Oliver III Wind Energy Center
Oliver Wind III, LLC
Oliver and Morton Counties, North Dakota

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

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Exhibit 1 – Application for Certificate of Site Compatibility
Oliver Wind III, LLC

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Appendix A Excerpt of NextEra Energy, Inc.'s 2015 Corporate Responsibility Report

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- Shadow Flicker Impact Analysis
- Acoustic Assessment

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1. INTRODUCTION

Oliver Wind III, LLC (Oliver Wind III), 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 Oliver III Wind Energy Center (the Project). The proposed Project is located in Oliver and Morton counties, North Dakota (**Figures 1-3**), and will have a nameplate capacity of approximately 100 megawatts (MW) consisting of up to 48 wind turbines using both General Electric (GE) 2.1 MW and GE 1.79 MW Xle wind turbine generators. Additional facilities include access roads, electrical collection systems and cabling, a collection substation, an operation and maintenance (O&M) building, meteorological towers, and a construction laydown area (**Figure 3**). The proposed Project will interconnect to the electrical grid via a tap to the existing Minnkota Power Cooperative, Inc. (Minnkota) Center to Mandan 230 kilovolt (kV) overhead transmission line located in the northeast quarter of Section 23, Township 141 North, Range 83 West. This site is located approximately 14 miles south, southeast of the City of Center, North Dakota. The 4.5-mile transmission line must be permitted separately and Oliver Wind III will submit a separate application for a Certificate of Corridor Compatibility and Route Permit for the line and associated switchyard in February 2016.

On March 12, 2012, in Case Number PU-11-561, the North Dakota Public Service Commission (PSC) issued Certificate of Site Compatibility for an Energy Conversion Facility No. 27 to Oliver Wind III for the construction, operation, and maintenance of a wind energy facility known as the Oliver Wind III Energy Center to be located in Morton County, North Dakota. The wind energy center and associated facilities as authorized in Case No. PU-11-561 have not been constructed. Due to significant changes in the wind energy center and associated facilities as proposed in this Application; Oliver Wind III respectfully requests that the proposed wind energy center and associated facilities as set forth in this Application be substituted for and supersede those as approved in Case No. PU-11-561.

NEER, through its affiliates, develops renewable projects throughout the United States and Canada. NEER is the largest generator of wind-powered electricity in North America, with nearly 11,300 MW of wind generation in operation in 19 states and Canada as of December 2015. In North Dakota specifically, NEER, through its affiliates, owns and operates 851 MW of wind generation and operates an additional 139 MW. NEER designs, constructs, and operates its facilities in an environmentally sound and responsible manner. Attached as **Appendix A**, please find the sections from NextEra Energy, Inc.'s 2015 Corporate Responsibility Report that describe NextEra Energy, Inc.'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 Chapter 49-22

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 49-22-02).

Oliver Wind III considered the exclusion and avoidance areas and selection and policy criteria set forth in NDAC Section 69-06-08-01 in the design of the proposed 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 proposed Project. **Table 1** outlines the information required to fulfill the requirements for a Certificate with the PSC and where these requirements are addressed in this document.

Table 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; and	1.3.1, **Table 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; and (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 proposed 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

Table 1. Certificate Completion Checklist

State Authority	Description	Section
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, 10.0-10.12, **Figures 1-3**
f.	The Application shall contain 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 4 and 5**
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, **Table 6, Table 7, Table 8, Table 9, Figure 5**
i.	A discussion of the mitigative measures that the application 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
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 3, 4 and 5**, 1.2, 3.0
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
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 1-5, Figures 11-13, Figures 15-16**
NDCC 49-22-08	Application for a certificate	
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 4**
b.	A summary of any studies which have been made of the environmental impact of the facility.	**Appendix B**
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 1-3**
e.	An identification of the location of the preferred corridor for any transmission facility.	4.5-mile transmission line and Minnkota Switchyard being permitted separately
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

Table 1. Certificate Completion Checklist

State Authority	Description	Section
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
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

Wind facility siting is a process through which input is considered from several different entities. When considering where to locate this wind farm in North Dakota, Oliver Wind III identified the proposed Project Area (see **Figures 1-3**) for further investigation based on the modeled wind resource and potential offtaker, as outlined in **Section 1.3** below. The identified proposed Project Area is considered optimal from a wind resource perspective. Oliver Wind III then analyzed the available land and initiated discussions with landowners and applied setbacks required by Morton County, the PSC, and Oliver Wind III's internal setbacks (Oliver County does not have applicable setback requirements). Oliver Wind III then conducted environmental desktop and field studies in the proposed Project Area, the results of which are incorporated in the appropriate sections of this application.

Oliver Wind III has entered into agreements with landowners that are interested in having wind turbines and associated facilities placed on their property. Simultaneously, Oliver Wind III has identified preliminary turbine locations based on initial site inspection, topographic maps, known environmentally sensitive areas, review of North Dakota's power plant siting exclusion and avoidance areas, and communications with local, state, and federal agencies. Oliver Wind III is not seeking a permit for each wind turbine indicated on **Figure 3**; rather, the preliminary layout indicates areas of the site with good wind resources and where there are no known environmental or regulatory siting issues.

Oliver Wind III seeks a Certificate of Site Compatibility for the proposed Project Area, as opposed to specific turbine locations. Oliver Wind III suggests that the Certificate define the Project Area, number of turbines, and structures related to wind generation to be located within the proposed Project Area based on the information presented in this Application. Within the permitted Project Area, Oliver Wind III proposes that conditions be included specifying that final turbine placement be subject to required setbacks from environmentally sensitive areas, and be sufficient to meet required noise levels.

Oliver Wind III is currently completing additional required studies, including final cultural resource surveys and wetland delineations, and will complete these studies as soon as land access and weather permits. Oliver Wind III will also further evaluate the Project Area based on efficient construction of the proposed Project. In addition, Oliver Wind III will seek further input from landowners regarding the location of wind turbines and associated facilities. Once these additional studies and communications have been completed, preliminary turbine locations will be re-evaluated for consistency with anticipated Certificate conditions and buffers. A final site plan for the proposed Project will be submitted to the PSC prior to construction and a pre-construction conference call will be held with PSC staff to ensure that the site plan conforms to the Certificate requirements.

Oliver Wind III believes that the aforementioned siting process is consistent with North Dakota siting rules and provides Oliver Wind III with the flexibility necessary to develop a timely, cost-effective project in an environmentally responsible manner.

1.3 Project Summary

Oliver Wind III evaluated wind resources in North Dakota for siting a 100 MW wind generation facility. Based on this review, Oliver Wind III selected a Project Area approximately 13 miles northwest of the city of Bismarck and nine miles south of the city of Center for additional study and preparation of an application for a Certificate to the PSC. The proposed Project Area was identified as optimal from wind resource, land acquisition, transmission interconnection, environmental, and economic perspectives. The proposed Project Area was selected considering the exclusion and avoidance criteria outlined in NDAC 69-06-08-01.

1.3.1 Project Area

The proposed Project Area is the location within which Oliver Wind III has negotiated easements with landowners and where Project facilities are proposed to be located. The proposed Project Area was selected to include all areas necessary for Oliver Wind III to optimize the wind resource while avoiding and minimizing impacts to environmental resources. Oliver Wind III currently has acquired the easements required for the proposed Project in Oliver and Morton counties (**Table 2**).

Table 2. Project Area Location

County	Township	Range	Sections
Morton County	140 N	82 W	18, 30, 31
	140 N	83 W	1-28, 35, 36
	140 N	84 W	1, 2, 10-15, 22-23
Oliver County	141N	82W	30, 31
	141 N	83W	25, 26, 32-36

The Project Area encompasses approximately 21,878 acres (34 square miles) in northeastern Morton County and southeastern Oliver County. Approximately 3,464 acres (16 percent) of the Project Area is in Oliver County, and 18,413 acres (84 percent) of the Project Area is located in Morton County.

Although the turbines will be placed throughout the Project Area, the permanent Project structures will occupy up to approximately 50 acres during operation (See **Tables 3 and 4 below**), or less than one percent of the total Project Area. **Table 3** summarizes the assumptions used to calculate impacts by proposed Project facility. Permanent impacts are considered to be the proposed Project footprint during operation. Temporary impacts are considered 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 4** summarizes the estimated impact for each proposed Project component for both construction (temporary) and operation (permanent). The Project Area and proposed Project layout are shown on **Figures 1-3**. The impact assumptions are shown on **Figure 4**.

Table 3. Project Impact Assumptions

Project Component	Temporary Construction Disturbance	Construction Disturbance to be Reclaimed	Permanent Disturbance (Operation)
Wind Turbines a/	4.5 acres per turbine	4.3 acres per turbine	0.2 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 wide per linear foot minus 12 feet x 8 feet for each junction box	12 feet x 8 feet for each junction box
O&M Facility	5 acres	3 acres	2 acres
Collection Substation	5 acres	3 acres	2 acres
Construction Laydown Area d/	15 acres	15 acres	0 acres
Meteorological Towers e/	1.25 acres per tower	1.25 acres per tower	5 sq. feet per tower
Minnkota Switchyard	5 acres	3 acres	2 acres
Fiber Optic Line	50 feet wide per linear foot	50 feet wide per linear foot minus 66 feet x 66 feet for the fiber optic demarcation	66 feet x 66 feet for the fiber optic demarcation
Temporary Crane Paths	80 feet wide per linear foot	80 feet wide per linear foot	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 a 40-foot x 100-foot gravel pad with a 15-foot buffer, or 0.2 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 34 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/ Where collection lines run parallel to access roads, the respective impact buffers generally do not overlap.

d/ Assumes one 15-acre laydown area.

e/ Area of impact is 1.25 acres per guyed tower during installation. Once installed, each tower has a 1 square-foot base plate and four 1-square-foot anchor points, or 5 square feet per tower.

Table 4. Project Impacts

Proposed Project Component	Temporary Construction Disturbance (acres)	Construction Disturbance to be Reclaimed (acres)	Permanent Disturbance (Operation) (acres)
Wind Turbines a/ (48 turbines, not 3 alternates)	216.0	206.4	9.6
Access Roads b/	86.3	52.3	34.0
Collection Lines c/	107.8	107.8	Less than 0.1 acre
O&M Facility	5	3	2
Collection Substation	5	3	2
Construction Laydown Area	15	15	0
Meteorological towers d/	5	5	0 (5 sq. ft.)
Minnkota Switchyard	5	3	2
Fiber Optic Line	6.0	5.9	0.1
Temporary Crane Paths e/	106	106	0
Total	557	507	50

a/ Assumes 48 turbines x 4.5 acres of ground disturbance during construction, 0.2 acre/turbine of that remaining as permanent. The 3 alternate turbines were not included in the calculation; calculations for the associated roads and collection lines included all roads and collection lines shown in the layout.

b/ Assumes a 50-foot wide easement for roads during construction, 16 feet of that remaining during operation. Assumes total of approximately 17.5 linear miles of service roads. The overlapping area for turbines and the substation 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 access road corridor buffer were removed from impact calculation. Approximately 8.1 miles of collection lines run parallel to the access roads, with a 150-foot distance designed between the collection line and access road centerlines. The impacts also include approximately 18.2 miles of collection lines not co-located with access roads. Junction boxes will be located on the ground throughout the Project Area and will each require approximately 12 feet x 8 feet. Currently 10 junction boxes are anticipated to be required.

d/ 3 temporary and 1 permanent met towers x 1.25 acres = 5 acres disturbance during construction; 1 permanent met tower, assuming guyed, 5 square feet.

e/ Assumes an 80-foot wide crane path for 10.9 miles that do not overlap with other infrastructure footprints.

1.3.2 Projected Output

The proposed Project will have a nameplate (gross) capacity of approximately 100 MW. Assuming a net capacity factor of 55.3 percent, the projected average annual output is estimated at 484,428 MW hours per year. 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. Oliver Wind III is targeting site construction to begin in July 2016 provided all pre-construction permits and approvals have been obtained. Key schedule milestones include the items described below.

1. Certificate of Site Compatibility: Oliver Wind III anticipates and has requested with this filing that the Certificate be issued by July 8, 2016.
2. Land Acquisition: All land easement agreements for the wind generation facility were completed in January 2016.

3. Permits: Oliver Wind III submitted applications for a Conditional Use Permit (CUP) for the Project to Morton County and Oliver County in February 2016 and anticipates receiving the Permits in March 2016. Oliver Wind III is responsible for undertaking all required environmental studies, and will obtain all permits and licenses that are required following issuance of the Certificate. Completing permits is on the "critical path" for the proposed Project and will allow Oliver Wind III to move forward with other commitments on the proposed Project.
4. Equipment Procurement, Manufacture, and Delivery: Oliver Wind III has ordered all long-lead equipment for the proposed Project, including substation equipment, and transformers, and has a purchase order in place with GE for the wind turbines.
5. Construction: Construction is scheduled to begin as early as July 2016, subject to road restrictions, weather, and permitting. The engineering, procurement, and construction (EPC) contractor will be responsible for completing all proposed Project construction, including roads, wind turbine assembly, electrical, and communications work. Construction will take approximately six months to complete.
6. Testing Operations: Oliver Wind III anticipates testing to begin in November 2016.
7. Commercial Operation: Oliver Wind III anticipates commercial operation of the proposed Project to occur by December 2016.
8. Expansions or Additions: Oliver Wind III has no specific plans for expansions of the proposed Project at this time.

1.5 Project Ownership

Oliver Wind III will own the entire proposed Project and, as a result, will manage the construction of all equipment and associated facilities related to the proposed Project. Oliver Wind III will select a third-party EPC contractor to perform the majority of the engineering and construction of the wind farm. Oliver Wind III will procure the turbine/tower equipment directly from a manufacturer.

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2. NEED FOR FACILITY

2.1 Need Analysis

Due partly to high heating demand in winter, North Dakota's per capita energy consumption is among the highest in the nation. Nearly three-tenths of North Dakota households use electricity as their primary energy source for home heating. Most of the coal used for power generation is supplied by several large surface mines in the central part of the state. Energy sources such as coal are finite and their combustion has environmental consequences.

In March 2007, North Dakota enacted legislation (H.B. 1506) adopting a voluntary renewable portfolio objective that aims to have ten percent of electricity used in the state generated from renewable sources by 2015. According to the Energy Information Administration (EIA 2014), in 2010, 79 percent of North Dakota's net electricity generation came from coal, 16 percent came from wind energy, and 5 percent came from conventional hydroelectric power sources. Consequently, the ten percent renewable portfolio objective is being met. However, other goals for renewable energy have been established. According to a March 2010 report prepared by the EmPower ND Commission, one of the state energy goals is to increase installed wind energy capacity to 5,000 MW by 2020 (EmPower ND 2010). 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; and
- Provide a fair and responsible regulatory environment that promotes energy development.

A regional need exists for renewable energy produced in North Dakota. Eleven of the Midwest Independent System Operator (MISO) states currently have renewable portfolio standards (MISO 2012). According to the MISO Transmission Expansion Plan for 2012, the MISO region needs to add between 4,484 and 11,290 MW of new capacity or 3,865 and 9,733 MW of demand reduction to meet the minimum Planning Reserve Margins in 2022 (MISO 2012). From 2015 onward, 9,912 MW of retirements of fossil-fueled power plants are assumed to occur due to Environmental Protection Agency (EPA) regulations. Depending on the projection scenario, MISO assumes anywhere from 13 to 60 gigawatts of incremental wind penetration. Seventeen multi-value transmission projects have been integrated into the MISO planning models, which will relieve a major part of MISO's internal future congestion and deliver wind energy more efficiently.

Apart from renewable energy goals, in recent years, the Mid-Continent Area Power Pool (MAPP) has consistently reinforced the regional need for increased generating capacity in the coming decade. The most recent MAPP report available (2009) indicates that deficits are now expected by 2017 (**Table 5**).

Table 5. MAPP (US) Summer Season Surplus/Deficit

Year	MW
2008	2,377.3
2009	1,522.2
2010	1,044.8
2011	939.5
2012	785.7
2013	502.8
2014	657.8
2015	524.4
2016	227.5
2017	-19.3
2018	-367.3

Source: Page III-5 of the MAPP 2009 Load and Capability Report (MAPP 2009).

The Oliver Wind III Project will allow North Dakota to continue to provide capacity to meet those forecasted deficits with clean, efficient, renewable energy for at least the projected 30-year life of the proposed Project.

On October 23, 2015, the EPA's final *Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units* (Clean Power Plan) was published in the Federal Register. Under the Clean Power Plan, the EPA established interim and final carbon dioxide emission performance rates for steam electric and natural gas fired power plants, as well as state-specific interim and final goals, based on these limits and each state's mix of power plants. The Clean Power Plan requires each state to develop and implement plans to ensure that the power plants in their state achieve the interim and the final carbon dioxide emission performance rates, and rate-based goals or mass-based goals by 2030. North Dakota's 2012 carbon dioxide emission rate was 2,368 pounds per megawatt-hour (MWh) and its 2030 goal is 1,305 pounds per MWh (EPA 2015a). The EPA anticipates that renewable energy will be a significant strategy for states and existing sources. New renewable energy facilities benefit mass-based states by avoiding emissions from affected fossil fuel-fired electric generating sources. States using a mass-based approach may provide additional support for renewable energy through direct allocations of emission allowances to renewables, or through distribution of proceeds from auctions of emission allowances to renewable energy generators (EPA 2015b). A renewable energy generator installed after 2012 in a rate-based state may be issued Emission Rate Credits for every MWh of zero-emission generation in 2022 and thereafter (EPA 2015b). Additionally, the Clean Power Plan facilitates trading of Emission Rate Credits for compliance across state lines (EPA 2015b). The implementation of the Clean Power Plan is currently stayed by order of the United States Supreme Court. If the Clean Power Plan is ultimately implemented, the proposed Project will contribute to meeting North Dakota's requirements under the Clean Power Plan to meet its interim and final carbon dioxide emission rate goals under either a mass-based or rate-based compliance regime.

Oliver Wind III is currently negotiating a power purchase agreement for this Project.

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, Oliver Wind III is negotiating a power purchase agreement for the proposed renewable energy project.

Although the proposed Project will include 48 planned turbines, an additional 3 alternate turbine locations have been included in the proposed Project layout in order to provide siting flexibility based on on-going environmental studies and landowner preferences.

2.3 Ten-Year Plan

As required by NDCC 49-22-04, Oliver Wind III will file a Ten-Year Plan with the PSC by July 1, 2016.

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3. SITE SELECTION CRITERIA

Oliver Wind III is evaluating the proposed 21,878-acre (34 square-mile) proposed Project Area to determine the best locations for up to 48 wind turbines. Siting turbines is a process through which input from several different entities is considered. The Project Area was identified as an optimal site from wind resource, transmission, landowner participation, economic, and environmental perspectives. An additional 3 alternate turbine locations have been included in the proposed Project layout in order to provide siting flexibility based on on-going environmental studies and landowner preferences, however, only up to 48 wind turbines will be constructed.

Oliver Wind III 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 power plant siting exclusion and avoidance areas; review of Oliver County, Morton 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 12 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 PSC to determine suitability of the site. Oliver Wind III has reviewed the criteria in Chapter 69-06-08 and has considered these criteria in proposed 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 6** shall be excluded in the consideration of a site for an energy conversion facility. The area of exclusion shall include a buffer zone of a reasonable width to protect the integrity of the area. Exclusion areas are mapped for the Project Area on **Figure 5**.

Table 6. Exclusion Areas

Exclusion Area	Present within Proposed Project Area?	Description	Section Addressed
Designated or registered national areas: 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	N/A	3.5, 7.3, **Figures 5 and 12**
Designated or registered state areas: 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	An archaeological survey is underway; archaeological sites have been identified through a Class I Literature Search, and a Class III Cultural Resources Inventory will be completed for the proposed construction footprint in spring 2016 (as weather permits). Known sites are not shown on **Figure 5** due to confidentiality.	7.7, 7.8, 7.9, 7.15, 7.17

Table 6. Exclusion Areas

Exclusion Area	Present within Proposed Project Area?	Description	Section Addressed
County parks and recreational areas; municipal parks; parks owned or administered by other governmental subdivisions; hardwood draws; and enrolled woodlands.	None	N/A	7.8, 7.14, 7.17
Prime farmland and unique farmland, as defined by the land inventory and monitoring division of the soil conservation service, United States department of agriculture, 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, such exclusion shall not apply.	Present	The proposed Project Area contains 1,611 acres (7.4%) of soils of statewide importance and 11,060 acres (approximately 50.6%) of prime farmland soils. Prime farmland has been avoided to the extent practical. Permanent impacts to soils of statewide importance and prime farmland soils from turbine placement and access roads are expected to be up to 17 acres and 1 acres, respectively, which is less than 1% of the proposed Project Area.	7.9, 7.10, **Figure 15**
Irrigated land	None	N/A	7.9
Areas critical to threatened or endangered animal or plant species	None	The eastern portion of the proposed Project Area is within the whooping crane migration corridor, but there is no designated critical habitat within the proposed Project Area.	7.16, 7.17
Areas where animal or plant species that are unique or rare to this state would be irreversibly damaged.	None	N/A	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	N/A	7.3.1
Wind-energy specific exclusion areas	N/A	The proposed Project complies with the following exclusion areas: • 1.1 x height of turbine from interstate and state road rights-of-way • 1.1 x height of turbine plus 75 feet from centerline of county or maintained township roadways • 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	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 7** 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 PSC 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. Avoidance areas are also mapped for the Project Area on **Figure 5**.

Table 7. Avoidance Areas

Avoidance Areas	Present within Proposed Project Area?	Description and Proposed Buffer	Section Addressed
Historical resources which are not designated as exclusion areas	Present	Historic farmsteads are present within the proposed Project Area. Oliver Wind III will avoid directly impacting all historic farmsteads within the proposed Project Area.	7.7, 7.17
Areas within the city limits of a city or the boundaries of a military installation	None	N/A	7.3, **Figures 1-3**
Areas within known floodplains as defined by the geographical boundaries of the 100-year flood	None	N/A	7.12, 7.17
Areas that are geologically unstable	Potentially Present	Lignite (coal) resources and historic mines are present within the proposed Project Area, but historic mining was limited to surface mining 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 has not inventoried the Project area for landslides to date, but review of available information indicates that landslide areas are not located in the proposed 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 that are removed will be replaced at a 2 to 1 ratio as required by the PSC.	7.13, 7.14, 7.17, **Figures 11 and 16**
Areas of recreational significance which are not designated as exclusion areas	None	N/A	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 dBA.	None	Noise modeling results indicated that received sound levels would be 50 dBA or less within 100 feet of 64 out of 65 inhabited residences identified in and near the Project area. Oliver Wind III is working to obtain a waiver from the owner of the residence where 50 dBA would be exceeded. If a waiver cannot be obtained Oliver Wind III will ensure that the 50 dBA requirement is met.	7.6.2

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 PSC 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 8**, will be at an acceptable minimum, or that those effects will be managed and maintained at an acceptable minimum.

Table 8. Selection Criteria

Selection Criteria	Potential Adverse Effects	Section Addressed
The impact upon agriculture:		
Agricultural production	Up to 50 acres of land will be permanently affected by the turbines, associated access roads, and other infrastructure during operation. Additional temporary impacts during construction for turbine installation, road construction, cable trenching, laydown, and construction staging would be up to 557 acres. These impacts represent a minor portion of the land area available for agricultural production. Landowner agreements include compensation for crop damage, if any, during surveys and construction. As a result, the proposed Project will not result in significant impacts to agricultural production.	7.3, 7.9
Family farms and ranches	The proposed Project will comply with state and county setbacks. Although some land area will be converted to wind turbine foundations and pads, access roads, and a substation, 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.	4.1.1, 7.2, 7.3, 7.10, Table 10, **Figure 5**
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 proposed Project Area.	7.9, 7.10
Surface drainage patterns and ground water flow patterns	A wetlands and waters survey will be completed in Spring 2016. 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 16**
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, Oliver Wind III will work with the 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. The Project will provide revenue for the Mandan School District.	7.4
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

Table 8. Selection Criteria

Selection Criteria	Potential Adverse Effects	Section Addressed
Recreational programs and facilities	No recreational programs or facilities will be directly affected by the Project. Recreational impacts would be auditory and visual in nature and limited to individuals using private property 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 proposed Project construction, but is expected to be temporary and not significant. During facility operation, no significant impacts are anticipated.	7.4, **Figure 13**
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 proposed Project construction.	7.4
Utility services	The proposed Project will utilize station service from Roughrider Electric Cooperative, Inc. and the Mor-Gran-Sou Electric Cooperative, which will suggest appropriate configurations for the electrical system, and Oliver Wind III 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	The noise sensitive land uses within the proposed Project Area are the residences near turbine locations. The sound impacts from the proposed Project turbines will be within the PSC limit at inhabited residences, with the exception of one inhabited residence; Oliver Wind III is working to obtain a waiver from the owner of the residence where 50 dBA would be exceeded. If a waiver cannot be obtained, Oliver Wind III will ensure the 50 dBA requirement is met.	7.6, 7.17
Rural residences and businesses	The proposed Project will comply with state and local setbacks.	4.1.1, 7.2, 7.3, **Figure 5**
Aquifers	Based on the small amount of increased impervious surface area that will be created by proposed Project components relative to the separation of these components and the size of the entire Project Area, the proposed Project would likely have minimal impacts to regional groundwater recharge.	7.11
The impact upon:		
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
Animal health and safety	No impacts to livestock are anticipated from construction or operation of the facility. Based on avian surveys performed to date, mean raptor use was generally low compared to other wind facilities. For other avian species, fatalities from the proposed Project, if any, are not anticipated to have population-level effects. Oliver Wind III will implement measures to avoid and minimize effects to wildlife by siting facilities away from active raptor nests and wetlands to the extent practicable. A Bird and Bat Conservation Strategy is being prepared for the proposed Project. In addition, Oliver Wind III will implement a post-construction Wildlife Response and Reporting System and one year of post-construction bird and bat mortality monitoring for the proposed Project in order to monitor avian/turbine interaction.	7.15, 7.16
Plant life	The proposed Project will result in up to 50 acres of permanent impact. Land where the turbines will be sited is primarily undeveloped pasture/hay, cropland, and grassland.	7.14, **Figure 11**
Temporary and permanent housing	Existing temporary housing, such as hotels, will be utilized during construction. No adverse impacts are anticipated.	7.2

Table 8. Selection Criteria

Selection Criteria	Potential Adverse Effects	Section Addressed
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 effect 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, noise, safety and health issues, and cultural resources. Socioeconomic impacts are anticipated to be positive, as the rural economy and energy production is diversified. Wind energy development removes less total land from agricultural use than other forms of energy generation development.	10.11

3.4 Policy Criteria

In accordance with NDAC Section 69-06-08-01(6), the PSC may give preference to an applicant that will maximize benefits that result from the adoption of the policies and practices listed in **Table 9**, and may require the adoption of such policies and practices as appropriate.

Table 9. Policy Criteria

Policy Criteria	Suitable Policy or Practice of Applicant	Section Addressed
Recycling of the conversion byproducts and effluents	Not applicable.	N/A
Energy conservation through location, process, and design	Oliver Wind III 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. Developing the Project in proximity to an existing transmission line will also reduce land impacts.	4.2
Training and utilization of available labor in this state for the general and specialized skills required	Oliver Wind III 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 of the State of North Dakota.	5.2
Non-relocation of residents	No residents will be relocated as a result of the proposed Project.	7.2.2
The dedication of an area adjacent to the facility to land uses such as recreation, agriculture, or wildlife management	The proposed 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 proposed Project Area is already used for agriculture.	7.3, 7.8, 7.9, 7.15, **Figures 5 and 12**
Economies of construction and operation	Oliver Wind III will utilize local contractors to the extent practicable.	7.2
Secondary uses of appropriate associated facilities for recreation and enhancement of wildlife	None.	N/A
Use of citizen coordinating committees	Oliver Wind III has coordinated with County officials on the location of the proposed Project, held a landowner dinner on January 7, 2016, and will continue to work with landowners of properties for the proposed Project.	8.0

Policy Criteria	Suitable Policy or Practice of Applicant	Section Addressed
A commitment of a portion of the energy produced for use in this state	Energy transmitted will be injected into the Center to Mandan 230kV Overhead Transmission Line. Oliver Wind III expects that a portion of this energy will be used in state.	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	Oliver Wind III and the EPC contractor will employ best management practices during construction to monitor soil impacts and segregate topsoil. A storm water prevention plan will be prepared for the proposed Project. Oliver Wind III will conduct 1 year of post-construction bat and bird fatality monitoring and rely on the Wildlife Response and Reporting System for the life of proposed Project operations.	7.10, 7.11, 7.12, 7.15, 7.16

3.5 Design and Construction Limitations

Key design and construction limitations when building any wind farm are wind resources, landowner easements, regulatory setbacks (local and state), and available transmission. The wind resource is essential to selecting and designing a wind farm. Oliver Wind III has conducted an analysis of the proposed Project Area 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 proposed Project. Oliver Wind III has secured voluntary land agreements with landowners necessary to develop the proposed Project. The proposed Project complies with all Morton county setbacks and PSC exclusion areas (see Section 4.1.1).

3.6 Economic Considerations

Economics were considered when selecting a location for the proposed Project. As discussed above, it is important to select a site with a wind resource capable of generating energy. The proposed 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 proposed Project is the need to qualify for the Federal Production Tax Credit (PTC). The PTC is an income tax credit of 2.3 cents/kilowatt-hour allowed for the production of electricity from utility-scale wind turbines. 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. The wind energy PTC will now be extended through 2016, and then continue at a decreased value through 2019. Wind projects qualify for the PTC if construction is started before the end of 2019 (AWEA 2015a).

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4. 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. Exact turbine models are subject to change to ensure selection of a turbine that is both cost effective and optimizes land and wind resources. Oliver Wind III is proposing to install up to 48 wind turbines. The current layout includes 43 GE 2.1 MW and 5 GE 1.79 MW Xle turbines. Oliver Wind III is seeking flexibility from the PSC to select the most appropriate technology for the proposed Project at the time of construction to ensure optimization of wind and land resources and cost efficiency.

The GE 2.1 MW utility-grade wind turbine has a nominal nameplate rating of 2.1 MW. Each turbine will have an 80-meter (262 feet) hub height and a 116-meter (381 feet) rotor diameter (**Figure 6**). The GE 1.79 MW Xle turbine has a nominal nameplate rating of 1.79 MW, an 80-meter hub height, and a 100-meter (328 feet) rotor diameter. Both turbines begin operation in wind speeds of 3.5 meters per second (m/s), or 7.8 miles per hour (mph), and are designed to operate in wind speeds of up to 25 m/s (56 mph). The 2.1 MW turbine is designed to reach its rated capacity at a wind speed of 11.0/s (24.6 mph), whereas the 1.79 MW turbine is designed to reach its rated capacity at a wind speed of 11.5 m/s (25.7 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 is raised (stepped up) to power collection line voltage of 34.5kV. The electricity is collected by a system of underground power collection lines within the Project Area (**Figure 7**). Both power collection lines and communication cables will be buried on private property or public right-of-way.

Each wind turbine will be accessible via all-weather, aggregate-surfaced roads between 16 and 34 feet in width that will connect with public roads. At the point where the access and public roads meet, the communication and power lines will continue as underground feeder lines. The feeder system distributes power to the proposed collection substation. **Figure 7** is a diagram of the path of energy from a wind farm to energy users and **Figure 8** shows a typical wind farm facility layout. The power will be transformed to 230kV at a collection substation that will be constructed on Section 10, Township 140 North, Range 83 West. The collection substation and O&M facility will be co-located along 32nd St, east of 33rd Ave (**Figure 9**). A 4.5-mile overhead transmission line and a switchyard (the Minnkota Switchyard, **Figure 10**) will be constructed to connect the proposed Project to the Center to Mandan 230kV Overhead Transmission Line. The Minnkota Switchyard and the 4.5 mile transmission line, will be permitted separately.

4.1.1 Wind Energy Center Layout

Oliver Wind III is developing 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 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 proposed Project are the most restrictive of those required by Morton County, the PSC, GE, or NEER's internal standards. At the time this application was prepared, Oliver County did not have established setbacks relevant to any of the components of the wind energy facility. The proposed Project also complies with or exceeds the following wind energy-specific exclusion areas provided in Section 69-06-08-01 (2):

- 1.1 x height of turbine from interstate and state road rights-of-way
- 1.1 x height of turbine plus 75 feet from centerline of county or maintained township roadways
- 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

Table 10 lists the setbacks utilized in designing the proposed Project layout. The distances are based on the GE 2.1 MW turbine, which has a larger rotor diameter than the GE 1.79 MW Xle turbine model, and has a total turbine height (from the bottom of the turbine tower to the top of the blade when vertical) of 453 feet. The CUP issued by Morton County specifies that the proposed Project turbines must be set back from the nearest interstate, state, or county road or above ground communication or electrical lines or railroad right-of-way a distance not less than 1.1 times the height of the turbine plus 75 feet from the centerline of the existing right-of-way or object. The Morton County CUP also requires that proposed Project turbines must have a setback distance of 1.25 times the height of the turbine or 1,320 feet, whichever is greater, from all existing inhabited residential structures. Oliver Wind III will comply with all applicable county setbacks, and has incorporated the PSC setback of 1,400 feet from all existing inhabited structures into Project design.

Table 10. Setback Distances for Wind Turbines

Setback Type	Distance
PSC Exclusion Areas	
Interstate and state road rights-of-way	1.1 x turbine height (498.3 feet)
Centerline of county or maintained township roadways	1.1 x turbine height, plus 75 feet (573.3 feet)
Railroad rights-of-way	1.1 x turbine height (498.3 feet)
115kV or higher transmission lines	1.1 x turbine height (498.3 feet)
Property line of non-participating landowners	1.1 x turbine height (498.3 feet)
Occupied residences	1,400 feet
Morton County Setbacks	
Inhabited structures and facilities (residence, commercial building or publicly-used structure), or state and county park	1.25 x turbine height (566.25 feet) or 1,320 feet, whichever is greater
Public roads	1.1 x turbine height plus 75 feet (573.3 feet)
Above ground communication and electrical lines	1.1 x turbine height plus 75 feet (573.3 feet)
Railroad right-of-way	1.1 x turbine height plus 75 feet (573.3 feet)
Section lines	100 feet
Wind Energy Facility Perimeter	1.5 x turbine height (679.5 feet for the 2.1 MW turbines and 640.5 feet for the 1.79 MW turbines)
Property line of non-participating landowners	1.5 x turbine height (679.5 feet) (unless variance is granted)
Other	
GE-provided setback from barns, abandoned houses, and roads (more conservative than PSC setback)	1.5 x turbine height (679.5 feet)

4.2 Associated Facilities

In addition to turbines, the proposed Project includes electrical collection lines, access roads, and meteorological towers. The electricity generated by each turbine is stepped up to a power collection line voltage of 34.5kV 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 the collection substation. A total of three temporary meteorological towers have been or will be installed for the proposed Project, and one additional permanent meteorological tower will be installed.

A separate application for the transmission line and Minnkota Switchyard will be submitted to the PSC for a Certificate of Corridor Compatibility and Route Permit. Equipment will be added within the proposed 5-acre footprint of the proposed Oliver III Wind Energy Center's collection substation to accommodate Project needs. The 5-acre O&M facility and temporary laydown area will also be used for the proposed Project.

4.3 Land Rights

Oliver Wind III has secured easements in Morton and Oliver counties for the proposed Project. Land rights will encompass the proposed wind farm and all associated facilities, including but not limited to wind and buffer easements, wind turbines, access roads, underground collection lines, meteorological towers, and overhead transmission line. The land for the proposed Project collection substation, O&M building, and Minnkota Switchyard will be purchased.

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5. PROPOSED SITE

5.1 Identification of Project Area

Oliver Wind III selected the Project Area based on its wind resource, land-use patterns, and low presence of environmentally sensitive features. The proposed Project Area boundary encompasses an area of 21,878 acres (34 square miles). However, the land occupied by turbines and other wind farm infrastructure during operation will be less than 1 percent of this area. It is anticipated that the area of permanent land use during operation will be up to 50 acres for the turbines, aggregate-surfaced access or service roads up to 16 feet wide, electrical junction boxes, one permanent meteorological tower, a collection substation, Minnkota Switchyard, and O&M building. Total temporary land disturbance during construction for the proposed Project is expected to be up to approximately 557 acres, including temporary disturbance due to turbine installation, road construction of roads up to 50 feet wide, collection line trenching, up to three temporary meteorological towers, fiber optic line, temporary crane paths, and the laydown area. See **Table 4** in **Section 1.3.1** and **Section 7.0** for a detailed description of the proposed Project Area impacts. **Figure 3** shows the proposed turbine locations, which are subject to shifts to avoid sensitive resources, pending completion of environmental and cultural resources surveys.

5.2 Wind Resource Areas – General

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. 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, 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 proposed Project generally consist of Class 4 winds (USDOE 2014).

5.3 Wind Characteristics in Project Area

Oliver Wind III has utilized wind data from meteorological towers in the Project Area to characterize the wind resource. Oliver Wind III 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 and processed by NEER. Industry standard software, such as Windographer, Openwind, WRF, and ArcGIS as well as internal NEER 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 in the Project Area. 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

NEER's internal wind resource group, there is good correlation between the long-term wind measurements and the short-term Project-specific wind measurements.

6. ENGINEERING AND OPERATIONAL DESIGN ANALYSIS

This section provides a summary description of the proposed Project, which includes a description of the proposed Project layout, turbines, electrical system, and associated facilities. Additional design components addressed in this section are proposed Project construction, schedule, operation, and decommissioning of the site. There are other turbines that are feasible choices for the proposed Project Area that are available from various manufacturers and Oliver Wind III wishes to reserve the right to select alternative turbines representative of the 2.1 MW and 1.79 MW Xle class of wind turbines. Turbine type may affect the number and configuration of the turbine array. Details for the GE 2.1 MW and 1.79 MW Xle turbines are presented below.

6.1 Project Layout and Associated Facilities

The proposed Project will consist of an array of wind turbines and transformers. The turbines will be interconnected by fiber optic communication cables and 34.5kV power collection cables within the wind farm.

Land will be graded on-site for the turbine pads. Drainage systems, access roads, and construction laydown 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 discussions with Minnkota. The proposed Project includes a computer-controlled communications system that permits automatic independent operation, and remote supervision, thus allowing the simultaneous control of many wind turbines. Oliver Wind III will be responsible for operation and maintenance for the life of the proposed Project and will contract with an appropriate supplier of O&M services at the time of operation, to assure timely and efficient operations.

6.2 Description of Wind Turbines

The proposed Project is currently designed to include a total of 48 turbines; 43 GE 2.1 MW and 5 GE 1.79 MW Xle turbines. Oliver Wind III is seeking flexibility from the PSC to select the most appropriate technology for the proposed Project at the time of construction to ensure optimization of wind and land resources and cost efficiency.

6.2.1 Turbine

Both turbine models would have a hub height of 262 feet (80 meters); the 2.1 MW turbines will measure 453 feet from the base of the tower to the tip of the upright blade (**Figure 6**), and the 1.79 MW turbines will measure 427 feet.

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 Supervisory Control and Data Acquisitions (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 for the proposed Project 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. Oliver Wind III 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 generator and an asynchronous 4-pole generator with a wound rotor;
- A braking system for each blade (three self-contained systems) and a fail-safe disc brake; and
- Yaw systems are electromechanically driven.

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 2.1 MW turbines have a 116-meter (381 feet) rotor diameter, with a swept area of 10,568 square meters (113,753 square feet) and a rotor speed between 8 to 15.7 revolutions per minute. The 1.79 MW turbines have a 100-meter (328 feet) rotor diameter, with a swept area of 5,346 square meters (57,544 square feet) and a rotor speed of 16.8 revolutions per minute.

