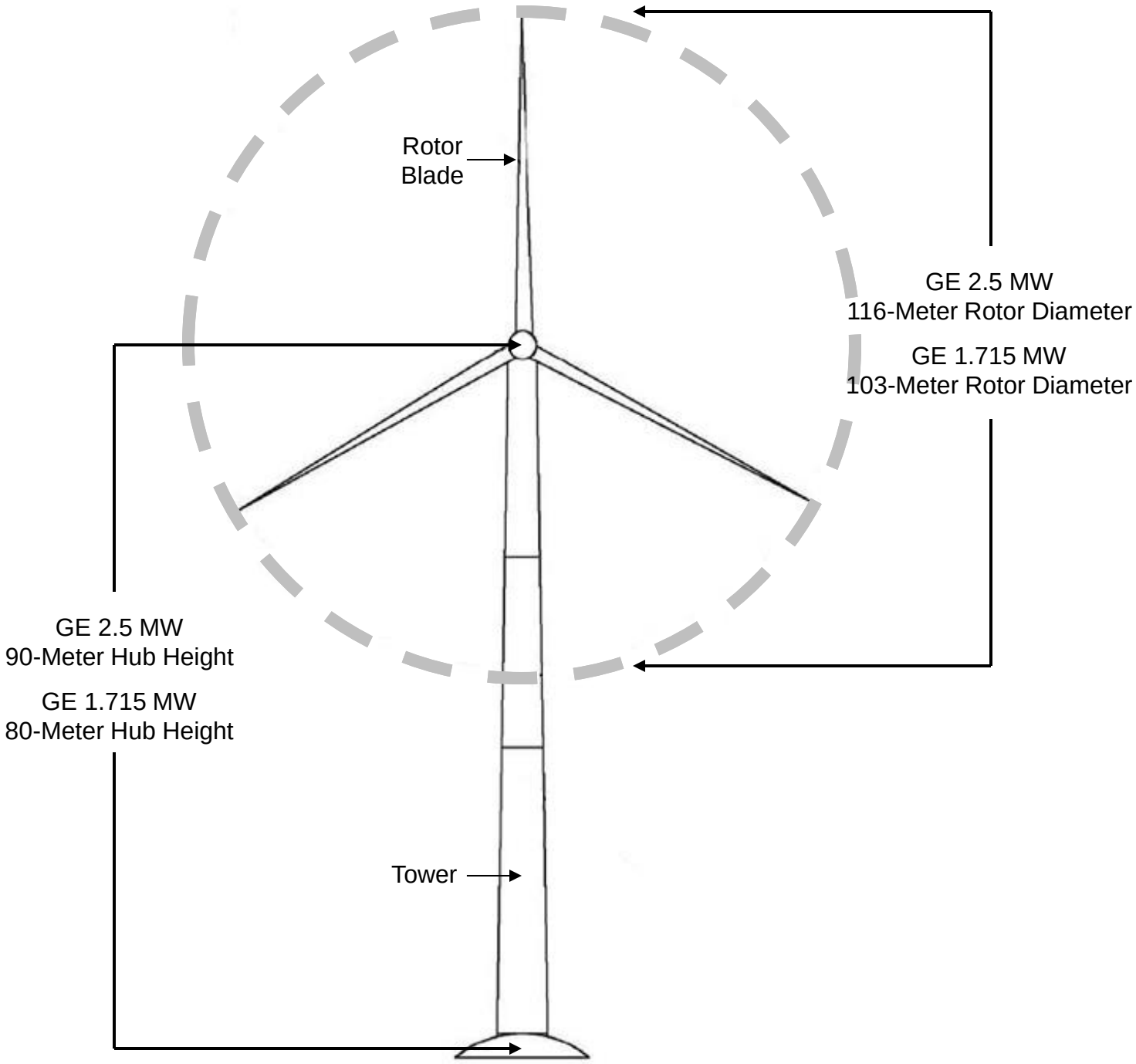
0 1 2 3 Miles

Figure 3-1
Exclusion and Avoidance Areas
Emmons-Logan Wind Energy Center
Emmons and Logan Counties, ND

N W E S

AECOM

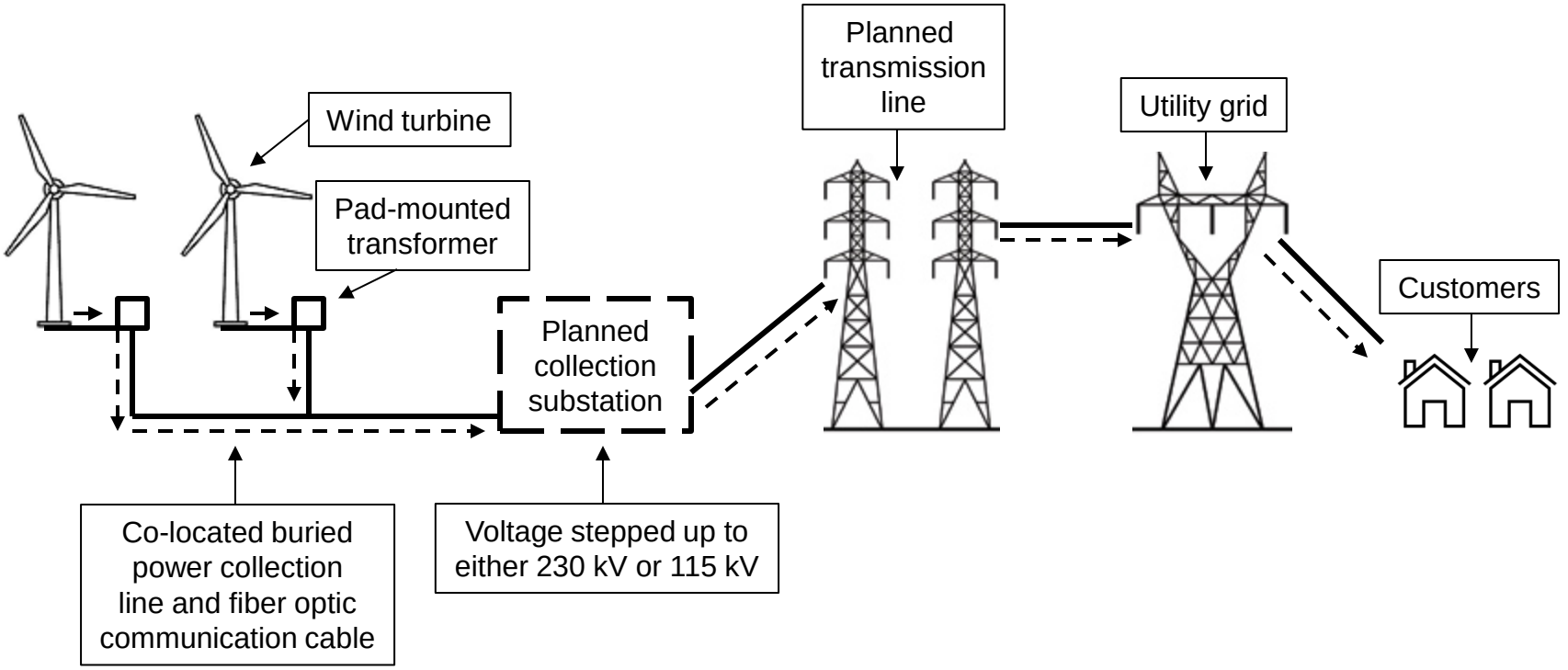
GE 2.5 MW and GE 1.715 MW Wind Turbines



Emmons-Logan Wind Energy Center
Emmons-Logan Wind, LLC
Emmons and Logan Counties, ND

Figure 4-1
Wind Turbine Design Features
GE 2.5 MW and GE 1.715 MW Wind Turbines

Path of Energy Diagram



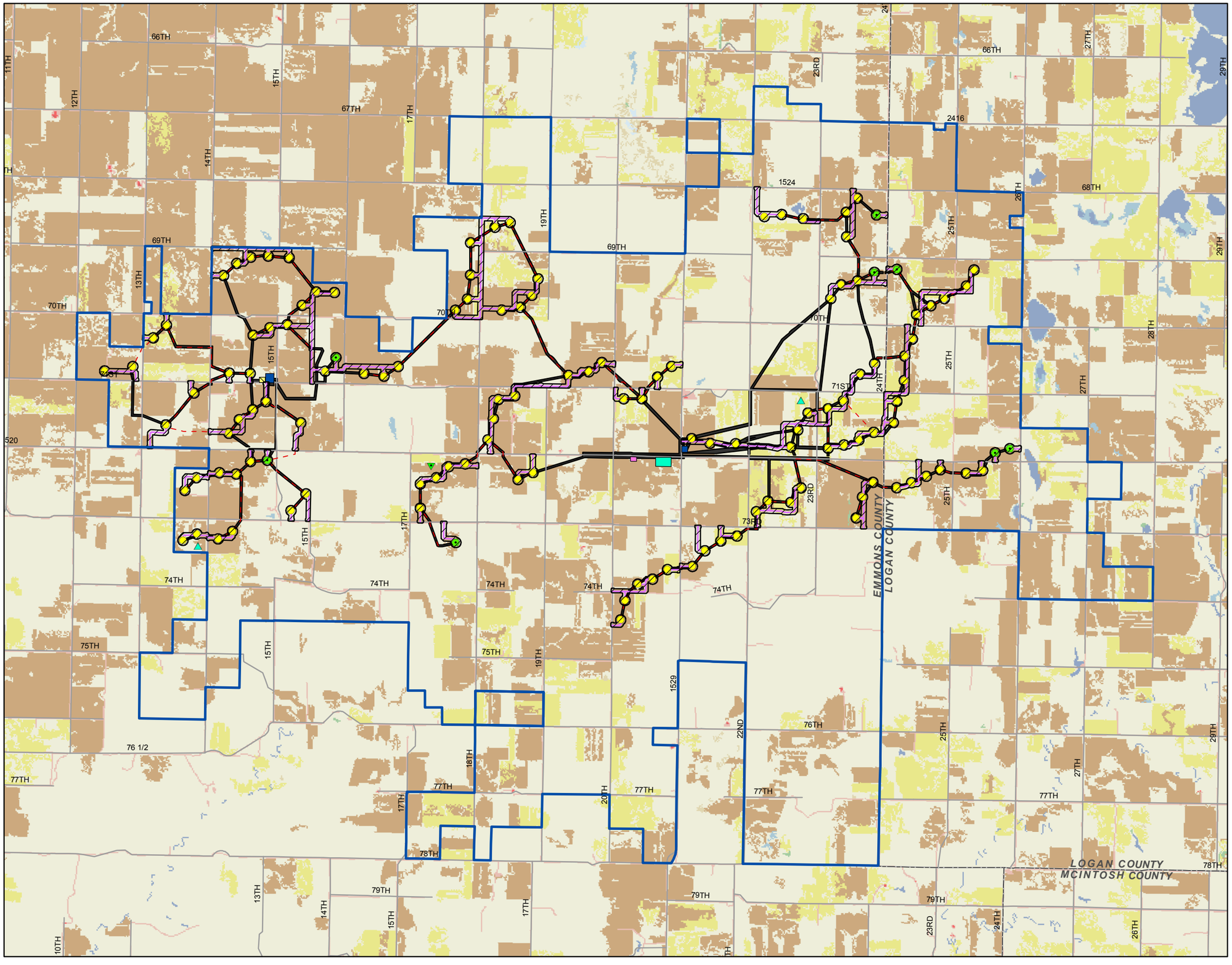
Emmons-Logan Wind Energy Center
Emmons-Logan Wind, LLC
Emmons and Logan Counties, ND

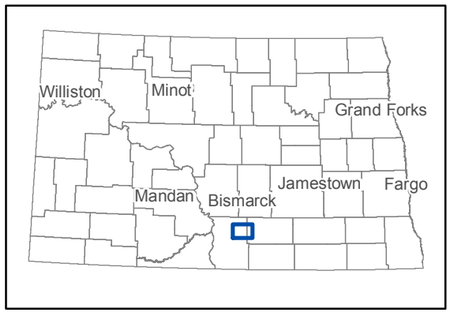
Figure 4-2
Path of Energy Diagram

Typical Wind Energy Center Layout

Emmons-Logan Wind Energy Center
Emmons-Logan Wind, LLC
Emmons and Logan Counties, ND

Figure 4-3
Typical Wind Energy Center Layout





Legend

- County Road
- County Boundary

Project Features

- Emmons-Logan Wind Energy Center Project Area
- Turbine
- Alternative Turbine
- Met Tower
- Alternative Met Tower
- Service Road
- Crane Path
- Construction Easement
- Proposed Substation
- Proposed O&M
- Proposed Batch Plant
- Proposed Laydown Yard
- Collection Corridor

NLCD Land Cover (Homer et al. 2015)

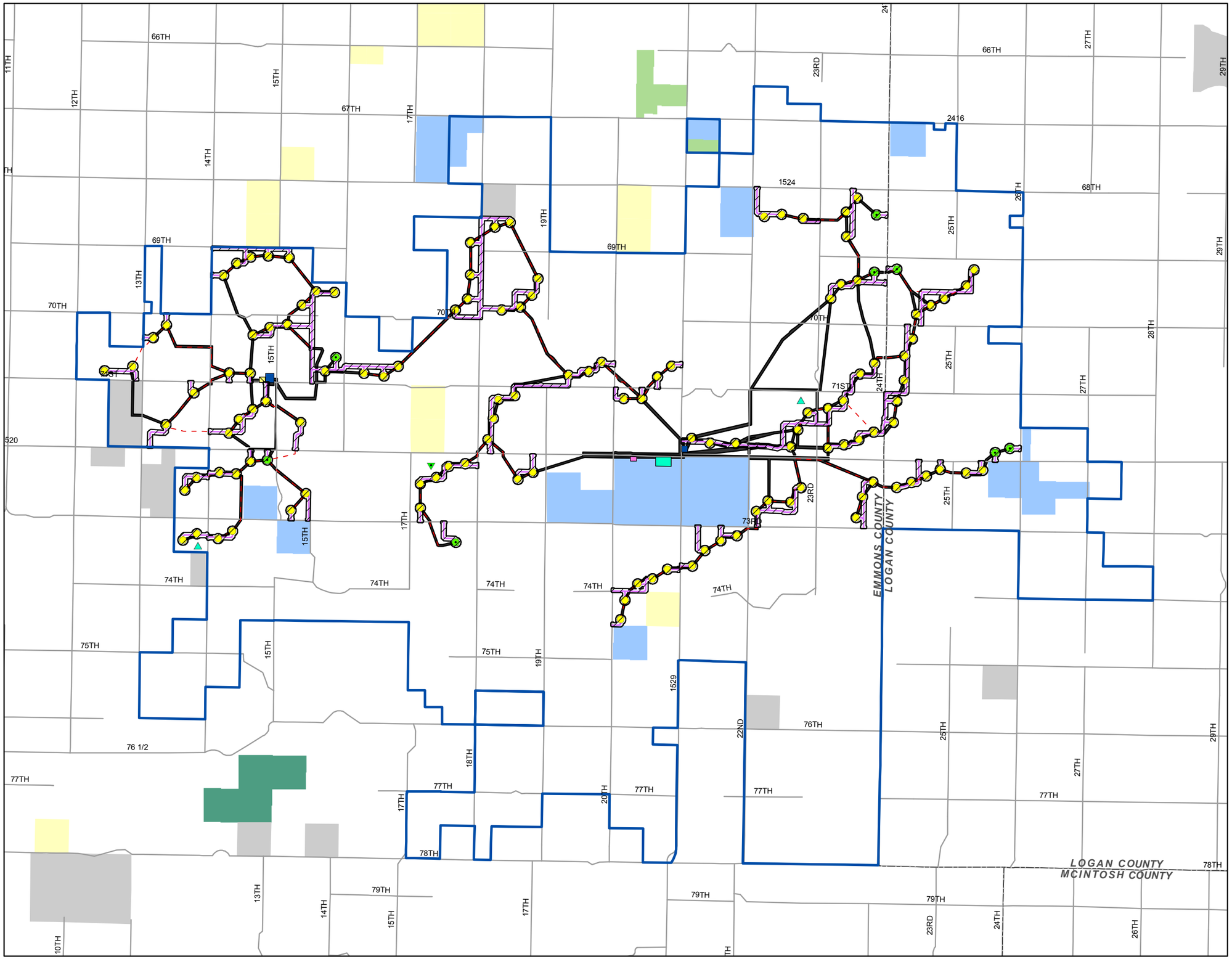
- Barren Land (Rock/Sand/Clay)
- Cultivated Crops
- Deciduous Forest
- Developed, High Intensity
- Developed, Low Intensity
- Developed, Medium Intensity
- Developed, Open Space
- Emergent Herbaceous Wetlands
- Grassland/ Herbaceous
- Open Water
- Pasture/Hay
- Shrub/Scrub
- Woody Wetlands

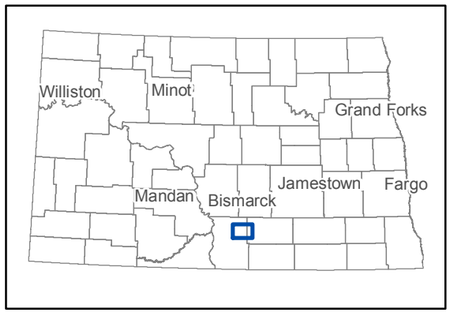
0 1 2 3 Miles

Figure 7-1
Land Cover
Emmons-Logan Wind Energy Center
Emmons and Logan Counties, ND

N W E S

AECOM





Legend

- County Boundary
- County Road
- State Trust Land
- ND Game & Fish PLOTS Lands
- USFWS Grassand/Wetland Easement
- USFWS Wetland Easement
- Wildlife Refuge

Project Features

- Emmons-Logan Wind Energy Center Project Area
- Turbine
- Alternative Turbine
- Met Tower
- Alternative Met Tower
- Service Road
- Crane Path
- Construction Easement
- Proposed Substation
- Proposed O&M Building
- Proposed Batch Plant
- Proposed Laydown Yard
- Collection Corridor

0 1 2 3 Miles

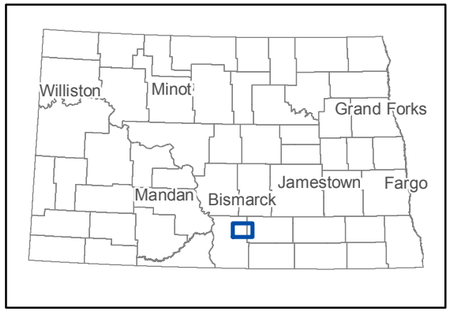
Figure 7-2

Public Lands & Easements

Emmons-Logan Wind Energy Center
Emmons and Logan Counties, ND

N W E S

AECOM



Legend

- County Boundary
- County Road
- 25 Average Daily Traffic (NDDOT)

Project Features

- Emmons-Logan Wind Energy Center Project Area
- Met Tower
- Alternative Met Tower
- Turbine
- Alternative Turbine
- Service Road
- Crane Path
- Construction Easement
- Proposed Substation
- Proposed O&M Building
- Proposed Batch Plant
- Proposed Laydown Yard
- Collection Corridor

0 1 2 3 Miles

Figure 7-3
Average Daily Traffic
Emmons-Logan Wind Energy Center
Emmons and Logan Counties, ND

AECOM

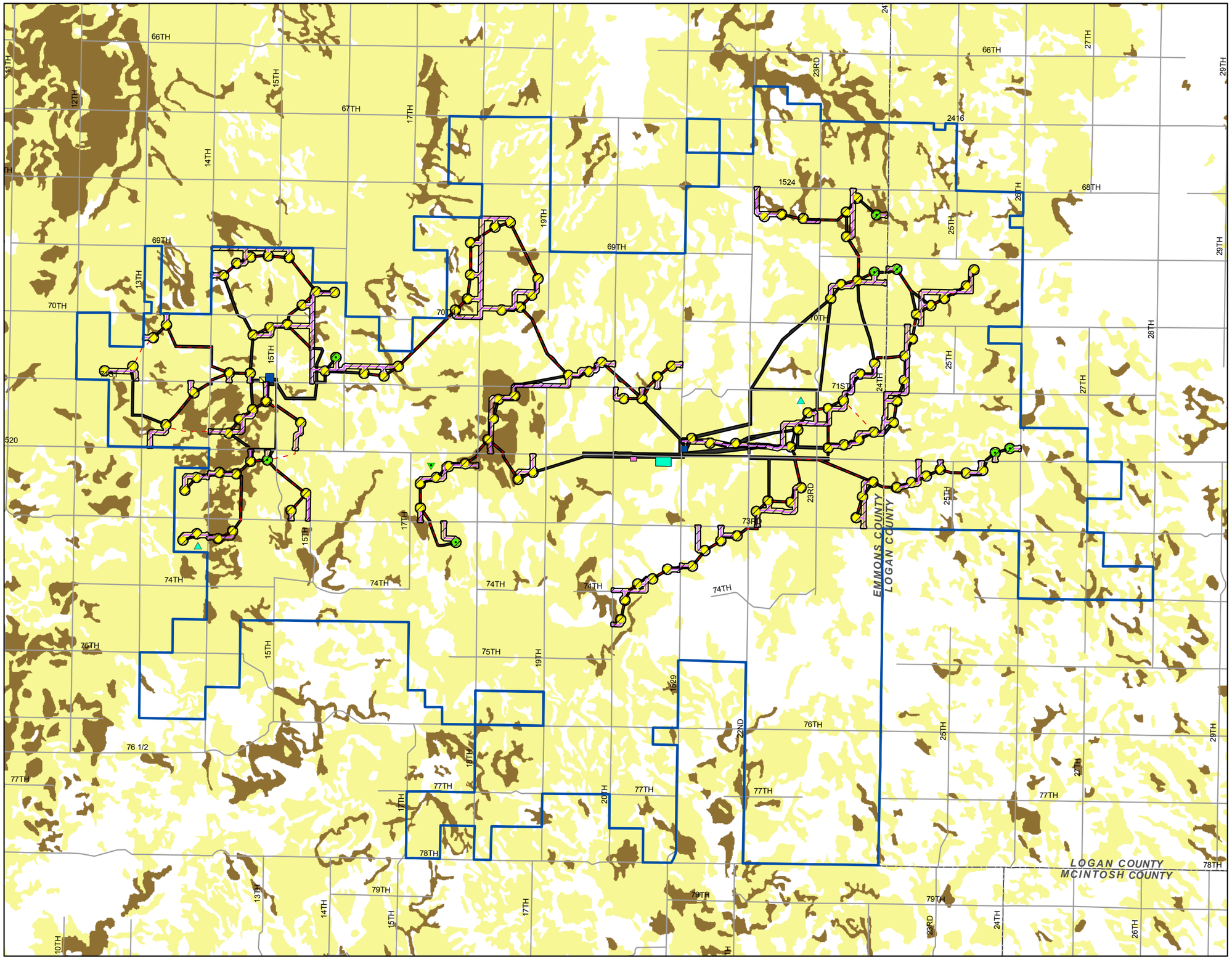
Typical Landscape Photos

Description: Typical cultivated field within the Project Area
Date Taken: May 16, 2018
Location: Township 134 North, Range 74 West, Section 24

Description: Typical hay field within the Project Area
Date Taken: May 20, 2018
Location: Township 134 North, Range 74 West, Section 23

Emmons-Logan Wind Energy Center
Emmons-Logan Wind, LLC
Emmons and Logan Counties, ND