6.2.3 Tower

The towers will all be conical tubular steel with a hub height of up to 80 meters (262 feet). The portion of the foundation that is above ground is 15 to 16 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 are made by automatically controlled power welding machines and ultrasonically inspected during manufacturing per American National Standards Institute specifications. All surfaces are sandblasted and multi-layer coated for protection against corrosion. Access to the turbine is 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 are placed in each rotor blade and in the tower. The electrical components are also protected.

6.3 Description of Electrical System

At the base of each turbine, a step-up transformer will be installed to step up the voltage to the power collection line voltage of 34.5kV. The power from these transformers will be run through an underground collection system consisting of various sized buried cables that are generally located alongside the proposed Project access roads. Collection lines will be buried 42 to 48 inches deep and will not affect farming equipment. At the point where the access and public roads meet, the collection system will continue as underground lines. All the collection system cables will terminate at an on-site Project collector substation, which includes a power transformer to step up the voltage from 34.5kV to 230kV and provides the necessary protection and control for interconnection to the transmission grid. The proposed collection substation (**Figure 9**) will be located east of 33rd Ave and adjacent to 32nd St in Section 10, Township 140 North, Range 83 West.

The proposed Project will interconnect to the electrical grid via a tap to the existing Minnkota Center to Mandan 230kV Overhead Transmission Line located in the northeast quarter of Section 23, Township 141 North, Range 83 West. A switchyard will be constructed at the point of interconnection (**Figure 10**). A 4.5-mile 230kV overhead transmission line will connect the proposed collection substation to the Minnkota Switchyard.

A fiber optic communication line will be needed for the proposed Project to connect to the West River Telecommunication Cooperative's system. The majority of the fiber optic line will be co-located with the underground collection system. Approximately one mile of fiber optic line will be sited outside of the collection system to connect the proposed Project to the 66 foot x 66 foot aboveground demarcation box (**Figure 3**).

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

6.4 Temporary Meteorological Evaluation Towers

Prior to the construction of the proposed Project, three temporary meteorological evaluation towers (METs) will be installed which will monitor and collect wind data (speed, direction, etc.) over a period of time up to a maximum of 5 ½ years, according to the terms of the agreement. This data will be used to validate Oliver Wind III's previous desk top analysis of available wind data in order to determine if this area possesses a wind resource that will support development of a wind energy center and provide critical wind data required for project financing after construction. These three temporary METs are located in the following locations (**Figure 3**):

MET DM01	SW4 24-140-83, Parcel 53-0092000
MET DM02	NW4 10-140-83, Parcel 53-0039000
MET DM03-Alt	SW4 6-140-83 (Less 10 acre tract), Parcel 53-0022000

Each of the proposed towers is an NRG 60 meter XHD Tall-tower consisting of galvanized steel tube construction that will be guyed at six levels in four directions, and will stand approximately 197 feet in height. The tower sits on a metal baseplate and is powered with small mounted solar panels, therefore requires no foundation or outside utilities. Four sets of guy anchors are placed at 40 meters (131 feet), 45 meters (147 feet), and the outermost guy anchor at 50 meters (164 feet). The tower is constructed on the ground and is tilted into its final position with a temporarily anchored winch. Construction of the tower is anticipated to take approximately two days depending on weather conditions.

Based on the height and location of the METs, none will require to be filed with the Federal Aviation Administration (FAA) or be artificially lit for nighttime visibility. Each of the towers will be painted orange and white and have orange marker balls placed on the guy wires to aid in daytime visibility. This marking methodology is consistent with recommendations from the FAA and National Transportation Safety Board.

6.5 SCADA Meteorological Evaluation Tower

One SCADA MET will be installed during the construction phase of the proposed Project and remain in place for the life of the Project. The purpose of the SCADA MET is to monitor real time wind data during the operation of the Project to ensure it is generating electricity at expected levels. One proposed permanent SCADA MET and one alternate SCADA MET are included in this application for flexibility; Oliver Wind III will only construct one permanent SCADA MET.

The lattice tower will stand approximately 80 meters in height (approximately 262 feet) and will sit on a single caisson foundation and be held in place with three sets of guy wires placed in a triangular pattern, each anchored at a single guy anchor 210 feet away. The lattice tower will have an 18 inch face width and have solid round legs with serpentine bracing.

Based on the height and location of the SCADA MET, Oliver Wind III is required to file with the FAA and it is anticipated to be artificially lit for nighttime visibility. The tower will also be painted orange and white and have orange marker balls placed on the guy wires to aid in daytime visibility.

6.6 Project Construction

Several activities must be completed prior to the proposed 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 proposed Project. Pre-construction, construction, and post-construction activities for the proposed Project include:

- Ordering of all necessary components including towers, nacelles, blades, foundations, and transformers;
- Final turbine micrositing;
- Complete survey to microsite locations of structures and roadways;
- Soil borings, testing, and analysis for proper foundation design and materials;
- Complete construction of access roads, to be used for construction and maintenance;
- Construction of underground feeder lines;
- Design and construction of the proposed collection substation and Minnkota Switchyard;
- Installation of tower foundations;
- Installation of underground and aboveground cables;

- Tower placement and wind turbine setting;
- Acceptance testing of facility; and
- Commencement of commercial operation.

Private turbine access roads will be built adjacent to the towers, allowing access to the turbines during and after construction. Access roads will be typically be 16 feet wide,[1] 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 proposed 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. Oliver Wind III estimates that there will be approximately 800 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 tower assembly are taking place. At the completion of each construction phase, this equipment will be removed from the site or reduced in number.

6.6.1 Construction Management

An EPC contractor will be primarily responsible for the construction management of the proposed Project. 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;
- Perform detailed civil, structural and electrical engineering;
- Schedule execution of construction activities; and
- Forecast labor requirements and budgeting.

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

- Site development, including roads;
- Foundation excavation;
- Concrete foundations;

[1] Roads required to support crane access to turbines during operation will remain up to 34 feet wide; all other roads may be built at 16 feet wide or reduced later to 16 feet.

- All electrical and communications installation;
- Tower assembly and machine erection; and
- 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 local subcontractors to complete all aspects of construction. Throughout the construction phase, ongoing coordination will occur between the Project development and the construction teams. The on-site construction manager will help to coordinate all aspects of the proposed Project, including ongoing communication with local officials, citizens groups and landowners. Even before the proposed 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, finally, operations.

6.6.2 Foundation Design

The wind turbines' freestanding 80-meter (262-foot) tubular towers 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, 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 registered professional engineer licensed to practice in the State of North Dakota.

6.6.3 Civil Works

Completion of the proposed Project 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 to the Project Area;
- 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 cabling 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 any site fencing and security; and
- Restoration and re-vegetation of disturbed land when construction activities are completed.

Any improvements to existing public access roads will consist of re-grading and filling of 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 to 34 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 is completed, the roads will be re-graded, filled, and dressed as needed.

6.6.4 Commissioning

The proposed Project will be commissioned after completion of the construction phase. The proposed 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.

6.6.5 Project Operation and Maintenance

Oliver Wind III will operate the wind energy facility for the life of the proposed Project. Approximately 6 people will be employed on-site to operate and maintain the facility. The O&M staff will have full responsibility for the facility to ensure operations and maintenance activities are conducted consistent with applicable permits, prudent industry practice, and equipment manufacturer recommendations for the turbines.

In addition to the on-site O&M staff, NEER’s Fleet Performance and Diagnostic Center will control, monitor, operate, and maintain the proposed Project remotely by means of a SCADA computer software program. The operation of the entire wind farm, including discrete settings for individual turbines, is managed by the onsite operations staff and remotely via the Fleet Performance and Diagnostic Center.

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; and
- Provide information reporting on a regular basis.

Maintenance Schedule

Oliver Wind III's on-site operations staff will be responsible for the maintenance of the proposed Project 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 three months of commercial operation to verify that the proposed Project is operating within expected parameters. Once installed, the proposed Project service and maintenance is carefully planned and divided into the following intervals:

A. First Service Inspection. The first service inspection will take place one to three months after the turbines have been commissioned. At this inspection, particular attention is paid to tightening all bolts by 100 percent, a full greasing, and filtering of gear oil.

B. Semi-Annual Service Inspection. Regular service inspections commence six months after the first inspection. The semi-annual inspection consists of lubrication and a safety test of the turbine.

C. Annual Service Inspection. The annual service inspection consists of a semi-annual inspection plus a full component check. Bolts are checked with a torque wrench. The check covers 10 percent of every bolt assembly. If any bolts are found to be loose, all bolts in that assembly are tightened 100 percent and the finding is recorded.

D. Two-Year Service Inspection. The two-year service inspection consists of the annual inspection, plus checking and tightening of terminal connectors.

E. Five-Year Service Inspection. The five-year inspection consists of the annual inspection, an extensive inspection of the wind braking system, and checking and testing of oil and grease, balance check, and tightness of terminal connectors.

6.6.6 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 proposed Project structures, access roads, drainage systems and other facilities necessary for the Project's operation;
- Maintenance of all O&M field maintenance manuals, service bulletins, revisions, and documentation for the proposed Project;
- Maintenance of all parts, price lists, and computer software;
- Maintenance and operation of proposed collection substation;
- 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 in order 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; and
- Remote monitoring on a daily basis.

Oliver Wind III affiliate NextEra Energy Operating Services will also remotely monitor the proposed Project on a daily basis.

6.6.7 Operations and Maintenance Facility

The O&M building will be a 5,000 square foot (50 feet x 100 feet) structure. The O&M building and collection substation will be adjacent to one another along 32nd St, east of 33rd Ave in Section 10, Township 140 North, Range 83 West.

6.7 Decommissioning and Restoration

Oliver Wind III will develop a Decommissioning Plan in accordance with NDCC 49-02-27, NDAC 69-09-09, and will remove all structures to a depth of three feet below pre-construction grade and release any easements of record in accordance with Morton County Land Use Code Article V Section 5-180(f). Additionally, Oliver Wind III has a contractual obligation to the landowners to remove the wind facilities, including foundations, to a depth of three 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. Oliver Wind III also reserves the right to explore alternatives regarding decommissioning at the end of the proposed Project's Certificate 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. 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 highlighted in NDCC 69-06-08-01.

7.1 Description of Environmental Setting

The Project Area is located in northeastern Morton County and southeastern Oliver County in central North Dakota, a primarily rural agricultural area located approximately 13 miles northwest of Bismarck, North Dakota.

7.2 Demographics

7.2.1 Description of Resources

The proposed Project is located in a primarily rural agricultural region in the southeastern portion of Oliver County and northeastern Morton County, North Dakota. The Project Area is located in between Morton County Road 84/Oliver County 37th Ave SW to the west and State Highway 25 to the east. The northern boundary of the Project Area is along 29th Street SW in Oliver County, and the southern boundary is along 35th St. in Morton County. Interstate Highway 94 is three miles south of the Project Area. There are no incorporated communities within the Project Area. The Project Area is approximately six miles west of the community of Harmon (2010 population 145; U.S. Census Bureau 2015), and approximately nine miles south of the city of Center (2010 population 571; U.S. Census Bureau 2015). The city of Mandan (2010 population 18,331; U.S. Census Bureau 2015) is located approximately seven miles southeast of the Project Area, and the city of Bismarck (2010 population 61,272; U.S. Census Bureau 2015) is located approximately 13 miles to the Southeast of the Project Area. According to data provided by Swenson, Hagen & Company, there are 65 inhabited residences and several agricultural operations within the Project Area, but there is no indication of any new residential construction within the Project Area.

Oliver County

Oliver County had a population of 1,846 persons in 2010, a 12 percent decrease from the 2000 population of 2,065 (U.S. Census Bureau 2015). Recent 2014 estimates indicate the population is decreasing (1,832 persons). The county contains 723 square miles of land, with a density of 2.6 persons per square mile. The majority of the county population resides in the county seat of Center, located approximately nine miles north of the Project (U.S. Census Bureau 2015). The population density within the rural area surrounding the Project Area is much lower than the county average. Approximately 97 percent of the population of Oliver County is composed of white persons who are not of Hispanic or Latino origin. As of 2014, it is estimated that approximately 17 percent of the county population is 65 years or older, while approximately six percent of the population is under five years of age (U.S. Census Bureau 2015).

According to the 2014 U.S Census Bureau American Community Survey (U.S. Census Bureau 2014) over 23 percent of the county workforce worked in agriculture, forestry, fishing and hunting, and mining, and over 20 percent worked in education, health, and social services. Construction accounted for approximately 13 percent of the jobs in the county. Per capita income estimated in 2014 was $31,194 and the median household income was $62,708 (U.S. Census Bureau 2014). In 2014, approximately 7.7 percent of the county population lived below the poverty level (U.S. Census Bureau 2014), compared to 11.9 percent nationwide (U.S. Census Bureau 2014).

Agriculture continues to play a significant role in the county's land use and economy. In 2012, there were 290 farms in Oliver County, comprising approximately 85 percent of the land area. According to the 2012 Census of Agriculture (USDA 2012b), total market value of agricultural products produced in Oliver County was $85,495,000, 60 percent of which was from crops and 40 percent from livestock sales. The primary livestock is cattle and the principal crops include wheat and spring wheat. Hay, corn, and sunflower are also grown.

Morton County

Morton County had a population of 27,471 persons in 2010, a nine percent decrease from the 2000 population of 25,303 (U.S. Census Bureau 2015). Recent 2014 estimates indicate the population is increasing (28,428 persons). The county contains 1,926 square miles of land, with a density of 14.3 persons per square mile. The majority of the county population reside in the city of Mandan, located approximately seven miles southeast of the Project (U.S. Census Bureau 2015). The population density within the rural area surrounding the Project Area is much lower than the county average. Approximately 94 percent of the population of Morton County is composed of white persons who are not of Hispanic or Latino origin. As of 2014, it is estimated that approximately eight percent of the county population is 65 years or older, while approximately three percent of the population is under five years of age (U.S. Census Bureau 2015).

According to the 2014 U.S Census Bureau American Community Survey (U.S. Census Bureau 2014) approximately 25 percent of the county workforce worked in education, health, and social services, and approximately 13 percent worked in retail trade. Arts, entertainment, and recreation, and accommodation and food services accounted for approximately eight percent of the jobs in the county. Per capita income estimated in 2014 was $30,293 and the median household income was $58,949 (U.S. Census Bureau 2014). In 2014, approximately 8.7 percent of the county population lived below the poverty level (U.S. Census Bureau 2014), compared to 11.9 percent nationwide (U.S. Census Bureau 2014).

Agriculture continues to play a significant role in the county's land use and economy. In 2012, there were 887 farms in Morton County, comprising approximately 99 percent of the land area. According to the 2012 Census of Agriculture (USDA 2012a), total market value of agricultural products produced in Morton County was $152,179,000, 68 percent of which was from crops and 32 percent from livestock sales. The primary livestock is cattle and the principal crops include wheat and spring wheat. Hay, corn, and sunflower are also grown.

7.2.2 Impacts

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

Oliver Wind III estimates that the proposed Project will provide over $14.6 million in tax revenue to Oliver and Morton counties over 30 years.

Less than one percent of the total proposed Project Area will be permanently affected due to conversion to turbine sites, access roads, a collector substation, O&M building, and meteorological towers. Landowner compensation has been established under individual lease agreements, and includes compensation for crop damage during surveys and construction. In general, agricultural areas surrounding each turbine can still be farmed. In addition, 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 proposed Project Area. Project construction will not cause additional impacts to leading industries within the proposed Project Area. There is no indication that any minority or low-income population is concentrated in any one area of the proposed Project, or that the wind turbines will be placed in an area occupied primarily by any minority group.

To the extent that local contractors are used for portions of the construction, total wages and salaries paid to contractors and workers in Oliver and Morton counties will contribute to the total personal income of the region. Additional personal income will be generated for residents in the county 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 county and the state.

Up to 200 construction workers are expected to be required for approximately six months for construction of the proposed Project. It is likely that general skilled labor is available either in the counties or the state to serve the basic infrastructure and site development needs of the proposed Project. Specialized labor will be required for certain components of wind farm development. It is likely that general skilled 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 Bismarck. Operation and maintenance of the facility will require six full-time employees, most of which are expected to reside locally. Sufficient permanent housing is available within the counties to accommodate these new employees.

Long-term beneficial impacts to the counties tax bases 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 southeast 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 in turn contribute to the economic growth in the region; there are at least four wind energy-related manufacturing facilities in North Dakota (AWEA 2015b).

7.2.3 Mitigative Measures

Socioeconomic impacts associated with the proposed Project will be primarily positive, with an influx of wages and expenditures made at local businesses during the proposed Project construction and an increase in the counties tax bases due to construction and operation of the wind turbines and associated infrastructure. In addition, the lease payments paid to landowners will offset potential financial losses associated with removing land from agricultural production.

7.3 Land Use

7.3.1 Description of Resources

The land within the proposed Project Area boundary is primarily agricultural with scattered farmstead residences. The proposed Project will be located on privately-owned land in southeastern Oliver County and northeastern Morton County, approximately 13 miles northwest of Bismarck. Oliver Wind III proposes to install a 100-MW wind generating facility, consisting of up to 48 wind turbines within a 34-square mile (21,878-acre) proposed Project Area. Current land use within the proposed Project Area is primarily agricultural, supporting both crops and livestock grazing. No city limits are within the proposed Project Area. The proposed Project Area is not within any known military installation (**Appendix B**) or near an intercontinental ballistic missile launch or launch control facility.

Natural resource development in the proposed Project Area consists primarily of agriculture. There are coal reserve/deposits within the proposed Project Area. Agricultural production is anticipated to continue in the future.

Table 11 and **Figure 11** identify current land use in the proposed Project Area based on 2011 U.S. Geological Survey (USGS) National Land Cover data. Land use in the proposed Project Area is dominated by cultivated crops (57 percent), followed by herbaceous (28 percent), and pasture/hay (9 percent). Developed open space is also present but limited, accounting for approximately 4 percent of the proposed Project Area. Forest, wetland, and water categories were each 1 percent or less of the proposed Project Area.

Table 11. Land Cover within the Project Area

Land Cover	Acreage	Percent of Proposed Project Area
Cultivated Crops	12,392	57
Herbaceous	6,221	28
Pasture/Hay	1,911	9
Developed, Open Space	780	4
Deciduous Forest	165	1

Table 11. Land Cover within the Project Area

Land Cover	Acreage	Percent of Proposed Project Area
Woody Wetlands	160	1
Shrub/Scrub	93	Less than 1
Emergent Herbaceous Wetlands	86	Less than 1
Barren Land	36	Less than 1
Open Water	25	Less than 1
Developed, Low Intensity	5	Less than 1
Developed, High Intensity	2	Less than 1
Evergreen Forest	2	Less than 1

Source: Homer et al. 2015.

The National Resource Conservation Service (NRCS) administers a number of conservation-based programs for private landowners. The Conservation Reserve Program conserves soil and water resources and provides wildlife habitat by removing enrolled tracts from agricultural production, generally for a period of 10 years. These tracts cannot be hayed, tilled, seeded, or otherwise disturbed without the authorization of the NRCS. Based on National Conservation Easement Database data, there are no lands within the proposed Project Area enrolled in Conservation Reserve Program or other NRCS easements, although this must be confirmed with participating landowners.

The North Dakota Game and Fish Department (NDGF) administers and regulates the Private Lands Open to Sportsmen (PLOTS) program to allow hunting access on private lands through lease agreements with landowners. PLOTS allow for walk-in hunting during the legal hunting season. No properties that participate in PLOTS have been identified within the proposed Project Area (**Figure 12**).

7.3.2 Impacts

The development of the proposed Project will not result in a significant change in land use. The development of the proposed Project will not displace any residents or existing or planned industrial facilities. Wind turbines will be sited a minimum of 1,400 feet from all currently occupied residences. The area will largely retain the rural characteristics of the vicinity. At other wind developments in North Dakota, landowners frequently plant crops and/or graze livestock to the edge of the access roads and turbine pads. The access roads will be between 16 and 34 feet wide[2] and low profile to allow cross-travel by farm equipment. Oliver Wind III will work closely with landowners in locating access roads to minimize land use disruptions to the extent possible. Consideration will be taken in locating access roads to minimize impact on current or future row crop agriculture and environmentally sensitive areas. During the construction of the wind power facilities, additional areas may be temporarily disturbed for contractor staging areas and underground power lines. These areas will be graded to original contour and, if necessary, reseeded with appropriate vegetation.

[2] Roads required to support crane access to turbines during operation will remain up to 34 feet wide; all other roads may be built at 16 feet wide or reduced later to 16 feet.

It is estimated that installation of up to 48 turbines and the associated access roads, collection substation, O&M building, and permanent meteorological tower will result in the conversion of up to 50 acres of land. An additional 557 acres are estimated to be temporarily disturbed during the construction phase of the proposed Project, primarily for installation of the turbines, road construction, collection line trenching, a 15-acre laydown/staging area, and three temporary meteorological towers.

7.3.3 Mitigative Measures

Oliver Wind III 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 extent possible. Operation of the wind farm will not change the land use in the proposed Project Area. The proposed land use will not involve any ongoing industrial use of non-renewable resources or emissions into the environment.

7.4 Public Services

7.4.1 Description of Resources

Local Government Services

The proposed Project is located in a sparsely populated, rural area in central North Dakota. There is an established transportation and utility network that provides access and necessary services to the small cities, homesteads, and farms existing near the proposed Project. There are no incorporated communities within the proposed Project Area. The closest communities are the small unincorporated community of Harmon, located approximately six miles east of the proposed Project Area (approximately seven miles from the nearest planned proposed Project turbines), and the Oliver County seat of the city of Center, approximately nine miles north of the proposed Project Area (approximately 9.5 miles from the nearest planned proposed Project turbines). The Morton County seat of the city of Mandan is located approximately seven miles southeast of the proposed Project Area. Mandan provides sanitary sewer, water, utility services, educational facilities, and recreational facilities and parks to its residents and visitors. Mandan's local services include emergency services, ambulance service, a hospital, clinics, a wastewater treatment plant, a landfill, and a police department.

Electrical Service

Electrical service in Morton County is provided by Mor-Gran-Sou Electric Cooperative, and electrical service in Oliver County is provided by Roughrider Electric Cooperative Inc. The Mor-Gran-Sou Electric Cooperative will provide power to the collection substation. Roughrider Electric Cooperative will serve the Minnkota Switchyard.

Roads

County and township (section line) roads characterize the existing roadway infrastructure in and around the proposed Project. The proposed Project Area is accessed via I-94, State Highway 25/26th Ave, Morton County Road 84/39th Ave (Oliver County 37th Ave SW), and other local two-lane paved and gravel county roads.

Traffic

Existing traffic volumes on the area's major roadways are documented in **Table 12** and **Figure 13**. Determining the specific capacity of any highway is a complex process. However, general estimates are used for planning purposes. For purposes of comparison, the functional capacity of a two-lane paved rural highway is approximately 5,000 vehicles per day, or Average Annual Daily Traffic (AADT).

Additional county and township roads run through the proposed Project Area, but no vehicle count data are available for them. In general, the North Dakota Department of Transportation (NDDOT) indicated that roads with vehicle counts under 100 AADT are rarely counted. According to NDDOT, vehicle counts on routes with no count data are likely lower than those with count data.

Table 12. Existing Daily Traffic Levels

Roadway Segment	Existing AADT/Commercial Truck Traffic
Interstate 94 west of State Highway 31	9,070/2,355
Interstate 94 east of State Highway 31	9,815/2,365
State Highway 31 north of Interstate 94	1,230/240
State Highway 31 north of State Highway 25	550/95
State Highway 31 south of State Highway 25	710/200
State Highway 25 west of Center	675/95
State Highway 25 east of Center	1,380/190

Source: 2014 Traffic Volumes (NDDOT 2014).

Water Supply

Water supply within the proposed Project Area is provided by the Missouri West Water System and the Southwest Water Authority. The Missouri West Water System supplies potable water to communities within and near the proposed Project Area within Morton County. The Southwest Water Authority supplies potable water to communities within and near the proposed Project Area via the Southwest Pipeline proposed Project within Oliver County and part of Morton County. The Southwest Water Authority is in the process of constructing a main transmission pipeline to Center (Southwest Water Authority 2015). Oliver Wind III has determined the locations of Southwest Pipeline proposed Project facilities within the proposed Project Area, and will obtain a Southwest Pipeline crossing permit from the Southwest Water Authority.

Oliver Wind III would likely obtain water for construction from the Southwest Water Authority or the Missouri West Water System; water would be trucked to the construction-site. Water for the O&M facility may be obtained from the Southwest Water Authority, from the city of Mandan, or via an on-site water well.

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.

Oliver Wind III conducted a preliminary telecommunications study to identify all non-federal microwave telecommunication systems within the proposed Project Area.

7.4.2 Impacts

The proposed 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 of the proposed Project.

Local Government Services

No impact is expected to local services.

Electrical Service

The proposed Project will require station service from the local electric provider when the proposed Project is not generating electricity.

Roads

Construction of the proposed Project will require approximately 17.5 linear miles of new permanent aggregate-surfaced access roads. During operation of the proposed Project, the access roads will be used by O&M crews while inspecting and servicing the wind turbines. The access roads will be between towers, 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 and 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 800 additional vehicle trips per day on roads where construction is active within the proposed Project Area. Using any combination of state and county highways and other township roads throughout the proposed Project Area, the traffic impacts are considered negligible. Approximately 30 concrete trucks will be required to pour the foundation for each turbine. This is typically completed within two days. While there may be some noticeable increase in heavy vehicle traffic in discrete locations for limited amounts of time, for the proposed Project Area as a whole, 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 throughout the proposed Project Area would be used.

Truck access to the proposed Project site is provided by Highway 25 that runs north and south four miles east of the proposed Project Area, and Morton County 39th Ave/Oliver County 37th Ave SW that runs north and south 1.5 miles west of the proposed Project Area. Specific additional truck routes will be dictated by delivery location. Additional operating permits will be issued by the State or County for over-sized truck movements.

Water Supply

Construction and operation of the proposed Project will not significantly impact local water supply. Construction of the proposed Project will require approximately three million gallons of water for foundations, backfill, and compaction; five million gallons of water for road construction and civil infrastructure; and eight 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 Southwest Water Authority. Water for operation of the O&M facility may be obtained from the Southwest Water Authority or via an on-site water well. The abandonment of wells is not required for the proposed Project. The proposed Project will not require appropriation of surface water or permanent dewatering. Temporary dewatering of groundwater may be required during construction of turbine foundations.

Communications

Telephone and fiber optic cables within the proposed Project Area will be located in the field by the respective utility companies prior to construction and will not be negatively affected during construction.

Federally operated communications systems can be identified through consultation with the National Telecommunications and Information Administration (NTIA). Oliver Wind III has contacted the NTIA regarding the proposed Project but no response has been provided to date. Oliver Wind III will submit the NTIA response to the Commission upon receipt.

No impacts to FCC-licensed microwave beams are anticipated from the proposed Project turbines because a setback of blade length (51.5 meters) plus 10 meters (total 61.5 meters, or 202 feet) has been incorporated in the turbine layout.

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 meters 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.

7.4.3 Mitigative Measures

Construction and operation of the proposed Project will be in accordance with all associated local, state, and federal permits and laws, as well as industry construction and operation standards.

Local Government Services

With the addition of substation and transmission capacity, no impact to local services is anticipated, and no mitigation is required.

Electrical Service

Oliver Wind III will purchase station service from Roughrider Electric Cooperative for the Minnkota Switchyard in Oliver County, and will purchase station service from Mor-Gran-Sou Electric Cooperative for the Project collection substation in Morton County. Each electric cooperative will suggest appropriate configurations for the electrical system that Oliver Wind III will abide by to prevent impacts to the transmission system. Oliver Wind III has established a setback of 498.3 feet (110 percent the turbine height) from existing transmission lines (**Table 10**). No additional mitigation is necessary.

Roads

Oliver Wind III 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 3**.

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.

Water Supply

The abandonment of wells is not required for the proposed Project. However, in the event wells are abandoned, they will be sealed as required by North Dakota law. If temporary dewatering of groundwater is required during construction activities, discharge of dewatering fluid will be conducted under the requirements of the National Pollutant Discharge Elimination System (NPDES) permit and Storm Water Pollution Prevention Plan (SWPPP).

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 proposed Project facilities cross or otherwise affect existing communications systems, Oliver Wind III 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

Air Traffic

There are no public airports within 6 nautical miles of the proposed Project Area. There are four private airports/airstrips within six nautical miles of the proposed Project Area; the Letzring airport is due west, the Minnkota airport is north, the Wachter Ranch Private Landing Strip is to the east, and Z.P. Field Airport is to the south. Nautical miles are the standard measure for aviation; 1 nautical mile is equal to 1.15 statute miles. The nearest airport certified for commercial carrier operations is the Bismarck Municipal Airport (FAA ID BIS), located south of Bismarck and approximately 16 nautical miles southeast of the proposed Project Area.

Federal Radar Interference

Wind turbines may interfere with radar systems and airspace navigation. A query of the online Department of Defense (DoD) Preliminary Screening Tool was conducted for the proposed Project to obtain a preliminary review of potential impacts to Long Range Radar (FAA 2015). The latitude and longitude of four points encompassing the proposed Project Area were submitted for review (**Appendix B**).

The FAA reviews potential impacts to DoD radar as part of its aviation hazard review of structures that file a Notice of Proposed Construction or Alteration (FAA Form 7460-1). The FAA will request that the DoD and the U.S. Department of Homeland Security (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 proposed Project on radar systems primarily depends on the distance to the radar, and the number and configuration of the turbines.

Electromagnetic Fields

Use of electricity in our everyday lives creates electric and magnetic fields (EMF). EMF occur both naturally and from man-made sources. Power lines and utility facilities are among several sources of EMFs. People are exposed to EMF from many sources at many different levels and durations throughout their daily environments. These sources include kitchen and home appliances, wiring in buildings, power lines and utility facilities, and electrical equipment and devices we use at work. Examples of natural sources of EMF include static electricity and the earth's static magnetic field which guides a compass needle.

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

Potentially hazardous materials associated with the proposed 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.

Security

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

7.5.2 Impacts

Air Traffic

The installation of wind turbines creates a potential for air traffic collision. The wind turbines and meteorological 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. Oliver Wind III has submitted Notices of Proposed Construction or Alteration to the FAA for all proposed Project turbines; FAA determination is expected by March 19, 2016. The FAA's review will include the evaluation of any potential interference with air traffic. The wind turbines and meteorological towers will have lighting and markings that comply with FAA requirements.

Federal Radar Interference

According to the DoD Long Range Radar screening tool, approximately half of the proposed Project is located in the zone where impact is highly likely to Air Defense and DHS radar and half is located in the zone where impact is likely to Air Defense and DHS radar (**Appendix B**).

National Weather Service Radar

According to the DoD National Weather Service Radar Screening Tool, the southeastern half of the proposed Project is located in a zone where significant impacts to weather radar are possible, and the southeast corner is located in a zone where significant impacts are likely (**Appendix B**). The northwestern half of the proposed Project is located in a zone where impacts to weather radar are possible. The National Oceanic and Atmospheric Administration (NOAA) has requested consultation to discuss the Project, and may request mitigation if a detailed analysis indicates that the project will cause significant impacts. Oliver Wind III is coordinating with the FAA and NOAA regarding additional analysis of potential impacts of the proposed Project to radar.

Military Training Routes and Special Use Airspace

From the results of the DoD Preliminary Screening Tool it was determined that military airspace and training routes do not overlap with the proposed Project; therefore impacts to military airspace are unlikely (**Appendix B**).

Electromagnetic Fields

There have been thousands of scientific studies related to EMF. One of the largest EMF research and evaluation programs ($45 million) was established by the U.S. Congress in 1992 and was completed by the U.S. National Institute of Environmental Health Sciences in 1999. None of these organizations has found that exposure to power frequency EMF causes or contributes to cancer or any other disease or illness. 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 proposed collection substation. All proposed Project facilities would be set back from residences as required by state and county regulation. At these distances EMF levels would not be above background levels. The only exposure will be brief exposure to maintenance workers, primarily at the substation. 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 proposed Project. An analysis of potential shadow flicker impacts from the proposed Project turbine layout dated January 20, 2016 was conducted using the WindPro software package (**Appendix B**). The WindPro 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 2,500 meters (8,202 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 93 structures were identified within and near the proposed Project Area; of these, 65 were determined to be inhabited residences and are considered potential shadow flicker receptors for the purpose of this analysis. Thirty hours per year of shadow flicker is the industry's generally accepted standard and the standard that has been used by the PSC. The predicted shadow flicker impacts are less than 30 hours per year at all but two identified occupied receptors. Oliver Wind III is working to obtain a waiver from these landowners. If waivers cannot be obtained Oliver Wind III will ensure the proposed Project meets the 30 hour per year standard. As a result of the analysis, no significant shadow flicker impacts are anticipated to sensitive receptors.

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 proposed Project. The potential of such events would be minimized through implementation of a Spill Prevention, Control, and Countermeasures 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 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 Traffic

Oliver Wind III has submitted Form 7460-1 to FAA for each turbine to determine whether the proposed Project layout and lighting will impact navigable airspace or communications technology used in aviation operations; FAA review is in process. The response from FAA will be submitted to the PSC when received. Wind turbines and meteorological towers will have lighting and markings according to FAA requirements that minimize any potential for air traffic impacts.

Electromagnetic Fields

Since no significant adverse impacts from EMF 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. Oliver Wind III is committed to a setback distance of 1,400 feet from all currently occupied residences, consistent with PSC policy and Oliver Wind III's internal setback distance. Oliver Wind III is working to obtain a waiver from the participating landowners where the 30 hour per year standard is exceeded. If waivers cannot be obtained Oliver Wind III will ensure the proposed Project meets the 30 hour per year standard. Because no significant impacts are anticipated, no additional mitigation is proposed at this time.

Hazardous Materials / Hazardous Waste

Since 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 1,400 feet from currently inhabited residences. The towers will be placed at least 1.1 times the height of turbine from interstate and state road rights-of-way and 1.1 times the height of turbine plus 75 feet from centerline of county or maintained township roadways. These distances are considered to be safe based on developer experience, and are consistent with the required local setbacks.
- Security measures will be taken during the construction and operation of the proposed 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, Oliver Wind III will construct gates or fences such as those around the collection substation.

7.6 Noise

7.6.1 Description of Resources

The proposed Project Area is primarily rural and agricultural. There are no populated towns within the proposed Project Area. The nearest planned proposed Project turbines are approximately seven miles and 9.5 miles, respectively, from the small unincorporated community of Harmon, and the city of Center. The acoustic environment is defined primarily by local traffic on local county roads within the proposed Project Area, as well as aircraft flyover events, and farming equipment. In addition to anthropogenic noise sources, the windy conditions of this site define a somewhat elevated ambient sound level, which increases with wind speed. Windy conditions can generate noise caused by the rustling of grass and tree leaves.

7.6.2 Impacts

The PSC's rules (NDAC 69-06-08-01(4)) specify that sound levels from a wind facility may not exceed 50 decibel, A-weighted (dBA) within one hundred feet of an inhabited residence or a community building, unless waived in writing by the owner. In addition, according to Article II Section 2.110(d)(6) of the Morton County Land Use Code, with the exception of temporary construction equipment, noises produced shall neither exceed 65 decibels between the hours of 7:00 am and 11:00 pm nor 60 decibels between the hours of 11:00 pm and 7:00 am, as measured at or beyond any of the property lines from which the noise is emanating.

Wind turbine generators produce noise through a number of different mechanisms roughly grouped into mechanical and aerodynamic sources. Modern wind turbines include design features that minimize mechanical sound sources. The interaction of air and the turbine blades produces aerodynamic noise through a variety of processes as air passes over and past the blades. Unlike other sound sources, wind turbines generally radiate more noise as wind speed increases. However, at elevated wind speeds the wind tends to generate significant background noise by moving trees and grasses, which can create a masking effect and may aid in reducing the audibility of wind turbine sound.

In January 2016, an acoustic engineering analysis was developed to address sound levels resulting from wind turbine operations, as well as the consideration of sound from the electrical substation and sound generated during proposed Project construction and maintenance activities (**Appendix B**).

Wind turbine operation was analyzed for the proposed Project employing the GE 2.1 MW and 1.79 MW turbine models and the substation with a 170 megavolt ampere transformer located in the southeast corner of the northeast quarter of Section 23, Township 141 North, Range 83 West. The GE 2.1 MW and 1.79 MW turbine noise specifications were used for their respective proposed turbine locations according to the turbine layout dated January 20, 2016. Acoustic modeling was completed at both wind turbine cut-in and maximum rotational conditions, inclusive of the entire range of future proposed Project operational conditions. Project compliance was assessed at a total of 93 receptors in and near the proposed Project Area, 65 of which were determined to be inhabited residences.

The noise modeling results indicate that the received sound levels at 64 occupied receptors are below the North Dakota noise requirement (Chapter 69-06-08-01(4)), which prescribes a limit of 50 dBA within 100 feet of an inhabited residence. The noise modeled at one occupied receptor was 51 dBA and would exceed the 50 dBA limit.

Project construction may cause short-term but unavoidable noise 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 noise 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 noise resulting from construction activities.

Construction activity will generate traffic having potential noise 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 noise is categorized into two categories: (1) the noise 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 turbines is setback distance. Oliver Wind III is committed to a setback distance of 1,400 feet from all currently occupied residences consistent with the PSC’s policy and NEER’s internal setback distance. It should be noted that the acoustic model conservatively predicts outdoor sound levels and assumes no shielding or attenuation by trees or other vegetation. Oliver Wind III is working to obtain a waiver from the owner of the residence where 50 dBA would be exceeded. If a waiver cannot be obtained, Oliver Wind III will ensure the Project meets the 50 dBA requirement.

7.7 Cultural and Archaeological Impacts

7.7.1 Description of Resources

Archaeological Resources

Tetra Tech performed a Class I Literature Review for archaeological and architectural resources for the Project Area plus a 1-mile buffer (i.e., the Study Area). The Class I Literature Review was completed at the State Historical Society North Dakota (SHSND) in December 2015. This Class I Literature Review included identifying previously recorded archaeological sites identified during previous surveys, and historic structures, bridges, and cemeteries.

The literature review identified three previously recorded cultural resources sites within the Survey Corridor (**Table 13**). The sites within the Survey Corridor include a Native American cairn and stone circle site, a Euro-American historical farmstead, and one culturally unknown site consisting of two depressions.

Two previously recorded cultural resources sites and three cultural resource site leads were identified within the Project Area. These sites include a Native American cultural material scatter and a Euro-American historical archaeology/architectural site. The site leads include three Euro-American coal mines.

Fourteen cultural resources sites and 6 cultural resource site leads were recorded within the Study Area (see **Table 13**). The sites include one Native American stone circle and one Native American cultural material scatter and cairn. The Euro-American sites include three farmsteads, two coal mines, one cemetery, one cultural material scatter/dump, and one outhouse. Four sites were determined to be of unknown cultural affiliation and include two sites with cairns, one site with a stone circle, and one site with a depression. The site leads include one Native American chipped stone isolated find, three Euro-American coal mines, one Euro-American foundation/cultural material scatter, and one Euro-American farmstead (**Table 13**).