Figure 7-4
Typical Landscape Photos



Legend

- County Boundary
- County Road
- Prime Farmland (Soil Survey Staff 2018)
- Farmland of Statewide Importance (Soil Survey Staff 2018)

Project Features

- Emmons-Logan Wind Energy Center Project Area
- Turbine
- Alternative Turbine
- Met Tower
- Alternative Met Tower
- Service Road
- Crane Path
- Construction Easement
- Proposed Substation
- Proposed O&M Building
- Proposed Batch Plant
- Proposed Laydown Yard
- Collection Corridor

0 1 2 3 Miles

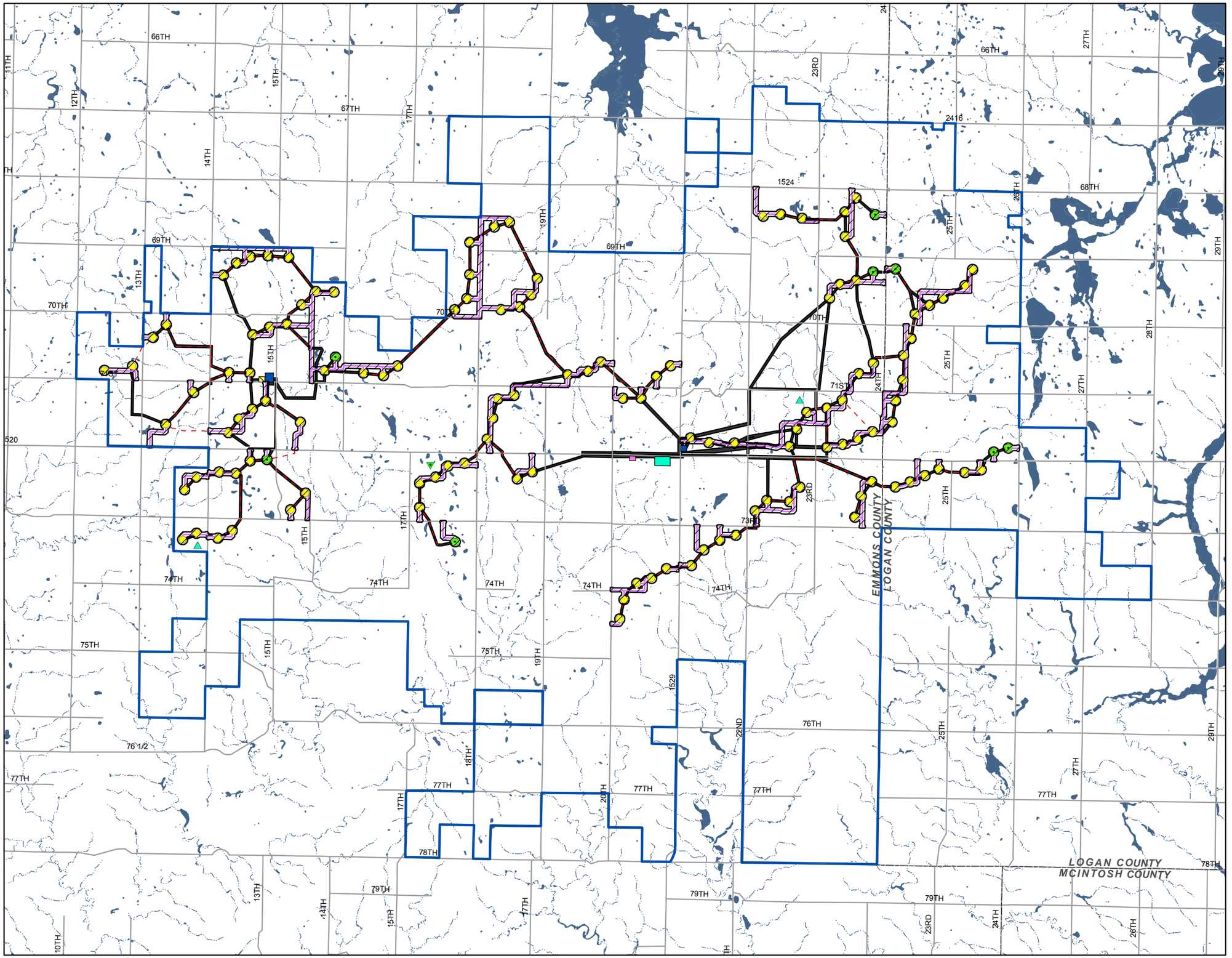
Figure 7-5

Prime Farmland Soil Distribution

Emmons-Logan Wind Energy Center
Emmons and Logan Counties, ND

N W E S

AECOM



Legend

- County Boundary
- County Road
- National Wetlands Inventory (USFWS 2018)
- National Hydrography Dataset (USGS 2018)

Project Features

- Emmons-Logan Wind Energy Center Project Area
- Turbine
- Alternative Turbine
- Met Tower
- Alternative Met Tower
- Service Road
- Crane Path
- Construction Easement
- Proposed Substation
- Proposed O&M Building
- Proposed Batch Plant
- Proposed Laydown Yard
- Collection Corridor

0 1 2 3 Miles

Figure 7-6

National Wetlands Inventory and Surface Waters

Emmons-Logan Wind Energy Center
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**.

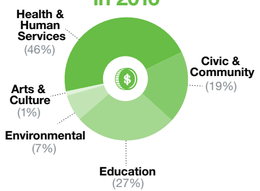
These FPL employees and thousands of their colleagues are working daily to provide affordable, reliable and clean energy to Floridians.

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**.

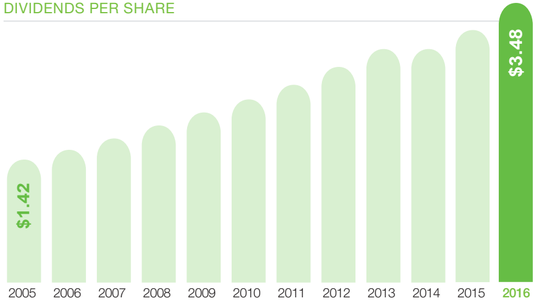
Training in this control room simulator underscores NextEra Energy's commitment to the safe and efficient operation of our nuclear power plant fleet.

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.

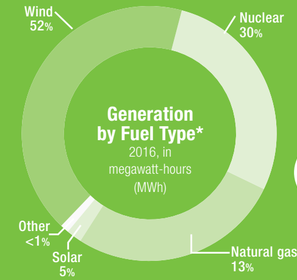
Today, Gexa serves more than 125,000 residential customers and 5,500 commercial customers in Texas. Outside of Texas, Gexa provides retail energy services under the brand NextEra Energy Services and currently serves more than 500,000 residential customers and 6,000 commercial customers in 14 states in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

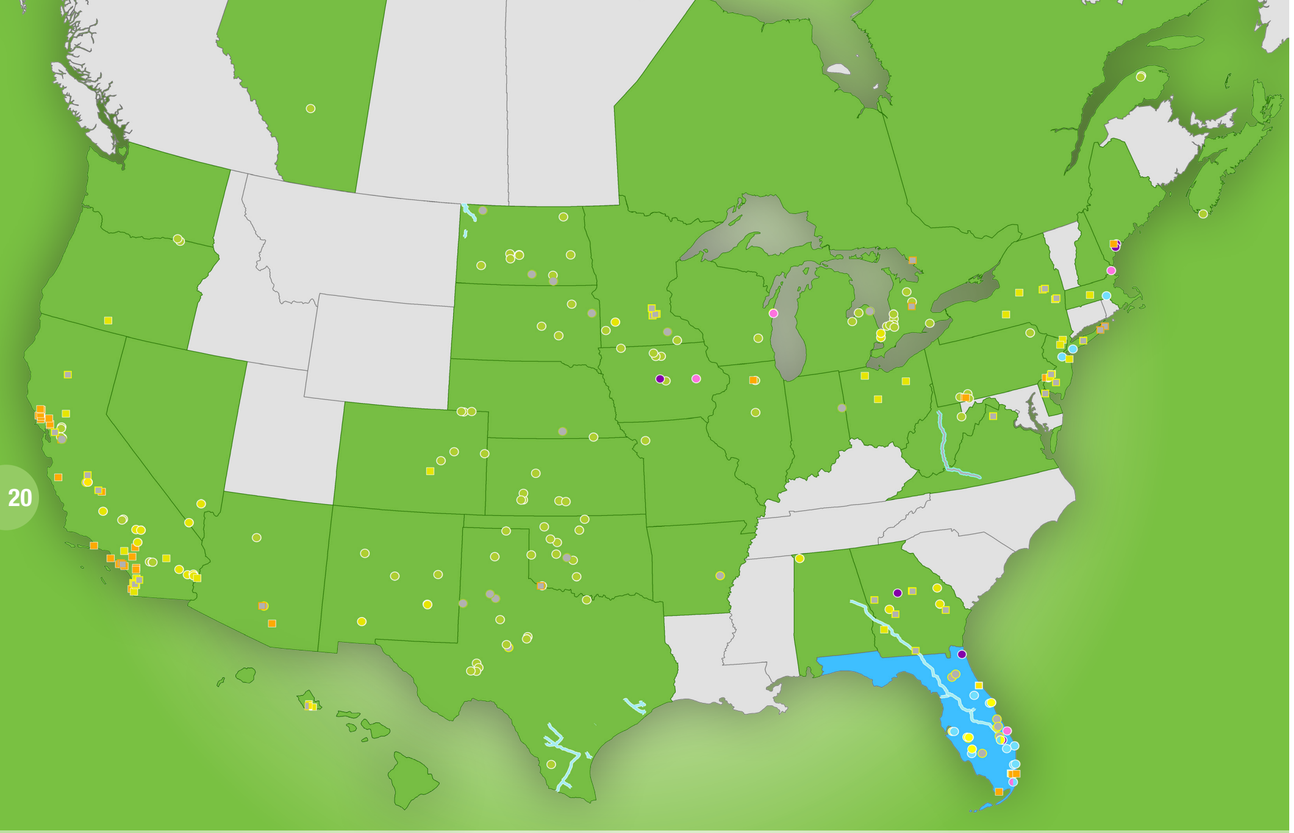
- **Natural gas supply services:** FPLES has been providing a reliable supply of natural gas at competitive rates, coupled with sophisticated industry analysis and custom consulting services in Florida for more than 15 years.
- **Commercial lighting solutions:** This program offers specialized lighting 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

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40957

Appendix B

Studies and Assessments

NTIA Notification Letter

DoD Preliminary Screening Tool

Northern Long-Eared Bat Desktop Habitat Assessment

Whooping Crane Habitat Review

2017 Grassland Assessment

2017 Sharp-tailed Grouse Lek Report

NTIA Notification Letter

January 10, 2017

Type of Notification: New

Project: Emmons-Logan

Counties: Emmons and Logan

State: North Dakota

Project Sponsor: NextEra Energy Resources
Contact: André Ferreira
Email: Andre.Ferreira@fpl.com
Phone: 561-304-5305

To Whom It May Concern:

This letter and its attachments will serve as notification to the government that NextEra Energy Resources plans to install a wind energy facility in Emmons and Logan Counties in North Dakota called Emmons-Logan Wind Energy Project. Enclosed are maps and tables that describe the location of this wind energy project.

- Figure 1 is a state level map showing the area where the Emmons-Logan Wind Energy Project is located.
- Figure 2 is a local USGS topographical map of the Emmons-Logan Wind Energy Project Area
- Figure 3 contains boundary points (WGS84) of the Emmons-Logan Wind Energy Project Area

The approximate dimensions of the wind turbines to be installed at this facility are as follows:

- Turbine Hub Height AGL: 90 meters
- Turbine Blade Diameter: 116 meters
- Maximum Blade Tip Height AGL: 148 meters
- Estimated Number of Turbines to be Installed: 133

Please review the attached information and contact me if any further information is required.

Sincerely,

André Ferreira
Associate Resource Modeling Analyst
WindLogics
700 Universe Blvd
Juno Beach, FL 33408

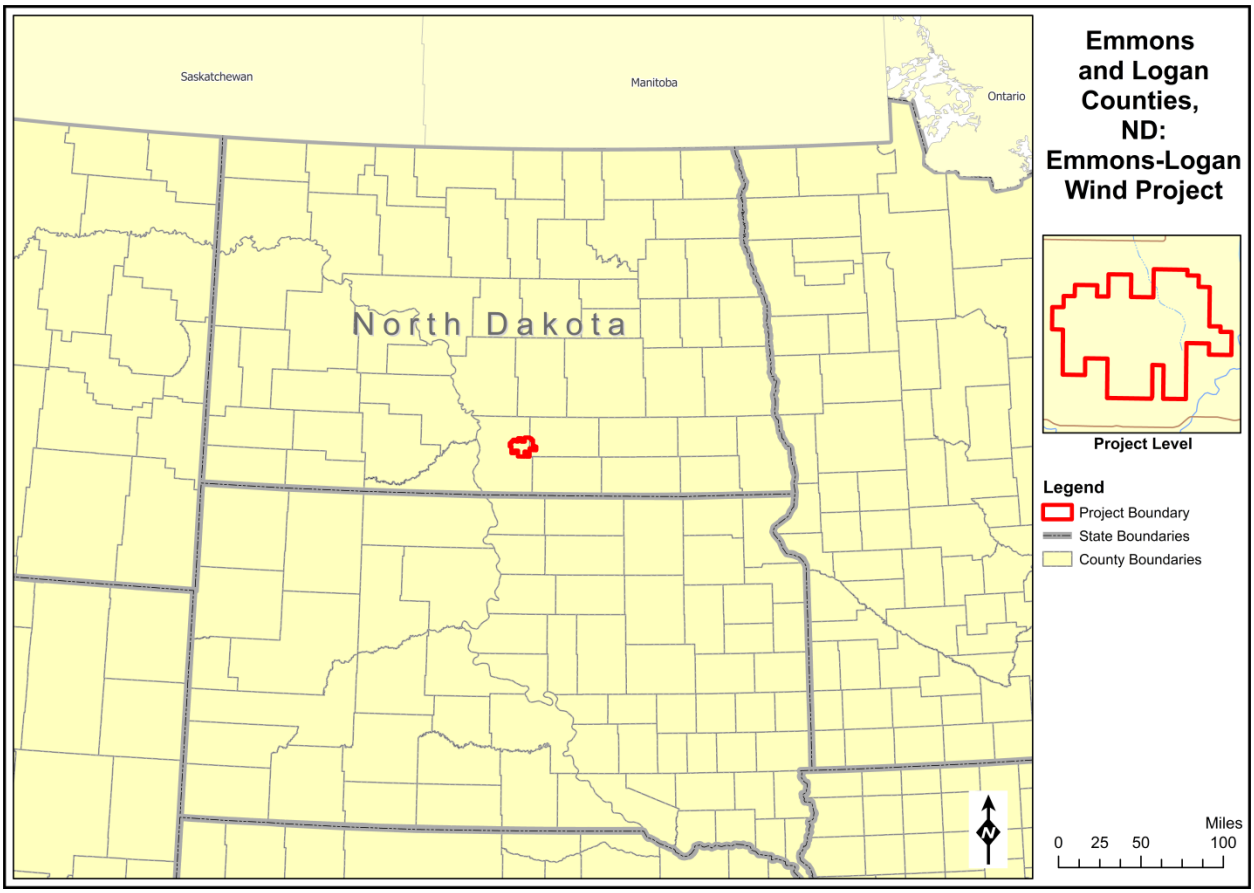


Figure 1: Location of the Emmons-Logan Wind Energy Project

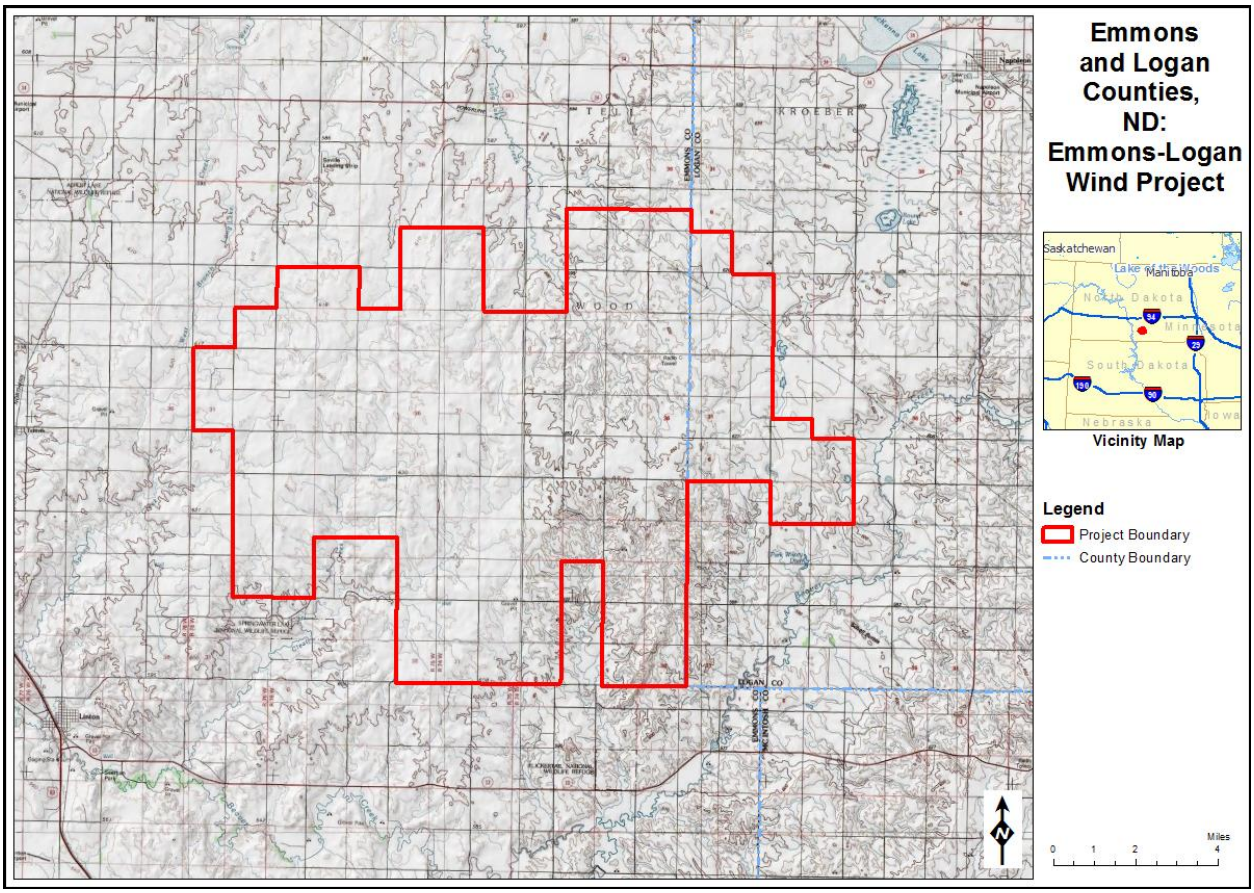


Figure 2: USGS map of the Emmons-Logan Wind Energy Project

Identifier	Longitude	Latitude
1	-99° 52' 28.503"	46° 25' 42.425"
2	-99° 52' 28.900"	46° 22' 39.854"
3	-99° 51' 13.517"	46° 22' 40.101"
4	-99° 51' 13.413"	46° 22' 14.279"
5	-99° 49' 58.183"	46° 22' 14.512"
6	-99° 49' 58.667"	46° 20' 27.033"
7	-99° 52' 29.369"	46° 20' 27.515"
8	-99° 52' 29.432"	46° 21' 19.913"
9	-99° 55' 1.247"	46° 21' 20.614"
10	-99° 55' 1.415"	46° 16' 59.581"
11	-99° 57' 33.867"	46° 16' 59.780"
12	-99° 57' 33.326"	46° 19' 35.734"
13	-99° 58' 49.074"	46° 19' 36.738"
14	-99° 58' 47.628"	46° 17' 9.235"
15	-99° 58' 53.093"	46° 16' 59.519"
16	-100° 1' 14.708"	46° 16' 59.838"
17	-100° 3' 50.741"	46° 17' 0.148"
18	-100° 3' 51.325"	46° 20' 3.456"
19	-100° 6' 21.916"	46° 20' 3.466"
20	-100° 6' 20.646"	46° 18' 45.710"
21	-100° 8' 51.318"	46° 18' 46.279"
22	-100° 8' 53.493"	46° 22' 15.701"
23	-100° 10' 7.520"	46° 22' 16.597"
24	-100° 10' 7.644"	46° 23' 59.876"
25	-100° 8' 52.125"	46° 24' 0.641"
26	-100° 8' 52.316"	46° 24' 52.278"
27	-100° 7' 37.950"	46° 24' 52.195"
28	-100° 7' 36.953"	46° 25' 44.873"
29	-100° 5' 6.094"	46° 25' 44.481"
30	-100° 5' 8.362"	46° 24' 52.439"
31	-100° 3' 51.302"	46° 24' 52.927"
32	-100° 3' 51.824"	46° 26' 36.201"
33	-100° 1' 19.151"	46° 26' 36.359"
34	-100° 1' 18.791"	46° 24' 52.050"
35	-99° 58' 47.926"	46° 24' 51.998"
36	-99° 58' 47.405"	46° 27' 2.925"
37	-99° 55' 0.390"	46° 27' 1.810"
38	-99° 55' 0.888"	46° 26' 35.580"
39	-99° 53' 44.002"	46° 26' 35.417"
40	-99° 53' 44.139"	46° 25' 43.211"
41	-99° 52' 28.503"	46° 25' 42.425"

Table 3: Project Boundary Coordinates (WGS84) of the Emmons-Logan Wind Energy Project Site

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.**

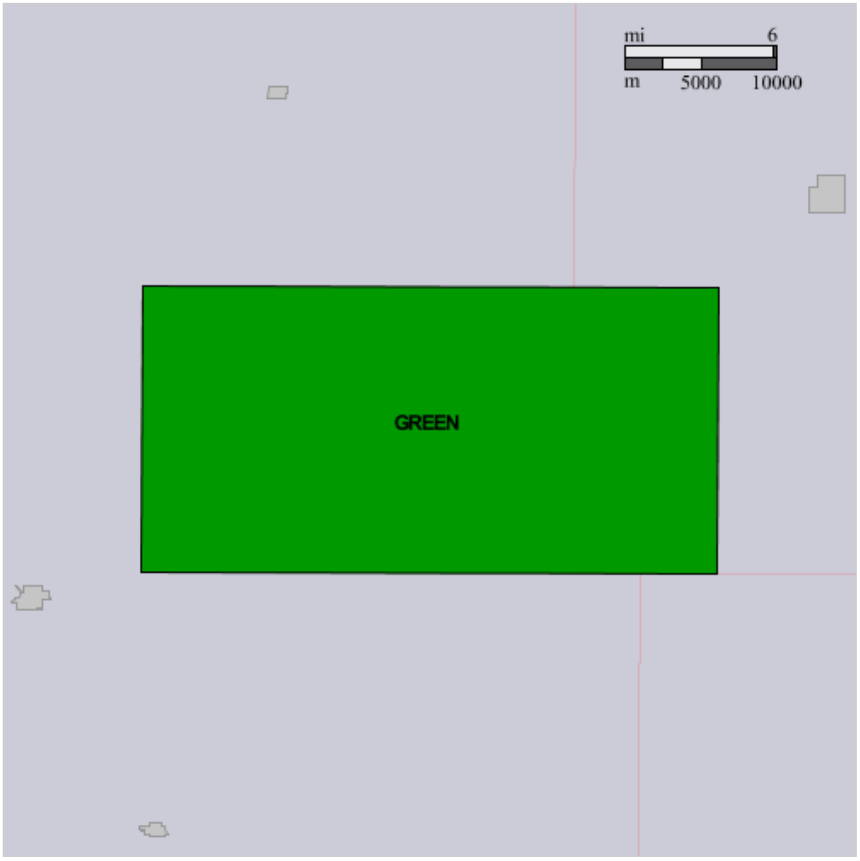
Instructions:

- 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

Disclaimer:

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Instructions:

- Select a screening type for your initial evaluation. Currently the system supports pre-screening on:
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- 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:
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- 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.