Table 13. Previously Recorded Archaeological and Architectural Sites and Isolates within the direct APE, Proposed Project Area, and within 1 Mile Surrounding the Proposed Project Area

Smithsonian Number	Resource Type	Description	Avoidance
Archaeological Sites within the Survey Corridor			
32MO1088	Native American archaeological	Cairns and Stone Circles	Avoid direct impacts to site
32MO1090	Euro-American archaeological/ architectural	Abandoned Farmstead	Avoid direct impacts to site
32MO1411	Unknown archaeological	Depressions or Quarry	Avoid direct impacts to site
Archaeological Sites within the Proposed Project Area			
32MO394	Native American archaeological	CM Scatter	Avoid direct impacts to site
32MO1068	Euro-American archaeological/ architectural	School	Avoid direct impacts to site
32MOx353*	Euro-American archaeological	Coal Mine	Avoid direct impacts to site
32MOx354*	Euro-American archaeological	Coal Mine	Avoid direct impacts to site
32OLx115*	Euro-American archaeological	Mine	Avoid direct impacts to site
Archaeological Sites within the Study Area			
32MOx121*	Euro-American archaeological	Foundation/CM Scatter	Avoid direct impacts to site
32MOx352*	Euro-American archaeological	Coal Mine	Avoid direct impacts to site
32MOx355*	Euro-American archaeological	Coal Mine	Avoid direct impacts to site
32MOx541*	Euro-American architectural	Farmstead (extant)	Avoid direct impacts to site
32OL352	Euro-American archaeological/ architectural	Cemetery	Avoid direct impacts to site
32OL599	Unknown archaeological	Stone Circle	Avoid direct impacts to site
32OL603	Unknown archaeological	Cairn	Avoid direct impacts to site
32OL604	Unknown archaeological	Cairn	Avoid direct impacts to site
32OL605	Native American archaeological	CM Scatter/Cairn	Avoid direct impacts to site
32OL606	Native American archaeological	Stone Circle	Avoid direct impacts to site

Table 13. Previously Recorded Archaeological and Architectural Sites and Isolates within the direct APE, Proposed Project Area, and within 1 Mile Surrounding the Proposed Project Area

Smithsonian Number	Resource Type	Description	Avoidance
32OL607	Unknown archaeological	Depression	Avoid direct impacts to site
32OL615	Euro-American archaeological	Coal Mine	Avoid direct impacts to site
32OL631	Euro-American archaeological	Coal Mine	Avoid direct impacts to site
32OL633	Euro-American archaeological	Farmstead	Avoid direct impacts to site
32OL634	Euro-American archaeological	Farmstead	Avoid direct impacts to site
32OL635	Euro-American archaeological/ architectural	Farmstead	Avoid direct impacts to site
32OL636	Euro-American archaeological	Farmstead	Avoid direct impacts to site
32OL637	Euro-American archaeological	CM Scatter/Dump	Avoid direct impacts to site
32OLx114*	Euro-American archaeological	Mine	Avoid direct impacts to site
32OLx241*	Native American archaeological	Chipped Stone Isolated Find	No further management necessary.

Note: CM = cultural material, *indicates cultural resource site lead

Class III Cultural Resources Inventory

A Class III Cultural Resources Inventory for the proposed construction footprint of the Project (i.e. Survey Corridor) is currently underway. A Class III Cultural Resources Inventory for architectural resources is planned for spring 2016. Oliver Wind III and Tetra Tech have coordinated with the SHSND on the appropriate scope and level of survey for the proposed Project. The survey report will be submitted to the SHSND for review and concurrence once complete, and will also be provided to the PSC. Oliver Wind III will avoid directly impacting all Native American sites including stone features and cultural material scatters.

Native American Consultation

In November 2015, Oliver Wind III sent a letter to the North Dakota Indian Affairs Commission notifying the agency about the proposed Project and the preparation of this application for a Certificate; no response has been received to date.

7.7.2 Impacts

Architectural Resources

A Class III Cultural Resources Inventory for architectural resources within 2 miles of proposed Project turbines will be conducted in spring 2016. The proposed Project will not directly impact any architectural resources. A report that evaluates potential visual effects on historic properties will be completed after the survey. This report will be submitted to the SHSND when complete for review and concurrence, and will also be submitted to the PSC.

Archaeological Resources

Oliver Wind III will avoid directly impacting all Native American sites including stone features and cultural material scatters. Oliver Wind III will avoid newly documented sites and the previously-documented cultural resources within the Survey Corridor. Avoidance buffers will be created for these sites and the buffers will be delineated prior to construction to ensure that historic properties are avoided. The pedestrian survey will be completed as weather permits in winter 2015 – spring 2016. 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 PSC.

7.7.3 Mitigative Measures

Turbine micrositing was completed at the Project to identify potential construction or environmental issues at proposed turbine locations. If Native American stone feature sites or cultural material scatters were identified during the micrositing process, Oliver Wind III worked to avoid these resources and place turbines in locations with no apparent cultural resources.

Avoidance buffers will be created for archaeological sites recorded during the pedestrian survey of the Survey Corridor. Oliver Wind III commits to avoid any newly documented sites and the previously-documented cultural resources within the Survey Corridor. Any sites that will be avoided during construction will be fenced to reduce the potential that they will be inadvertently disturbed.

An Unanticipated Discovery Plan will 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 previously undiscovered archaeological sites and possible human remains. The Plan will 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 of the proposed Project. No significant impacts to undiscovered archaeological sites would, therefore, be anticipated from the proposed Project.

In the event that human remains are identified during construction of the proposed Project, construction will immediately stop within a minimum of 100 feet of the site while the site is evaluated and photographed, and until SHSND and the North Dakota Indian Affairs Commission are consulted, in addition to any involved Tribes that express interest in the proposed Project and identify a potential impact.

If confirmed or potential human skeletal remains are discovered, the Oliver and Morton County Sheriff’s 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

Recreational opportunities in Oliver and Morton counties include hunting, fishing, boating, biking, and camping. The closest recreation areas to the proposed Project Area are the Harmon Lake Recreation Area, Crown Butte Dam, and Sweet Briar Lake. Other recreation near the proposed Project Area include the Cross Ranch State Park north of Sanger, Fort Abraham Lincoln State Park south of Mandan, and the Old Red/Old Ten Scenic Byway south of Interstate 94.

The Old Red/Old Ten Scenic Byway is a state-designated byway between Mandan and Dickinson. The byway is oriented east to west and parallels Interstate 94 along Old Highway 10 (**Figure 1**). The Old Red/Old Ten Scenic Byway is located approximately five miles south of the proposed Project Area. The North Dakota Scenic Byway Program is a tourism program managed by the North Dakota Parks and Recreation Department and the NDDOT.

7.8.2 Impacts

No recreational resources will be directly affected by the proposed Project. Recreational impacts will be auditory and visual in nature and limited to individuals using public or private property in and near the proposed Project Area for hunting, fishing, or nature observation. The turbines would introduce a new visual element into the landscape, but the area already has transportation and utility infrastructure such as transmission lines, railroads, and Interstate 94. There are also six existing wind farms in the vicinity of the proposed Project, including the Bison Wind Project near New Salem in Oliver and Morton counties, the Baldwin Wind Energy Center near Baldwin in Burleigh County, the Wilton I Wind Energy Center near Wilton in Burleigh County, the Wilton II Wind Energy Center near Wilton in Burleigh County, the Oliver I Wind Energy Center near Center in Oliver County, and the Oliver II Wind Energy Center near Center in Oliver County.

Viewers at nearby recreational areas will have limited visibility of the proposed Project components due to the distance from the proposed Project, topography, and vegetation. A small portion of the turbines may be visible on the horizon, but they would not be noticeable to the casual observer.

Travelers along the Old Red/Old Ten Scenic Byway will have limited visibility of the proposed Project components due to existing infrastructure and topography.

7.8.3 Mitigative Measures

Since the proposed Project is not anticipated to result in significant adverse impacts to recreational resources, no mitigative measures are proposed.

7.9 Effects on Land-Based Economies

7.9.1 Description of Resources

Agriculture/Farming

The majority of the proposed Project Area is either pasture/hay or cropland (**Figure 11**). Most crop fields within the proposed Project Area are spring wheat and alfalfa fields.

Agriculture has historically played a dominant role in the local economy, and although agriculture comprises a smaller share of the Morton County economy than it used to, it is still a major driver of income and exports (Morton County 2015a). In 2012, there were 887 farms in Morton County, comprising approximately 98 percent of the land area; approximately 45 percent of the land in farms is cropland, 52 percent is pasture, and three percent is other uses. According to the 2012 Census of Agriculture (USDA 2012a), total market value of agricultural products produced in Morton County was $225,239,000, 68 percent of which was from crops and 32 percent from livestock sales. The primary livestock is cattle and the principal crop is wheat.

Agriculture is a dominant land use in Oliver County as well. In 2012, there were 290 farms in Oliver County, comprising approximately 84 percent of the land area; approximately 42 percent of the land in farms is cropland, 53 percent is pasture, and five percent is other uses. According to the 2012 Census of Agriculture (USDA 2012b), total market value of agricultural products produced in Oliver County was $85,495,000, 60 percent of which was from crops and 40 percent from livestock sales. The primary livestock is cattle and the principal crop is wheat.

Prime farmland is the land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. The NRCS also identifies farmland of statewide and local importance, which is land that is important for the production of food, feed, fiber, forage, and oilseed crops. Generally, additional farmlands of statewide or local importance include those that are nearly prime and that produce high yields of crops in an economic manner when treated and managed according to acceptable farming methods. Some may produce a yield as high as prime farmland if conditions are favorable. **Table 13** lists the soils within the proposed Project Area, including those considered prime farmland and soils of statewide or local importance. **Figure 15** shows the prime farmland soil distribution in the proposed Project Area.

Five prime farmland soils occur within the proposed Project Area, comprising 1,611 acres or 7.4 percent of the proposed Project Area; 37 soil types are considered farmland of statewide importance, totaling 11,060 acres or 50.6 percent of the proposed Project Area.

Woodlands

Economically important forestry resources are not found in the proposed Project Area. Trees and shrubs in the proposed Project Area are sparse, and limited to windbreaks around residential properties and between fields, or those found in and along drainages and wetlands. Trees observed on-site include plains cottonwood (*Populus deltoids*), green ash (*Fraxinus pensylvanica*), willow (*Salix spp.*), Siberian elm (*Ulmus pumila*), wild plum (*Prunus americana*), blue spruce (*Picea pungens*), round-leaved hawthorn (*Crataegus rotundifolia*), and boxelder (*Acer negundo*).

7.9.2 Impacts

Agriculture/Farming

Wind energy development removes less total land from agricultural use than other forms of development. No impacts are anticipated to animal health and safety due to the construction or operation of the wind farm and associated facilities. Except for the physical locations of the turbines, access roads, and substation, all the land surrounding the proposed Project facilities will be available for grazing. Cattle have been seen using shade from turbines as a refuge at other wind energy projects.

Anticipated permanent impacts from the Project will be approximately 50 acres, including turbine foundations, access roads, and the proposed Project collection substation. It is possible that some of this land is not used for agricultural purposes, thus the actual impacts to agricultural production cannot be determined until turbine and road locations are finalized.

The proposed Project will permanently disturb approximately 1 acre of soils classified as prime farmland and approximately 17 acres in farmland soils of statewide importance, not including the collection lines, which will be buried and would be a temporary disturbance of soil. This would be a negligible impact to agricultural production in the county. As noted earlier, wind lease payments will provide farmers with a supplemental source of income, helping assure that farmers can continue to operate financially viable farms, and thus helping to assure the continuation of farming in Oliver and Morton counties.

No turbines will be placed within 1,400 feet of inhabited residences. Other impacts to residences are discussed throughout **Section 7.0**. Family farms will be affected due to the loss of land associated with the construction of the turbines and access roads. The extent of impacts will not be known until final turbine locations are determined in conjunction with the landowners.

Woodlands

No significant impacts are anticipated to woodlands.

7.9.3 Mitigative Measures

Agriculture/Farming

The wind turbines and access roads will be located so that the most productive farmland (prime farmland) will be avoided as much as practicable. Only land for the turbines, substation, and access roads will be unavailable for crop production. Oliver Wind III will work with landowners to minimize impacts to their land. Once the wind turbines are constructed, all land surrounding the turbines can still be farmed or grazed. All construction areas will be separated from grazing animals by temporary or permanent fencing.

Woodlands

If trees are removed as part of the proposed Project, they will be replaced per PSC's Tree and Shrub Mitigation Specifications.

7.10 Soils

7.10.1 Description of Resources

The U.S. Department of Agriculture has mapped over 70 soil map units within the proposed Project Area (USDA 2016). These soils are primarily well-drained loams, clay loams, silt loams, and silty clay loams. These soils are primarily derived from the underlying bedrock including mudstone and siltstone, fine loamy till, and clayey and fine silty alluviums. Eighteen soil types comprise approximately 74 percent of the proposed Project Area. The most extensive of these are Amor-Cabba loams (10.7 percent of the proposed Project Area), Williams-Bowbells loams (10.3 percent), Chama-Cabba-Sen silt loams (5.5 percent), Williams-Zahl loams (4.7 percent), Williams-Reeder loams (4.6 percent), Savage silty clay loam (4.1 percent), and Farland silt loam (4.2 percent). **Table 14** provides a summary of the soil map units within the proposed Project Area, including their acreages and percentages of the proposed Project Area.

Table 14. Soil Map Units Within the Project Area

Map Unit Name	Area (acres)	Percentage of Proposed Project Area	Farmland Classification
Amor-Arnegard loams	27.2	0.1%	Farmland of statewide importance
Amor-Cabba loams	2,335.5	10.7%	Not prime farmland
Amor-Shambo loams	769.9	3.5%	Farmland of statewide importance
Amor-Werner-Farnuf loams	284.6	1.3%	Not prime farmland
Amor-Werner loams	18.8	0.1%	Not prime farmland
Arnegard loam	735.3	3.0%	All areas are prime farmland
Beisigl-Flasher-Telfer loamy fine sands	87.9	0.4%	Not prime farmland
Belfield-Daglum complex	318.3	1.5%	Not prime farmland
Belfield-Grail clay loams	731.9	3.4%	Farmland of statewide importance
Belfield-Savage-Daglum complex	504.0	2.3%	Farmland of statewide importance
Bowbells loam	232.0	1.1%	All areas are prime farmland
Cabba-Chama-Sen silt loams	498.8	2.3%	Not prime farmland
Cabba-Chama-Shambo loams	269.3	1.2%	Not prime farmland
Cabba-Rock outcrop-Chama complex	18.0	0.1%	Not prime farmland
Chama-Cabba-Sen silt loams	1,206.3	5.5%	Not prime farmland
Chama-Sen-Cabba silt loams	316.2	1.5%	Farmland of statewide importance
Cohagen-Vebar-Parshall fine sandy loams	17.3	0.1%	Not prime farmland
Daglum-Rhoades complex	185.8	0.9%	Not prime farmland
Dimmick silty clay	80.2	0.4%	Not prime farmland
Farland silt loam	910.0	4.2%	Farmland of statewide importance
Flasher-Rock outcrop-Vebar complex	33.4	0.2%	Not prime farmland
Flasher-Vebar-Parshall complex	97.4	0.5%	Not prime farmland
Grail-Belfield clay loams	864.2	4.0%	Farmland of statewide importance
Grail-Farland silt loams	5.5	Less than 0.1%	Farmland of statewide importance
Grail-Savage silty clay loams	25.0	0.1%	Farmland of statewide importance
Grail silt loam	386.6	1.8%	All areas are prime farmland
Grail silty clay loam	257.1	1.2%	All areas are prime farmland
Harriet loam, occasionally flooded	117.6	0.5%	Not prime farmland
Heil silty clay loam	26.2	0.1%	Not prime farmland
Korchea-Fluvaquents complex, channeled, frequently flooded	73.8	0.3%	Not prime farmland
Lehr-Stady loams	51.7	0.2%	Not prime farmland
Manning-Wabek complex	30.2	0.1%	Not prime farmland
Manning fine sandy loam	71.1	0.30%	Not prime farmland
Moreau-Barkof silty clays	52.7	0.2%	Farmland of statewide importance
Moreau-Wayden silty clays	45.9	0.2%	Not prime farmland
Morton-Cabba silt loams	471.0	2.2%	Farmland of statewide importance
Morton-Farland silt loams	250.0	1.1%	Farmland of statewide importance
Morton-Werner silt loams	121.0	0.6%	Farmland of statewide importance
Parshall fine sandy loam	15.8	0.1%	Farmland of statewide importance
Reeder-Farnuf loams	67.9	0.3%	Farmland of statewide importance

Table 14. Soil Map Units Within the Project Area

Map Unit Name	Area (acres)	Percentage of Proposed Project Area	Farmland Classification
Regan silt loam, occasionally flooded	23.7	0.1%	Not prime farmland
Regan silt loam, strongly saline, occasionally flooded	23.6	0.1%	Not prime farmland
Regent-Janesburg complex	568.5	2.6%	Not prime farmland
Regent-Savage silty clay loams	475.6	2.2%	Farmland of statewide importance
Rhoades-Daglum complex	64.5	0.3%	Not prime farmland
Savage-Grail silty clay loams	38.8	0.2%	Farmland of statewide importance
Savage silty clay loam	889.4	4.1%	Farmland of statewide importance
Sen-Chama silt loams	233.4	1.1%	Farmland of statewide importance
Sen-Janesburg silt loams	58.5	0.3%	Not prime farmland
Sen-Werner loams	16.5	0.1%	Farmland of statewide importance
Shambo loam	56.8	0.3%	Farmland of statewide importance
Stady loam	109.4	0.5%	Farmland of statewide importance
Tally-Parshall fine sandy loams, 2 to 6 percent slopes	218.2	1.0%	Farmland of statewide importance
Tally-Parshall fine sandy loams, 6 to 9 percent slopes	59.8	0.3%	Not prime farmland
Tally fine sandy loam, gravelly substratum	22.1	0.1%	Farmland of statewide importance
Tonka silt loam	14.5	0.1%	Not prime farmland
Vebar-Cohagen fine sandy loams	557.0	2.6%	Not prime farmland
Vebar-Flasher-Tally complex	336.0	1.5%	Not prime farmland
Vebar-Parshall fine sandy loams	134.1	0.6%	Farmland of statewide importance
Wabek-Cabba-Shambo complex	27.8	0.1%	Not prime farmland
Wabek-Manning complex	51.6	0.2%	Not prime farmland
Wanagan loam	5.6	Less than 0.1%	Farmland of statewide importance
Water	14.1	0.1%	Not prime farmland
Werner-Amor-Arnegard loams	111.9	0.5%	Not prime farmland
Werner-Chama-Sen silt loams	215.9	1.0%	Not prime farmland
Williams-Bowbells loams	2,257.1	10.3%	Farmland of statewide importance
Williams-Reeder loams	1,015.1	4.6%	Farmland of statewide importance
Williams-Zahl loams	1.019.0	4.7%	Not prime farmland
Williams loam	427.0	2.0%	Farmland of statewide importance
Zahl-Max loams, dissected	109.7	0.5%	Not prime farmland
Zahl-Williams loams	83.4	0.4%	Not prime farmland

Source: USDA 2016.

Fifty-eight percent of the soils within the proposed Project Area are prime farmland or farmland of statewide importance. Approximately 19 percent of the soils in the proposed Project Area (with the exception of areas mapped as "Water", which are unrated) have high susceptibility to erosion by water (i.e., K-factors greater than or equal to 0.37). Twenty-one percent of the soils also have high susceptibility to wind erosion (i.e., U.S. Department of Agriculture Wind Erosion Groups of less than 6) (USDA 2016).

7.10.2 Impacts

The impact to soils within the proposed Project Area will be limited to areas removed from agricultural production by occupancy of proposed Project components, including turbines, roads, collection lines, and a proposed collection substation. Construction disturbance activities including grading for roads and turbine footprints, excavation for turbine foundations and underground lines and other infrastructure has the potential to contribute to soil erosion through exposure of soils that were previously vegetated or stable. Access roads will be 16- to 34-foot wide[3] aggregate-surfaced roadways. Impacts include permanent operations disturbance to soils due to turbine placement, access road construction, and a proposed collection substation. If cuts are made during construction, top soil will be segregated and reapplied after final contours have been graded.

7.10.3 Mitigative Measures

Wind and water erosion are potential hazards for the soils found in the proposed Project Area. To minimize erosion during and after construction, best management practices (BMPs) for erosion and sediment control will be utilized. Construction sites will maintain sediment control practices in accordance with the SWPPP. A proposed Project-specific erosion control protocol based on the SWPPP will be developed to treat disturbed and exposed soil surfaces and prevent erosion and contamination of natural water resources. Since towers will not be located on significant slopes, only non-structural practices should be required. These practices include temporary seeding, permanent seeding, mulching, filter strips, erosion blankets, and sod stabilization. In addition, during construction and operation, vehicle speed will be limited to 25 mph on proposed Project roads to minimize dust.

7.11 Geologic and Groundwater Resources

7.11.1 Description of Resources

Southwestern North Dakota and the area of the proposed Project lie within the Unglaciated Missouri Plateau section of the Great Plains physiographic province and on the southeast flank of the Williston Basin, a broad structural depression underlying parts of North and South Dakota, Montana, Manitoba, and Saskatchewan (USGS 1975, NDGS 1983, NDGS 1973). The proposed Project Area is located within the glaciated area of North Dakota, and within the Rolling Soft Shale Plain major land resource area which is an old, moderately dissected, rolling plain with local badlands, buttes, and isolated hills (NRCS 2006). Gentle slopes characterize most of the proposed Project Area and local relief ranges from less than 2,035 to over 2,260 feet (see **Figure 3**).

Most of the Proposed Project Area is underlain by Tertiary Age bedrock of the Tongue River formation. The Tongue River formation is composed of interbedded sand, silt, clay, and lignite. Scattered unconsolidated surface deposits include Pleistocene Age yellowish brown glacial till.

[3] Roads required to support crane access to turbines during operation will remain up to 34 feet wide; all other roads may be built at 16 feet wide or reduced later to 16 feet.

The till is silty, sandy, bouldery clay. The underlying Cannonball and Ludlow formations are exposed just east of the Proposed Project Area in the direction of the Missouri River (NDGS 1983). The Cannonball formation is composed of yellowish-brown fine-grained sandstone and brownish gray siltstone and mudstone. Recent/Pleistocene landslide and mass movement deposits are not mapped within or in the surrounding area (NDGS 2016a).

North Dakota Geological Survey (NDGS) maps (Anderson 2010) indicate there are no potential viable sand and gravel resource areas within the proposed Project Area.

Desktop data from the North Dakota Department of Mineral Resources oil and gas database (NDDMR 2016) does not list any exploration wells in the vicinity of the proposed Project.

Lignite (coal) is known to occur in the Sentinel Butte Formation. There is one area of mapped lignite reserves within the proposed Project Area based on a review of available NDGS maps (NDGS 2016b). The 89-acre area is located in the southeast portion of Section 9 and the eastern portion of Section 16, Township 40N, Range 83W. Oliver Wind III has met with the North Dakota Department of Trust Lands to discuss active and future coal mining near the proposed Project Area; the North Dakota Department of Trust Lands is not aware of any current or planned lignite mining within the proposed Project Area. Information provided by the North Dakota Department of Trust Lands (North Dakota Department of Trust Lands 2016) indicates there are active coal leases and mineral tracts that are managed by the North Dakota Department of Trust Lands within the Proposed Project area. The cultural resources file review completed at the SHSND identified three historic mines within the proposed Project Area (see section 7.7.1). Based on discussions with North Dakota Department of Trust Lands (Combs 2016), coal mining in the proposed Project Area is extracted via surface mining and no underground mining (room and pillar mining) has taken place. Therefore, potential subsidence from historic underground mining is not a concern. No coal mines were observed in site visits to the proposed Project Area. Oliver Wind III has met with the North Dakota Department of Trust Lands to discuss active and future coal mining near the proposed Project Area. The North Dakota Department of Trust Lands suggested mineral rights research on parcels where Oliver Wind III would site facilities for the proposed Project. The North Dakota Department of Trust Lands provided GIS data of State Mineral Resources which Oliver Wind III compared to proposed Project facilities. Mineral rights were researched by an outside consultant and mineral rights did not exceed 50% rights on all of the properties that proposed Project facilities are planned.

According to the USGS, North Dakota is located in an area of very low seismic risk (USGS 2014). There are no known active tectonic features or faults known to generate earthquakes with magnitudes of 6 or greater in North Dakota (USGS 2016). Related geologic hazards, such as soil liquefaction, are therefore also unlikely. The NDGS landslide mapping program has not yet inventoried the Project area for landslides, but review of available landslide information indicates that landslide areas are not located in the proposed Project Area (NDGS 2016a).

The Tongue River formation sandstone is the shallowest bedrock aquifer in the proposed Project Area and has a thickness from 5 to 180 feet (NDGS 1983). Water level depths are reported from 20 to 50 feet, and yields can reach up to 100 gallons per minute. The Cannonball-Ludlow undifferentiated sandstone aquifer zones are present below the Tongue River formation. Sandstone thicknesses range from 5 to 129 feet and well yields can reach 50 gallons per minute. Glacial sand and gravel deposits are not prominent in the proposed Project Area and are therefore, not used as a groundwater source.

Review of driller logs available from the North Dakota State Water Commission database (NDSWC 2016a) indicates that 5 wells have been drilled within the proposed Project Area. One of these wells did not have any additional information. The other wells were completed between depths of 250 and 370 feet. Three of the wells are noted for domestic use and tap the Cannonball-Ludlow formation and one of the wells is used as a stock well and taps the Tongue River aquifer.

7.11.2 Impacts

Impacts of the proposed Project to available mineral resources are likely to be very limited. No coal resources are known to be actively or historically mined in the proposed Project Area, however an economic deposit of lignite coal is present within the proposed Project Area. Currently there are only six operations mining 32 million tons of coal annually in North Dakota (NDGS 2015). Four operations are mining coal to feed steam boilers for electric generating plants in North Dakota. Two smaller operations are mining Leonardite (oxidized lignite) to be used in soil stabilization and as drilling fluid additives. Per landowner agreements, Oliver Wind III will coordinate with landowners to facilitate the compatibility of any future coal resource development.

The proposed Project Area is located in a region of low seismic risk and landslide areas are not located in the proposed Project Area based on review of available landslide information. Consequently, geologic hazards are unlikely to impact the proposed Project, and the proposed Project would not affect geologic hazards. No significant impacts to geology would, therefore, be anticipated.

Impacts to groundwater resources in the proposed Project Area are anticipated to be minimal. Major withdrawals of groundwater will not be necessary due to the limited water supply needs of the proposed Project. A new well may be drilled to provide water for the O&M building; other water sources for the proposed Project would be obtained from the Southwest Water Authority, the Missouri West Water System, or the city of Mandan. Based on the small amount of increased impervious surface area that would be created by proposed Project components relative to the separation of these components and the size of the entire proposed Project Area, the proposed Project will likely have minimal impacts to regional groundwater recharge. There are only a small number of private wells in the proposed Project Area and proposed Project construction activities such as excavation and construction of foundations are unlikely to affect groundwater quality or flow patterns. Oliver Wind III is coordinating with participating landowners to ensure that private water wells are not directly or indirectly impacted by the proposed Project. In addition, each turbine would be located a minimal distance of 1,400 feet away from existing residential structures, thereby minimizing the risk of impacts to private wells in the area, which are assumed to be located in proximity to the structures they serve.

Development of the turbine foundations may require subsurface blasting, which could potentially fracture bedrock and affect groundwater flow in the immediate vicinity of the disturbance. In the event that subsurface blasting is required, potential disturbances due to blasting would be localized and temporary, with groundwater likely to resume its natural course of flow down gradient of the foundation. Although it is not anticipated, if dewatering of excavations is necessary, water would be discharged to the surrounding surface, allowing it to infiltrate back into the ground to minimize potential impacts and in compliance with a stormwater permit.

7.11.3 Mitigative Measures

Oliver Wind III is coordinating with land owners and mineral rights owners to identify potential future development issues. However, these resources are relatively abundant in Morton and Oliver counties and central North Dakota, and it is expected that impacts to these resources would not result in overall adverse impacts to development of coal resources in the greater region. In addition, Oliver Wind III has researched subsurface mineral rights within the proposed Project Area and mineral rights did not exceed 50% rights on all of the properties that proposed Project facilities are planned.

Wind turbine locations will not impact the use of existing water wells because the turbines will not be sited within 1,400 feet of inhabited residences. In the event that subsurface blasting is required, a blasting plan would be developed and implemented to keep the impacts localized and fracture the least amount of bedrock necessary for construction.

7.12 Surface Water and Floodplain Resources

7.12.1 Description of Resources

Surface water and floodplain resources for the proposed Project Area were identified by reviewing U.S. Geological Survey topographic maps, Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps, and U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) data, and surface water features were surveyed for proposed Project facilities. There are numerous intermittent, unnamed tributaries within the proposed Project Area (see **Figure 16**). The majority of the proposed Project Area is drained to into the Hagel Creek watershed; south into the Sweetbriar Creek watershed; and southeast into the Missouri River. Sweetbriar Creek flows into Heart River which then flows east into the Missouri River, and Hagel Creek also flows into the Missouri River.

According to electronic data from FEMA, there are no 100-year floodplains located in the Proposed Project Area (**Figures 5 and 16**; FEMA 2016). This was also confirmed by the North Dakota State Water Commission (NDSWC 2016b; **Appendix C**). The 100-year floodplain is defined as the area that will be inundated by a flood event having a one percent chance of occurring in any given year.

7.12.2 Impacts

Construction of the wind turbines, transformer pads, and access roads will disturb land within the proposed Project Area. The wind turbines will be located to avoid intermittent streams/drainages. Access roads to the turbines will be built to avoid impacts to surface waters and drainages to the extent practicable.

7.12.3 Mitigative Measures

Access roads constructed adjacent to intermittent streams/drainages 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. An application (Notice of Intent) to obtain coverage under the NPDES general permit for storm water discharges associated with construction activity will be submitted to the North Dakota Department of Health prior to construction of the proposed Project.

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.

Desktop analysis was employed to identify probable locations of wetlands and waterbodies prior to field work. Desktop analysis included review of National Hydrography Dataset (USGS 2010), NWI maps (USFWS 2014a), aerial photo imagery (USDA NAIP 2014), and web soil survey maps (NRCS 2013).

The initial desktop analysis identified eight National Hydrography Dataset mapped intermittent stream features with no NWI mapped wetlands that intersect project features.

The desktop analysis was followed by a site visit to microsite and conduct wetland and other waters of the U.S. (WoUS) delineations at turbine locations in November 2015. One wetland and no stream features were delineated during this initial survey. Additional wetland and other WoUS delineations to evaluate the remainder of the proposed Project facilities is scheduled to be completed in the spring of 2016. The delineations will be conducted using the methodologies cited in the U.S. Army Corps of Engineers (USACE) Jurisdictional Determination Form Instruction Guidebook (USACE and EPA 2007), including the December 2, 2008 revised Rapanos guidance (EPA and USACE 2008). Delineated features will be avoided where feasible. A report of findings will be provided upon completion. A site visit to microsite turbine locations took place in December 2015.

7.13.2 Impacts

Oliver Wind III has committed to minimizing impacts to jurisdictional wetlands or other WoUS to the extent practicable. Based on desktop analysis and preliminary field surveys, the proposed 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 preconstruction notification to the USACE Bismarck Regulatory Office. By “single and complete project,” we are referring to each discrete intersection between planned Project infrastructure and jurisdictional wetlands and other WoUS. 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 proposed Project will likely meet the authorization criteria for a Section 404 Nationwide Permit (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 proposed Project because it is not anticipated that the proposed Project will exceed the 0.10-acre threshold for preconstruction notification for NWP 12 or NWP 14. Nevertheless, if the proposed Project does cause minor impacts less than 0.10-acre in jurisdictional wetlands/WoUS, then general and state of North Dakota NWP requirements will be adhered to. These requirements are included in the USACE response letter in **Appendix C**.

A wetland survey report is underway and will be submitted upon completion.

Oliver Wind III will obtain a stormwater runoff permit from the North Dakota Department of Health prior to construction. Compliance with the conditions of this permit and those of the associated stormwater pollution prevention plan would ensure that surface water would not be adversely affected by runoff from areas disturbed by Project construction activities.

7.13.3 Mitigative Measures

Oliver Wind III has committed to avoiding and minimizing impacts to potentially jurisdictional wetlands and other WoUS, as practicable. Wetlands will be delineated and flagged prior to construction when in close proximity to proposed Project features.

7.14 Vegetation

7.14.1 Description of Resources

The proposed Project Area is in a rural location with farming and livestock grazing and related agricultural operations dominating the land use. According to the National Land Cover Database data, 94 percent of the proposed Project Area land use is either agricultural crops (55 percent) or grasslands/herbaceous or hay/pasture (39 percent; Homer et al. 2015). A native prairie assessment for the proposed Project Area was conducted in September 2015 and revised in December 2015. Areas identified via desktop assessment were field-verified in August 2015, where possible from public rights of way. Approximately 21 percent of the proposed Project Area was identified as potential native prairie in a desktop review.

7.14.2 Impacts

Areas of highest quality native prairie were avoided. Access road construction will result in the greatest effects to native vegetation resulting in permanent loss of these habitats where they occur along selected routes. Installation of the proposed buried collector system will result in some temporary effects to native and non-native grasslands.

7.14.3 Mitigative Measures

Oliver Wind III will work to avoid and to minimize impacts to existing trees and shrubs. Trees and shrubs anticipated to be cleared will be inventoried for replacement. Tree replacement will be on a 2 to 1 basis with 2-year-old saplings; shrub replacement will be on a 2 to 1 basis with stem cuttings. Trees and shrubs will be replaced by the same species or similar species, according to the PSC Tree and Shrub Mitigation Specifications.

Impacts to grassland vegetation will be mitigated by reseeding the construction areas with native grasses following completion of construction activities, if approved by the landowner. Areas currently in crop will be replaced with crop in coordination with landowner preferences.

7.15 Wildlife

7.15.1 Description of Resources

Although wind energy provides a clean, renewable energy source, wind energy facilities have the potential to negatively impact wildlife, especially birds and bats, which can be killed or injured as a result of colliding with turbine blades. To address these concerns, field studies to document wildlife and habitat within the Project Area in accordance with the voluntary USFWS Land-Based Wind Energy Guidelines (USFWS 2012), are currently planned or underway. A bat desktop habitat assessment was conducted in September 2015 (revised in December 2015, Tetra Tech 2015), and bat acoustic monitoring was conducted from August to September 2015; the report is currently underway. Fall avian point-count and eagle use surveys began in August 2015. A ground-based raptor nest survey was conducted in June 2015, a fall nest inventory was conducted after the deciduous trees lost their leaves (mid-November 2015) (revised in January 2016, Tetra Tech 2016a). An aerial and follow-up ground–based raptor nest survey will be conducted in spring 2016. A desktop likelihood assessment for whooping crane (*Grus americana*) was also conducted in January 2016 (Tetra Tech 2016b). Spring avian point-count surveys will be conducted in spring 2016.

Avian Species

Based on the location of the proposed Project Area and the habitat present (based on field observations in fall 2015), it is expected that the majority of avian species present within the proposed Project Area will be those typically associated with agriculture and grassland habitats. The most common species observed during fall avian surveys were red-winged blackbird (*Agelaius phoeniceus*), horned lark (*Eremophila alpestris*), Canada goose (*Branta canadensis*), mourning dove (*Zenaida macroura*), western meadowlark (*Sturnella neglecta*), and American robin (*Turdus migratorius*). Individual sharp-tailed grouse (*Tympanuchus phasianellus)* were also observed within the Project Area during the fall 2015 surveys (Tetra Tech 2016a). Additionally, birds migrating between breeding and wintering grounds may also pass through the proposed Project Area given its position within the Central Flyway (USFWS 2015a).

Breeding, wintering, and migratory bird habitat within the Project Area is primarily grassland or agriculture, but there are also small, scattered wooded, riparian, and wetland areas available.

Bats

Based on available information, five species of bat, big brown bat (*Eptesicus fuscus*), little brown bat (*Myotis lucifugus*), eastern red bat (*Lasiurus borealis*), hoary bat (*Lasiurus cinereus*), and silver-haired bat (*Lasionycteris noctivagans*) are expected to have a moderate or high potential to occur within, and in the vicinity of the proposed Project Area. Migratory tree-roosting bat species, such as eastern red bat, silver-haired bat, and hoary bat, travel long distances at altitudes that may overlap with the height of wind turbine blades, making them particularly susceptible to direct mortality from wind turbines. These species have been the predominant species found during post-construction mortality studies at operational wind energy facilities in North America (Arnett and Baerwald 2013).The remaining bat species found in North Dakota are expected to have a low potential of occurrence.

Suitable natural roosting habitats in the proposed Project Area are limited to individual trees, windrows, woodlots, buildings, bridges, and riparian zones. The availability of tree-roosting habitat in the proposed 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 proposed Project Area. Farmstead buildings (houses, barns, etc.) could also provide potential roosting locations within the proposed Project Area; however, the suitability of these man-made structures has not been evaluated. There are no known abandoned mines within the proposed Project Area that bats could use for roosting (PSC 2013). Therefore, bat use of the proposed Project Area is likely to be low given the limited availability of roosting habitat.

7.15.2 Impacts

Potential impacts from the development of the proposed Project to avian and bat species include collisions with wind turbines, transmission lines, and guyed meteorological towers, as well as loss of habitat due to displacement.

Avian Collisions

The collision risk for birds at the proposed Project will likely be low based on records of fatalities at other wind energy facilities. Recent meta-analyses relevant to the proposed 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 proposed Project Area and it is likely that rates of collision at the proposed Project would be similar to rates reported by these studies.

Bat Collisions

The collision risk for bats at the proposed Project will likely be low based on records of fatalities at other wind energy facilities in the Great Plains which average 3.07 bats/MW/year and range from 0.12 to 10.85 bats/MW/year (Hein et al. 2013).

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 2012). The USFWS North Dakota field office has developed a list of species of habitat fragmentation concern for the state (USFWS 2013a). The primary range for seven of the eleven designated species cover the proposed Project Area – Baird's sparrow (*Ammodramus bairdii*), chestnut-collared longspur (*Calcarius ornatus*), grasshopper sparrow (*Ammodramus savannarum*), northern harrier (*Circus cyaneus*), sharp-tailed grouse (*Tympanuchus phasianellus*), Sprague's pipit (*Anthus spragueii*), and upland sandpiper (*Bartramia longicauda*) (USFWS 2013a). Habitat fragmentation from the construction of a wind energy proposed Project may potentially reduce habitat available for these species. However, because the proposed Project will be largely located in already disturbed agricultural areas which are generally considered suboptimal habitat for most avian species, the impact of habitat fragmentation is likely to be minimal for most species. Some short-term displacement in grassland areas would be expected, but the effects would be mostly limited to the construction period and the immediate area around the turbines. (Pearce-Higgins et al. 2012). 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.

Potential impacts to sensitive species are discussed in more detail in **Section 7.16.2** below.

7.15.3 Mitigative Measures

Oliver Wind III is conducting environmental studies of the proposed Project Area to aid in the final placement of turbines, roads, and associated facilities to avoid and minimize impacts to wildlife and native habitat. The following measures will be used, to the extent practicable, by Oliver Wind III to help avoid potential impacts to wildlife in the proposed Project Area during selection of the turbine locations and subsequent development and operation:

- Siting access roads and turbines away from wetlands and waterbodies to the greatest extent practicable.
- Designing the layout of the proposed Project to avoid permanent impacts where feasible. Avoiding wetland impacts would generally reduce potential impacts to migratory birds and bats and sensitive habitat.
- Burying collection lines from the turbines to the collection substation to avoid collision risk following the Avian Power Line Interaction Committee (APLIC 2006) suggested practices, if practicable.
- Temporarily disturbed areas will be reseeded or restored to crop, depending on original conditions and landowner preference. Native prairie will be avoided to the extent practicable and will be reseeded using a native prairie mix in accordance with landowner preferences.
- Install bird diverters on the transmission line associated with the proposed Project following APLIC suggested practices (APLIC 2012) to avoid and minimize risk of injury or fatality to birds from collisions.
- Implementing a Wildlife Response and Reporting System (WRRS) once turbine construction is 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 proposed Project boundaries by Project personnel, the 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.
- Conducting post-construction bird and bat mortality surveys for 1 year following construction of the proposed Project.
- Oliver Wind III has consulted with NDGF regarding grouse habitat, and is planning to conduct lek surveys in the spring, working with NDGF to develop survey protocol.