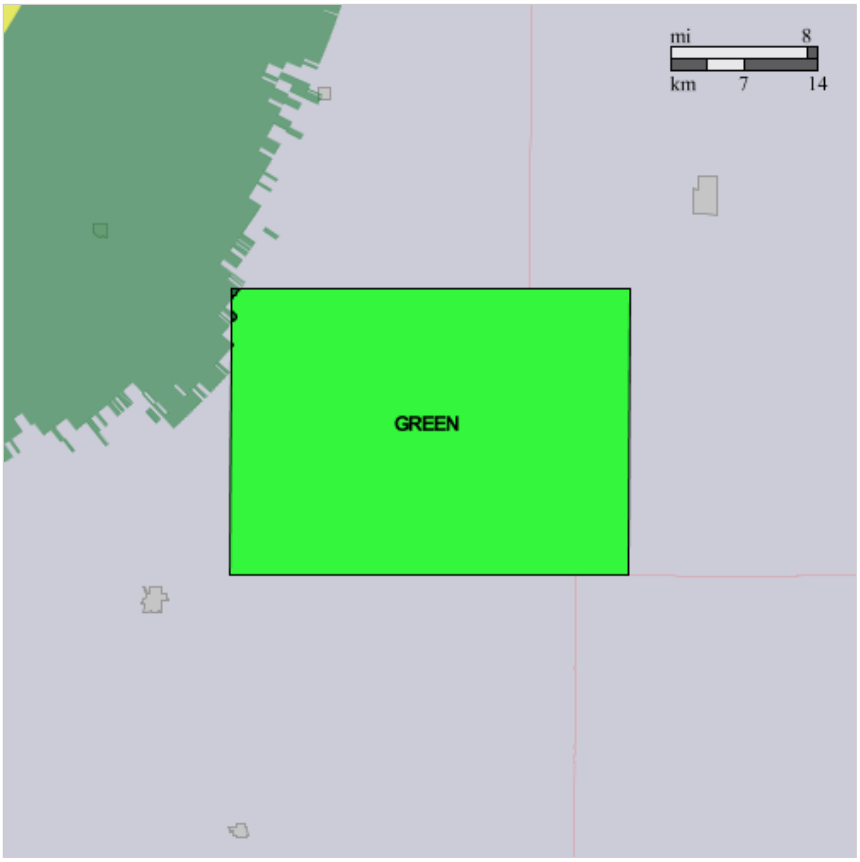
Screening Type: NEXRAD ▼ **Geometry Type:** Polygon ▼

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.

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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.

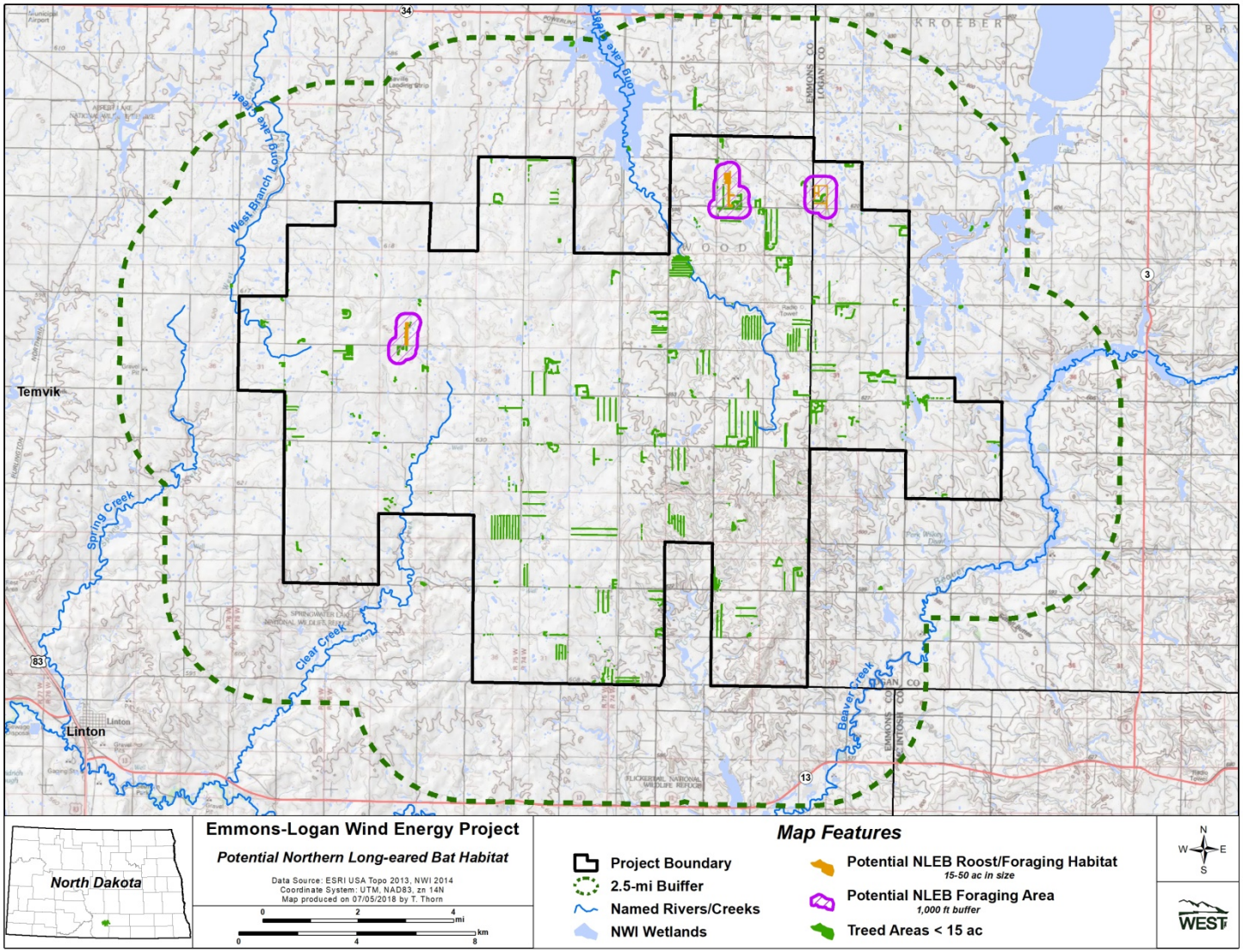

Figure 1. Potential northern long-eared bat habitat within the proposed Emmons-Logan Wind Energy Center and a 2.5 mile buffer, in Emmons and Logan Counties, North Dakota.

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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.

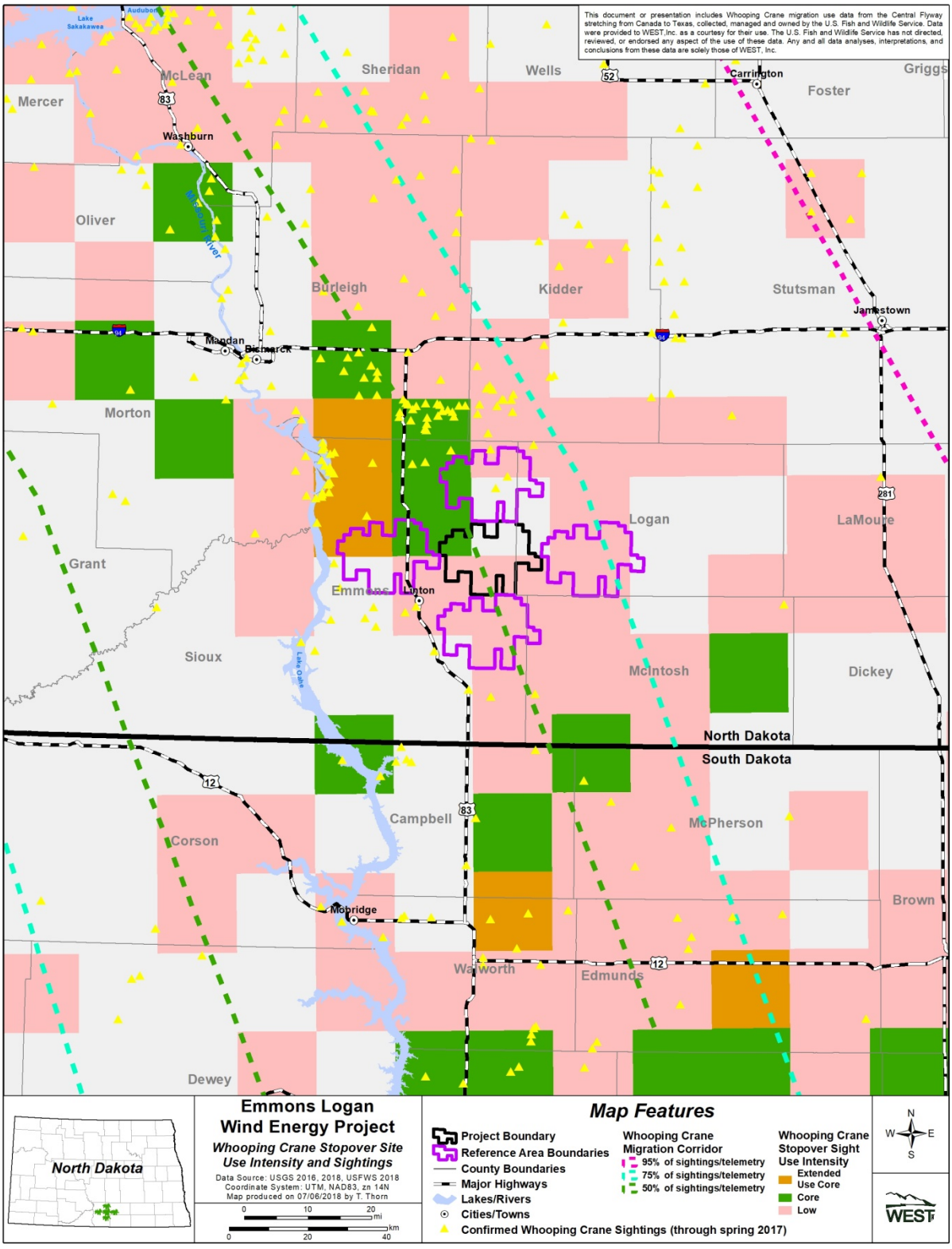

Figure 1. Location of the Emmons-Logan Wind Energy Center, adjacent reference areas, and whooping crane stopover site use intensity and sightings.

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).