- Developing a voluntary Bird and Bat Conservation Strategy, 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 proposed Project.
- Proposing in its lighting plan to use the minimum number of aviation hazard lights acceptable to the FAA to avoid attracting migrating birds and bats to the turbines. Oliver Wind III will also install motion-activated lighting or down-shielded lighting on other proposed Project facilities that require lighting at night (i.e., the collection substation) to avoid the potential to draw birds and bats toward the facility.
- During construction and operation, limiting vehicle speed limited to 25 mph on proposed Project roads to minimize wildlife collisions.

7.16 Rare and Unique Natural Resources

7.16.1 Description of Resources

The Endangered Species Act (ESA), as administered by the USFWS, mandates protection of species federally listed as threatened or endangered and their associated habitats. Candidate species receive no statutory protection from the USFWS unless they are formally listed.

Oliver Wind III identified federally-listed species with the potential to occur in Oliver and Morton counties, North Dakota based on the USFWS endangered species database organized by county. The following listed species have potential to occur within the counties and potentially the proposed Project Area: whooping crane, black-footed ferret (*Mustela nigripes*), northern long-eared bat, red knot (*Calidris canutus rufa*), pallid sturgeon (*Scaphirynchus albus*) Dakota skipper (*Hesperia dacotae*) and interior least tern (*Sterna antillarum*) (USFWS 2015b). Additionally, there is the potential for bald and golden eagles to occur within the proposed Project Area; both species are protected under the Bald and Golden Eagle Protection Act (BGEPA).

These federally protected species are described below in taxonomic order.

Black-footed Ferret (Federally Endangered)

The black-footed ferret, a medium-sized member of the weasel family, was listed as endangered in 1967 (USFWS 2014c). The black-footed ferret is an obligate predator of prairie dogs and occurs exclusively in prairie dog colonies which it depends upon for food and shelter (USFWS 2014c). Previously believed extinct, 18 individuals were discovered in 1986 and were then used to develop a breeding and reintroduction program (USFWS 2010). It is estimated that over 1,000 black-footed ferrets occur in the wild with another 300 within breeding facilities (USFWS 2014c). No reintroductions of black-footed ferrets have been made in North Dakota (USFWS 2014c), and it is thought to be extirpated from the state (NDGF 2012).

The habitat within the proposed Project Area is highly fragmented. Black-footed ferrets only occur in large, unfragmented prairie dog colonies (USFWS 2010, NDGF 2012). There are no prairie dog colonies within the proposed Project Area. Based on the range, known reintroduction locations of black-footed ferrets, and habitat within the proposed Project Area, it is unlikely the black-footed ferret would occur within the proposed Project Area.

Northern Long-eared Bat (Federally Threatened)

The northern long-eared bat was listed as threatened with an interim 4(d) rule effective May 4, 2015 (USFWS 2015c). A final 4(d) rule became effective on January 12, 2016. The final 4(d) rule limits the prohibition of take to areas affected by white-nose-syndrome (WNS) and an additional 150-mile buffer around this area. Under the final 4(d) rule, incidental take is prohibited if it occurs within a hibernaculum, results from tree removal within 0.25 miles of a hibernaculum entrance, or results from tree removal within 150 feet of a known roost tree; fatalities caused by collisions with wind turbines are explicitly excluded from the prohibition on incidental take. Incidental take is not prohibited outside of the WNS zone described above. North Dakota, and the proposed Project Area specifically, fall outside of the area where incidental take is prohibited as currently mapped by the USFWS.

Northern long-eared bats 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 2013b). The northern long-eared bat is considered common only in discrete portions of its western range, including the Black Hills of South Dakota (USFWS 2013b). This species roosts in trees during the spring, summer, and fall (USFWS 2013b). The species prefers large, contiguous tracks of upland forested habitat during the summer residency period. Suitable natural roosting habitats in the proposed Project Area are limited to individual trees, wind breaks and woodlots. Northern long-eared bats 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 (USFWS 2013b). Information on habitat use during migration is limited, but individuals in transit are likely to use foraging habitats at least part of the time. Northern long-eared bats spend winter hibernating in caves and mines. However, there are no known wintering hibernacula within North Dakota (USFWS 2013b).

The NLEB has a low likelihood to occur in the proposed Project Area during the summer residency period (approximately May 15–August 15) because of the lack of large contiguous woodlots and due to the species being uncommon in the far western extent of its range, which includes the proposed Project Area. The species has been detected in Oliver County (WAPA and USFWS 2015), and could occur in the proposed Project Area during seasonal movements to and from hibernacula; However, no hibernacula are known to occur in the state of North Dakota. Therefore there is a low overall likelihood that the northern long-eared bat would occur within the proposed Project Area.

Pallid Sturgeon (Federally Endangered)

The pallid sturgeon historically occupied the Mississippi and Missouri rivers and their major tributaries (USFWS 1990a). The reason for decline of the sturgeon has been water control and development projects on the Mississippi and Missouri rivers. The sturgeon still occupies portions of the main stem of the Missouri River. Neither the pallid sturgeon nor suitable habitat is found in the proposed Project Area.

Whooping Crane (Federally Endangered)

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 308 birds (with a 95% probability of actual flock size being between 267–350 birds) as of the 2014/2015 winter whooping crane survey conducted by USFWS (USFWS 2015d). 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 (Lewis 1995). Stopover habitat during migration includes a variety of croplands with roosting occurring in shallow, freshwater inland wetlands (Lewis 1995). 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 2012). 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 (USFWS 2012).

A desktop likelihood assessment for whooping crane (*Grus americana*) was conducted for the proposed Project Area and associated transmission line (Tetra Tech 2016b). The likelihood of whooping cranes occurring within the proposed Project Area is low as there is limited roosting habitat in the form of suitable wetlands within the proposed Project Area. The proposed Project Area is located near the center of the approximate 200-mile wide migratory corridor, and whooping cranes may still migrate thought the proposed Project Area and would be at risk of colliding with wind turbines and any associated utility lines. 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.

Interior Least Tern (Federally Endangered)

The interior population of the least tern was listed as endangered species in 1985 (USFWS 1985). The species nests on barren sandbars on the Missouri River and feeds on small fish in the river (USFWS 1990b). In North Dakota, the interior least tern is primarily found on sandbars on the Missouri River between the Garrison Dam and Lake Oahe, in the reservoirs, and on the Missouri and Yellowstone Rivers upstream of Lake Sakakawea (USFWS 1990a). There are no preferred habitats within the proposed Project Area and no least terns were observed during any biological surveys. However, it is possible, but unlikely, that least terns may encounter the turbines within the proposed Project Area during migration.

Red Knot (Federally Threatened)

The USFWS listed the rufa subspecies of red knot as threatened on December 11, 2014. The red knot is a medium sized shorebird that is found in the western hemisphere and 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 rufa 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 2014d). To date, no red knot fatalities have been reported at a wind farm with publicly available data. There are no preferred stopover habitat for red knots and none were detected within the proposed Project Area during any of the onsite surveys (Tetra Tech 2016a). However, it is possible, but unlikely, that red knots may encounter the turbines within the proposed Project area during migration.

Dakota Skipper (Federally Threatened)

The Dakota skipper is a species of butterfly formally listed as threatened under the ESA on October 23, 2014. The species historic range once consisted of vast unbroken native prairie in the north-central U.S. and south-central Canada (USFWS 2015e). The Dakota skipper population has declined due to sensitivity to disturbances, such as grazing and fire, and the loss of native prairie habitat. Generally, the species does not occur in areas that have previously been plowed or otherwise converted to tame or non-native plants even if native grass has been replanted (USFWS 2015e). The USFWS proposed to designate 50 units, ranging in size from 31 acres to 2,887 acres, in North Dakota, Minnesota, and South Dakota as critical habitat (USFWS 2014b). The closest proposed critical habitat to the proposed Project area is approximately 71 miles to the northeast in Wells County. The Dakota skipper is known to occur in Oliver County (USFWS 2015b), and as a result, there is a low likelihood for the species to occur within the proposed Project Area. The proposed Project Area is mostly fragmented into agriculture (51 percent), pastures (11 percent), and grasslands (32 percent) of which much of the grasslands appear to be fallow cultivated fields used for cattle grazing.

Oliver Wind III has evaluated potential habitat for the Dakota skipper within the Project Area and has identified 800 acres (4 percent of the Project Area) of excellent habitat and 2,013 acres (10 percent of the Project Area) of good habitat. Approximately 1,518 acres (7 percent of the Project Area) were classified as undetermined (i.e., could not be determined from desktop analysis or verified in the field due to access limitations)

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 February and ends when the young fledge, typically in July (Johnson 2010). 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 (Johnson 2010), 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) growing steadily to 140–150 active bald eagle nests to date (Johnson 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 of bald eagles is variable. Populations in Oregon and Washington have home ranges of 2.7 to 18.1 square mile, with an average of 8.5 square mile (Watson et al. 1991), and in Montana the average home range size was 3.5 square mile (Stangle 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 (USFWS 2013c), 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). 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).

There were no bald eagle nests found within the proposed Project area or 2-mile buffer surrounding the proposed Project Area during a nest inventory conducted in June and November 2015.

Bald eagles are unlikely to occur in the proposed Project Area during the winter given the absence of large bodies of water that remain unfrozen within or near the proposed Project Area. Bald eagles are unlikely to breed within the proposed Project Area due to a lack of suitable habitat. Nearby nesting (over 2 miles from the proposed Project Area) and migrating bald eagles could potentially occur in the proposed Project Area.

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 (Kochert et al. 2002). 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 have been observed displaying courtship behavior as early as January in North Dakota (K. Shelley, USFWS, personal communication, December 16, 2015). Golden eagles in North

Dakota nest mainly west of the Missouri River (Johnson 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 eagle nests were found within the proposed Project area or 2-mile buffer surrounding the proposed Project Area during a nest inventory conducted in June and November 2015. Golden eagles may potentially occur in the proposed Project Area during any time of the year but are unlikely to be breeding within the proposed Project Area due to a lack of suitable habitat.

7.16.2 Impacts

Per the WRRS protocol, if an injured bird is found, it must be left undisturbed and reported to USFWS.

Whooping Crane

Collisions with turbines, meteorological towers, or transmission lines are a potential impact from the proposed Project. However, sandhill cranes have been documented altering flight direction in response to turbines at a wind facility in South Dakota (Nagy et al. 2012), and multiple studies have documented sandhill cranes gradually climbing as they approach marked power lines (Morkill and Anderson 1991, Murphy et al. 2009). Therefore, this avoidance behavior may minimize the potential for proposed Project-related collisions. Furthermore, no whooping crane fatalities have been recorded at wind facilities, suggesting that likelihood of collision may be low (USFWS 2009).

The potential for indirect impacts resulting from habitat loss is likely to be low. This is because the potential roosting habitat within the proposed Project Area is minimal. Less than 1 percent of the proposed Project Area is categorized as open water or emergent herbaceous wetlands that would be favorable for cranes (**Table 11**).

Based on location of the proposed Project Area within the migration corridor and the avoidance and minimization measures discussed in Section 7.16.13 (e.g., buried collection systems, and marking the transmission line within 1 mile of suitable stopover habitat), the proposed Project is not likely to impact the whooping crane.

Black-footed Ferret

Given that NDGF believes that the black-footed ferret is extirpated from the state (NDGF 2012), it is unlikely that the proposed Project will affect the black-footed ferret.

Northern Long-eared Bat

There is little suitable roosting or foraging habitat in the proposed Project Area and no known hibernacula in North Dakota for the northern long-eared bat. The species could potentially collide with operational turbines during the spring and fall periods when migrating between summer roosts and winter hibernaculum. Although northern long-eared bat fatalities have occurred at wind energy facilities, there have only been 41 confirmed records, all of which occurred at wind energy facilities located east of the Mississippi River (USFWS 2015c). No northern long-eared bat fatalities from wind energy facilities have been documented in North Dakota (USFWS 2015c). The northern long-eared bat is considered to be rare in North Dakota and the proposed Project Area is located at the edge of the species' range (USFWS 2013b, Dyke 2014). Therefore, it is unlikely that the proposed Project will affect the northern long-eared bat.

Pallid Sturgeon

Neither the pallid sturgeon nor suitable habitat is found in the proposed Project Area. Therefore it is unlikely that the proposed Project will affect the Pallid Sturgeon

Interior Least Tern

There were no observations of interior least terns during the 2015 fall avian survey or preferred habitat identified within the proposed Project Area. Therefore it is unlikely that the proposed Project will affect the interior least tern.

Red Knot

There were no observations of red knots during the 2015 fall avian survey or preferred stopover habitat identified within the proposed Project Area. Therefore it is unlikely that the proposed Project will affect the red knot.

Dakota Skipper

Much of the original prairie grasslands in the proposed Project Area is already highly fragmented and disturbed due to agriculture production, pasture maintenance, and cattle grazing. Therefore it is unlikely that Dakota Skipper would be affected by the proposed Project Area development.

Bald Eagle

Six bald eagle mortalities associated with wind energy facilities within the United States 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). The landscape within the proposed Project Area does not support any large waterbodies or an abundance of smaller waterbodies that would attract bald eagles for nesting or foraging, and there are no known bald eagle nests that occur within 2 miles of the proposed Project Area. There were no bald eagles observed during the 2015 eagle use surveys of the proposed Project, and it is unlikely that the Project will affect the bald eagle.

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).

There are no golden eagle nests known to occur within 2-miles of the proposed Project Area. The landscape within the proposed Project Area does not support cliff nesting sites; therefore, it is unlikely that golden eagles will nest within the proposed Project Area. Golden eagles may occur within the proposed Project Area during migration and winter seasons; however, there are no known features that would concentrate golden eagles within the proposed Project Area compared to the surrounding area. No golden eagles were observed during the 2015 eagle use surveys of the proposed Project, and it is unlikely that the Project will affect the golden eagle.

7.16.3 Mitigative Measures

General avoidance and minimization practices for vegetation and wildlife are discussed in **Sections 7.14.3** and **7.15.3**, respectively. Oliver Wind III has committed to the following additional avoidance and minimization measures which are specific to potential impacts to federally threatened and endangered species:

- Oliver III will bury collection lines from the turbines to the collection substation to avoid collision risk following the APLIC suggested practices, if practicable.
- The proposed associated overhead transmission line located within 1 mile of wetlands that may provide stopover habitat for whooping cranes will be outfitted with bird flight diverters.
- Oliver Wind III will implement a WRRS, whereby if any dead or injured birds or bats are found within the proposed Project boundaries by proposed 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. In addition, if an injured or dead endangered or threatened animal is found in the proposed Project Area, Oliver Wind III employees will promptly notify the USFWS after completing the WRRS documentation process.
- In addition to the training provided via the WRRS, Oliver Wind III 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.
- Oliver Wind III will conduct bird and bat post-construction fatality surveys for 1 year following construction of the proposed Project.

7.17 Summary of Impacts

Table 15 summarizes the resources that will be affected as a result of the proposed Project and the appropriate mitigation.

Table 15. 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.	N/A

Table 15. Summary of Impacts and Mitigation

Resource	Impact	Mitigation
Land Use	Up to 50 acres of land will be 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 would require an additional 557 acres.	Oliver Wind III will work with landowners and regulatory agencies to minimize impacts of the proposed Project.
Public Services	No impacts are anticipated.	The proposed Project will utilize station service from the local electrical utility and will abide by the recommendations to prevent impacts to the transmission system.
Human Health and Safety	No adverse impacts are anticipated. No non-participating, inhabited residences are predicted to have more than 30 hours per year of shadow flicker.	Turbines will be lighted to comply with FAA requirements. A variety of security measures will be implemented to reduce the chance of physical and property damage. Modeling results have identified two inhabited residences with more than 30 hours per year of shadow flicker. Oliver Wind III is working to obtain a waiver from these participating landowners. If waivers cannot be obtained Oliver Wind III will ensure the proposed Project meets the 30 hour per year standard.
Noise	No adverse impacts are anticipated to noise-sensitive resources (inhabited residences). No non-participating, inhabited residences are predicted to have noise impacts greater than 50 dBA at a distance of 100 feet.	Noise modeling results indicated that received sound levels for all but one occupied receptor are below the North Dakota noise requirement (Chapter 69-06-08-01(4)), which prescribes a limit of 50 dBA within 100 feet of an inhabited residence. Noise modeling results have identified received sound levels of 51 dBA within 100 feet of one inhabited residence. Oliver Wind III is working to obtain a waiver from the owner of the residence where 50 dBA would be exceeded. If a waiver cannot be obtained, Oliver Wind III will ensure that the Project meets the 50 dBA requirement.
Cultural and Archaeological	No impacts to previously identified cultural resources are anticipated. An archaeological survey is underway, and the proposed Project layout will avoid all newly documented sites. The sites are not shown on **Figure 5** due to confidentiality. The field survey is anticipated to be completed in spring 2016.	Sites within or adjacent to the construction easement will be fenced prior to construction. An unanticipated discoveries plan will be prepared prior to construction.
Recreational Resources	No direct impacts to recreational resources are anticipated.	No mitigation measures are proposed at this time.
Land Based Economies	Up to 50 acres of land will be permanently affected. An additional 557 acres will be temporarily disturbed for turbine installation, road construction, cable trenching, laydown and contractor staging.	Oliver Wind III has worked with landowners to minimize impact to their land.
Soils	Same as above.	BMPs for erosion and sediment control will be utilized to minimize wind and water erosion at the site in association with the proposed Project SWPPP. Only land needed for the facility will be permanently affected. Temporarily disturbed areas will be restored.

Table 15. Summary of Impacts and Mitigation

Resource	Impact	Mitigation
Geologic and Groundwater Resources	No impacts to geologic or groundwater resources are anticipated.	Oliver Wind III has researched subsurface mineral rights within the proposed Project Area and mineral rights did not exceed 50% rights on all of the properties that proposed Project facilities are planned.
Surface Water and Floodplain Resources	Access roads, turbines, and other proposed Project facilities will be located and constructed in such a manner that no impacts are anticipated.	Impacts to surface waters will be avoided. Oliver Wind III will implement BMPs to minimize erosion and sedimentation at the site in association with the proposed Project SWPPP.
Wetlands	Impacts to wetlands and WoUS will be avoided and minimized to the 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 50 acres of land will be permanently affected. An additional 557 acres will be temporarily disturbed during construction.	Oliver Wind III will avoid existing trees and shrubs as practicable and will use BMPs during construction and operation to minimize impacts. If impacts to trees or shrubs cannot be avoided, the individual trees or shrubs will be replaced. Temporarily disturbed areas will be reseeded or restored to crop, depending on original conditions and landowner preference. Native prairie will be avoided to the extent practicable and will be reseeded using a native prairie mix in accordance with landowner preferences.
Wildlife	Potential avian and bat collisions may occur, but are anticipated to be relatively few. Habitat fragmentation is likely to be minimal for most avian species; the Project is unlikely to fragment bat habitat.	A variety of mitigative measures will be implemented, as discussed in Section 7.15.3. The proposed Project's WRRS will be implemented after construction of the proposed Project as described in Section 7.15.3.and the proposed Project will complete one year of post-construction mortality monitoring. Oliver Wind III will prepare a Project-specific Bird and Bat Conservation Strategy that documents these measures.
Rare and Unique Natural Resources	The Project is unlikely to affect the pallid sturgeon, black-footed ferret, northern long-eared bat, red knot, interior least tern, and Dakota skipper; there is a low likelihood for the Project to affect whooping cranes. Additional studies are ongoing to evaluate potential impacts to bald eagles and golden eagles.	Oliver Wind III has committed to marking portions of the associated overhead transmission line within 1 mile of suitable crane habitat to minimize risk to whooping cranes. O&M staff will be trained to identify federally protected species. Dead or injured federally protected species will be promptly reported to USFWS.

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8. PUBLIC AND AGENCY COORDINATION

8.1 Public Outreach

Principal stakeholders in the proposed Project are landowners that have entered into agreements with Oliver Wind III to provide wind rights for the proposed Project. A landowner dinner was held in January 2016 for the Oliver III Wind Energy Center. Oliver Wind III invited all landowners within the proposed Project Area as well as adjacent to the proposed Project Area to the open house.

8.2 Agency Coordination

Per Section 69-06-01-05 of the PSC's administrative rules, Oliver Wind III and its representatives have contacted key local, state, and federal agencies in January 2016 to inform them of the proposed Project and for assistance in identifying concerns or issues within the proposed Project Area. Agency correspondence and responses received as of February 29, 2016 are included in **Appendix C; Table 16** summarizes the responses received from agencies to date.

Oliver Wind III will continue to meet with county officials as the proposed Project moves forward and Oliver Wind III seeks any necessary local permits (e.g. building permit).

Table 16. Summary of Agency Responses

Agency	Date of Correspondence	Information Provided	Response Date	Response Summary	Section(s) Where Response is Addressed
U.S. Fish and Wildlife Service	01/11/2016	Shapefiles of proposed Project Area	01/20/2016	There are no USFWS easements or fee-title lands within or near the proposed Project area.	3.1, 3.2, 7.3
North Dakota Game and Fish Department	01/14/2016	Agency consultation letter; T,R,S of proposed Project Area; map of Project Location	2/10/2016	The agency originally provided comments regarding this Project on 24 December 2015. The agency reviewed the Project as updated and has nothing additional to offer. The original comments are still applicable.	3.1, 3.2, 7.13, 7.14, 7.15, 10.10

Agency	Date of Correspondence	Information Provided	Response Date	Response Summary	Section(s) Where Response is Addressed
North Dakota Game and Fish Department	11/24/2015	Agency consultation letter; T,R,S of proposed Project Area; map of Project Location	12/24/15	Asks that native prairie be avoided to the extent possible and suggests use of USFWS Land-Based Wind Energy Guidelines. Recommends avoidance of wetland impacts and maintaining existing drainage patterns, and replacing wetlands that are affected. Requests burying of collection lines, marking overhead lines near streams or wetlands to minimize avian impacts; recommends conducting aerial surveys for raptor nests prior to construction and implementing a ½ mile buffer around active eagle nest sites; recommends monitoring for avian and bat mortality, and requests GPS coordinates of turbines once proposed Project is constructed.	3.1, 3.2, 7.13, 7.14, 7.15, 10.10
North Dakota Game and Fish Department	01/11/2016	Shapefiles of proposed Project Area and 10-mile buffer	01/13/2016	There are no known prairie dog or burrowing owl locations within the proposed Project Area.	3.1, 3.2
North Dakota Game and Fish Department	01/11/2016	Shapefiles of proposed Project Area and 10-mile buffer	02/03/2016	NDGF recommends that the agency help design a survey protocol for grouse habitat.	3.1, 3.2
U.S. Army Corps of Engineers	01/14/2016	Agency consultation letter; T,R,S of proposed Project Area; map of Project Location	01/20/2016	If a Section 10 and/or Section 404 permit is required, a permit application must be submitted to USACE. A web link to Section 10/404 permit applications and instructions for completion was provided.	3.1, 3.2, 7.13
State Historical Society of North Dakota	02/02/2016	Email correspondence	02/02/2016	Confirmed that the Study Area for historic architecture for the proposed Project is set at 2 miles.	3.1, 3.2, 7.7, 10.9

Agency	Date of Correspondence	Information Provided	Response Date	Response Summary	Section(s) Where Response is Addressed
State Historical Society of North Dakota	01/14/2016	Agency consultation letter; T,R,S of proposed Project Area; map of Project Location	01/20/2016	Recommends Class I file search and Class III Intensive Cultural Resources Inventories for historic structures over 50 years within the visual Study Area. The visual Study Area for historic structures should be within a 2 mile radius of individual turbine locations but may be modified depending on specific turbine locations. The agency requests a map of the turbine locations to see if there needs to be any modifications to the Study Area. Class III archaeological (pedestrian) surveys will be warranted for archaeological sites for all areas directly impacted by the proposed Project.	3.1, 3.2, 7.7, 10.9
State Historical Society of North Dakota	01/15/2016	Shapefiles of proposed Project Area	01/15/2016	A survey area for architectural resources consisting of a 2-mile buffer around planned turbines is acceptable for the proposed Project. A Class I file search and Class III Intensive Cultural Resources Inventories for archaeological sites and historic structures should be completed for the proposed Project.	3.1, 3.2, 7.7, 10.9

Agency	Date of Correspondence	Information Provided	Response Date	Response Summary	Section(s) Where Response is Addressed
ND Parks and Recreation Department	01/14/2016	Agency consultation letter; T,R,S of proposed Project Area; map of Project Location	02/12/16	The proposed Project does not affect state park lands or state Land and Water Conservation Fund lands managed by the agency. Upon review of North Dakota Natural Heritage biological conservation database, there are no documented significant ecological community, plant or animal species of concern occurrences in the database within or adjacent to the proposed Project Area. The agency suggests that all efforts be made to avoid impacts to wildlife species and their habitats. To identify and assess adverse impacts to wildlife the agency suggests pre and post construction avian and bat monitoring studies be conducted.	3.1, 3.2. 7.3, 7.8

Agency	Date of Correspondence	Information Provided	Response Date	Response Summary	Section(s) Where Response is Addressed
ND Department of Health	01/14/2016	Agency consultation letter; T,R,S of proposed Project Area; map of Project Location	02/02/16	The agency believes the environmental impacts of the proposed Project will be minor and can be controlled by proper construction methods. Fugitive dust emissions should be minimized during construction. Impacts to streams should be avoided and disturbed areas should be revegetated. The agency attached guidelines for minimizing degradation to waterways during construction. Projects disturbing one or more acres must have a permit to discharge storm water runoff. The agency directs to check with local officials to be sure any local storm water management considerations are addressed. Noise from construction activities can be minimized by ensuring that construction equipment is equipped with a working muffler. The agency believes the proposed activities are consistent with the State Implementation Plan for the Control of Air Pollution for the State of North Dakota.	3.1, 3.2, 7.6, 7.10, 9.0

Agency	Date of Correspondence	Information Provided	Response Date	Response Summary	Section(s) Where Response is Addressed
ND State Water Commission	01/14/2016	Agency consultation letter; T,R,S of proposed Project Area; map of Project Location	02/05/16	There are no floodplains identified and/or mapped in the proposed Project Area, and no floodplain permits from Morton or Oliver County would be necessary relative to the National Flood Insurance Program. Directs to contact the Southwest Water Authority regarding Southwest Pipeline Project infrastructure that may be located in the Project area. States that it is the project sponsor's responsibility to ensure that the appropriate agencies are contacted for any required approvals, permits, or easements. States all waste material must be disposed of properly and not placed in identified floodway areas.	3.1, 3.2, 7.4, 7.12

9. POTENTIAL PERMITS/APPROVALS

The federal and state permits or approvals that have been identified as potentially required for the construction and operation of the proposed Project are shown in **Table 17**. Permits dependent on the final site layout will be applied for after receiving PSC approval, but prior to construction.

Table 17. Potential Permits and Approvals Required for Construction and Operation of the Proposed Facility

Agency	Type of Approval	Status*	Need
Federal Approvals			
USACE	Nationwide Permit 12 and 14	3	Wetland surveys are currently underway to ensure that the proposed Project minimizes impacts to WoUS and stays below the pre-construction notification threshold.
FAA	Form 7460-1, Notice of Proposed Construction	1	Notice and approval are required for structures over 200 feet in height. FAA approval of lighting and marking of turbines is required.
EPA	SPCC	2	Required if more than 1,320 gallons of oil are stored on-site.
State of North Dakota			
PSC	Certificate of Site Compatibility	1	Required for construction of generation facility over 0.5 MW in size.
	Certificate of Corridor Compatibility and Route Permit	1	Required for transmission lines over 115kV.
SHSND	Concurrence with effect determinations	2	Class I File Search is complete and a Class III Intensive Cultural Resources Inventory for archaeology is underway; a Class III Cultural Resources Inventory for historic structures is also underway. The reports will be submitted to SHSND for review when complete.
North Dakota Department of Health	NPDES Permit: General Construction Storm Water	2	Required for disturbance of over 1 acre of land. Must prepare a SWPPP.
North Dakota Highway Patrol	Overheight/Overweight Permit	2	Permit required for hauling construction equipment and materials on State Highways.
NDDOT	Road Approach/Access Permit	2	Permit required for construction of access roads from State Highways.
	Utility Permit/Risk Management Documents	2	Permit required for utility crossings on State Highway right-of-way.
ND State Water Commission	Drainage Permit	3	Required if draining a wetland with a drainage area of 80 acres or more.
	Water Permit	3	Required if drilling a well for the O&M facility.

Table 17. Potential Permits and Approvals Required for Construction and Operation of the Proposed Facility

Agency	Type of Approval	Status*	Need
Local Permits			
Oliver County	Conditional Use Permit	1	Oliver Wind III submitted the application in February 2016.
	Utility Occupancy Permit	3	Permit to place collection lines and telecommunication lines within County right-of-way.
	Road Use Agreement	2	Permit for road use, access roads, intersections, road maintenance and repair of County roads.
	Building Permit	2	Permit to build aboveground facilities associated with the proposed Project.
Morton County	Special Use Permit	1	Oliver Wind III submitted the application in February 2016.
	Zoning Map Amendment	1	Oliver Wind III submitted the application in February 2016.
	Road Use Agreement	2	Permit for road use, access roads, intersections, road maintenance and repair of County roads.
	Utility Occupancy Permit	3	Permit to place collection lines and telecommunication lines within County right-of-way.
	Building Permit	2	Permit to build aboveground facilities associated with the proposed Project.
Southwestern Water Authority	Pipeline Crossing Permit	2	Required for crossing the Southwest Pipeline Project.

* Status Explanation:
  1 Applied and/or Decision Pending
  2 Will Apply Prior to Construction
  3 Final Layout will Determine Whether Permit/Approval is Needed

10. FACTORS CONSIDERED

The North Dakota Energy Conversion and Transmission Facility Siting Act lists 11 factors to guide the PSC 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 proposed facility 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

Oliver Wind III 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 proposed 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 proposed Project is expected to impact up to 50 acres of land during operation, which will not be available for other uses. An additional 557 acres of land will be temporarily affected due to turbine pad construction, road construction, collection line trenching, laydown and contractor staging areas, and temporary meteorological towers. Additional unavoidable effects include visual effects and increased habitat fragmentation.

10.5 Alternatives to the Proposed Site

Oliver Wind III believes that the proposed site is the most viable alternative. Oliver Wind III is committed to being flexible on the preliminary site layout and will work closely with landowners and 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 proposed 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 40 to 60 feet across and 7 to 10 feet thick. 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 proposed Project will balance the irretrievable commitment of resources resulting from the construction of the proposed Project (see **Section 10.7**).

10.7 Direct and Indirect Economic Impacts

Economic impacts include impacts associated with the temporary disturbance of up to 557 acres of land during construction. Permanent impacts will be lower, at approximately 50 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 Oliver and Morton counties will contribute to the total personal income of the region. Additional personal income will be generated for residents in the county and 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 benefit businesses in the county and the state.

Long-term beneficial impacts to the county's 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 western North Dakota. Additional revenues are expected from property and income taxes.

Continuing to establish the 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 in the Study Area for direct effects is underway. The literature review results identified a total of three previously recorded cultural resources sites within the Survey Corridor. Two previously recorded cultural resource sites and three cultural resource site leads were identified within the proposed Project Area.

Oliver Wind III will avoid directly impacting all Native American sites including stone features and cultural material scatters. 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 PSC.

10.10 Effect of Site on Biological Resources

The impact of the proposed Project on wildlife is expected to be low. Oliver Wind III has sited the proposed Project following the voluntary USFWS Wind Energy Guidelines (USFWS 2012) and designed the proposed Project following suggested APLIC practices (APLIC 2006). There is potential for avian and bat collisions with facility turbines, power lines, and meteorological towers, as well as the potential for habitat loss and fragmentation; however, Oliver Wind III will implement measures to avoid and minimize potential impacts to biological resources from the proposed Project. Electrocution risk is avoided by using pad-mounted transformers and designing the associated transmission line per APLIC 2006 recommendations. Risks of collision will be minimized by siting facilities away from wetlands, burying collection lines, and marking portions of the associated transmission line within 1 mile of suitable whooping crane habitat. Similarly, risk of impacts to habitat will be avoided and minimized by reseeding or planting disturbed areas with native material, if approved by landowner.

The Project is unlikely to affect the pallid sturgeon, black-footed ferret, northern long-eared bat, red knot, interior least tern, Dakota skipper, and whooping cranes. Eagle use surveys and raptor nest surveys were conducted in in June and November 2015 to evaluate risk of proposed Project activities to bald and golden eagles; no bald or golden eagle nests found were found within the proposed Project area or 2-mile buffer surrounding the proposed Project Area. Oliver Wind III will prepare a Project-specific Bird and Bat Conservation Strategy documenting all bird and bat avoidance, minimization, and mitigation commitments.

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** (Rare and Unique Natural Resources).

10.11 Cumulative Effects

Activities that currently exist within the proposed Project Area and vicinity are primarily limited to agriculture. Lignite (coal) is known to occur in the Sentinel Butte Formation. Coal mining is an existing industrial component of the landscape in Oliver County. Coal mining is expected to continue in the vicinity of the proposed Project (Combs 2016). In addition to the proposed Project, there are six existing wind farms in the vicinity of the proposed Project. It is likely that wind energy development will continue in central North Dakota.

Wind energy development is anticipated to have a positive cumulative impact on air quality, and minimal impacts to geology, soils, water, noise, 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.

With the increase in the amount of land being used for wind energy generation activities, farming activities may decrease slightly. This potential shift in land use in rural communities that have historically made their living from agricultural activities may lead to a cumulative impact; 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 from agricultural use than other forms of development.

With regard to the potential cumulative impacts to wildlife resources, there is potential for the proposed 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 proposed Project is not expected to result in a cumulative loss of quality wildlife habitat. Based on the existing land use, location of existing and planned facilities, and known impacts from similar wind facilities in the area, it is expected that the proposed Project will have minimal cumulative impacts to wildlife.

10.12 Agency Comments

Agency coordination and potential permits/approvals are discussed in **Section 8** and **Section 9**, respectively. A copy of agency response letters is included in **Appendix C.**

11. QUALIFICATIONS OF CONTRIBUTORS

Name Project Role	Education and Professional Experience
MARK TRUMBAUER Project Manager, Development NEER	Mr. Trumbauer currently manages the development of wind projects in the Upper Midwest. Mr. Trumbauer joined NEER in 2008 and has been involved in wind projects in Illinois, Michigan, Kanas, Iowa, and North Dakota. Mr. Trumbauer holds a Bachelor of Landscape Architecture from Iowa State University.
KIMBERLY WELLS, PH.D. Environmental Services Project Manager NEER	Dr. Wells has 15 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 and state equivalents; the ESA, the Clean Water Act, and associated natural resource laws. She is a certified wildlife biologist and wetland delineator, and obtained her Bachelors of Science in Natural Resource Management from the University of Arizona, her MS in Fisheries and Wildlife Ecology from Oklahoma State, and her PhD in Fisheries and Wildlife Sciences from the University of Missouri – Columbia. Dr. Wells is the environmental permitting manager for the Mid-Continent Region that includes North Dakota.
JASON UTTON Director Development NEER	Mr. Utton currently directs all wind energy development efforts in the MISO and PJM markets. Jason joined NEER in 2007. While with NEER, he has successfully developed over 500 MW of clean, renewable energy, which reflects a total company investment of over $2.0B. Mr. Utton is the lead negotiator for all commercial contracts in North Dakota.
JOHN SCHAJATOVIC Sr. Project Manager Construction NEER	Mr. Schajatovic is a Senior Project Manager for NEER responsible for the early stage management within the Engineering & Construction Department. Since joining NEER in September of 2010, Mr. Schajatovic has been responsible for supporting the engineering, design, permitting and successful turnover to execution teams for multiple wind development projects and their associated transmission lines throughout the United States and Ontario. Prior to joining NEER, John served in various project management roles responsible for all phases of infrastructure projects from inception to completion in both the private construction sector as well as with public development companies. Mr. Schajatovic has a Bachelor's of Science degree in Business Administration from Youngstown State University in Ohio.
BRIAN BJELLA Attorney for Applicants Crowley Fleck PLLP	Applicant's counsel. Juris Doctor and Bachelor's degree, both from University of North Dakota.
SARAH MCCALL Project Manager Tetra Tech, Inc.	Ms. McCall has more than 12 years of experience as an environmental planner and natural resources specialist/policy analyst. Responsibilities have included project management and technical support of National Environmental Policy Act documents and other land use permits, focusing largely on renewable energy projects. Ms. McCall received her Master of Public Administration in Environmental Management at Indiana University, her Master of Science in Environmental Science at Indiana University, and her Bachelors of Science in Zoology at the University of Wisconsin.
TARA LOW Environmental Planner Tetra Tech, Inc.	Ms. Low has more than 12 years of experience in environmental planning, policy, and regulation with an emphasis in transmission line, power generation, and pipeline siting and permitting. Ms. Low received her Master of Science in Environmental Sciences from the University of Colorado and her Bachelors of Science in Zoology and Environmental Biology from Michigan State University.

Name Project Role	Education and Professional Experience
JAKE ENGELMAN GIS Analyst Tetra Tech	Mr. Engelman prepared the application figures, impact calculations, and other geographic information systems (GIS) tasks in support of this permit application. He is a GIS specialist with 4 years of experience in environmental resource and utility planning projects. His skills include GIS, cartographic and graphic design, remote sensing, natural and cultural environmental resource mapping, and global positioning system data collection. He uses these skills to produce high-quality graphic products of proposed projects, ranging from generation scale utility projects to single parcel substations. Mr. Engelman received his Bachelors of Science in Geography at Minnesota State University-Mankato.
ADAM HOLVEN Archaeologist Tetra Tech	Mr. Holven led the Class I and Class III Cultural Resources Inventory for archaeology for the proposed Project. He has extensive archaeological field experience, including large-scale multi-square mile cultural resource surveys for wind farms in North Dakota, South Dakota, and Minnesota. Mr. Holven obtained his Master's of Arts in Anthropology at Iowa State University, his Bachelors of Arts in Anthropology at University of Northern Iowa, and his Bachelors of Science in Geology at University of Northern Iowa.
APRYL JENNRICH Geologist/Wetlands Specialist Tetra Tech	Ms. Jennrich led the wetlands survey for the proposed Project. She has 8 years of experience as a geologist and environmental scientist in the environmental consulting field and approximately 6 years of wetland specific experience. Ms. Jennrich obtained her Masters of Science in Geology (emphasis on hydrogeology) at the University of Minnesota – Twin Cities and her Bachelor of Science in Geology at the University of Wisconsin – River Falls.
RICH YOUNG Wildlife Biologist Tetra Tech	Mr. Young is a wildlife biologist with over 20 years of experience. He has overseen the avian and eagle surveys for the proposed Project. Mr. Young specializes in biological assessments of sensitive and rare wildlife, inventories and censuses of wildlife populations, habitat restoration and management, and impacts of anthropogenic disturbance. He has managed and supervised a variety of field-intensive projects involving the inventory and assessment of sensitive species and habitats. Mr. Young received his Bachelor of Science in Fisheries and Wildlife Biology at Iowa State University.

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13. DEFINITIONS

AADT	Average Annual Daily Traffic
APE	area of potential effects
APLIC	Avian Power Line Interaction Committee
Asynchronous Generator	A cage-wound generator, also called an induction generator, used to generate alternating current
BGEPA	Bald and Golden Eagle Protection Act
BMPs	Best Management Practices; prevents soil erosion and sedimentation
capacity	The capability of a system, circuit, or device for storing electronic charge
Certificate	Certificate of Site Compatibility
CUP	Conditional Use Permit
dBA	decibel, A-weighted
DoD	Department of Defense
DHS	U.S. Department of Homeland Security
Electromechanical	Of, relating to, or being a mechanical process or device actuated or controlled electrically; especially being a transducer for converting electrical energy to mechanical energy
EMF	electromagnetic field
EPA	Environmental Protection Agency
EPC	engineering, procurement, and construction
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
GE	General Electric
Gearbox	An assembly of parts including the speed-changing gears and the propeller shaft by which the power is transmitted from an automobile engine to a live axle; the speed-changing gears in such an assembly
Generator	A machine by which mechanical energy is changed into electrical energy
Geotechnical	A science that deals with the application of geology to engineering
Hub	The central part of a circular object (as a wheel or propeller)
Interconnection	To be or become mutually connected
kV	kilovolt
m/s	meters per second
mph	miles per hour
MW	megawatt

MWh	megawatt-hour
MAPP	Mid-Continent Area Power Pool
MET	meteorological evaluation tower
Micrositing	The process in which the wind resources, potential environmentally sensitive areas, soil conditions, and other site factors, as identified by local, state and federal agencies, are evaluated to locate wind turbines and associated facilities.
Minnkota	Minnkota Power Cooperative, Inc.
MISO	Midwest Independent System Operator
NDDOT	North Dakota Department of Transportation
NDAC	North Dakota Administrative Code
NDCC	North Dakota Century Code
NDGF	North Dakota Game and Fish Department
NDGS	North Dakota Geological Survey
NEER	NextEra Energy Resources, LLC
NPDES	National Pollutant Discharge Elimination System
NOAA	National Oceanic and Atmospheric Administration
NRCS	National Resource Conservation Service
NTIA	National Telecommunications and Information Administration
NWI	National Wetlands Inventory
NWP	Nationwide Permit
O&M	Operations and maintenance
Oliver Wind III	Oliver Wind III, LLC
Pitch	The action or a manner of pitching; especially an up-and-down movement
PLOTS	Private Lands Open to Sportsmen
Proposed Project, the	Oliver III Wind Energy Center
PSC	North Dakota Public Service Commission
PTC	Production Tax Credit
Resistance	The opposition offered by a body or substance to the passage through it of a steady electric current
Rotor	The rotor consists of three blades mounted to a rotor hub
SCADA	Supervisory Control and Data Acquisitions (communications technology)
SHSND	State Historical Society of North Dakota
Step-up Transformer	A transformer that increases voltage
Substation	A subsidiary station in which electric current is transformed
SWPPP	Storm Water Pollution Prevention Plan
Torque	A force that produces or tends to produce rotation or torsion; also a measure of the effectiveness of such a force that consists of the product of the force and the perpendicular distance from

	the line of action of the force to the axis of rotation : a turning or twisting force
Transformer	An electrical device by which alternating current of one voltage is changed to another voltage
Transmission	An assembly of parts including the speed-changing gears and the propeller shaft by which the power is transmitted from an automobile engine to a live axle; the speed-changing gears in such an assembly
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WoUS	water of the United States
WRRS	Wildlife Response and Reporting System
Yaw	To deviate erratically from a course (as when struck by a heavy sea); especially to move from side to side: to turn by angular motion about the vertical axis

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FIGURES

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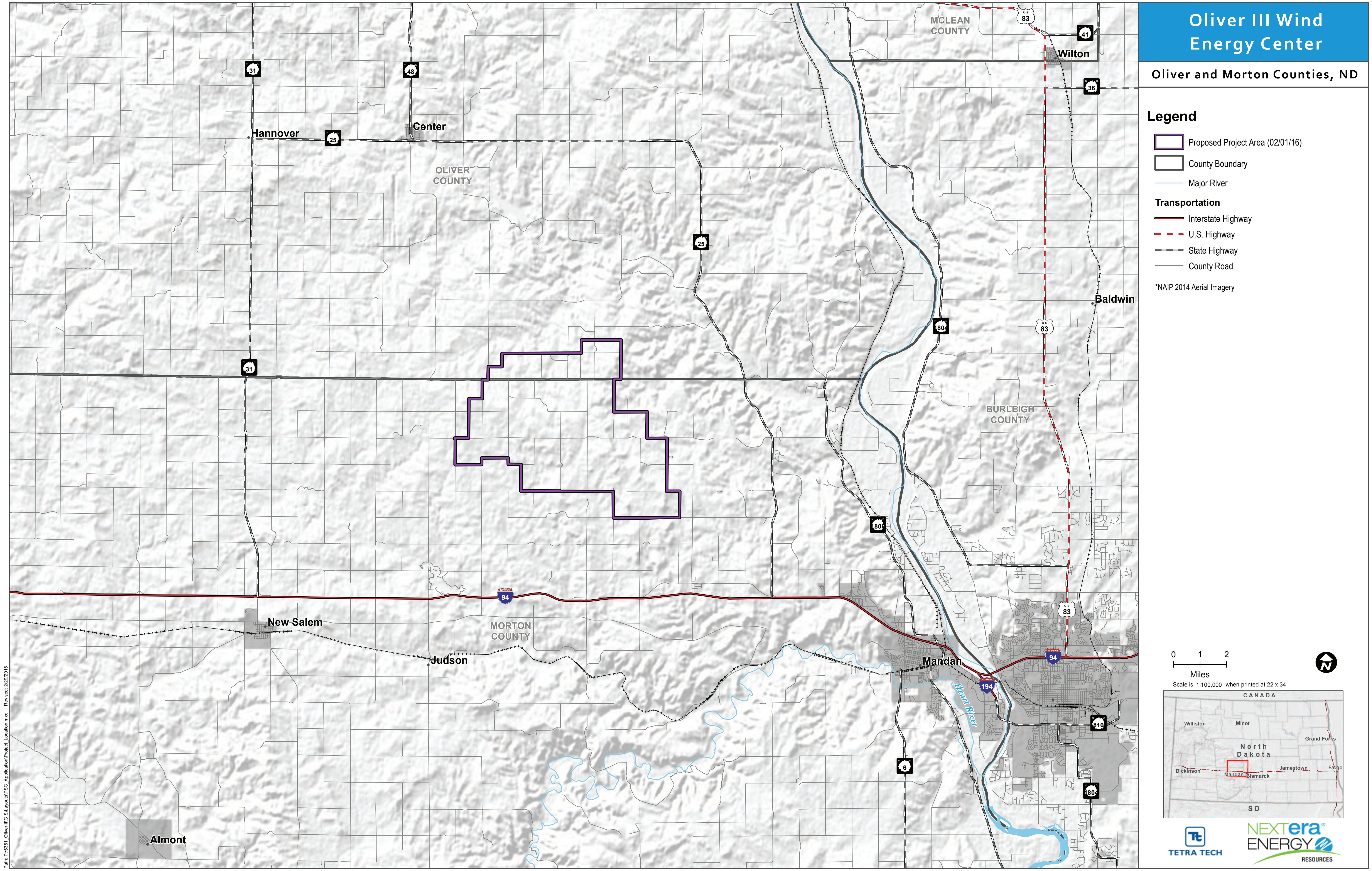
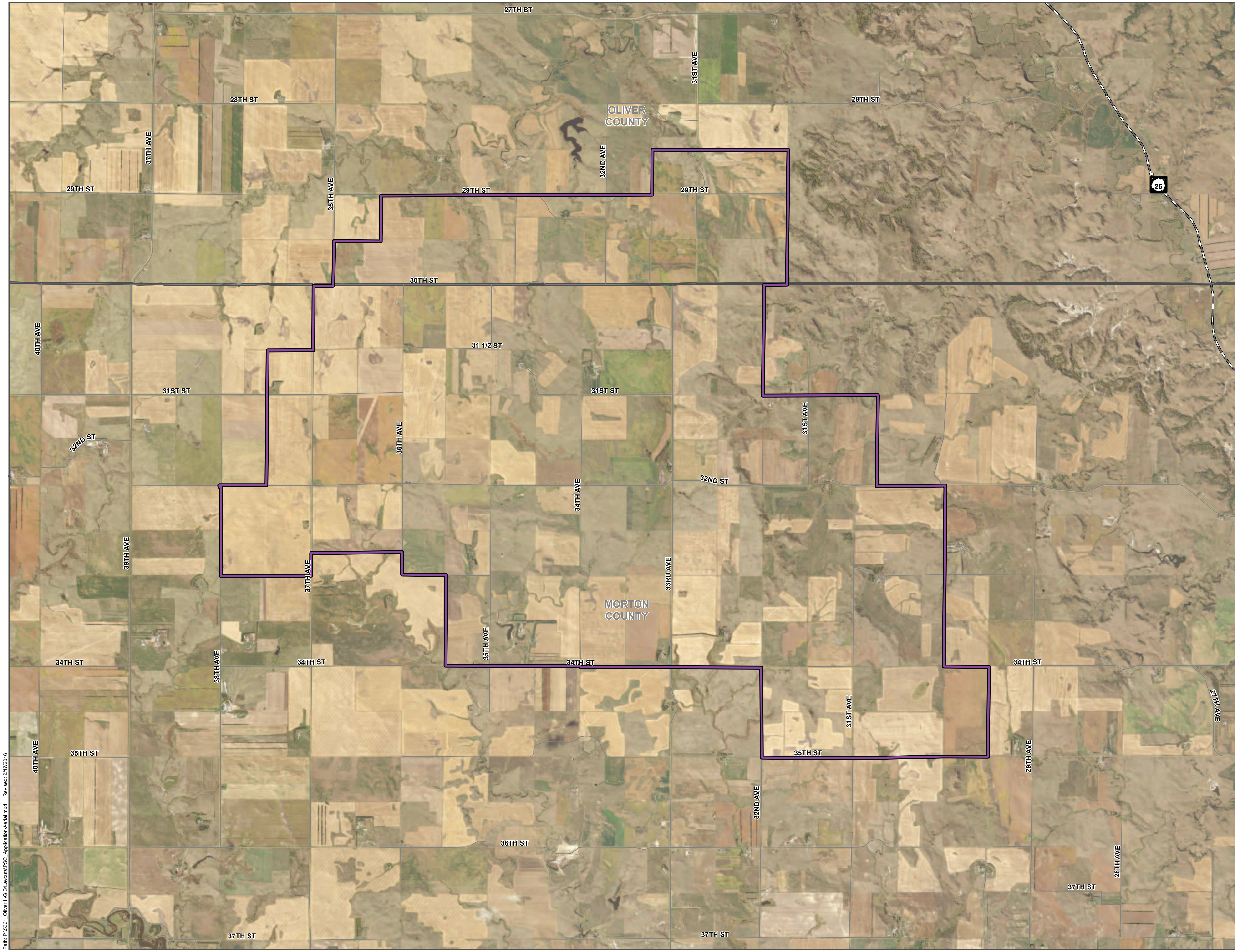


Figure 1: Project Location



Oliver III Wind Energy Center

Oliver and Morton Counties, ND

Legend

- Proposed Project Area (02/01/16)
- County Boundary
- Major River

Transportation

- County Road

*NAIP 2015 Aerial Imagery

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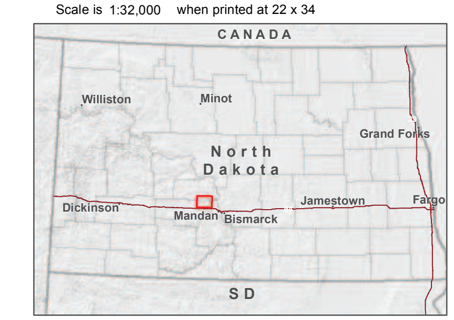

TETRA TECH

NEXTera ENERGY RESOURCES

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Figure 2: Project Area (Aerial)

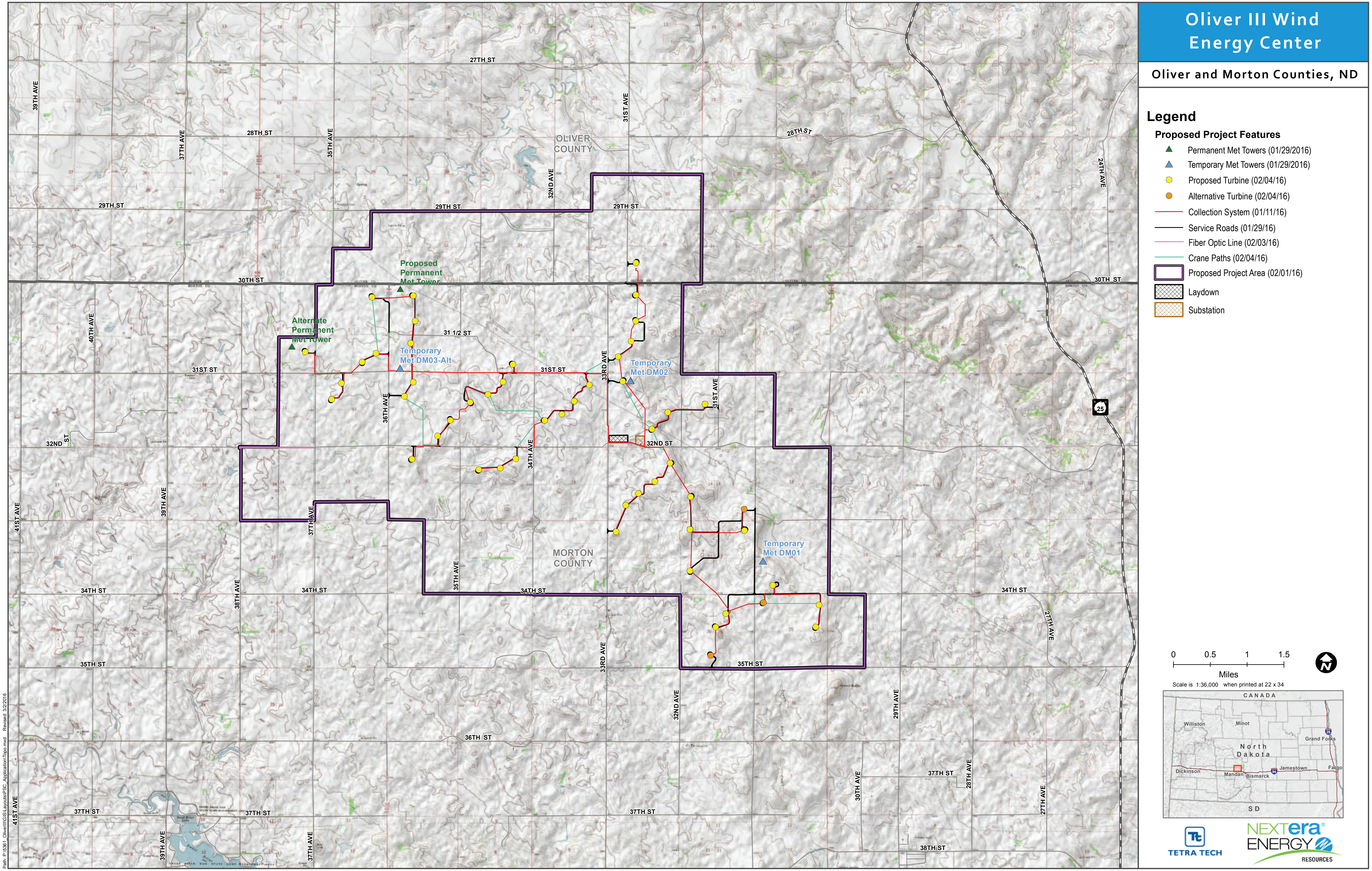
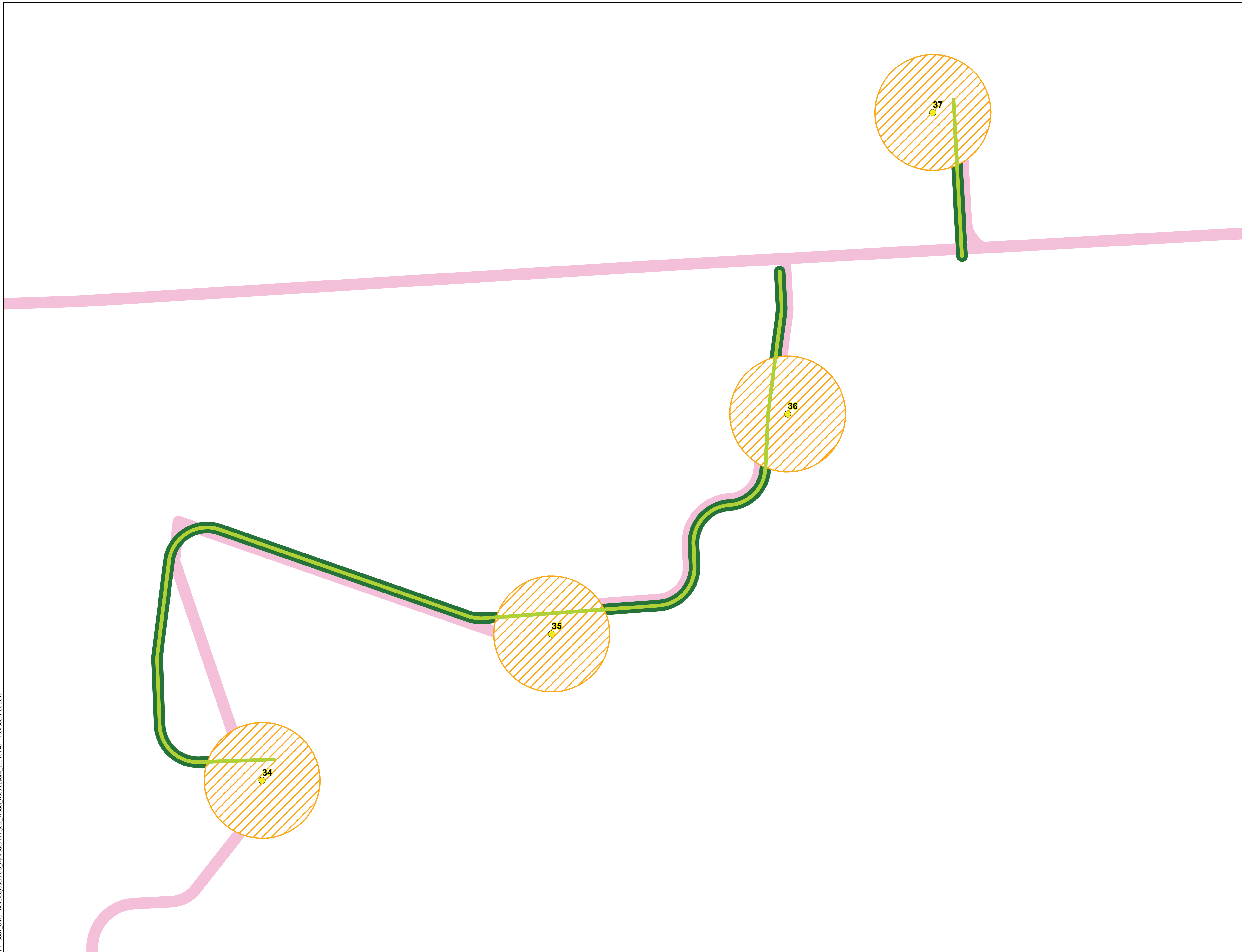


Figure 3: Project Area (Topographical)



Oliver III Wind Energy Center

Oliver and Morton Counties, ND

Legend

Proposed Impact Assumptions

- Temporary Turbine Impact Buffer
- Temporary Service Road Impact Buffer
- Temporary Collection Line Buffer
- Permanent Turbine Impact Buffer
- Permanent Service Road Impact Buffer

*Permanent impacts from collection lines are limited to junction boxes.

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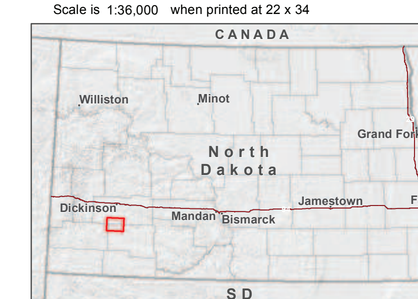
Miles
Scale is 1:36,000 when printed at 22 x 34



TETRA TECH

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Figure 4: Project Impact Assumptions

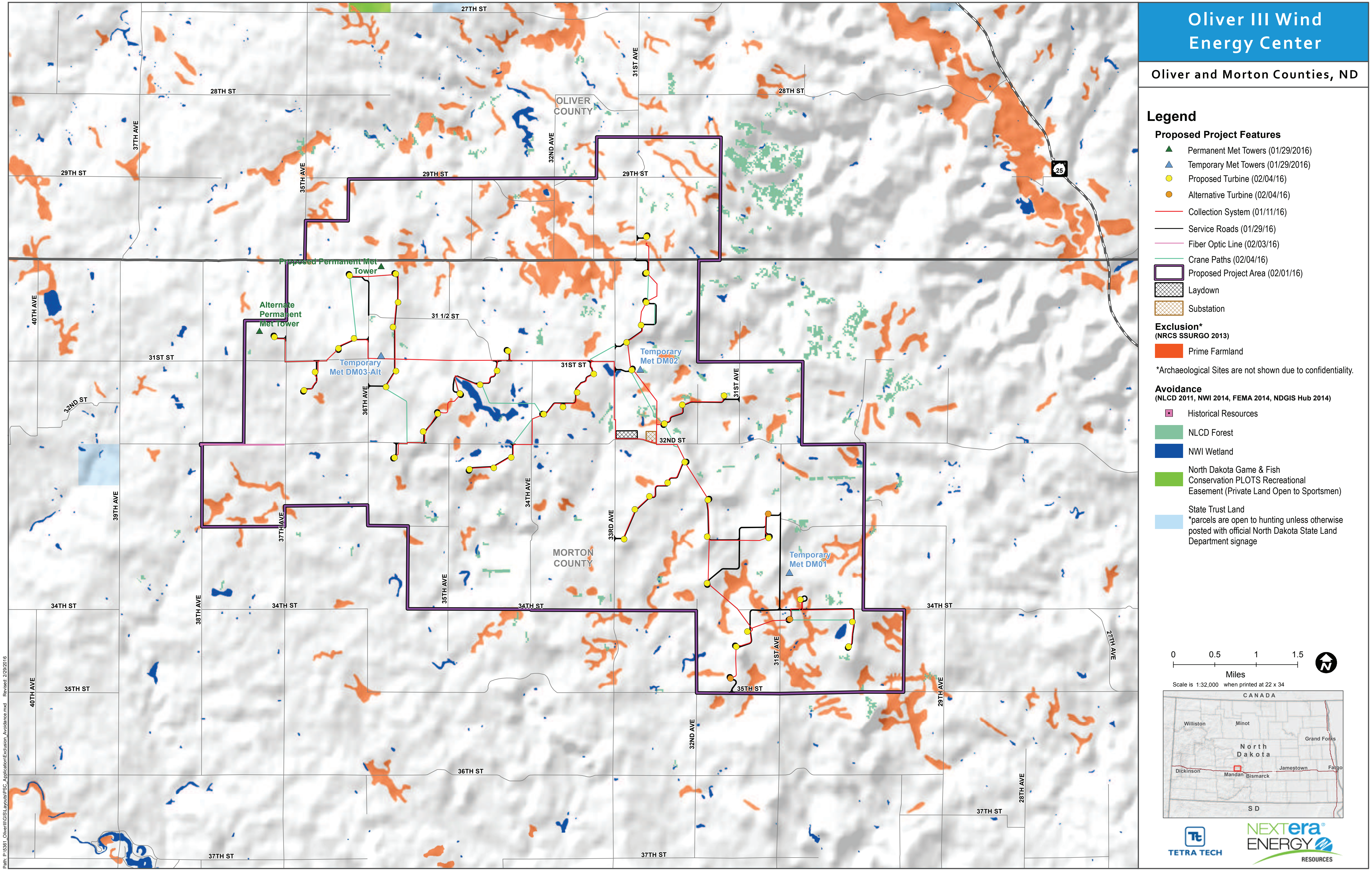
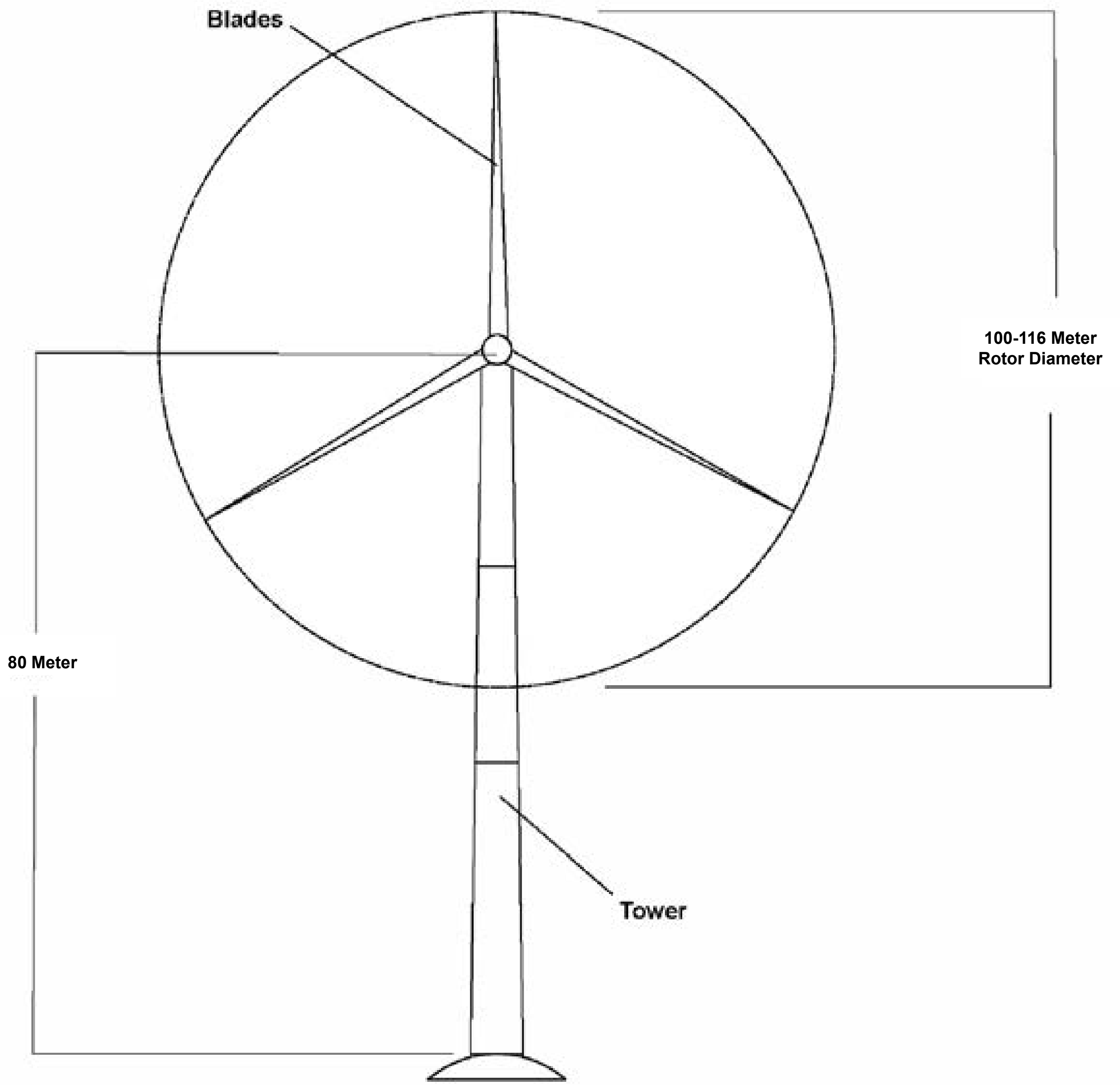


Figure 5: Exclusion and Avoidance Areas



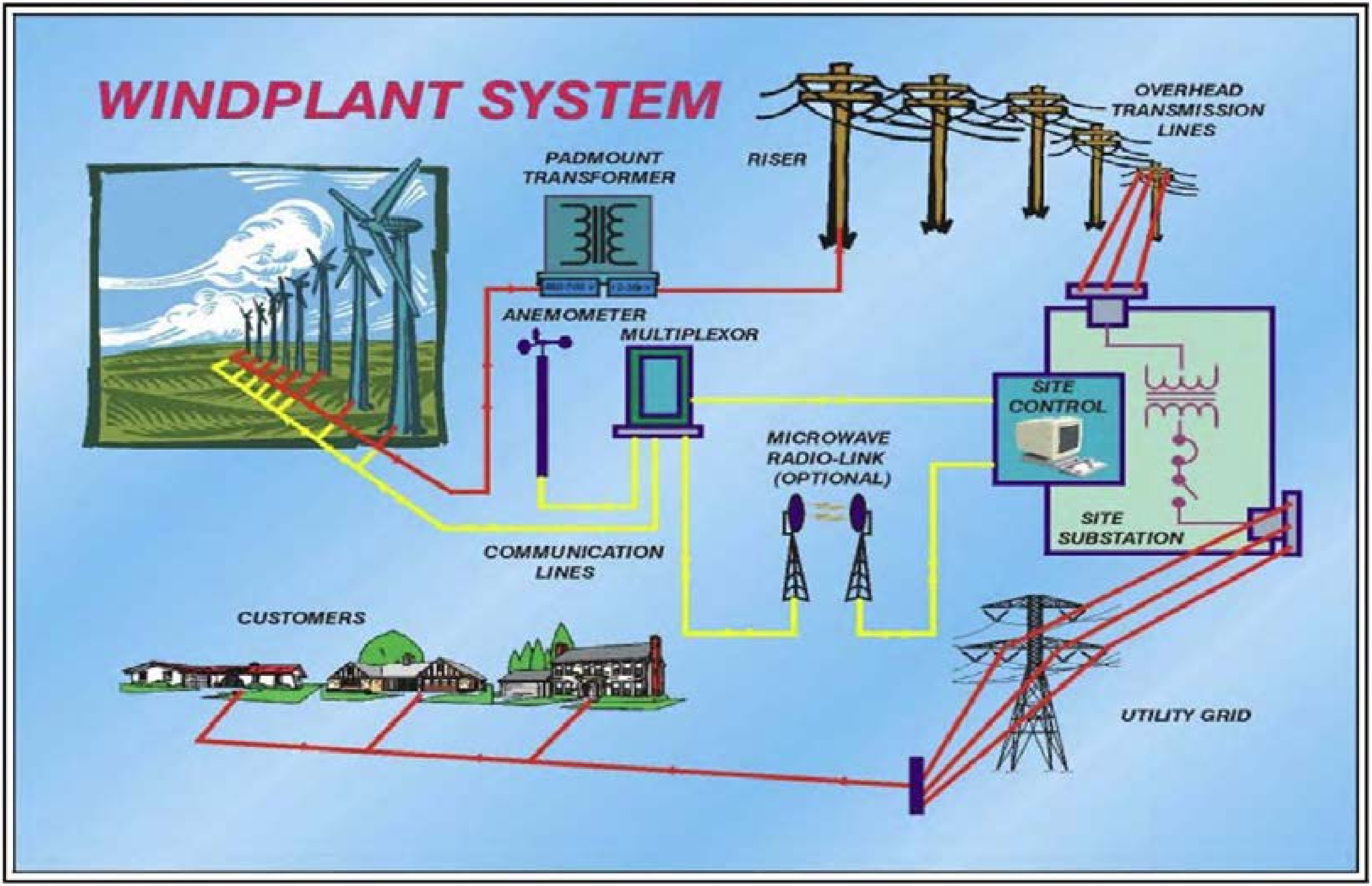
GE 2.1 and 1.79 MW Xle Wind Turbine

Figure 6

Wind Turbine Design Features

Oliver III Wind Energy Center

TETRA TECH



TETRA TECH

Figure 7

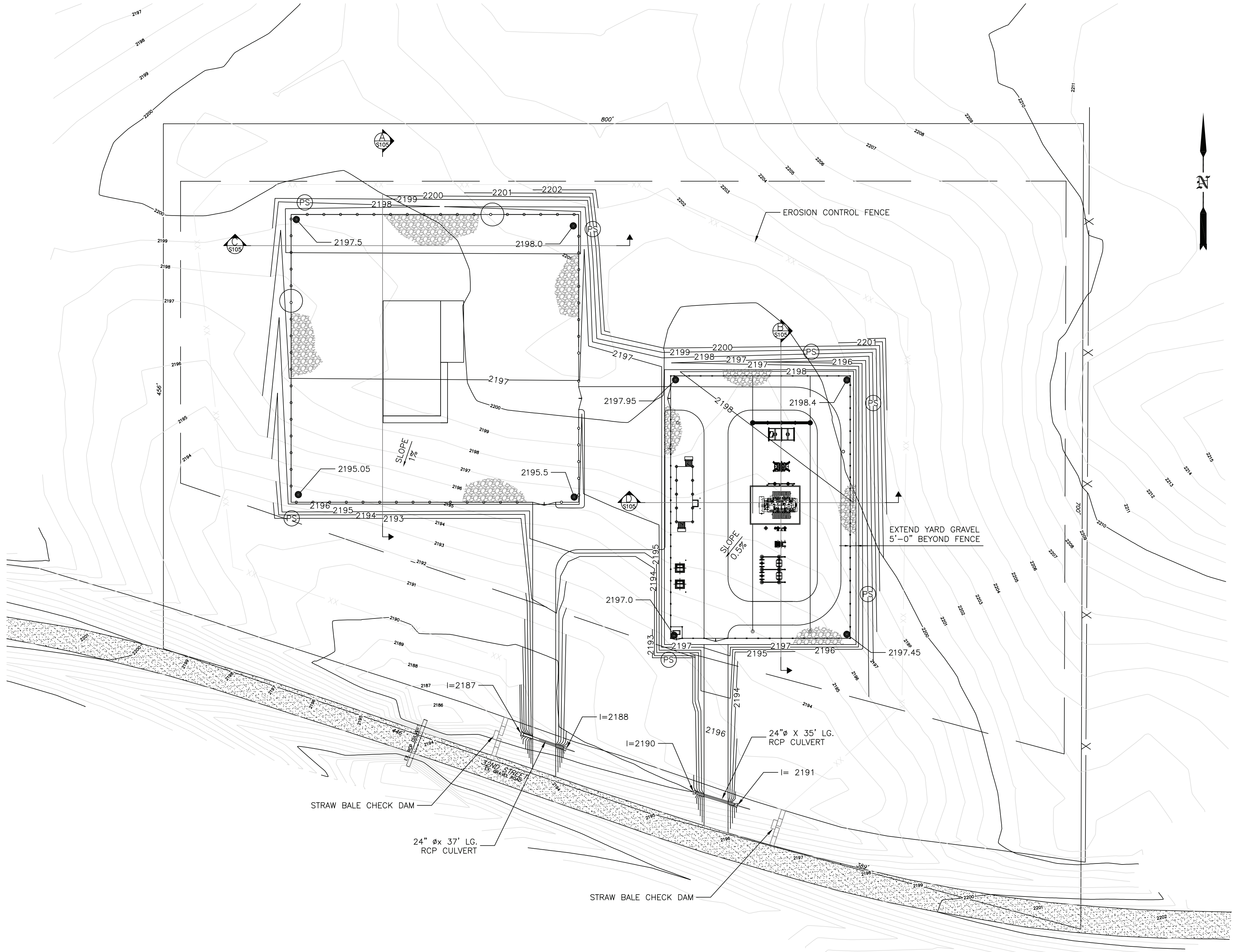
Path of Energy Diagram

Oliver III Wind Energy Center

Figure 8

Typical Wind Energy Center Layout

Oliver III Wind Energy Center



1 CIVIL PLAN
SCALE: 1" = 50'

0 50' 100'

CUT/FILL VOLUMES

CUT VOLUME: 6135 CY
FILL VOLUME: 4820 CY

LEGEND:

- PS — PERMANENT SEEDING
- PROPOSED SPOT ELEVATION (FINAL GRADE)
- EXISTING SPOT ELEVATION
- EROSION CONTROL FENCE
- CHAIN LINK FENCE
- PROPOSED CONTOUR
- EXISTING CONTOUR
- LOT LINE
- EASEMENT
- BASELINE
- SET BACK
- UE — UNDER GROUND ELECTRICAL LINE
- UT — UNDER GROUND TELEPHONE LINE
- W — UNDER GROUND WATER LINE
- G — UNDER GROUND GAS LINE
- S — UNDER GROUND SEWER LINE
- FIRE HYDRANT
- SIGN POST

REFERENCE DRAWINGS:

E-9282-S100 SITE PLAN
E-9282-S105 GRADING PROFILE
E-9282-S106 GRADING DETAILS

MODULE NUMBER:

SCALE: 0 8' 16'

ACAD 22X34 E9282-S104.dwg

KCS CORPORATION

P & E ENGINEERING CO.
POWER SYSTEM ANALYSIS AND DESIGN
245 S. 5th
P.O. Box 620
Carlisle, IA 50047
Office: 515-989-3083
FAX: 515-989-3138
peengr@peengr.com