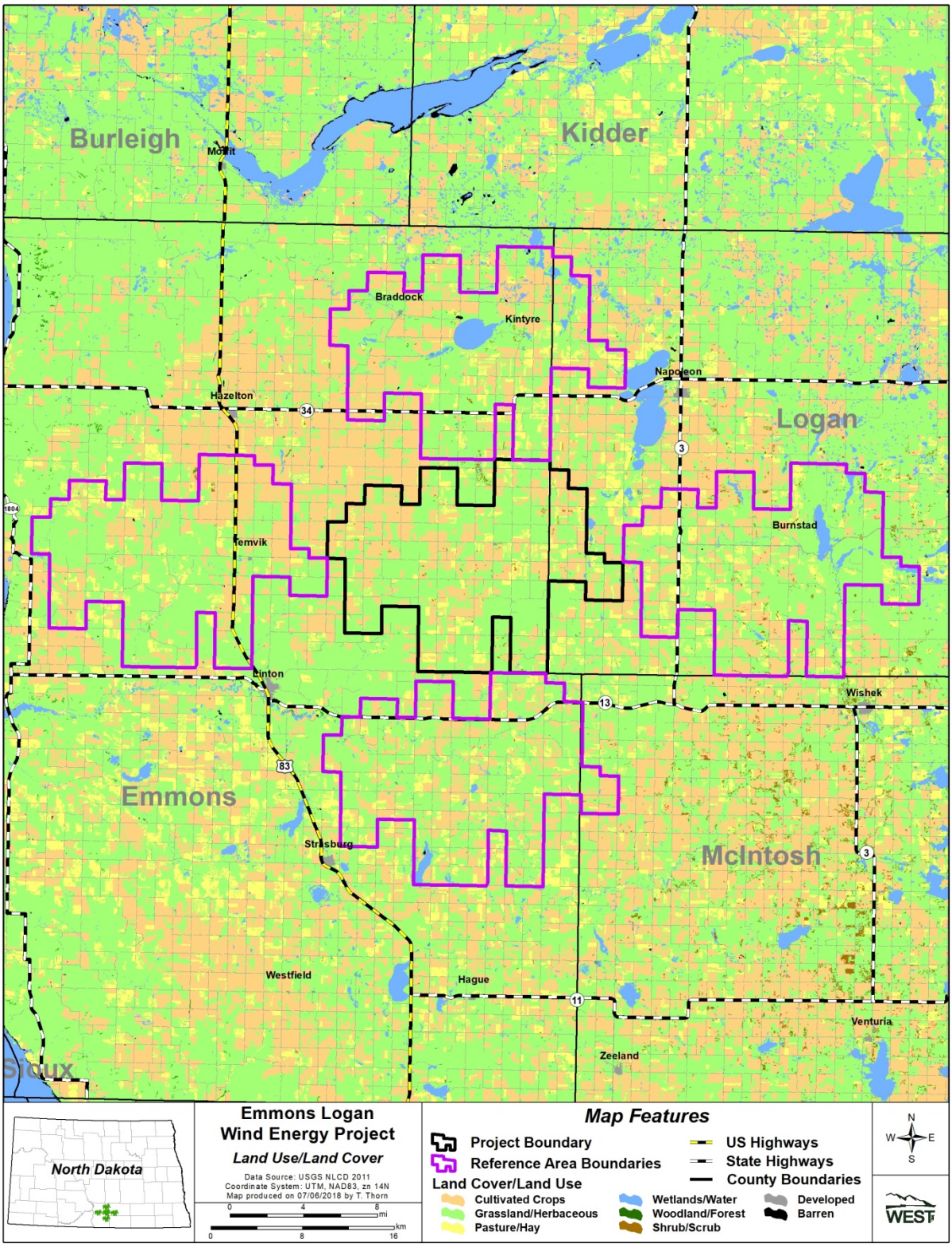

Figure 2. Land Use/Land Cover within and around the Emmons-Logan Wind Energy Center.

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.

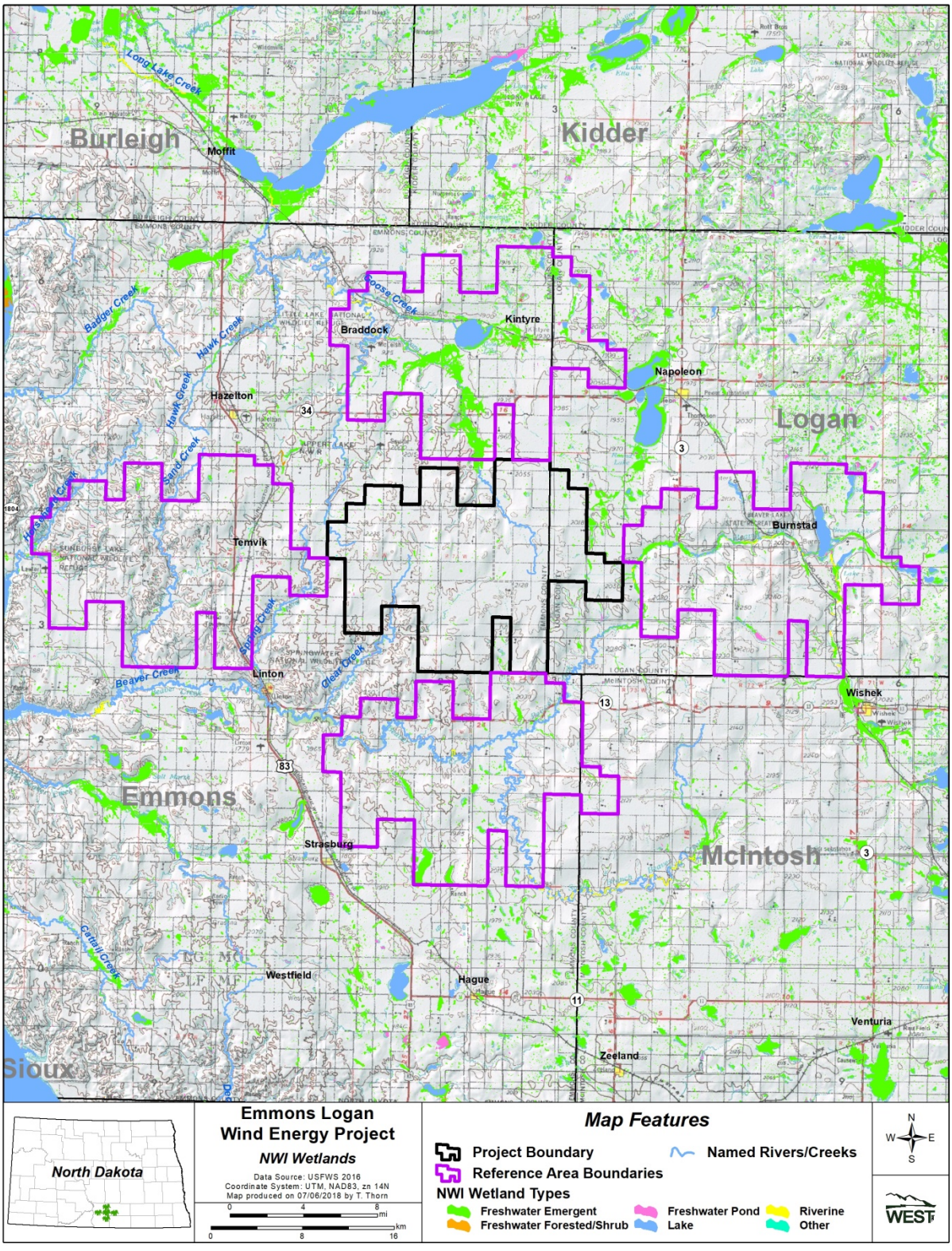

Figure 3. NWI wetlands and rivers/creeks within and around the Emmons-Logan Wind Energy Center.

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.

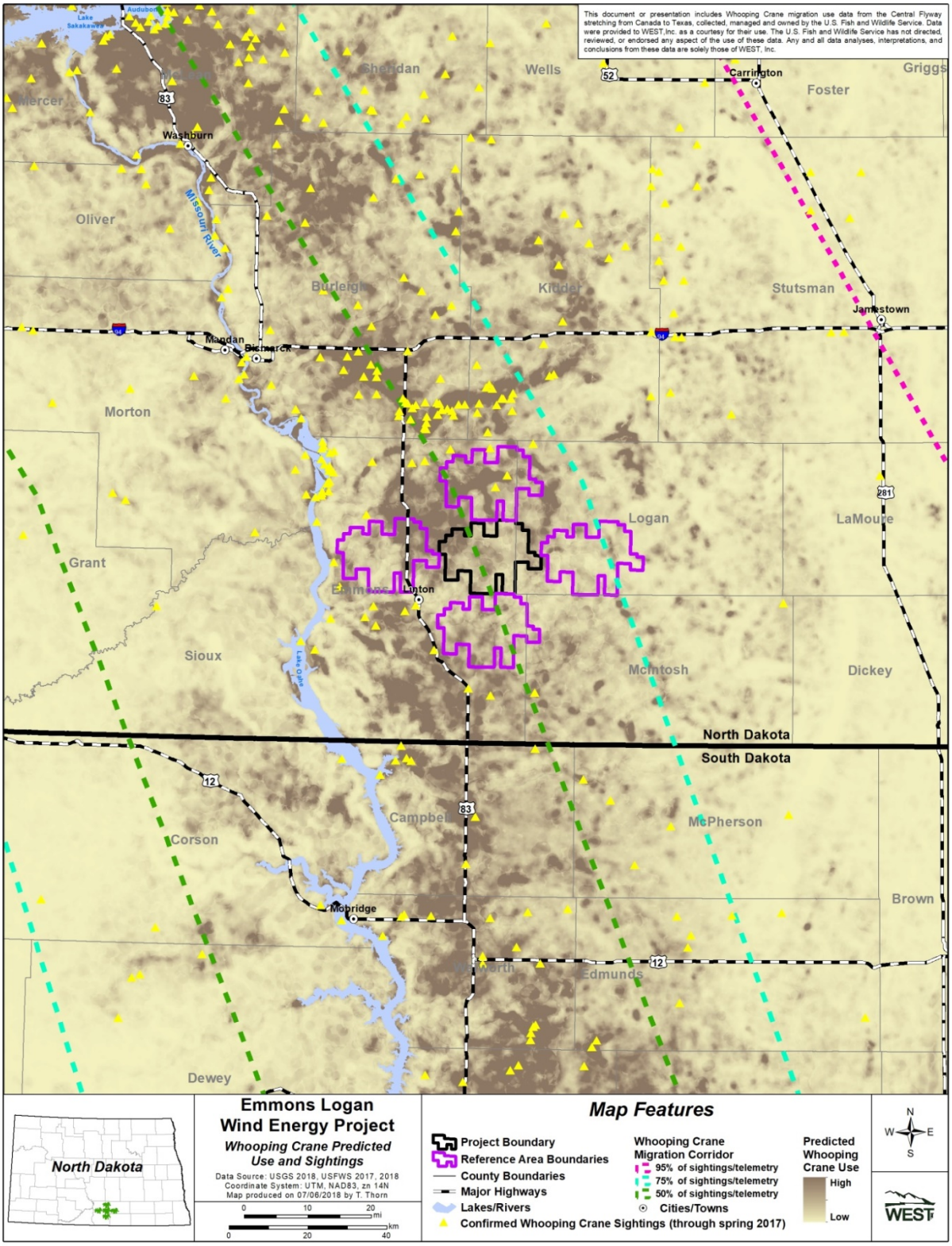

Figure 4. Potential whooping crane use based on the USFWS habitat suitability model for the Emmons-Logan Wind Energy Center and reference areas.

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:

Clayton Derby, Katherine Moratz, and Terri Thorn

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July 17, 2018

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REPORT REFERENCE

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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).

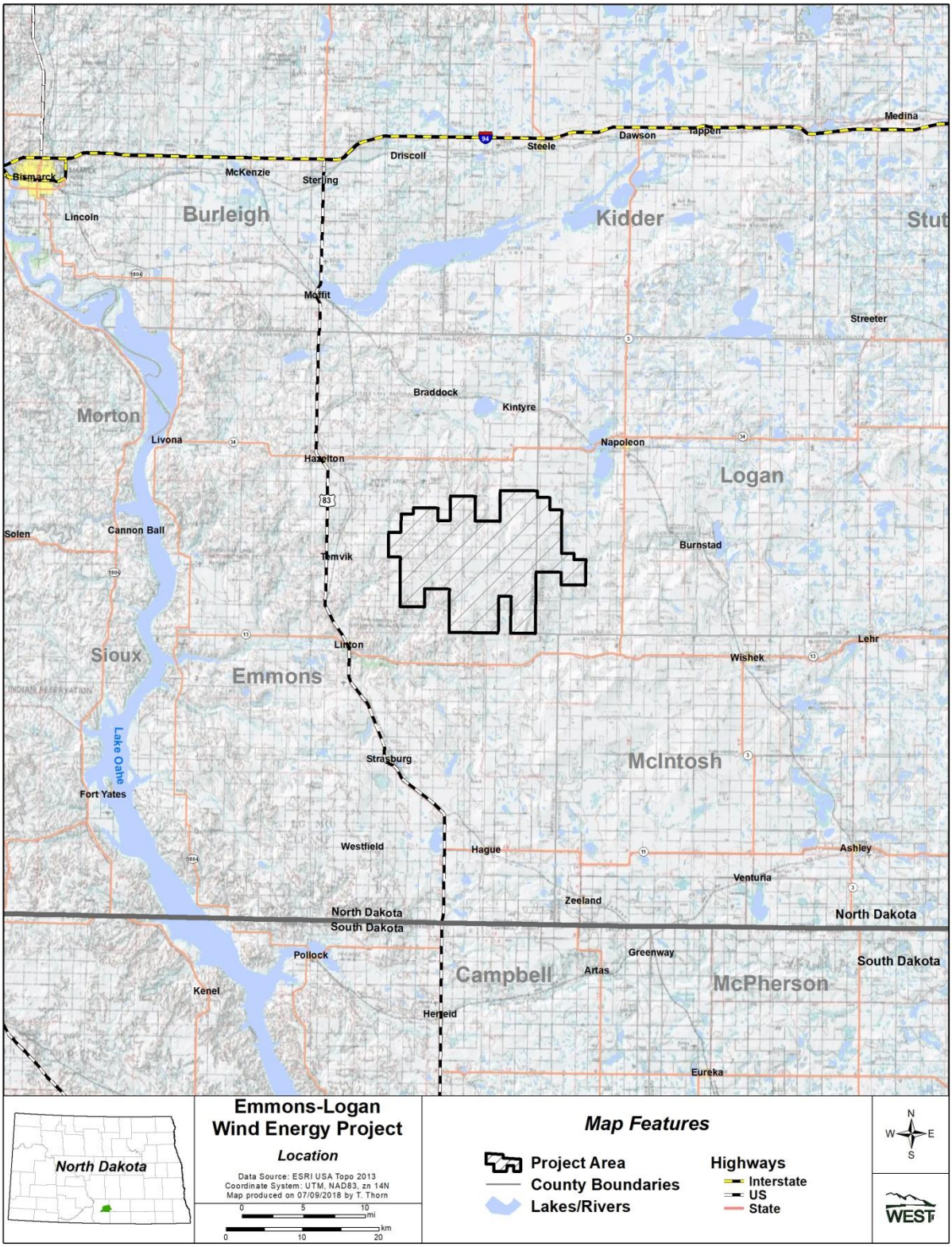

Figure 1. Location of the Emmons-Logan Wind Energy Center in Emmons and Logan counties, North Dakota.

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

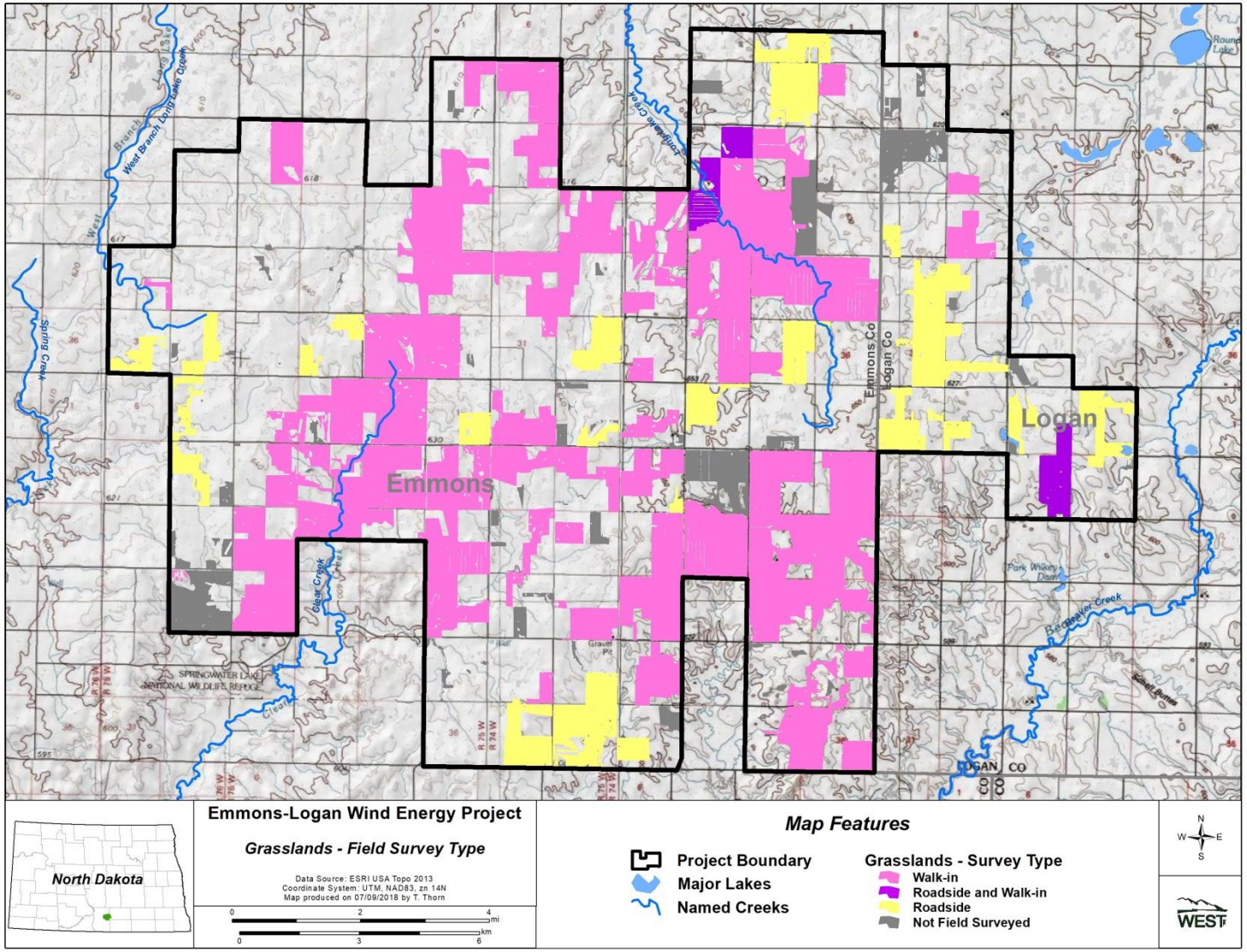

Figure 2. Survey types for grassland areas at the Emmons-Logan Wind Energy Center and associated transmission line in Emmons and Logan counties, North Dakota.

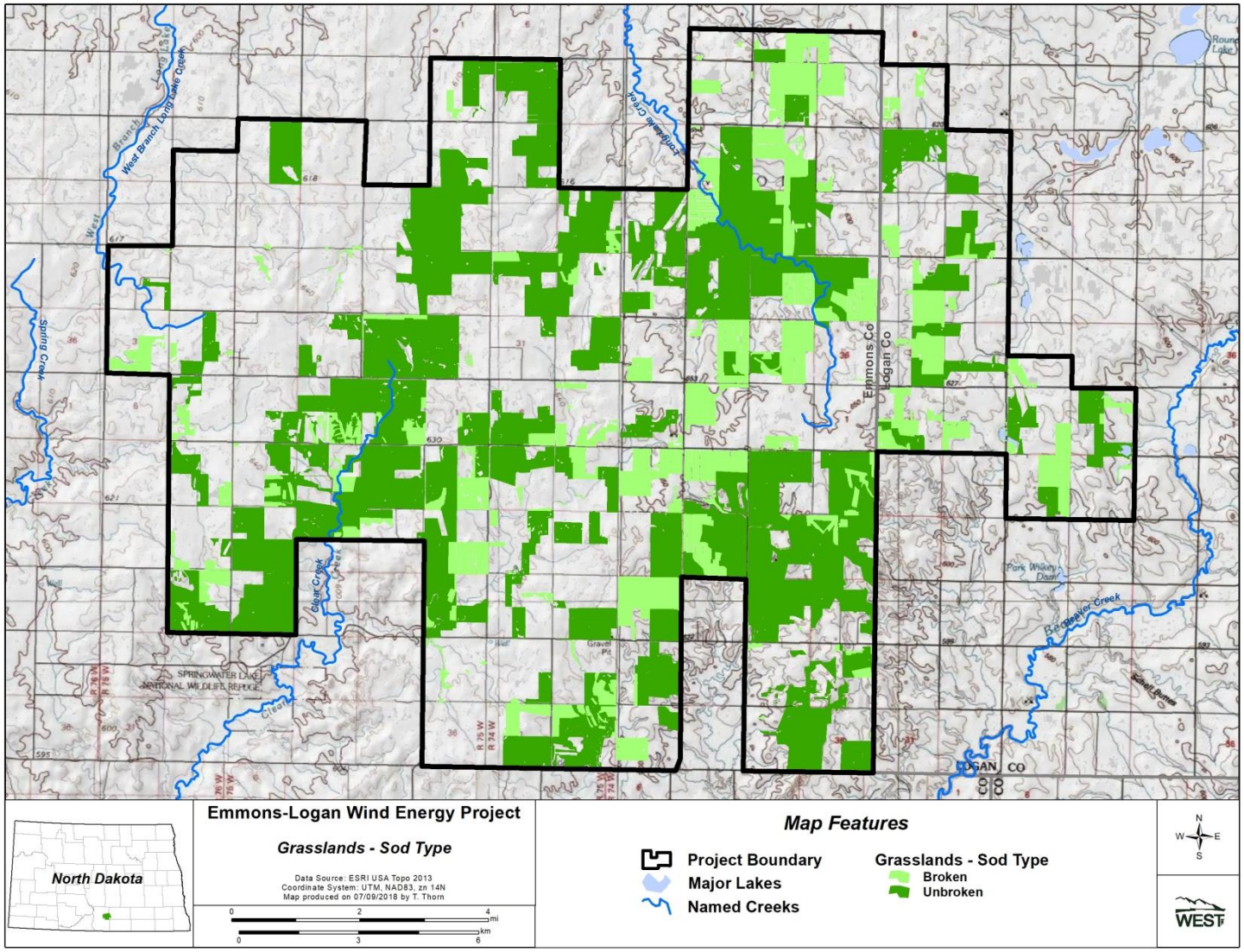

Figure 3. Grassland sod type within grassland areas at the Emmons-Logan Wind Energy Center and associated transmission line in Emmons and Logan counties, North Dakota.

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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:

Katherine Moratz and Terri Thorn

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July 17, 2018

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Sofia Agudelo	Technical Editor
Karen Seginak	Field Technician

REPORT REFERENCE

Moratz, K. and T. Thorn. 2018. 2017 Sharp-tailed Grouse Lek Reports, 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..