REV	DESCRIPTION	DESG	DFTR	APPR	DATE
A	ORIGINAL DESIGN	KCS	KCS	MS	01/22/16

INCEPTION	
DATE	2015-11-19
DESG	P&E
DFTR	P&E
APPR	RDK

PRELIMINARY
NOT FOR CONSTRUCTION

NEXTERA ENERGY RESOURCES
OLIVER III COLLECTION SUBSTATION

GRADING PLAN

REV A
DWG NO E9282-S104

Figure 9: Operation and Maintenance Building and Collector Substation Site Plan

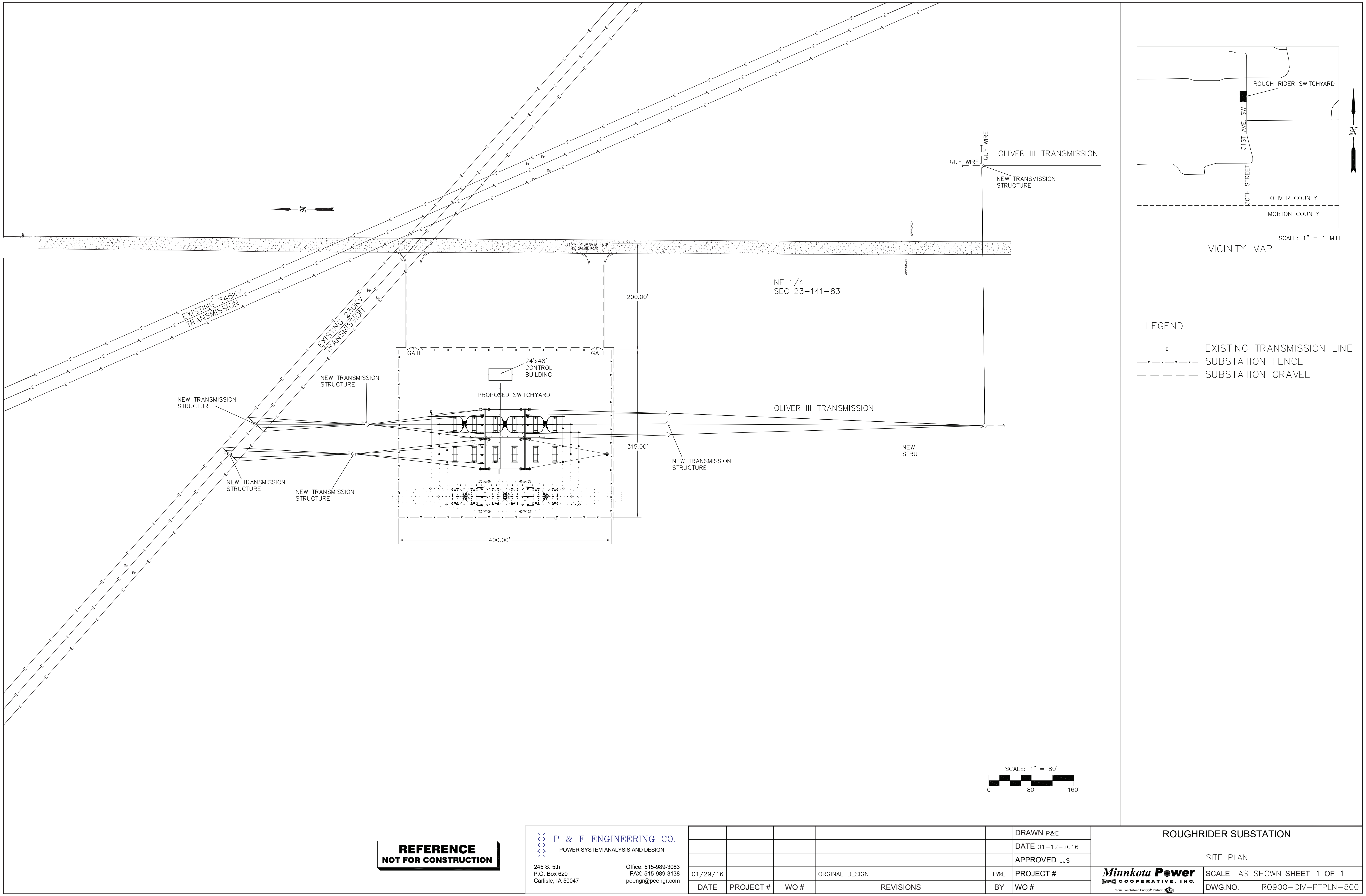


Figure 10: Minnkota Switchyard Site Plan

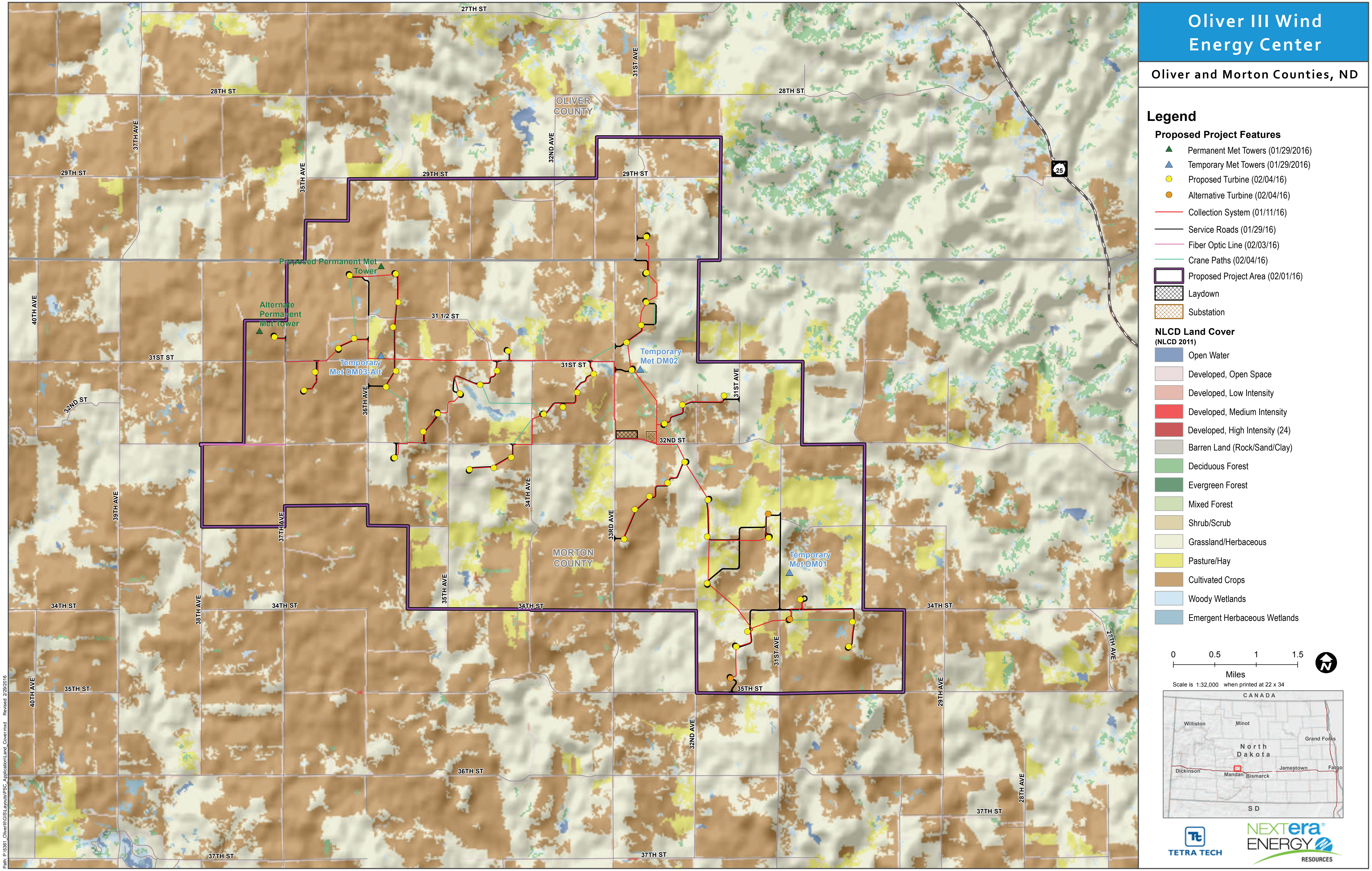


Figure 11: Land Cover Map

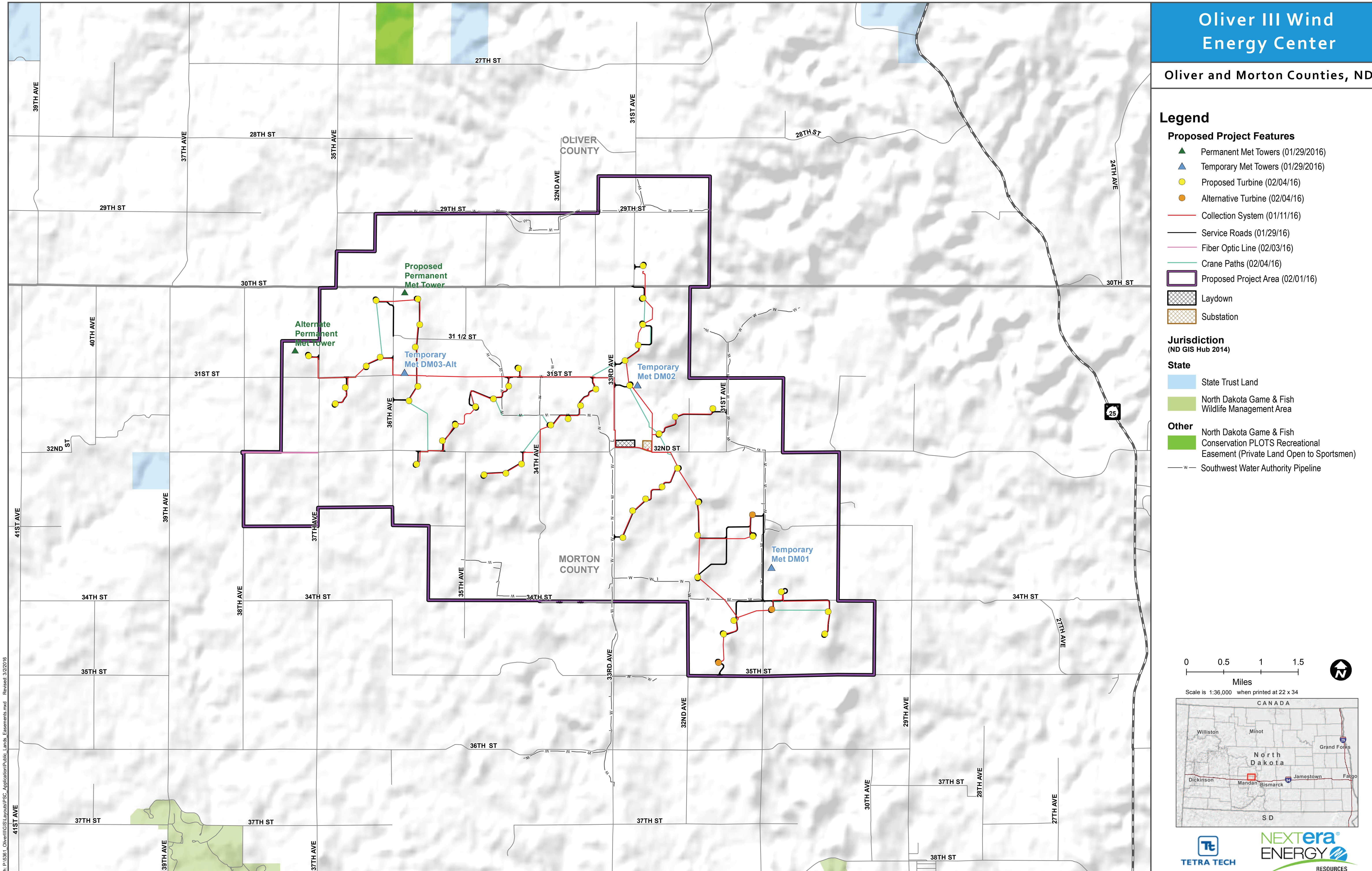


Figure 12: Public Lands and Easements

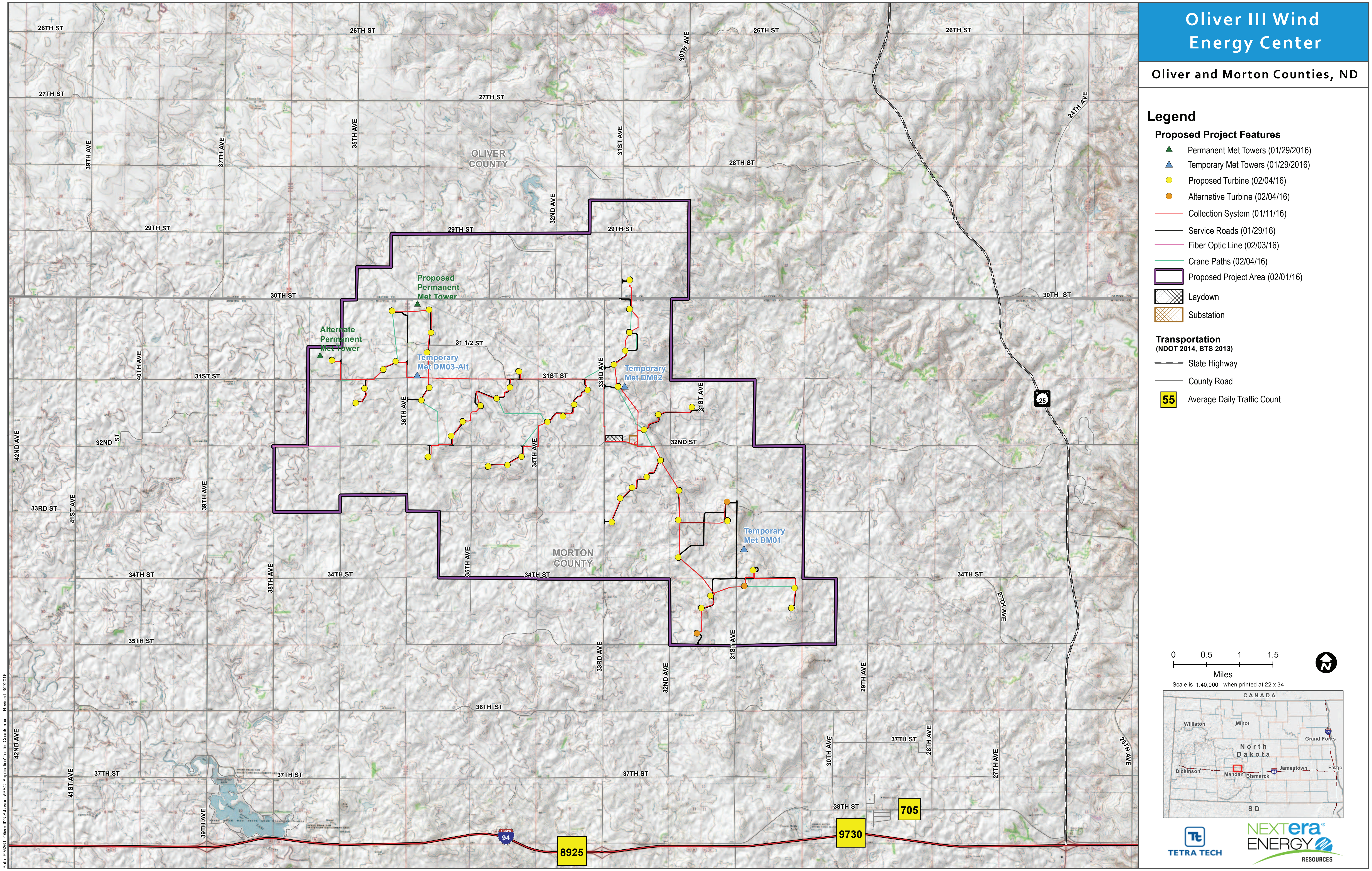


Figure 13: Average Daily Traffic Map

Figure 14: Photo of Typical Landscape

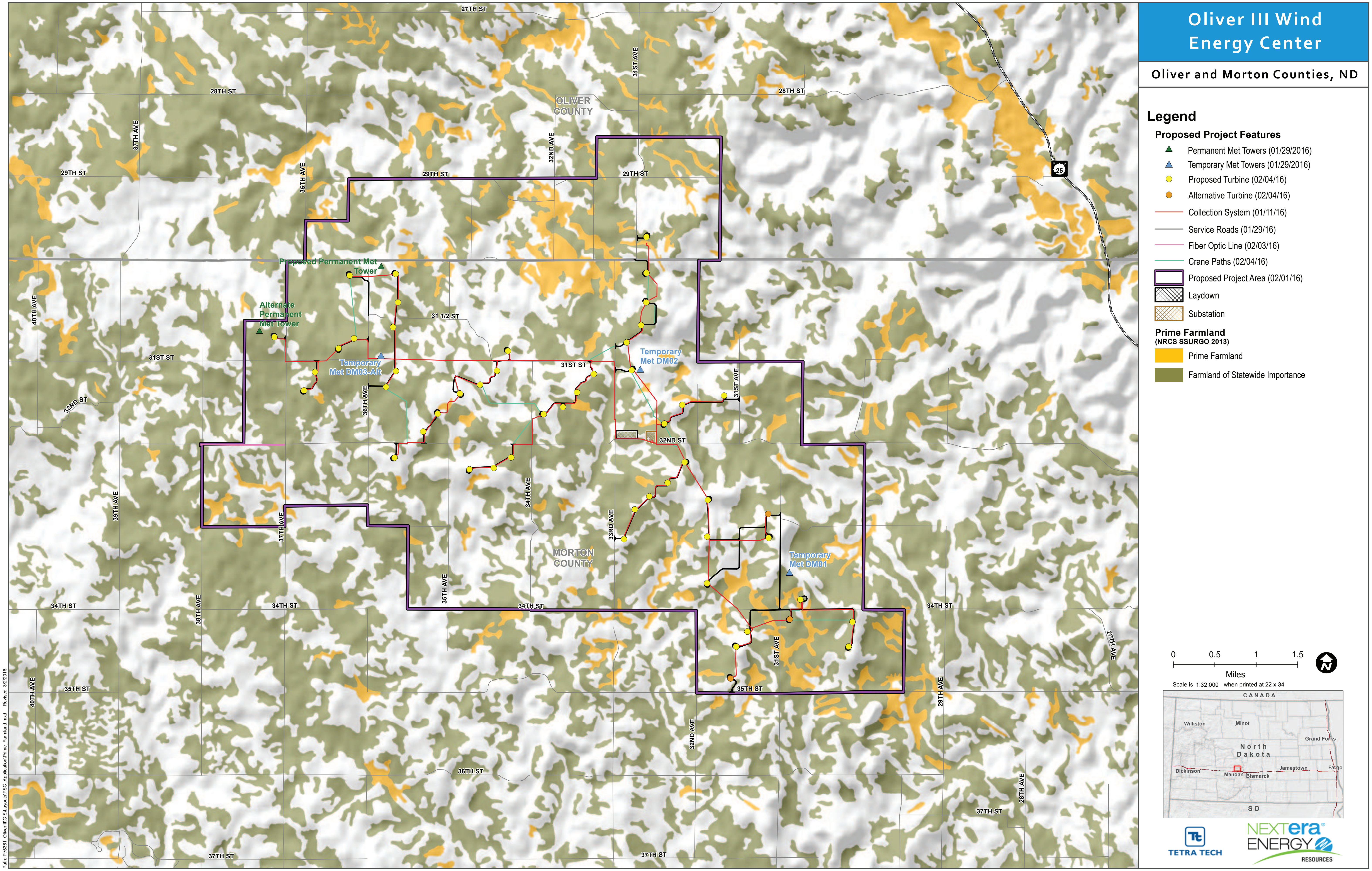


Figure 15: Prime Farmland Soil Distribution Map

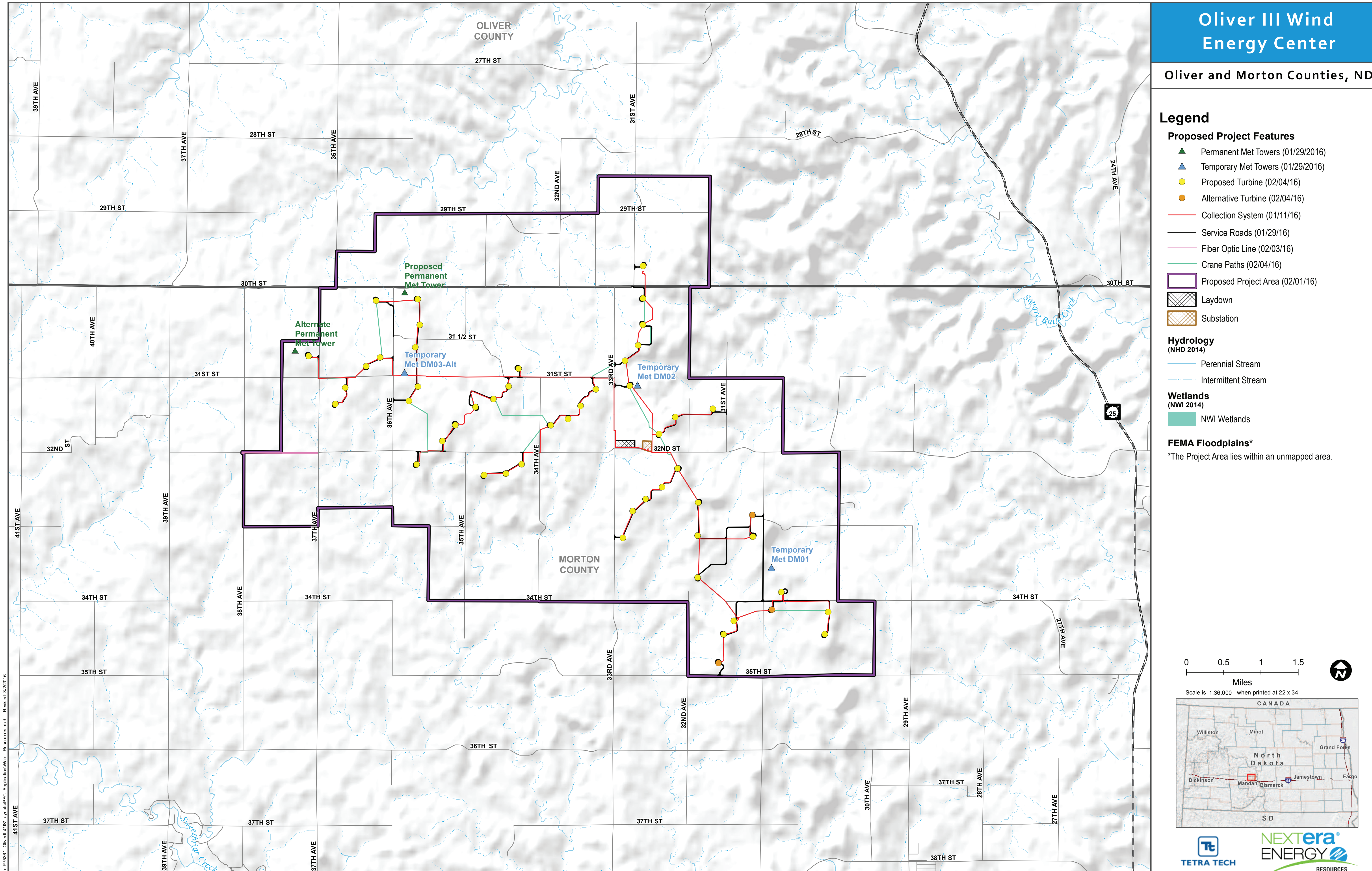


Figure 16: National Wetlands Inventory and Surface Waters Map

Appendix A
Excerpt of NextEra Energy, Inc.'s 2015 Corporate Responsibility Report

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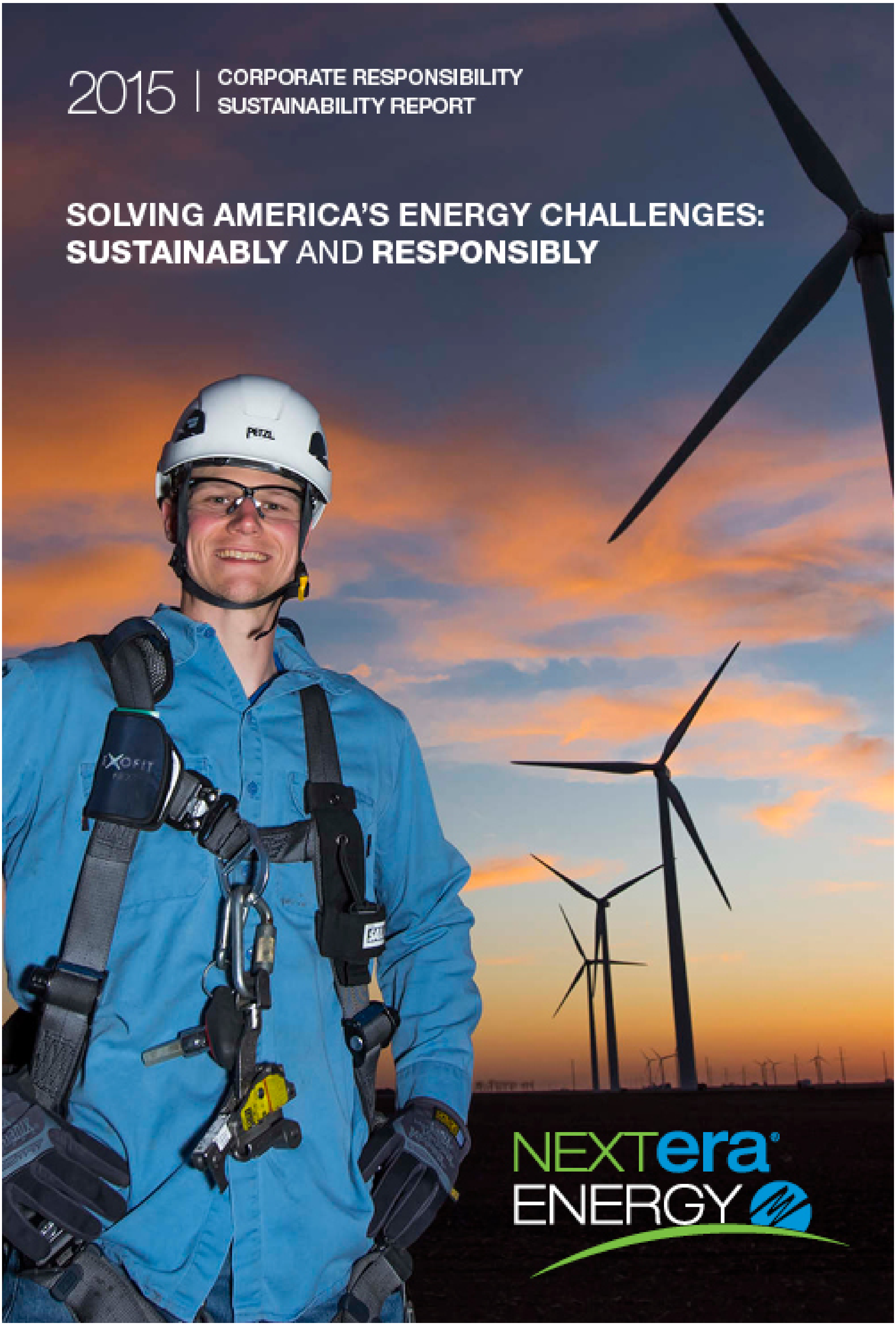

Project totals for NextEra Energy, Inc. and NextEra Energy Resources, LLC include those in which NextEra Energy Partners, LP holds a minority interest.

Our Story

At NextEra Energy, we’re proud of the role we’re playing in helping solve America’s energy challenges and in creating a more affordable clean energy future ... sustainably and responsibly.

To us, being sustainable and responsible means respecting our environment, investing in customer value, sustaining and growing our communities, investing in our team, and growing shareholder value.

As we continue to pursue our vision of becoming America’s clean energy leader, we do so with a commitment to ensuring we are providing benefits daily for our environment, our customers, our communities, our employees and our shareholders.

We’re pleased you’ve taken the time to learn about the NextEra Energy story, and we invite you to join us in our journey to create a more affordable clean energy future we can all be proud of.

Delivering for OUR ENVIRONMENT

Project totals for NextEra Energy, Inc. and NextEra Energy Resources, LLC include those in which NextEra Energy Partners, LP holds a minority interest.

Highlights

1. NextEra Energy achieved its lowest-ever emissions rates of SO2, NOx and CO2 in 2014 – rates that were 97-, 79- and 55-percent lower, respectively, than our industry's averages
2. We installed more than 1,600 MW of wind and solar power in 2014
3. We committed to interacting with nature in a positive manner and have developed wildlife protection programs to protect a number of species and their habitats, including eagles, kestrels, sea turtles, crocodiles, and ospreys

Environmental Stewardship

At NextEra Energy, we're committed to being an industry leader in environmental protection and stewardship. As citizens, we're all stakeholders of our earth's environment. As an energy company, we recognize that environmental protection and stewardship are essential to the way we do business and critical to the value we deliver for our stakeholders.

Our Environmental Policy establishes our core environmental expectations and provides actionable guidance for all employees as we strive to foster a culture of environmental excellence and challenge ourselves to continuously improve. The policy is incorporated in our Code of Business Conduct & Ethics and Supplier Code of Conduct, which apply to our employees and suppliers, respectively. Everyone at NextEra Energy understands that protecting the environment is a collective responsibility. It's why our senior executives are actively involved in our environmental accountability, management and stewardship programs 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.

We want to be the first and best source of information for our stakeholders to learn about our environmental performance and programs. That's what it means to be the clean energy leader. And that's how we deliver for the environment.

Project totals for NextEra Energy, Inc. and NextEra Energy Resources, LLC include those in which NextEra Energy Partners, LP holds a minority interest.

The protection of our natural environment is a fundamental part of our goal to be America’s clean energy leader. We are committed to meeting our energy needs, while protecting the air, water, land and wildlife, and our exceptional environmental performance record and clean energy portfolio demonstrate just how well we are doing. These commitments are important to our employees, customers and communities and are what further enable us to deliver outstanding value to our customers and shareholders.

-Randy LaBauve, vice president of environmental services

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Toward Cleaner Air

At NextEra Energy, we're committed to being an industry leader in environmental protection and stewardship, and one of the key ways in which we've demonstrated this commitment is by making business decisions to invest in emissions-free and clean generation. This enables us to reduce our impact on the air we all breathe. In fact, NextEra Energy's generation fleet has significantly lower rates of emissions of CO_2, SO_2 and NO_x compared to the U.S. electric power industry as a whole.

At year-end 2014, NextEra Energy Resources was the world's largest generator of renewable energy from the wind and the sun. We ended 2014 with more than 11,400 megawatts of wind generation capacity and nearly 1,000 megawatts of solar generation capacity.

At FPL, we are continuing to modernize our fossil generation fleet by replacing older, inefficient oil-fired generation with state-of-the-art combined-cycle, natural gas generation. Since 2001, FPL's investments in clean, fuel-efficient power plants have saved customers more than $7.5 billion in fuel costs and helped reduce the company's use of foreign oil by 99 percent. Because of these modernization efforts, FPL has been able to avoid more than 40 million barrels of oil, using less than 1 million barrels of oil for generation in 2014. These investments have also enabled FPL to significantly reduce power plant emissions rates and have prevented more than 85 million tons of carbon emissions to date. FPL now operates one of the most modern, clean, fuel-efficient and low-carbon generation fleets in the nation.

At NextEra Energy, we have positioned our business well to meet the challenges of new federal environmental regulations. We anticipate these new rules will significantly advance the need for low-emitting and zero-emitting electric generation. At NextEra Energy, we've positioned our business to manage the opportunities and risks presented by these new regulations while simultaneously lowering emissions.

Reducing Our Emissions

SO_2 Emissions Rate

NEXTERA ENERGY VS. INDUSTRY:

97% lower

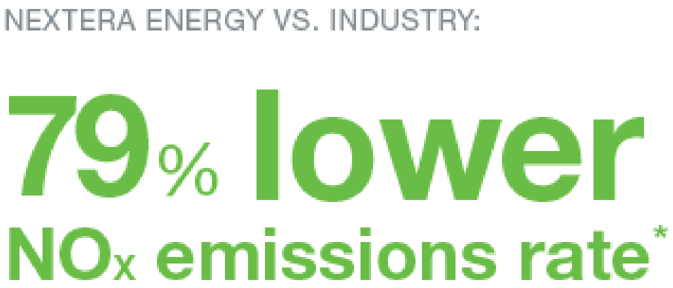
SO_2 emissions rate*

Project totals for NextEra Energy, Inc. and NextEra Energy Resources, LLC include those in which NextEra Energy Partners, LP holds a minority interest.

*Source for Electric Sector: U.S. Department of Energy

*The environmental attributes of NextEra Energy's electric generating 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
  trading program and to ownership of such environmental attributes.

NO_x Emissions Rate



*Source for Electric Sector: U.S. Department of Energy

*The environmental attributes of NextEra Energy's electric generating 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
  trading program and to ownership of such environmental attributes.

CO_2 Emissions Rate

NEXTERA ENERGY VS. INDUSTRY AVERAGE:

55% lower

CO_2 emissions rate*

NextEra Energy:
538
LBS / MWh

vs

U.S. electric sector rate
1,186
LBS / MWh

Source for Electric Sector: U.S. Department of Energy

**The environmental attributes of NextEra Energy's electric generating 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.*

- In 2014, FPL brought into service its Riviera Beach Next Generation Clean Energy Center – one of the cleanest, most energy-efficient plants in the nation. Over its operational lifetime, the new, fuel-efficient plant is expected to provide FPL customers with hundreds of millions of dollars in fuel and other savings. This is part of FPL's focus on modernizing its power plant fleet by replacing oil-fired plants with clean, highly efficient, combined-cycle natural gas plants such as this one. It's also a big reason parent company NextEra Energy in 2014 recorded its lowest-ever air emissions rates.

In 2014, 97 percent of the power produced by NextEra Energy facilities was generated from a diverse mix of clean or renewable sources, including wind, solar, combined-cycle natural gas and nuclear. By implementing our strategy to become America's clean energy leader, we have been able to reduce our emissions rates of SO2, NOX and CO2 by 98 percent, 93 percent and 33 percent, respectively, since 1990, while at the same time growing our generation fleet by approximately 274 percent.

FPL Powers Formula E Electric Race with Clean Solar Energy; Student Focus Garners Statewide Honors

FPL powered the vehicles racing in the country's first-ever electric car race, held in downtown Miami in March 2015. Part of the FIA Formula E Championship, the Miami ePrix featured the highest class of competition for electrically powered racing cars.

"Our partnership with Formula E and the Miami ePrix is another example of our commitment to advancing zero-emissions solar energy and the use of electric vehicles in Florida," said Eric Silagy, president and CEO of FPL. "By the end of 2016, we will triple the energy we are able to produce from the sun, furthering our mission to provide low-cost, reliable and clean energy to our 4.8 million customers."

FPL announced its partnership with Formula E at its Martin Next Generation Solar Energy Center, along with famed race car driver Michael Andretti and drivers in the Miami ePrix. During the announcement event, electric race cars were charged with power generated from the Martin Next Generation Solar Energy Center, one of three solar power plants operated by FPL. Earlier in the year, FPL announced plans to install more than 1 million solar panels at three additional solar power plants by the end of 2016. These new plants, combined with community-based solar installations and other small-scale arrays that FPL is installing, would total more than 225 megawatts of new solar capacity. This would effectively triple FPL's solar capacity, which currently totals approximately 110 megawatts.

"The Formula E Miami ePrix is all about sharing our passion for electric vehicles," said Alejandro Agag, CEO of Formula E Holdings. "The race series is exciting, it's entertaining, and we hope it will turn the world's attention to the potential electric vehicles have to change the way we power transportation. We are pleased to partner with FPL – a company that shares our vision for powering the future with affordable, clean energy."

"It's an honor for us to have been selected as one of the 10 founding Formula E teams for the inaugural season," said Michael Andretti, chairman and CEO of Andretti Sports Marketing.

Formula E hosts races in 10 cities around the world, including London, Beijing, Monaco and Buenos Aires. The Miami ePrix was the first Formula E race in the United States.

Education tie is applauded

As part of its Formula E partnership, FPL also sponsored a student electric vehicle race. Students from schools throughout FPL's service area who are involved in science, technology, engineering and math (STEM) programs assembled 10 electric kit cars. The student teams competed in the Formula E School Series, racing on the same track as the Miami ePrix. The grand prize was $5,000, second-place $2,500 and third-place $1,500. All prizes support STEM or robotics initiatives of the winning school teams.

The effort was hailed by Miami-Dade County Public Schools Superintendent Alberto M. Carvalho, who chose FPL for the Florida Commissioner of Education's Corporate Business Recognition Award. "Miami-Dade County Public Schools and its students have benefitted tremendously from FPL's support of STEM initiatives," said Superintendent Carvalho. "Their commitment has enriched the learning environment by providing additional resources in our classrooms and giving students invaluable real-life learning experiences."

"We are proud of our long-time partnership with Miami-Dade County Public Schools and of the difference we are making in our classrooms," said Eric Silagy, president and CEO of FPL. "FPL is honored to be recognized for our involvement inside and outside the classroom. Together with the school district, we are making Miami an even better place to work and raise a family."

Wildlife and Habitat Preservation

At NextEra Energy, we're committed to being an industry leader in environmental protection and stewardship, and that includes wildlife and habitat protection. We have operations across the U.S. and Canada, so we are keenly aware of the potential impacts that existing and future operations may have to wildlife and their habitat. This is why we have environmental policies and programs in place at both the corporate and local levels to avoid and minimize these impacts and to address any remaining impacts through appropriate mitigation measures. Here's what we do:

- Before we build a power plant or other electric facilities, we work hard to make sure we understand the local ecosystem and what it takes to be a partner in its preservation and to be a good neighbor to all the species that live there.
- As part of that work, we consider the presence of any threatened or endangered species and the proximity to valuable wildlife corridors, wetlands or other ecologically important areas. We make efforts to avoid these areas entirely. If we can't do that, we seek to minimize and mitigate the impact of our developments to affected areas.
- Once a project is operating, we continue to monitor potential impacts to biodiversity that may occur. For example, at wind sites, we implement a voluntary Wildlife Response and Reporting System (WRRS) to monitor long-term avian and bat interactions. We also voluntarily adhere to the FWS Wind Energy Guidelines that were issued in 2012, and conduct a minimum of one year of formal post-construction mortality monitoring at all U.S. wind sites constructed after March 2012.
- In Ontario, our company complies with Ministry of Natural Resources guidance, which requires that we perform a minimum of three years of post-construction mortality monitoring for birds and bats, in addition to other project-specific monitoring conditions.

We have long adhered to numerous policies and programs to protect threatened and endangered species. We follow all federal and state regulations including the Endangered Species Act (ESA), which is administered by the U.S. Fish and Wildlife Service (FWS) and the U.S. National Marine Fisheries Service (NMFS). We also go above and beyond those regulations by making important contributions to protect a number of vulnerable species and habitat areas. Some examples of our wildlife-related programs are featured below.

- FPL has donated 130 concrete power poles to an artificial reef program managed by St. Lucie County, Florida. The poles provide additional habitat for marine life. Area fishing and diving businesses also benefit.

Eagle Nest Platforms

Project totals for NextEra Energy, Inc. and NextEra Energy Resources, LLC include those in which NextEra Energy Partners, LP holds a minority interest.

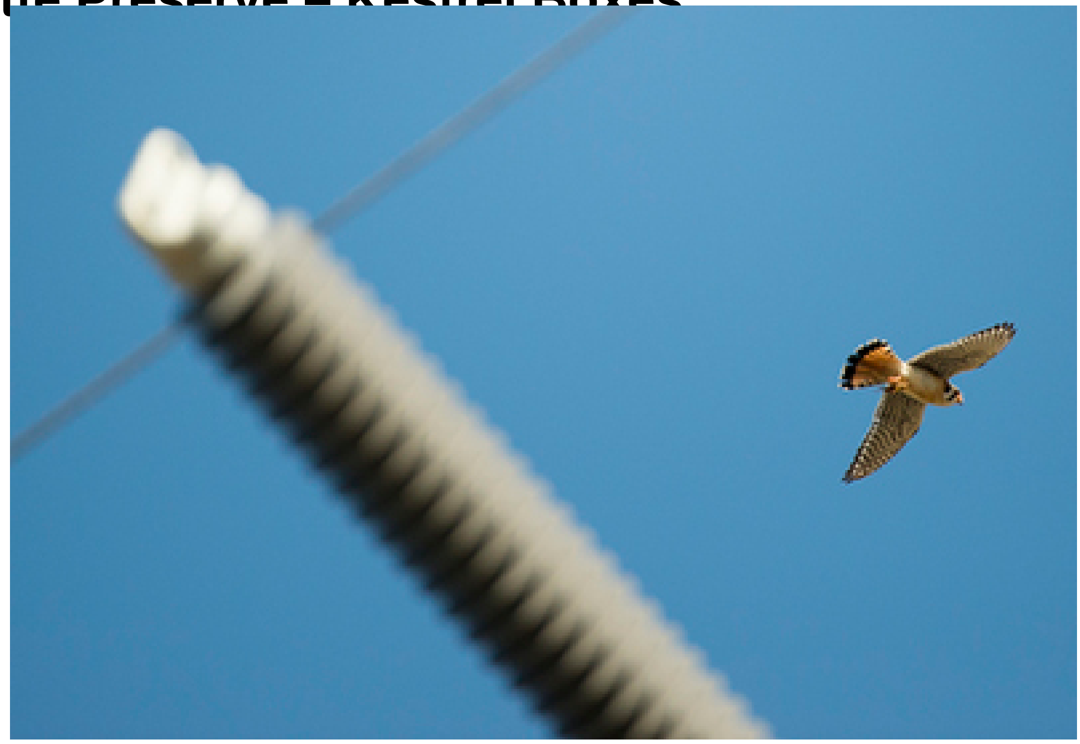
- For many centuries, eagles have represented strength, courage and power. That's been true not only in the U.S. ? where the bald eagle has been our national symbol since the late 1700s ? but in countries the world over.
- During early construction of NextEra Energy's Summerhaven Wind Energy Centre in Ontario in late 2012, Canada, a pair of eagles began building a new nest within the project area. For three years prior, the area had been monitored and no nest had been found.
- After consulting with the Ontario Ministry of Natural Resources and receiving their approval, we removed the tree and nest in January 2013 to eliminate a potential hazard to the eagles and to give the birds time to build a new nest or find another one prior to their breeding season.
- From early January through late February 2013, a team of experts installed five eagle platforms near the Lake Erie shoreline in the general vicinity of the original nest, but at a safe distance from the turbines, to provide alternative nesting sites for this pair of eagles and other pairs in the local eagle population.
- To our delight, a pair of eagles was documented to have successfully raised young in one of these nests in the summer of 2013. The eagles returned in 2014 and successfully raised two chicks.
- See the following website for more information, including photographs and a video of the eagles.