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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

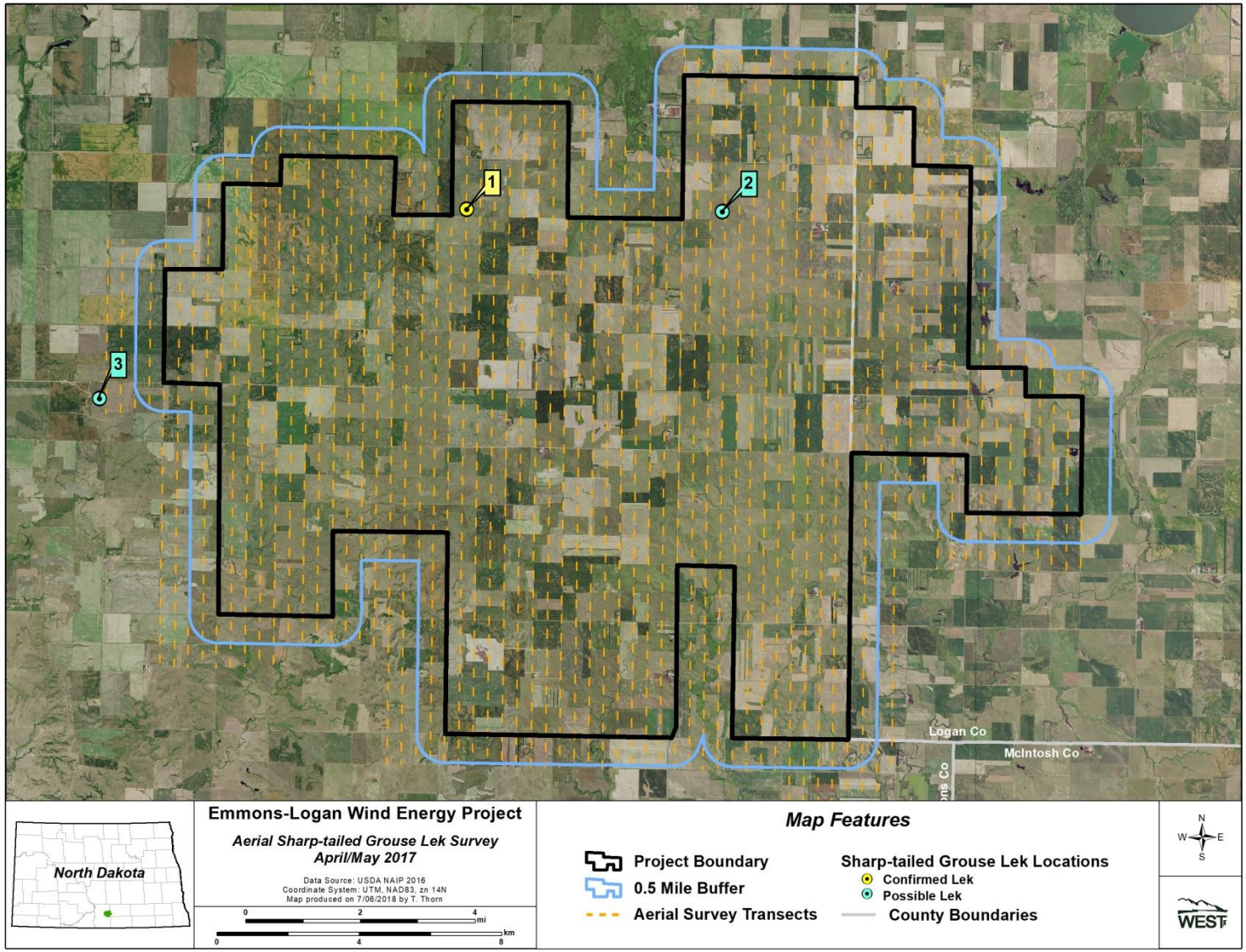

Figure 1. Sharp-tailed grouse leks observed during aerial surveys at the Emmons-Logan Wind Energy Center conducted in April and May 2017.

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Appendix C

Public and Agency Correspondence

UNITED STATES DEPARTMENT OF COMMERCE
National Telecommunications and Information Administration
Washington, D.C. 20230

MAR 10 2017

Mr. Andre Ferreira
Associate Resource Modeling Analyst
WindLogics
700 Universe Blvd.
Juno Beach, FL 33408

Re: Emmons-Logan Project: Emmons & Logan Counties, ND

Dear Mr. Ferreira:

In response to your request on January 10, 2017, the National Telecommunications and Information Administration provided to the federal agencies represented in the Interdepartment Radio Advisory Committee (IRAC) the plans for the Emmons-Logan Wind Project, located in Emmons and Logan Counties, North Dakota.

After a 45+ day period of review, no agencies had issues with turbine placement in this area.

While the IRAC agencies did not identify any concerns regarding radio frequency blockage, this does not eliminate the need for the wind energy facilities to meet any other requirements specified by law related to these agencies. For example, this review by the IRAC does not eliminate any need that may exist to coordinate with the Federal Aviation Administration concerning flight obstruction.

Thank you for the opportunity to review this proposal.

Sincerely,

Peter A. Tenhula
Deputy Associate Administrator
Office of Spectrum Management

EXAMPLE TRIBAL OUTREACH LETTER

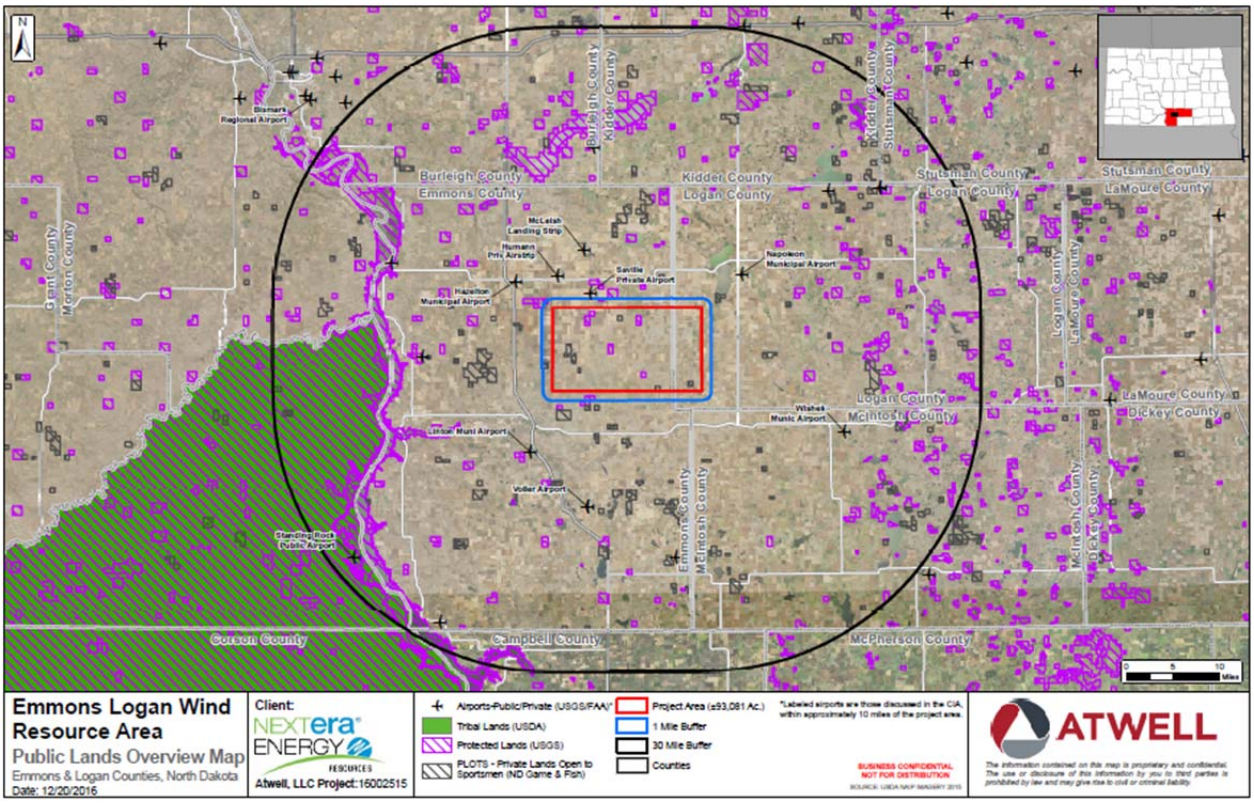
April 30, 2017

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.

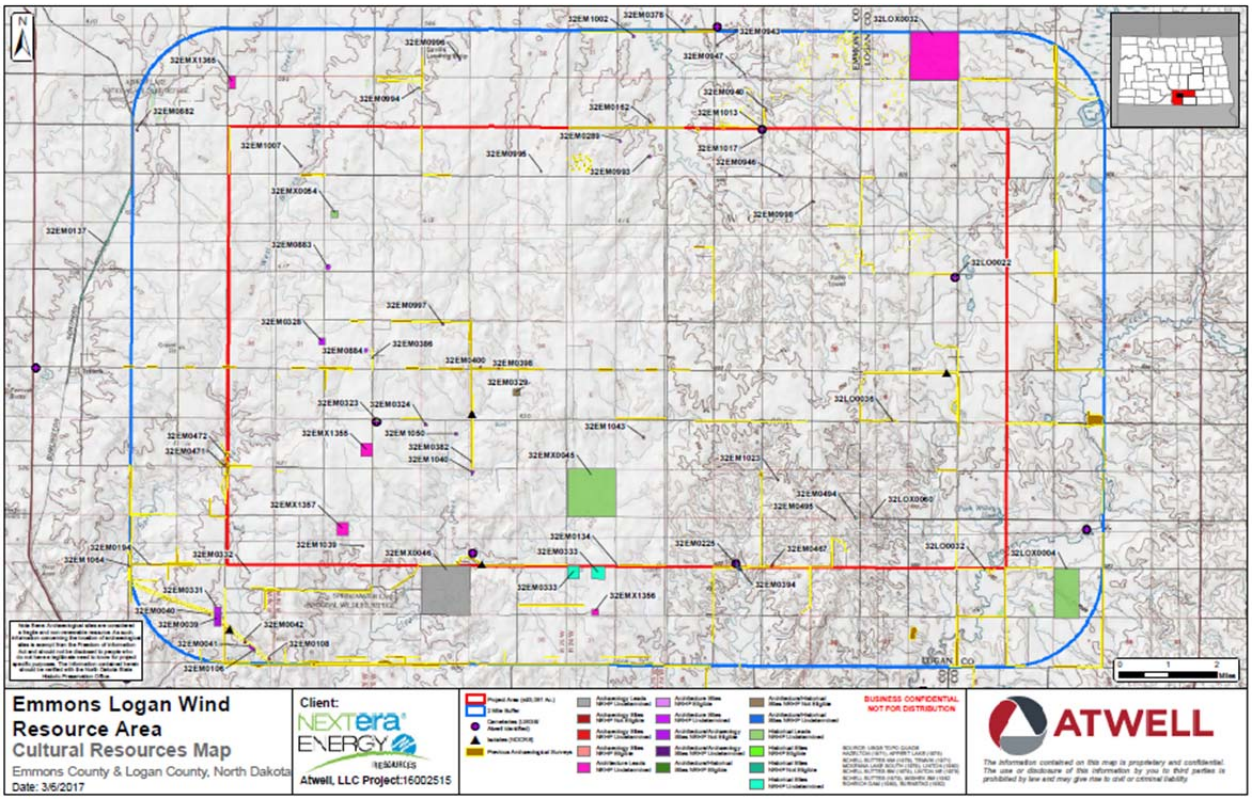
Land would be graded on-site for the turbine pads with native vegetation. Drainage systems, access roads, storage areas, and construction/laydown areas would be installed as necessary to fully accommodate all aspects of Project construction, operation, and maintenance.

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.

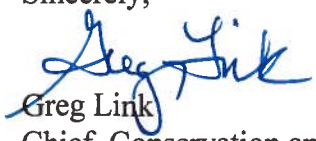
- The Bald Eagle population and number of nest sites is increasing significantly in North Dakota. The number of nest sites has increased from 10 known sites in the year 2000 to more than 300 in the year 2017. Due to the continual increase and selection of non-traditional nest sites, it is possible that 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.