Nesting platform success in Florida

- Bald eagles are found in all 50 U.S. states, including throughout FPL's service territory in Florida.
- In the fall of 2013, a bald eagle built its nest on a 230-kV transmission line in Volusia County, Fla. To protect the nest and the eagles that would be raising their family in it, and because the surrounding area lacked viable nest trees, FPL for the first time ever constructed an independent pole and platform to provide the birds with a nearby nest location. With input from the Florida Fish and Wildlife Conservation Commission and

the U.S. Fish and Wildlife Service, the platform was designed to provide long-term support of the nest. Within 45 days of the nest transfer, a pair of eagles began to add onto and occupy the nest, and in 2014, a baby eaglet hatched in the nest!

Duette Preserve – Kestrel Boxes



- The colorful Southeastern American Kestrel is the smallest falcon in North America. Unfortunately, its numbers have dwindled so much that researchers cannot say how many of the threatened species still exist in Florida.
- In March 2013, while installing new, more storm-resilient power line poles and replacing old wooden poles in an area of its service territory, FPL identified an opportunity to assist the kestrel. Line workers attached kestrel boxes to four of the new poles - a first for the company - and also preserved the old wooden poles that contained inactive nests.
- In 2015, as FPL continues to upgrade the poles in this area of Kestrel habitat, we've included nest boxes on an additional 20 poles. We're also working with the Audubon Society toward a program to monitor the boxes for nesting success.

We're No. 1 in Wind

At NextEra Energy, we're the No. 1 owner of wind energy in North America. We operate approximately 11,400 MW of emissions-free wind energy, enough to power a city the size of Chicago - the "Windy City." Our wind program helps us deliver reliable and affordable energy to customers with a focus on environmental stewardship. Wind energy is an especially attractive source of electric power because:

- wind farms can be constructed quickly,
- they use no water and produce no solid waste or air emissions,
- there are no fuel costs because wind is free,
- many customers are requesting electricity produced only from renewables such as wind, and
- the price of wind energy is low and competitive with other forms of power generation.

NORTH AMERICA'S LARGEST GENERATOR OF WIND POWER

107 wind facilities

9,899 individual wind turbines

19 U.S. states and 4 Canadian provinces

Avoided CO_2 emissions of 30 million tons due to wind generation

In 2012, we set an aggressive goal for additions to our U.S. wind portfolio, and through diligence and hard work, we exceeded it. We commissioned roughly 1,500 MW of wind in the United States, a milestone no other company has ever achieved. In fact, we celebrated the commissioning of our 10,000th MW of wind at our 400-MW Limon Wind Project in Colorado in December 2012. Not only did this record building program result in 1,500 MW of zero-emissions generation, it also helped us

Project totals for NextEra Energy, Inc. and NextEra Energy Resources, LLC include those in which NextEra Energy Partners, LP holds a minority interest.

deliver for our communities by creating more than 3,000 construction jobs, 90 full-time jobs, and new tax revenue that state and local governments use to meet pressing community needs.

Roughly

1,500 MW of wind

commissioned in 2012

— a milestone

no other company has ever achieved

At NextEra Energy Resources, our wind portfolio grew in 2014 by approximately 1,300 MW, including facilities in Oklahoma, Colorado and Texas, as well as four wind sites in Ontario, Canada.

We now have wind projects in 19 states and four Canadian provinces, representing a total capital investment of more than $20.1 billion and a fleet size that is comparable to the generation capacity of a top-15 utility.

WIND ENERGY PORTFOLIO

CUMULATIVE MW

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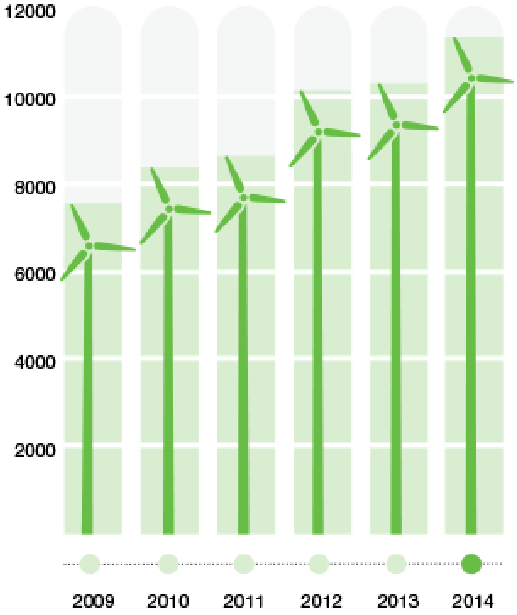

- Enough emissions-free wind energy can be generated at our Vasco Wind Energy Center in California to power more than 19,500 homes.

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Appendix B
Studies and Assessments

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DOD Preliminary Screening Tool

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Federal Aviation Administration

FAA Advisory Circular 70/7460-1L, Obstruction Marking Lighting was published on 12/4/2015, and is effective as of that date. The document may be viewed at http://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.information/documentID/1028657

« 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.**

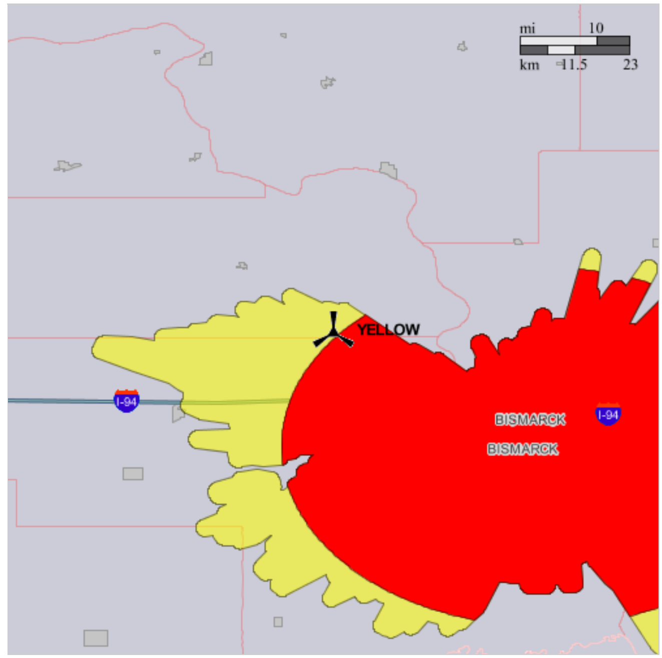
Instructions:

- 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:** Single Point

Point	Latitude Deg	Min	Sec	Dir	Longitude Deg	Min	Sec	Dir
1	46	59	47	N	101	7	47.45	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.

Federal Aviation Administration

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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 Deg	Min	Sec	Dir	Longitude Deg	Min	Sec	Dir
1	46	59	47	N	101	7	47.45	W

Horizontal Datum: NAD83

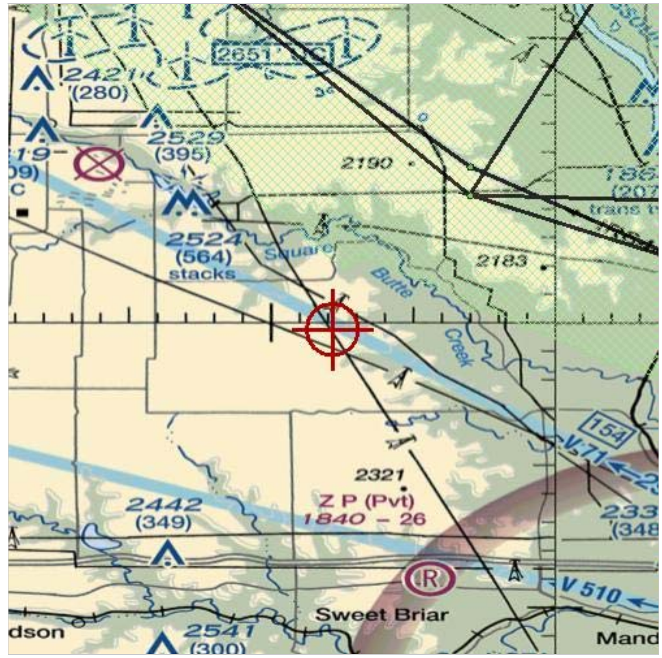
The preliminary review of your proposal does not return any likely impacts to military airspace. Please contact Dr. Thomas (Thom) H. Rennie at the USAF Regional Enviromental Coordinator at (214)767-4678 for confirmation and documentation.

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

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.



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

Federal Aviation Administration

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Screening Type: NEXRAD **Geometry Type:** Single Point

Point	Latitude Deg	Min	Sec	Dir	Longitude Deg	Min	Sec	Dir
1	46	59	47	N	101	7	47.45	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.
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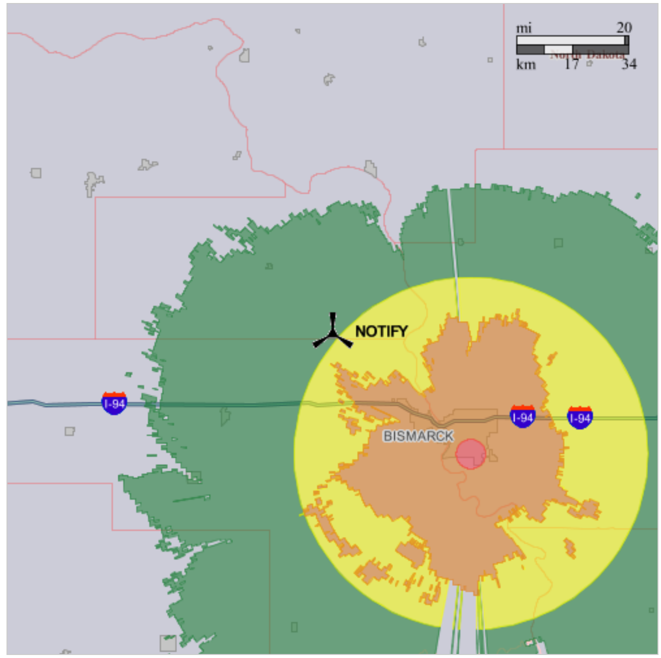

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Screening Type: Long Range Radar **Geometry Type:** Single Point

Point	Latitude Deg	Min	Sec	Dir	Longitude Deg	Min	Sec	Dir
1	46	58	14.90	N	101	15	3.62	W

Horizontal Datum: NAD83

Map Legend:

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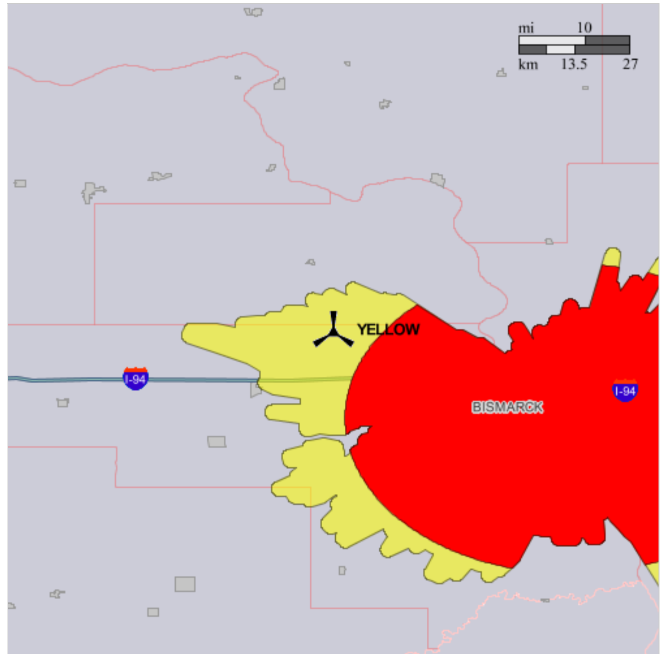

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Screening Type: Military Operations **Geometry Type:** Single Point

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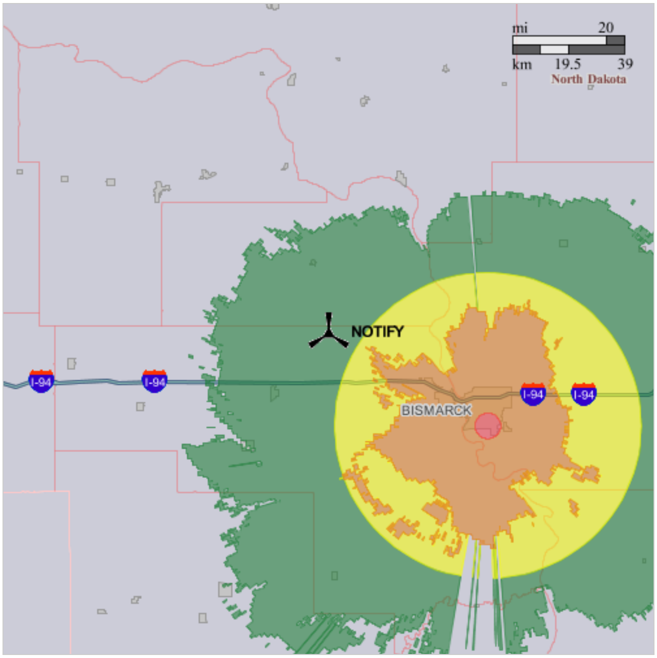

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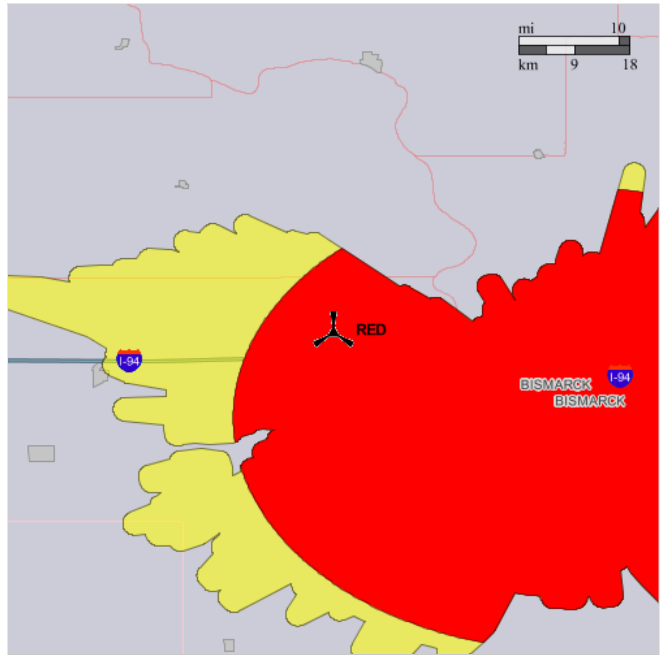

Screening Type: Long Range Radar **Geometry Type:** Single Point

Point	Latitude				Longitude			
	Deg	Min	Sec	Dir	Deg	Min	Sec	Dir
1	46	54	24.83	N	101	4	55.89	W

Horizontal Datum: NAD83

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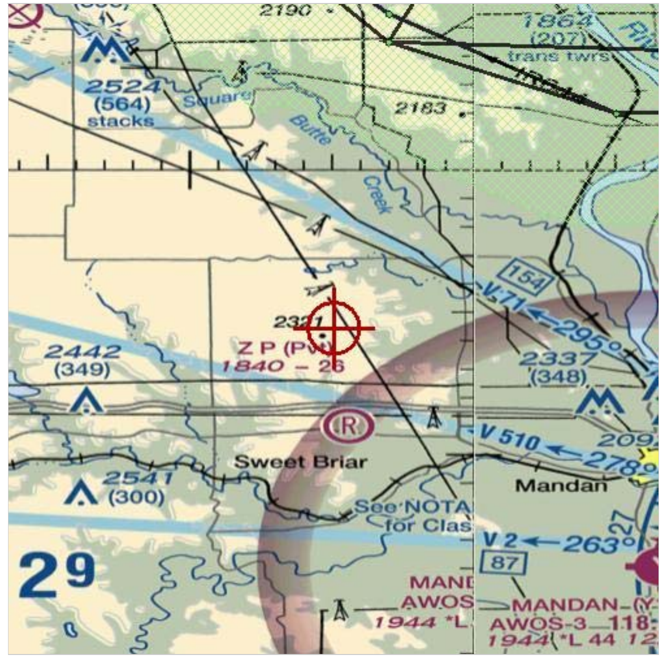
Horizontal Datum: NAD83



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Point	Latitude Deg	Min	Sec	Dir	Longitude Deg	Min	Sec	Dir
1	46	54	24.83	N	101	4	55.89	W

Horizontal Datum: NAD83

Map Legend:

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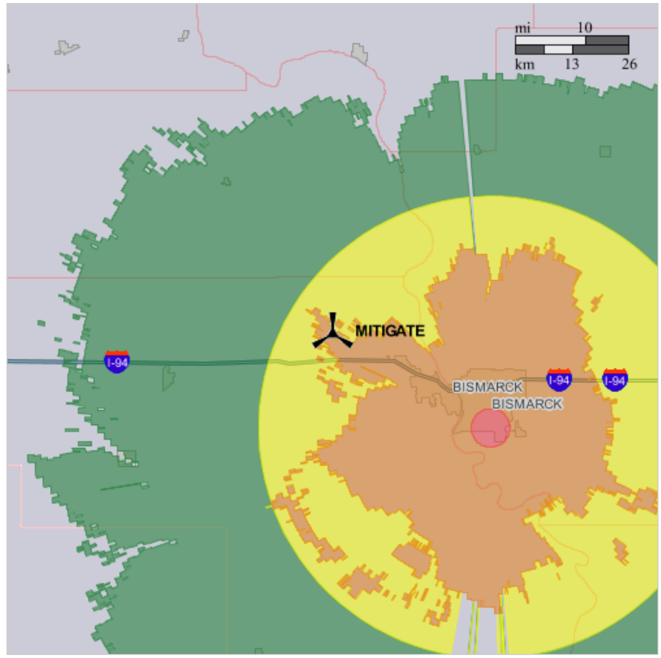

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Screening Type: Long Range Radar **Geometry Type:** Single Point

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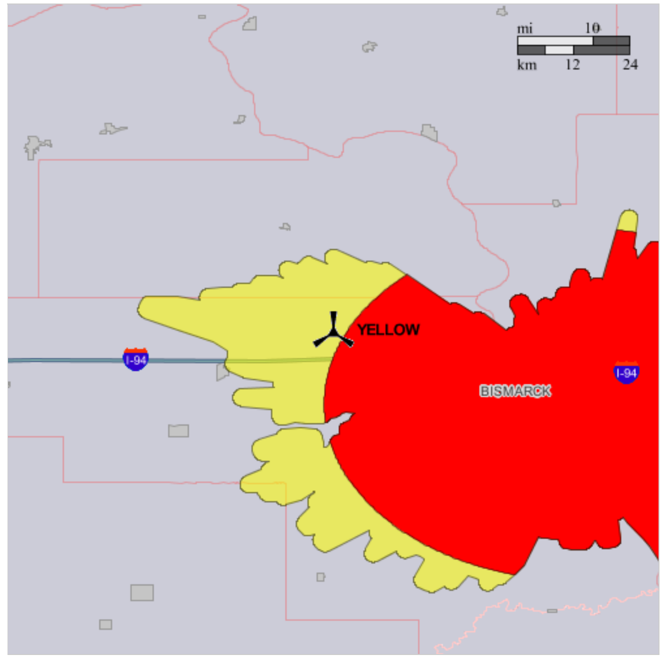
Horizontal Datum: NAD83



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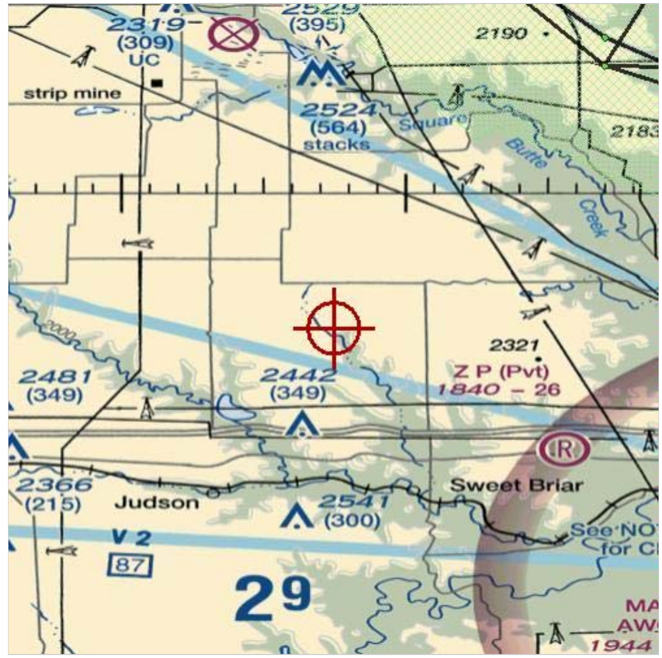

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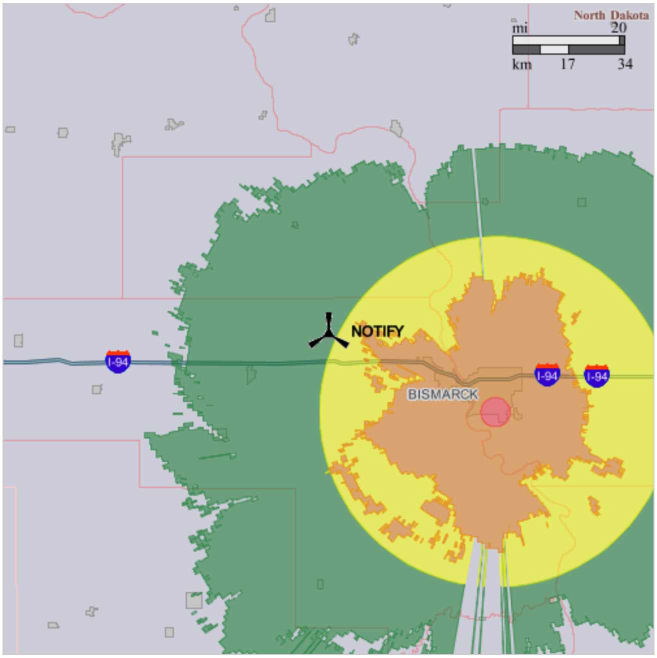

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Shadow Flicker Impact Analysis

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Shadow Flicker Impact Analysis

for the

Oliver III Wind Energy Center

Oliver and Morton Counties, North Dakota

Prepared for

Oliver III Wind, LLC
700 Universe Boulevard
Juno Beach, FL 33408

Prepared by

TETRA TECH

February 2016

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List of Attachments

Attachment A. Detailed Summary of WindPro Shadow Flicker Analysis Results

Acronyms and Abbreviations

Oliver Wind III	Oliver Wind III, LLC
GE	General Electric
Hz	Hertz
NCDC	National Climatic Data Center
Project	Oliver III Wind Energy Center Project
rpm	rotations per minute
UTM	Universal Transverse Mercator

1.0 OVERVIEW

Oliver Wind III, LLC (Oliver Wind III), a wholly owned, indirect subsidiary of NextEra Energy Resources, LLC (NEER), is proposing to develop the Oliver III Wind Energy Center (the Project) in Morton and Oliver counties, North Dakota. The proposed Project includes up to 48 wind turbines with a maximum nameplate capacity of approximately 100 megawatts. In addition to the 48 primary turbines, up to three (3) alternate turbine locations have also been considered. Alternate locations are proposed to provide siting flexibility based on on-going environmental studies and landowner preferences. Only 48 turbines will be constructed. Tetra Tech has conducted the following shadow flicker analysis for the Project to support Oliver Wind III's application for a Certificate of Site Compatibility under the North Dakota Public Service Commission.

2.0 PROJECT COMPONENTS

The Project will consist of up to 48 wind turbines. Five (5) of the turbines (numbers 26 through 30) will be the GE 1.79-100 turbine model and the rest of turbines will be the General Electric (GE) 2.1-116 turbine model. The two wind turbine models being considered for the Project, and evaluated for potential shadow flicker impacts, have the following characteristics:

- **GE 1.79-100** – 3-blade 100-meter diameter rotor, with a hub height of 80 meters and generating capacity of 1.79 MW. The GE 1.79-100 has a normal high rotor speed of 17.5 rotations per minute (rpm) which translates to a blade pass frequency of 0.87 hertz (Hz) (less than 1 alternation per second). The Project plans to install up to 5 GE 1.79-100 turbines.

- **GE 2.1-116** – 3-blade 116-meter diameter rotor, with a hub height of 80 meters and generating capacity of 2.1 MW. The GE 2.1-116 has a normal high rotor speed of 18.5 rpm which translates to a blade pass frequency of 0.93 Hz (less than 1 alternation per second). The Project plans to install up to 43 GE 2.1-116 turbines.

3.0 SHADOW FLICKER BACKGROUND

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 at nearby residences or public gathering places. The impact area depends on the time of year and day (which determine 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 impact to surrounding properties generally occurs during low angle sunlight conditions, typically during sunrise and sunset times of the day. However, when the sun angle gets very low (less than 3 degrees), sunlight passes through more atmosphere and becomes too diffused to form a coherent shadow. Shadow flicker will not occur when the sun is obscured by clouds or fog, at night, or when the source turbine(s) are not operating. In addition, shadow flicker is only an issue when at least 20 percent of the sun's disc is covered by the turbine blades.

Shadow flicker intensity is defined as the difference in brightness at a given location in the presence and absence of a shadow. Shadow flicker intensity diminishes with greater receptor-to-turbine separation distance. Shadow flicker intensity for receptor-to-turbine distances beyond 2,500 meters (8,202 feet) is very low and generally considered imperceptible. In general, increasing proximity to turbines may make shadow flicker more noticeable, with the largest number of shadow flicker hours, along with greatest shadow flicker intensity, occurring nearest the wind turbines.

Shadow flicker frequency is related to the wind turbine's rotor blade speed and the number of blades on the rotor. From a health standpoint, the low flicker frequencies associated with wind turbines, are harmless, and public concerns that flickering light from wind turbines can have negative health effects, such as triggering seizures in people with epilepsy are unfounded. Epilepsy Action (working name for the British Epilepsy Foundation) states that there is no evidence that wind turbines can cause seizures (Epilepsy Action 2008). However, they recommend that wind turbine flicker frequency be limited to 3 Hz (For comparison, strobe lights used in discotheques have frequencies which range from about 3 Hz to 10 Hz (1 Hz = 1 flash per second). Since the proposed Project's wind turbine blade pass frequency is approximately 0.87 Hz (less than 1 alternation per second), no negative health effects to individuals with photosensitive epilepsy are anticipated.

Shadow flicker impacts are not regulated in applicable 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. However, a widely used industry standard of 30 hours per year, has been used for this shadow flicker impact analysis.

4.0 WINDPRO SHADOW FLICKER ANALYSIS

An analysis of potential shadow flicker impacts from the Project was conducted using the WindPro software package. As described above, the Project will install up to 48 wind turbines (5 GE 1.79-100 and the rest GE 2.1-116 model turbines). While only 48 turbines will be constructed, 51 turbines have been evaluated with WindPro so that the analysis includes assessment of up to three (3) alternative turbine locations (layout dated January 20, 2016). The analysis evaluated the following two turbine layout scenarios:

- Scenario A – 48 wind turbines (primary turbines only)
- Scenario B – 51 wind turbines (primary plus alternate turbines)

The WindPro analysis was conducted to determine shadow flicker impacts under realistic impact conditions (actual expected shadow). This analysis calculated the total amount of time (hours and minutes per year) that shadow flicker could occur at receptors surrounding the Project. The realistic impact condition scenario is based on the following assumptions:

- The elevation and position geometries of the wind turbines and surrounding receptors (potentially occupied residences). Elevations were determined using U.S. Geological Survey digital elevation model data. Positions geometries were determined using geographic information system and referenced to Universal Transverse Mercator (UTM) Zone 13 (NAD83).

- The position of the sun and the incident sunlight relative to the wind turbine and receptors on a minute-by-minute basis over the course of a year.

- Historical sunshine availability (percent of total hours available). Historical sunshine rates for the area (as summarized by the National Climatic Data Center [NOAA 2014] for nearby Bismarck, North Dakota) used in this analysis are as follows:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
54%	52%	61%	58%	64%	67%	75%	72%	67%	53%	42%	45%

- Estimated wind turbine operations and orientation (based on approximately 2.5 years of wind data (10/23/2008–4/30/2011), including wind speed/wind direction frequency distribution, measured at a meteorological tower located approximately 50 miles northeast of the Project).

- Receptor viewpoints (i.e., house windows) are assumed to always be directly facing turbine to sun line of sight (“greenhouse mode”).

WindPro incorporates terrain elevation contour information and the analysis accounts for terrain elevation differences. The sun’s path with respect to each turbine location is calculated by the software to determine the cast shadow paths every minute over a full year. Sun angles less than

3 degrees above the horizon were excluded, for the reasons identified earlier in this section. Since shadow flicker is only an issue when at least 20 percent of the sun disc is covered by the blades, WindPro uses blade width dimension data to calculate the maximum distance from the turbine where shadow flicker must be calculated. Beyond this distance, the turbine will not contribute to the shadow flicker impact. It should be noted however, that WindPro provides a conservative estimate of shadow flicker as obstacles such as trees, haze, and visual obstructions (window facing, coverings) are not accounted for despite the likelihood of their reducing or eliminating shadow flicker impacts to receptors.

A total of 93 structures were identified within and near the Project Area; of these, 65 were determined to be occupied or potentially occupied residences and are considered potential shadow-flicker receptors for the purpose of this analysis. A receptor in the model is defined as a 1 meter squared area (approximate size of a typical window), 3.28 feet (1 meter) above ground level. Approximate eye level is set at 4.94 feet (1.5 meters). Figure 1 shows the locations of all identified structures and the 93 shadow flicker receptors (occupied residences), along with the 51 potential turbine locations considered.

5.0 SHADOW FLICKER ANALYSIS RESULTS

As expected, WindPro predicts that shadow flicker impacts will be greatest at locations nearer to the wind turbines. Figures 2 illustrates the WindPro predicted shadow flicker impact areas. A detailed WindPro shadow flicker analysis summary, for each of the modeled receptor location, is provided in Attachment A.

Tables 1 and 2 present the WindPro predicted shadow flicker impacts for the top ten worst case impacts for the 93 identified receptors, for the turbine scenarios A and B, respectively. The predicted shadow flicker for all 93 receptors is presented in Appendix A. Because the Project is using a minimum turbine siting setback requirement of 1.25 x turbine height (566.25 feet) or 1,320 feet, whichever is greater to occupied residences as required by the Morton County Wind Ordinance, the most sensitive receptors are generally not located in the high potential shadow flicker impact zones. The maximum predicted shadow flicker impact at any occupied residence receptor is 56 hours and 34 minutes per year (Receptor 810021) if only the 48 planned turbines are constructed, and 56 hours 34 minutes per year (Receptor 810021), if the alternate turbines are also included in the analysis. The highest predicted shadow flicker impacts, 56 hours and 34 minutes, is approximately 1.3 percent of the potential available daylight hours. There are only two occupied receptors with shadow flicker impacts greater than 30 hours per year, although only one of these occupied receptors (Receptor 810021) has predicted shadow flicker impacts greater than 30 hours per year for the primary turbines only scenario (Scenario A). Oliver Wind III is in the process of obtaining waivers from the owners of the two occupied residences where the predicted shadow flicker impacts are expected to be over 30 hours per year. If waivers cannot be obtained, Oliver Wind III will ensure the Project meets the 30 hour per year standard.

Table 1. WindPro Predicted Shadow Flicker Impacts for Receptors – Scenario A (Primary Turbines Only)			
Receptor ID	**Shadow Hours per Year (expected) [hh:mm / year]**	**Receptor Type**	**Assumed Receptor Occupation Status**
810614	64:59:00	shed	Unoccupied
810021	56:34:00	house	Occupied
810023	27:01:00	house	Occupied
810144	25:18:00	abandoned house	Unoccupied
6005	24:12:00	abandoned house	Unoccupied
30008	20:37:00	garage	Occupied
6006	18:34:00	relay tower	Unoccupied
6004	16:26:00	garage	Occupied
810132	12:59:00	house	Occupied
7002	11:40:00	trailer	Unoccupied

Table 2. WindPro Predicted Shadow Flicker Impacts for Receptors – Scenario B (Primary Plus Alternate Turbines)			
Receptor ID	**Shadow Hours per Year (expected) [hh:mm / year]**	**Receptor Type**	**Assumed Receptor Occupation Status**
810614	71:55:00	shed	Unoccupied
810021	56:34:00	house	Occupied
7002	32:43:00	house	Occupied
810023	27:01:00	abandoned house	Unoccupied
810144	25:18:00	abandoned house	Unoccupied
6005	24:12:00	garage	Occupied
30008	20:37:00	relay tower	Unoccupied
6006	18:34:00	garage	Occupied
6004	16:26:00	house	Occupied
7004	15:14:00	trailer	Unoccupied

The shadow flicker impact prediction statistics are summarized in Tables 3 and 4 below.

Table 3. Statistical Summary of WindPro Predicted Shadow Flicker Impacts at Modeled Receptor Locations – Scenario A (Primary Turbines Only)

Cumulative Shadow Flicker Time (expected)	Number of Receptors
Total	93
= 0 Hours	69
> 0 Hours < 10 Hours	13
≥ 10 Hours < 20 Hours	5
≥ 20 Hours < 30 Hours	4
≥ 30 Hours	2

Table 4. Statistical Summary of WindPro Predicted Shadow Flicker Impacts at Modeled Receptor Locations – Scenario B (Primary Plus Alternate Turbines)

Cumulative Shadow Flicker Time (expected)	Number of Receptors
Total	93
= 0 Hours	69
> 0 Hours < 10 Hours	12
≥ 10 Hours < 20 Hours	5
≥ 20 Hours < 30 Hours	4
≥ 30 Hours	3

6.0 CONCLUSION

The analysis of potential shadow flicker impacts from the Project on nearby receptors shows that shadow flicker impacts within the area of study are expected to be minor and well within acceptable ranges for avoiding nuisance conditions. Shadow flicker is not expected to be a significant environmental impact. Only two of the modeled receptors (occupied residences) has expected shadow impacts predicted for greater than 30 hours per year. Oliver Wind III is in the process of obtaining waivers from the owners of these two residences. If waivers cannot be obtained, Oliver Wind III will ensure the Project meets the 30 hour per year standard at these receptors.

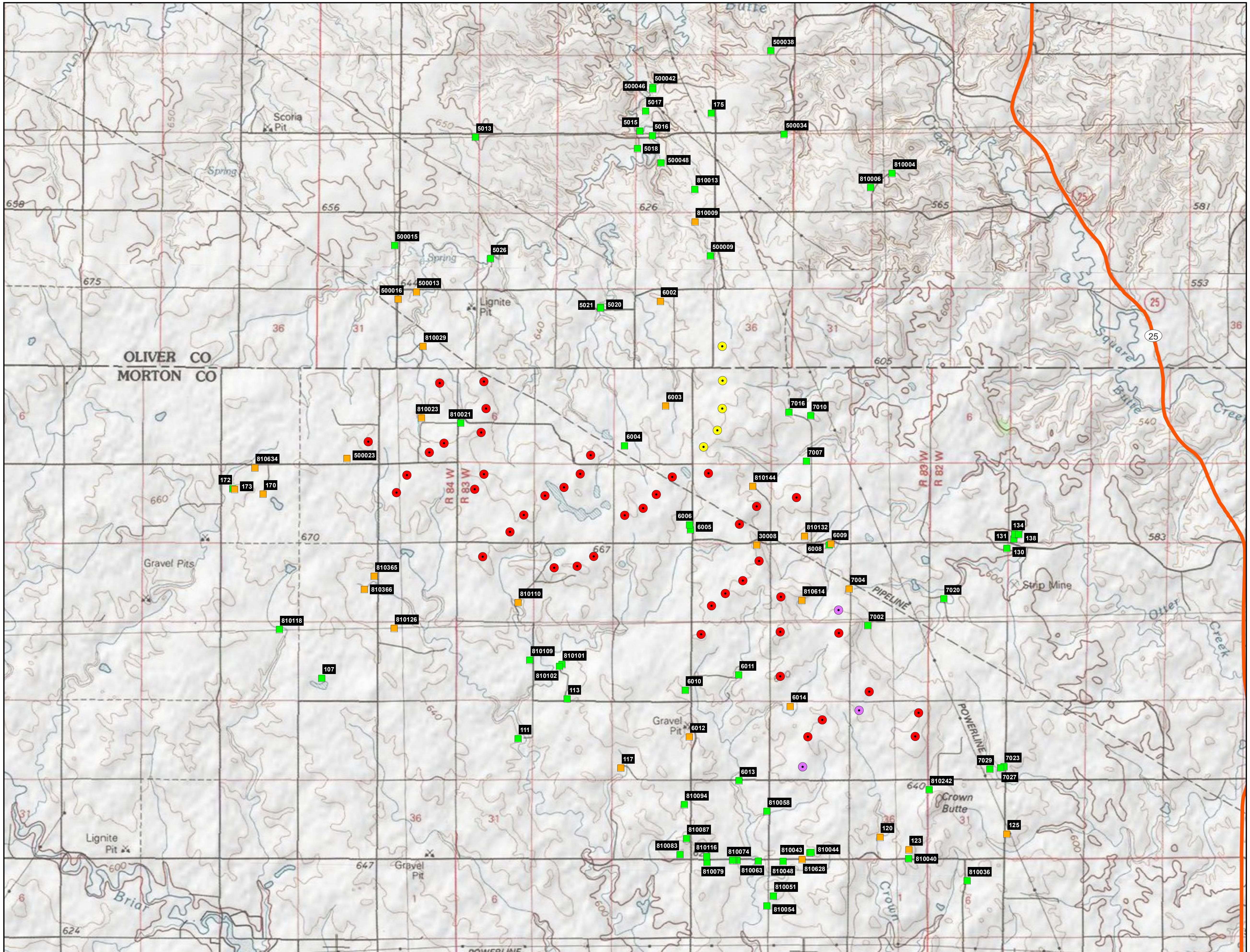
The analysis was deliberately conservative and actual shadow flicker is expected to occur for less than the modeled durations. The analysis assumes that the receptors all have a direct in-line view of the incoming shadow flicker sunlight and does not account for trees or other obstructions which may block sunlight. In reality, the windows of many houses will not face the sun directly for the key shadow flicker impact times. Adding to the analysis' conservatism, both the primary and alternate turbines were modeled cumulatively. Oliver Wind III will only construct up to 48 turbines, which is fewer wind turbines than were included in the Scenario B modeled results.

7.0 REFERENCES

Epilepsy Action. 2008. Information Web Page on Photosensitive Epilepsy. British Epilepsy Association. http://www.epilepsy.org.uk/info/photo_other.html. Accessed November 2015.

National Oceanic and Atmospheric Administration (NOAA). 2014. Comparative Climatic Data for the United States Through 2014.

Figures



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OLIVER AND MORTON COUNTIES, NORTH DAKOTA

FIGURE 1
TURBINE AND RECEPTOR LOCATIONS

FEBRUARY 2016

Proposed Turbine Array (1/20/2016)

- GE Xle 1.715-103 Turbine
- GE Xle 1.715-103 Turbine (Alt)
- GE Xle 1.79-100 Turbine

Receptors

- Occupied
- Unoccupied
- Major Road

REFERENCE MAP

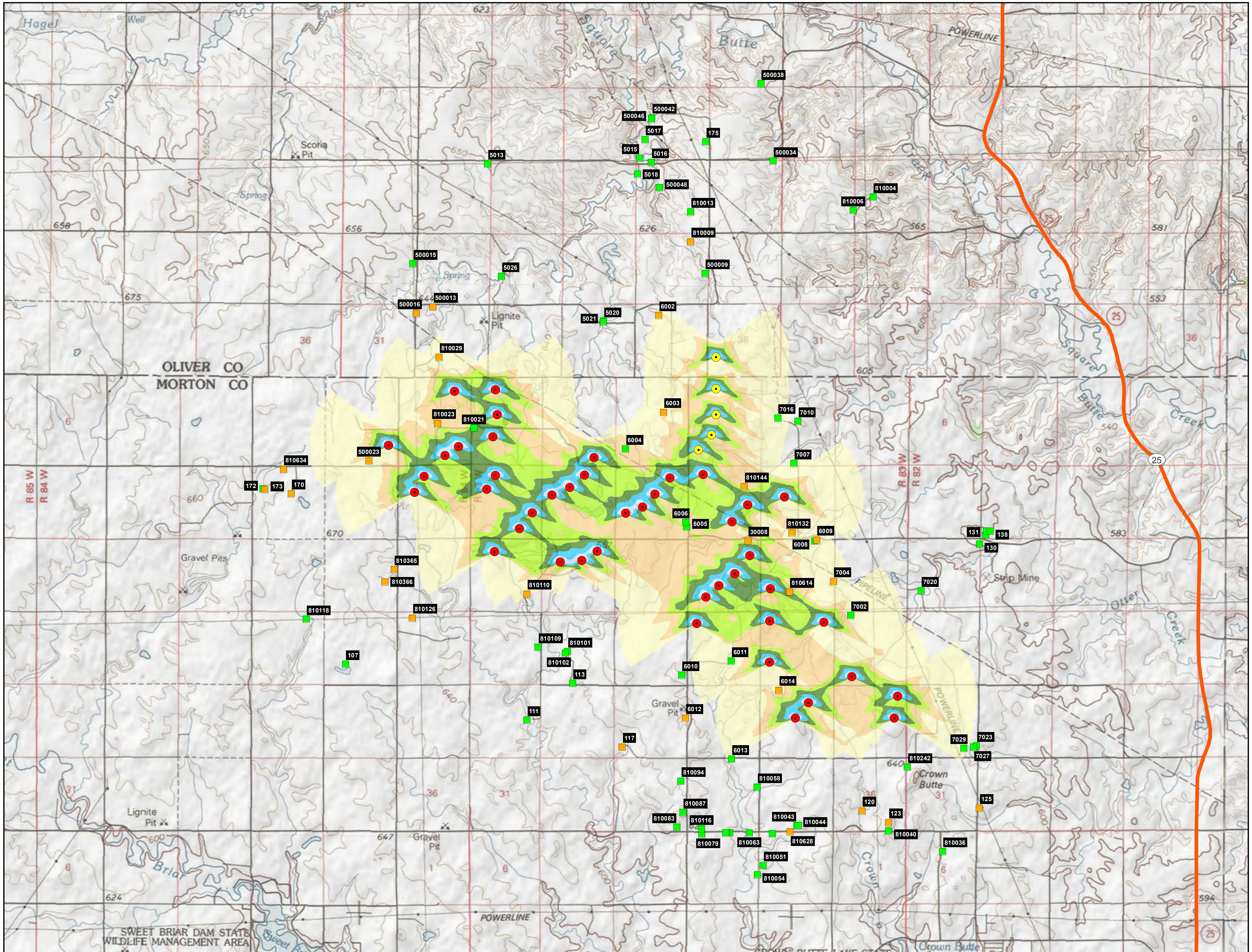

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FIGURE 2
EXPECTED SHADOW FLICKER IMPACT AREAS (SCENARIO A – PRIMARY TURBINES ONLY)

FEBRUARY 2016

Proposed Turbine Array (1/20/2016)

- GE Xle 1.715-103 Turbine
- GE Xle 1.79-100 Turbine

Receptors

- Occupied
- Unoccupied

Shadow Flicker (hours per year)

- 0 - 15
- >15 - 30
- >30 - 50
- >50 - 100
- >100 - 200
- >200

Major Road

N

0 0.5 1 1.5 2 MILES

REFERENCE MAP

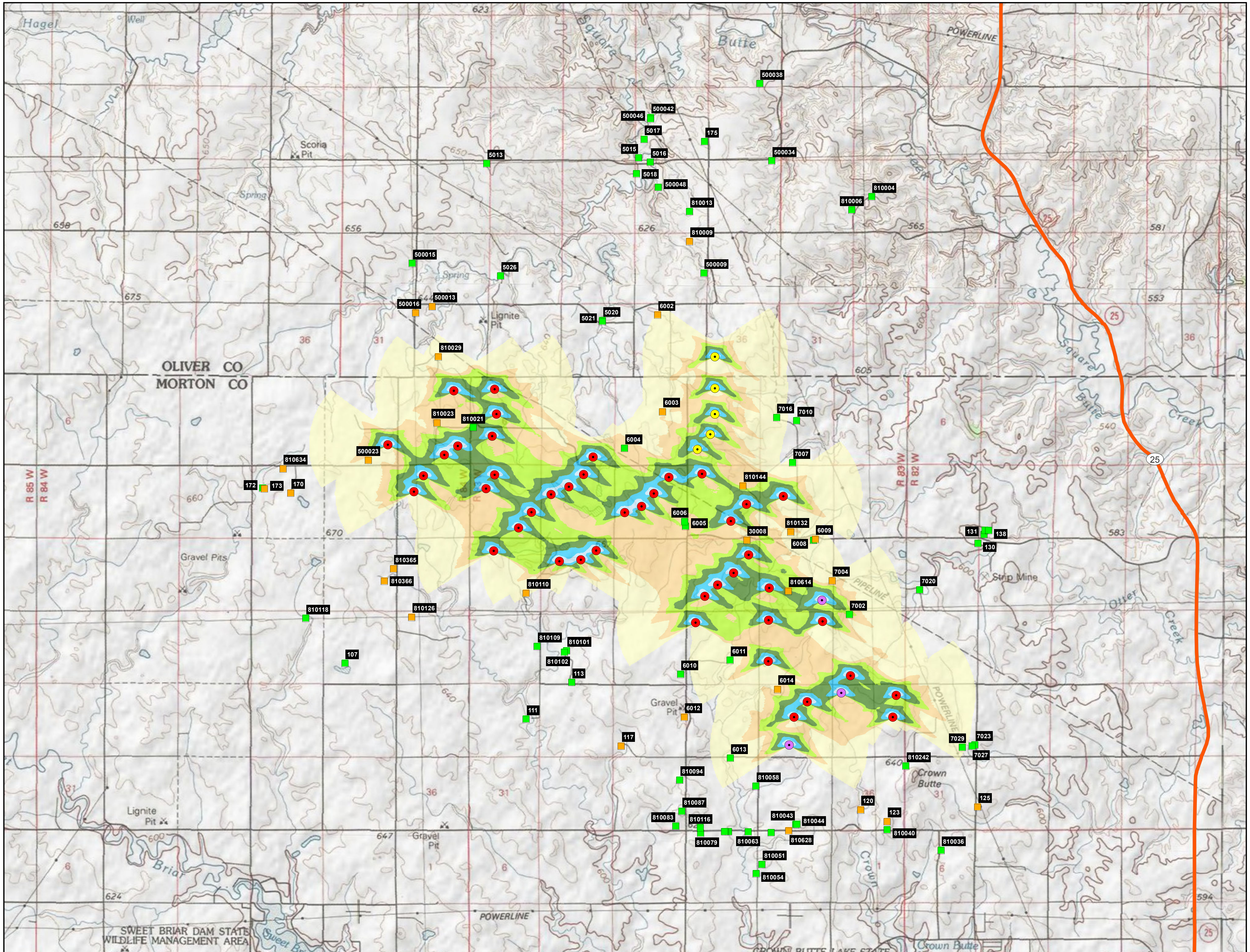

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FIGURE 3
EXPECTED SHADOW FLICKER IMPACT AREAS (SCENARIO B – PRIMARY PUS ALTERNATE TURBINES)

FEBRUARY 2016

Proposed Turbine Array (1/20/2016)
- GE Xle 1.715-103 Turbine
- GE Xle 1.715-103 Turbine (Alt)
- GE Xle 1.79-100 Turbine

Receptors
- Occupied
- Unoccupied

Shadow Flicker (hours per year)
- 0 - 15
- >15 - 30
- >30 - 50
- >50 - 100
- >100 - 200
- >200

- Major Road

N

0 0.5 1 1.5 2 MILES

REFERENCE MAP

Attachment A:
Detailed Summary of WindPro Shadow Flicker Analysis Results

Detailed Summary of WindPro Shadow Flicker Analysis Results Scenario A

NextEra Oliver III Receptor ID	UTM-E (m)	UTM-N (m)	WindPro Predicted Expected Shadow Flicker (Hours per Year)	Status
107	328,318	5,199,223	0:00:00	Occupied
111	332,294	5,197,910	0:00:00	Occupied
113	333,315	5,198,704	0:00:00	Occupied
117	334,380	5,197,276	0:00:00	Unoccupied
120	339,638	5,195,765	0:00:00	Unoccupied
123	340,219	5,195,497	0:00:00	Unoccupied
125	342,224	5,195,776	0:00:00	Unoccupied
130	342,338	5,201,598	0:00:00	Occupied
131	342,481	5,201,792	0:00:00	Occupied
134	342,502	5,201,888	0:00:00	Occupied
138	342,586	5,201,880	0:00:00	Occupied
170	327,196	5,203,001	0:00:00	Unoccupied
172	326,573	5,203,121	0:00:00	Occupied
173	326,614	5,203,107	0:00:00	Unoccupied
175	336,480	5,210,588	0:00:00	Occupied
5013	331,662	5,210,195	0:00:00	Occupied
5015	335,015	5,210,254	0:00:00	Occupied
5016	335,270	5,210,159	0:00:00	Occupied
5017	335,141	5,210,664	0:00:00	Occupied
5018	334,958	5,209,903	0:00:00	Occupied
5020	334,149	5,206,673	0:00:00	Occupied
5021	334,144	5,206,664	0:00:00	Occupied
5026	331,919	5,207,710	0:00:00	Occupied
6002	335,368	5,206,778	1:39:00	Unoccupied
6003	335,435	5,204,641	8:04:00	Unoccupied
6004	334,582	5,203,847	16:26:00	Occupied
6005	335,894	5,202,102	24:12:00	Occupied
6006	335,875	5,202,206	18:34:00	Occupied
6008	338,714	5,201,739	6:31:00	Occupied
6009	338,753	5,201,759	5:02:00	Unoccupied
6010	335,722	5,198,836	0:00:00	Occupied
6011	336,821	5,199,125	7:12:00	Occupied
6012	335,789	5,197,882	0:00:00	Unoccupied
6013	336,785	5,196,966	2:56:00	Occupied
6014	337,857	5,198,463	12:50:00	Unoccupied
7002	339,472	5,200,083	32:43:00	Occupied
7004	339,106	5,200,837	15:14:00	Unoccupied
7007	338,286	5,203,461	3:49:00	Occupied

NextEra Oliver III Receptor ID	UTM-E (m)	UTM-N (m)	WindPro Predicted Expected Shadow Flicker (Hours per Year)	Status
7010	338,391	5,204,385	0:00:00	Occupied
7016	337,949	5,204,464	5:49:00	Occupied
7020	341,032	5,200,597	0:00:00	Occupied
7023	342,191	5,197,153	0:00:00	Occupied
7027	342,126	5,197,130	0:00:00	Occupied
7029	341,907	5,197,106	3:34:00	Occupied
30008	337,240	5,201,768	20:37:00	Unoccupied
500009	336,405	5,207,685	0:00:00	Occupied
500013	330,397	5,207,060	0:00:00	Unoccupied
500015	329,972	5,208,020	0:00:00	Occupied
500016	330,022	5,206,923	0:00:00	Unoccupied
500023	328,917	5,203,693	5:56:00	Unoccupied
500034	337,954	5,210,133	0:00:00	Occupied
500038	337,720	5,211,843	0:00:00	Occupied
500042	335,296	5,211,142	0:00:00	Occupied
500046	335,293	5,211,109	0:00:00	Occupied
500048	335,435	5,209,595	0:00:00	Occupied
810004	340,144	5,209,297	0:00:00	Occupied
810006	339,698	5,209,012	0:00:00	Occupied
810009	336,106	5,208,385	0:00:00	Unoccupied
810013	336,115	5,209,049	0:00:00	Occupied
810021	331,249	5,204,371	56:34:00	Occupied
810023	330,451	5,204,493	27:01:00	Unoccupied
810029	330,511	5,205,949	2:01:00	Unoccupied
810036	341,396	5,194,840	0:00:00	Occupied
810040	340,215	5,195,314	0:00:00	Occupied
810043	338,198	5,195,469	0:00:00	Occupied
810044	338,224	5,195,477	0:00:00	Occupied
810048	337,653	5,195,304	0:00:00	Occupied
810051	337,439	5,194,605	0:00:00	Occupied
810054	337,303	5,194,404	0:00:00	Occupied
810058	337,338	5,196,332	0:00:00	Occupied
810063	337,149	5,195,323	0:00:00	Occupied
810068	336,713	5,195,341	0:00:00	Occupied
810070	336,646	5,195,342	0:00:00	Occupied
810074	336,623	5,195,344	0:00:00	Occupied
810079	336,099	5,195,320	0:00:00	Occupied
810083	335,553	5,195,486	0:00:00	Occupied
810087	335,690	5,195,807	0:00:00	Occupied

NextEra Oliver III Receptor ID	UTM-E (m)	UTM-N (m)	WindPro Predicted Expected Shadow Flicker (Hours per Year)	Status
810094	335,659	5,196,501	0:00:00	Occupied
810101	333,216	5,199,405	0:00:00	Occupied
810102	333,166	5,199,373	0:00:00	Occupied
810109	332,567	5,199,511	0:00:00	Occupied
810110	332,347	5,200,690	1:53:00	Unoccupied
810116	336,094	5,195,437	0:00:00	Occupied
810118	327,470	5,200,229	0:00:00	Occupied
810126	329,809	5,200,210	0:00:00	Unoccupied
810132	338,217	5,201,930	12:59:00	Unoccupied
810144	337,177	5,202,967	25:18:00	Unoccupied
810242	340,658	5,196,713	0:00:00	Occupied
810365	329,428	5,201,283	0:00:00	Unoccupied
810366	329,219	5,201,020	0:00:00	Unoccupied
810614	338,133	5,200,625	71:55:00	Unoccupied
810628	338,043	5,195,338	0:00:00	Unoccupied
810634	327,032	5,203,541	0:00:00	Unoccupied

Detailed Summary of WindPro Shadow Flicker Analysis Results- Scenario B

NextEra Oliver III Receptor ID	UTM-E (m)	UTM-N (m)	WindPro Predicted Expected Shadow Flicker (Hours per Year)	Status
107	328,318	5,199,223	0:00:00	Occupied
111	332,294	5,197,910	0:00:00	Occupied
113	333,315	5,198,704	0:00:00	Occupied
117	334,380	5,197,276	0:00:00	Unoccupied
120	339,638	5,195,765	0:00:00	Unoccupied
123	340,219	5,195,497	0:00:00	Unoccupied
125	342,224	5,195,776	0:00:00	Unoccupied
130	342,338	5,201,598	0:00:00	Occupied
131	342,481	5,201,792	0:00:00	Occupied
134	342,502	5,201,888	0:00:00	Occupied
138	342,586	5,201,880	0:00:00	Occupied
170	327,196	5,203,001	0:00:00	Unoccupied
172	326,573	5,203,121	0:00:00	Occupied
173	326,614	5,203,107	0:00:00	Unoccupied
175	336,480	5,210,588	0:00:00	Occupied
5013	331,662	5,210,195	0:00:00	Occupied
5015	335,015	5,210,254	0:00:00	Occupied
5016	335,270	5,210,159	0:00:00	Occupied
5017	335,141	5,210,664	0:00:00	Occupied
5018	334,958	5,209,903	0:00:00	Occupied
5020	334,149	5,206,673	0:00:00	Occupied
5021	334,144	5,206,664	0:00:00	Occupied
5026	331,919	5,207,710	0:00:00	Occupied
6002	335,368	5,206,778	1:39:00	Unoccupied
6003	335,435	5,204,641	8:04:00	Unoccupied
6004	334,582	5,203,847	16:26:00	Occupied
6005	335,894	5,202,102	24:12:00	Occupied
6006	335,875	5,202,206	18:34:00	Occupied
6008	338,714	5,201,739	6:31:00	Occupied
6009	338,753	5,201,759	5:02:00	Unoccupied
6010	335,722	5,198,836	0:00:00	Occupied
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6014	337,857	5,198,463	10:59:00	Unoccupied
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7004	339,106	5,200,837	4:10:00	Unoccupied
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7020	341,032	5,200,597	0:00:00	Occupied
7023	342,191	5,197,153	0:00:00	Occupied
7027	342,126	5,197,130	0:00:00	Occupied
7029	341,907	5,197,106	3:34:00	Occupied
30008	337,240	5,201,768	20:37:00	Unoccupied
500009	336,405	5,207,685	0:00:00	Occupied
500013	330,397	5,207,060	0:00:00	Unoccupied
500015	329,972	5,208,020	0:00:00	Occupied
500016	330,022	5,206,923	0:00:00	Unoccupied
500023	328,917	5,203,693	5:56:00	Unoccupied
500034	337,954	5,210,133	0:00:00	Occupied
500038	337,720	5,211,843	0:00:00	Occupied
500042	335,296	5,211,142	0:00:00	Occupied
500046	335,293	5,211,109	0:00:00	Occupied
500048	335,435	5,209,595	0:00:00	Occupied
810004	340,144	5,209,297	0:00:00	Occupied
810006	339,698	5,209,012	0:00:00	Occupied
810009	336,106	5,208,385	0:00:00	Unoccupied
810013	336,115	5,209,049	0:00:00	Occupied
810021	331,249	5,204,371	56:34:00	Occupied
810023	330,451	5,204,493	27:01:00	Unoccupied
810029	330,511	5,205,949	2:01:00	Unoccupied
810036	341,396	5,194,840	0:00:00	Occupied
810040	340,215	5,195,314	0:00:00	Occupied
810043	338,198	5,195,469	0:00:00	Occupied
810044	338,224	5,195,477	0:00:00	Occupied
810048	337,653	5,195,304	0:00:00	Occupied
810051	337,439	5,194,605	0:00:00	Occupied
810054	337,303	5,194,404	0:00:00	Occupied
810058	337,338	5,196,332	0:00:00	Occupied
810063	337,149	5,195,323	0:00:00	Occupied
810068	336,713	5,195,341	0:00:00	Occupied
810070	336,646	5,195,342	0:00:00	Occupied
810074	336,623	5,195,344	0:00:00	Occupied
810079	336,099	5,195,320	0:00:00	Occupied
810083	335,553	5,195,486	0:00:00	Occupied
810087	335,690	5,195,807	0:00:00	Occupied

NextEra Oliver III Receptor ID	UTM-E (m)	UTM-N (m)	WindPro Predicted Expected Shadow Flicker (Hours per Year)	Status
810094	335,659	5,196,501	0:00:00	Occupied
810101	333,216	5,199,405	0:00:00	Occupied
810102	333,166	5,199,373	0:00:00	Occupied
810109	332,567	5,199,511	0:00:00	Occupied
810110	332,347	5,200,690	1:53:00	Unoccupied
810116	336,094	5,195,437	0:00:00	Occupied
810118	327,470	5,200,229	0:00:00	Occupied
810126	329,809	5,200,210	0:00:00	Unoccupied
810132	338,217	5,201,930	12:59:00	Unoccupied
810144	337,177	5,202,967	25:18:00	Unoccupied
810242	340,658	5,196,713	0:00:00	Occupied
810365	329,428	5,201,283	0:00:00	Unoccupied
810366	329,219	5,201,020	0:00:00	Unoccupied
810614	338,133	5,200,625	64:59:00	Unoccupied
810628	338,043	5,195,338	0:00:00	Unoccupied
810634	327,032	5,203,541	0:00:00	Unoccupied

Acoustic Assessment

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Oliver III Wind Energy Center
Acoustic Assessment
Morton and Oliver Counties, North Dakota

Prepared for

Prepared by

160 Federal Street
Boston, MA 02110

February 2016

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Acronyms and Abbreviations

AGL	above ground level
CadnaA	Computer-Aided Noise Abatement Program
dB	decibel
dBA	A-weighted decibel
dBL	unweighted decibel
GE	General Electric
HH	hub height
Hz	Hertz
IEC	International Electrotechnical Commission
ISO	International Organization for Standardization
kHz	kilohertz
L_{eq}	equivalent sound level
L_{max}	maximum sound level
L_p	sound pressure level
L_w	sound power level
m/s	meters per second
mph	miles per hour
MVA	megavolt ampere
MW	megawatt
NEER	NextEra Energy Resources, LLC
NEMA	National Electrical Manufacturers Association
Oliver Wind III	Oliver Wind III, LLC
Project	Oliver III Wind Energy Center
PSC	Public Service Commission
pW	picowatt
RD	rotor diameter
Tetra Tech	Tetra Tech, Inc.
µPa	microPascal
USGS	United States Geological Survey
UTM	Universal Transverse Mercator
W	watt
WTG	wind turbine generators

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EXECUTIVE SUMMARY

Oliver Wind III, LLC (Oliver Wind III) a wholly-owned, indirect subsidiary of NextEra Energy Resources, LLC (NEER), contracted Tetra Tech, Inc. (Tetra Tech) to conduct an acoustic assessment for the proposed Oliver III Wind Energy Center (Project) located in Morton and Oliver Counties, North Dakota. A screening-level analysis was completed to evaluate the expected sound levels resulting from the Project wind turbine generators (WTGs) and substation. Although the Project would consist of up to 48 WTGs, three alternate WTG locations are included in the layout. Two scenarios were analyzed, one referred to as the “With Alternates” scenario and the other referred to as the “No Alternates” scenario. Analysis of the “With Alternates” scenario should be considered conservative, since all 51 WTGs were modeled but only 48 WTGs will be built as part of the Project. The overall objective of this study was to determine the feasibility of the Project to operate in compliance with the applicable North Dakota Public Service Commission (PSC) 50 A-weighted decibels (dBA) noise limit.

Wind turbine sound source data was obtained from General Electric (GE), the manufacturer of the GE 2.1-116 (2.1 MW) and GE 1.79-100 (1.79 MW) as documented in the turbine noise specification section (GE 2015). Substation data were obtained from Oliver Wind III based on a 170 megavolt ampere (MVA) transformer. It is expected that the GE WTGs and substation equipment installed will have similar sound profiles to what was used in the acoustic modeling analysis; however, it is possible that the final warranty sound power levels may vary slightly. Sound propagation modeling was conducted using the Computer-Aided Noise Abatement (CadnaA) program (version 4.6.153), a comprehensive 3-dimensional acoustic modeling computer simulation software, with calculations made in accordance with the International Organization for Standardization (ISO) standard 9613-2 “Attenuation of Sound during Propagation Outdoors”. This acoustic modeling software is widely used by acoustical engineers due to its adaptability to evaluate complex acoustic scenarios.

The results of the acoustic modeling analysis were compared to the North Dakota PSC 50 dBA noise limit within 100 feet of an inhabited residence. Acoustic modeling results showed that the Project will comply with the PSC noise limit at the majority of occupied NSRs with the exception of the occupied residence referenced as NSR ID 810021. Oliver Wind III is in the process of obtaining a waiver of the 50 dBA requirement from the owner of this occupied residence. If a waiver cannot be obtained, Oliver Wind III will ensure that the proposed Project complies with the PSC’s 50 dBA noise limit.

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1.0 INTRODUCTION

Oliver Wind III, LLC (Oliver Wind III), a wholly-owned, indirect subsidiary of NextEra Energy Resources, LLC (NEER), proposes to construct and operate the Oliver III Wind Energy Center (Project) in Oliver and Morton Counties, North Dakota. Oliver Wind III is proposing to construct up to 48 wind turbine generators (WTGs). The site layout dated January 20, 2016 includes 43 GE 2.1-116 WTGs, 5 GE 1.79-100 WTGs, and 3 alternate GE 2.1-116 WTG locations. While no more than 48 WTGs will be built, one or more of the alternate WTG locations could be activated in the event that any of the primary WTG locations were eliminated. The rotor diameter of the GE 2.1-116 is 381 feet (116 meters) and it has a hub height (HH) of 262 feet (80 meters). The GE 1.79-100 has a rotor diameter of 328 feet (100 meters) and a hub height of 262 feet (80 meters). The proposed Project infrastructure also includes a collection substation to enable interconnection to Minnkota Power Cooperative's transmission system. The substation would be located near the center of the Project Area along 32nd Street near the intersection of 32nd Street and 33rd Avenue. Substation data were obtained from Oliver Wind III based on a 170 megavolt ampere (MVA) transformer similar to the HICO 170 MVA transformer in use at other NEER energy facilities.

An acoustic modeling analysis was completed for the Project, evaluating two scenarios, one referred to as the "With Alternates" scenario and the other referred to as the "No Alternates" scenario. Analysis of the "With Alternates" scenario should be considered conservative since only 48 WTGs will be built as part of the Project. Operational sounds levels resulting from the Project were analyzed at existing noise-sensitive receptors (e.g., residential structures) and compliance was assessed relative to the North Dakota Public Service Commission (PSC) noise limit.

1.1 Project Area

The Oliver III Project Area encompasses approximately 14,172 acres (22.14 square miles) in northeastern Morton County and southeastern Oliver County, although all WTGs will be located in Morton County. County and township (section line) roads characterize the existing roadway infrastructure in and around the Project Area. The Project Area is accessed via I-94, State Highway 25, State Highway 31, and other local two-lane paved and gravel county roads. The land within the Project Area is primarily agricultural with scattered farmstead residences. The turbines will be located on privately-owned land in northeastern Morton County, approximately 12 miles northwest of Bismarck. This region of North Dakota has topography that can be described as level to rolling plains. Gentle slopes characterize most of the Project Area and local relief ranges from less than 2,018 ft to 2,278 ft. Current land use within the Project Area is primarily agricultural, supporting both crops and livestock grazing.

Occupied and unoccupied structures are scattered throughout the Project Area. Potential noise sensitive receptor locations within the Project Area and in the vicinity of proposed turbine locations were included in the acoustical analysis. Of these 93 receptors identified, 65 are occupied structures and 28 are unoccupied. Oliver Wind III designed the Project using a minimum turbine setback of 1,400 feet from occupied residences, which exceeds Morton County's setback requirement of 1,320 feet. Figure 1 in the Appendix presents the proposed Project WTGs, as well as the noise sensitive receptor locations.

1.2 Existing Acoustic Environment

Northeastern Morton County and southeastern Oliver County would generally be considered rural agricultural areas. Existing ambient sound levels are expected to be relatively low, although sound levels would be higher near roadways such as I-94, State Highway 25, and State Highway 31. Other human activity such as agricultural operations would seasonally contribute to sound levels in the area associated with crop harvests. Background sound levels are expected to vary both spatially and temporally depending on proximity to area sound sources such as roadways and natural sounds. Typically, background sound levels are quieter during the night than during the daytime, except during periods when evening and nighttime insect noise may contribute to the soundscape, predominantly in the warmer seasons.

1.3 Acoustic Terminology

Airborne sound is described as the rapid fluctuation or oscillation of air pressure above and below atmospheric pressure, creating a sound wave. Sound is characterized by properties of the sound waves, which are frequency, wavelength, period, amplitude, and velocity. Noise is defined as unwanted sound. A sound source is defined by a sound power level (L_W), which is independent of any external factors. The acoustic sound power is the rate at which acoustical energy is radiated outward and is expressed in units of watts (W). Sound energy travels in the form of a wave, a rapid fluctuation or oscillation of air pressure above and below atmospheric pressure. A sound pressure level (L_P) is a measure of this fluctuation and can be directly determined with a microphone or calculated from information about the source sound power level and the surrounding environment through predictive acoustic modeling. While the sound power of a source is strictly a function of the total amount of acoustic energy being radiated by the source, the sound pressure levels produced by a source are a function of the distance from the source and the effective radiating area or physical size of the source. In general, the magnitude of a source’s sound power level is always considerably higher than the observed sound pressure level near a source due to the fact that the acoustic energy is being radiated in various directions.

Sound levels are presented on a logarithmic scale to account for the large pressure response range of the human ear, and are expressed in units of decibels (dB). A dB is defined as the ratio between a measured value and a reference value usually corresponding to the lower threshold of human hearing defined as 20 micropascals (µPa). Conversely, sound power is commonly referenced to 1 picowatt (pW), which is one trillionth of a watt. Broadband sound includes sound energy summed across the frequency spectrum. In addition to broadband sound pressure levels, analysis of the various frequency components of the sound spectrum is often completed to determine tonal characteristics. The unit of frequency is Hertz (Hz), which corresponds to the rate in cycles per second that sound pressure waves are generated. Typically, a sound frequency analysis examines 11 octave (or 33 1/3 octave) bands ranging from 20 Hz (low) to 20,000 Hz (high). This range encompasses the entire human audible frequency range. Since the human ear does not perceive every frequency with equal loudness, spectrally varying sounds are often adjusted with a weighting filter. The A-weighted filter is applied to compensate for the frequency response of the human auditory system. Sound exposure in acoustic assessments is commonly measured and calculated as A-weighted dB (dBA). Unweighted sound levels are referred to as linear. Linear dB are used to determine a sound's tonality and to engineer solutions to reduce or control noise as techniques are different for low and high frequency noise. Sound levels that are linear in this report are presented as dBL.

Sound can be measured, modeled, and presented in various formats, with the most common metric being the equivalent sound level (L_{eq}). The equivalent sound level has been shown to provide both an effective and uniform method for comparing time-varying sound levels and is widely used in acoustic assessments in the state of North Dakota. Estimates of noise sources and outdoor acoustic environments, and the comparison of relative loudness are presented in Table 1. Table 2 provides additional reference information on acoustic terminology.

Table 1. Sound Pressure Levels (L_P) and Relative Loudness of Typical Noise Sources and Soundscapes

Noise Source or Activity	Sound Level (dBA)	Subjective Impression	Relative Loudness (perception of different sound levels)
Jet aircraft takeoff from carrier (50 ft)	140	Threshold of pain	64 times as loud
50-hp siren (100 ft)	130		32 times as loud
Loud rock concert near stage or Jet takeoff (200 ft)	120	Uncomfortably loud	16 times as loud
Float plane takeoff (100 ft)	110		8 times as loud
Jet takeoff (2,000 ft)	100	Very loud	4 times as loud
Heavy truck or motorcycle (25 ft)	90		2 times as loud
Garbage disposal, food blender (2 ft), or Pneumatic drill (50 ft)	80	Loud	Reference loudness
Vacuum cleaner (10 ft)	70	Moderate	1/2 as loud
Passenger car at 65 mph (25 ft)	65		
Large store air-conditioning unit (20 ft)	60		1/4 as loud
Light auto traffic (100 ft)	50	Quiet	1/8 as loud
Quiet rural residential area with no activity	45		
Bedroom or quiet living room or Bird calls	40	Faint	1/16 as loud
Typical wilderness area	35		
Quiet library, soft whisper (15 ft)	30	Very quiet	1/32 as loud
Wilderness with no wind or animal activity	25	Extremely quiet	
High-quality recording studio	20		1/64 as loud
Acoustic test chamber	10	Just audible	
	0	Threshold of hearing	
Adapted from: Beranek 1988; EPA 1971			

Table 2. Acoustic Terms and Definitions

Term	Definition
Noise	Typically defined as unwanted sound. This word adds the subjective response of humans to the physical phenomenon of sound. It is commonly used when negative effects on people are known to occur.
Sound Pressure Level (L_P)	Pressure fluctuations in a medium. Sound pressure is measured in decibels referenced to 20 microPascals, the approximate threshold of human perception to sound at 1,000 Hz.
Sound Power Level (L_W)	The total acoustic power of a noise source measured in decibels referenced to picowatts (one trillionth of a watt). Noise specifications are provided by equipment manufacturers as sound power as it is independent of the environment in which it is located. A sound level meter does not directly measure sound power.
A-Weighted Decibel (dBA)	Environmental sound is typically composed of acoustic energy across all frequencies. To compensate for the auditory frequency response of the human ear, an A-weighting filter is commonly used for describing environmental sound levels. Sound levels that are A-weighted are presented as dBA in this report.
Unweighted Decibels (dBL)	Unweighted sound levels are referred to as linear. Linear decibels are used to determine a sound's tonality and to engineer solutions to reduce or control noise as techniques are different for low and high frequency noise. Sound levels that are linear are presented as dBL in this report
Propagation and Attenuation	Propagation is the decrease in amplitude of an acoustic signal due to geometric spreading losses with increased distance from the source. Additional sound attenuation factors include air absorption, terrain effects, sound interaction with the ground, diffraction of sound around objects and topographical features, foliage, and meteorological conditions including wind velocity, temperature, humidity, and atmospheric conditions.
Octave Bands	The audible range of humans spans from 20 to 20,000 Hz and is typically divided into center frequencies ranging from 31 to 8,000 Hz for noise modeling evaluations.
Broadband Sound	Noise which covers a wide range of frequencies within the audible spectrum, i.e., 200 to 2,000 Hz.
Masking	Interference in the perception of one sound by the presence of another sound. At elevated wind speeds, leaf rustle and noise made by the wind itself can mask wind turbine sound levels, which remain relatively constant.
Frequency (Hz)	The rate of oscillation of a sound, measured in units of Hz or kilohertz (kHz). One hundred Hz is a rate of one hundred times (or cycles) per second. The frequency of a sound is the property perceived as pitch: a low-frequency sound (such as a bass note) oscillates at a relatively slow rate, and a high-frequency sound (such as a treble note) oscillates at a relatively high rate. For comparative purposes, the lowest note on a full range piano is approximately 32 Hz and middle C is 261 Hz.

Note: Compiled by Tetra Tech from multiple technical and engineering resources.

2.0 NOISE REGULATIONS AND GUIDELINES

A review was conducted of noise regulations applicable to the Project at the federal, state, county, and local levels. There are no federal environmental noise requirements specific to this Project. At the state level, the PSC has established regulations applicable to wind energy facilities. Morton and Oliver Counties do not provide noise limits applicable to the Project via their land use regulations. The controlling regulation for the Project is the PSC's noise limit.

2.1 State of North Dakota Public Service Commission Noise Regulations

North Dakota adopted noise regulations for wind energy facilities under the PSC Chapter 69-06-08-01(4) as follows:

> *A wind energy conversion facility site must not include a geographic area where, due to operation of the facility, the sound levels within one hundred feet of an inhabited residence or a community building will exceed fifty dBA. The sound level avoidance area criteria may be waived in writing by the owner of the occupied residence or the community building.*

Sound levels resulting from the Project within 100 feet of all identified receptors located in the vicinity of the Project were assessed against the 50 dBA limit to determine whether compliance was achieved. The PSC noise limit is absolute and independent of the existing acoustic environment; therefore, a baseline sound survey is not required to assess conformity.

3.0 ACOUSTIC MODELING METHODOLOGY AND RESULTS

Sound generated by an operating WTG is comprised of both aerodynamic and mechanical sound with the dominant sound component from modern utility scale WTGs being largely aerodynamic. Aerodynamic sound refers to the sound produced from air flow and the interaction with the WTG tower structure and moving rotor blades. Mechanical sound is generated at the gearbox, generator, and cooling fan, and is radiated from the surfaces of the nacelle and machinery enclosure and by openings in the nacelle casing. Due to the improved design of WTG mechanical components and the use of improved noise damping materials within the nacelle, including elastomeric elements supporting the generator and gearbox, mechanical noise emissions have been minimized. Sound reduction elements designed as a part of the WTGs include impact noise insulation of the gearbox and generator, sound reduced gearbox, sound reduced nacelle, and rotor blades designed to minimize noise generation.

Wind energy facilities, in comparison to other energy-related facilities, are somewhat unique in that the sound generated by each individual WTG will increase as the wind speed across the site increases. Wind turbine sound is negligible when the rotor is at rest, increases as the rotor tip speed increases, and is generally constant once rated power output and maximum rotational speed are achieved. Under this condition, the WTG maximum sound power level will be reached at approximately 7 meters per second [m/s], according to the GE specifications. It is important to recognize as wind speeds increase, the background ambient sound level will generally increase as well, resulting in acoustic masking effects; however, this trend is also affected by local contributing sound sources. The net result is that during periods of elevated wind speeds when higher WTG sound emissions occur, the sound produced from a WTG operating at maximum rotational speed may be largely or fully masked due to wind generated sound in foliage or vegetation. In practical terms, this means a nearby receptor would tend to hear leaves or vegetation rustling rather than WTG noise. This relationship is expected to further minimize the potential for any adverse noise effects of the Project. Conversely, these acoustic masking effects may be limited during periods of unusually high wind shear or at receiver locations that are sheltered from the prevailing wind direction.

3.1 Acoustic Modeling Software and Calculation Methods

The operational acoustic assessment was performed using the proposed Project WTG layout dated January 20, 2016, which includes 43 GE 2.1-116 WTGs, 5 GE 1.79-100 WTGs, and 3 alternate GE 2.1-116 WTG locations. Two scenarios were modeled, a “With Alternates” scenario consisting of 51 WTG locations (48 planned WTG locations and an additional 3 alternate locations), and a “No Alternates” scenario consisting of 48 WTG locations. The Project would use the GE 2.1-116 WTG model, which has a rotor diameter of 381 feet (116 meters) and a hub height of 262 feet (80 meters) and the GE 1.79-100 WTG model, which has a rotor diameter of 328 feet (100 meters) and a hub height of 262 feet (80 meters). The Project would also include a collection substation with a 170 MVA transformer. WTG sound source data were obtained from GE (GE 2013 and 2015) and substation transformer data were obtained from Oliver Wind III.

The acoustic modeling analysis was conducted using the most recent version of DataKustic GmbH's computer-aided noise abatement program or CadnaA (v 4.6.153). CadnaA is a comprehensive 3-dimensional acoustic software model that conforms to the International Organization for Standardization (ISO) standard ISO 9613-2 "Attenuation of Sound during Propagation Outdoors." The engineering methods specified in this standard consist of full (1/1) octave band algorithms that incorporate geometric spreading due to wave divergence, reflection from surfaces, atmospheric absorption, screening by topography and obstacles, ground effects, source directivity, heights of both sources and receptors, seasonal foliage effects, and meteorological conditions. Topographical information was imported into the acoustic model using the official United States Geological Survey (USGS) digital elevation dataset to accurately represent terrain in three dimensions. Terrain conditions, vegetation type, ground cover, and the density and height of foliage can also influence the absorption that takes place when sound waves travel over land. The ISO 9613-2 standard accounts for ground absorption rates by assigning a numerical coefficient of G=0 for acoustically hard, reflective surfaces and G=1 for absorptive surfaces and soft ground. If the ground is hard-packed dirt, typically found in industrial complexes, pavement, bare rock or for sound traveling over water, the absorption coefficient is defined as G=0 to account for reduced sound attenuation and higher reflectivity. In contrast, ground covered in vegetation, including suburban lawns, livestock and agricultural fields (both fallow with bare soil and planted with crops), will be acoustically absorptive and aid in sound attenuation (i.e., G=1.0). A mixed (semi-reflective) ground factor of G=0.5 was used in the Project acoustic modeling analysis. In addition to geometrical divergence, attenuation factors include topographical features, terrain coverage, and/or other natural or anthropogenic obstacles that can affect sound attenuation and result in acoustical screening. To be conservative, sound attenuation through foliage and diffraction around and over existing anthropogenic structures such as buildings was not included in the model.

Sound attenuation by the atmosphere is not strongly dependent on temperature and humidity; however, the temperature of 10ºCelsius (50ºFahrenheit) and 70 percent relative humidity parameters were selected as reasonably representative of conditions favorable to sound propagation. Atmospheric absorption depends on temperature and humidity and is most important at higher frequencies. Over short distances, the effects of atmospheric absorption are minimal. The ISO 9613-2 standard calculates attenuation for meteorological conditions favorable to propagation, i.e., downwind sound propagation or what might occur typically during a moderate atmospheric ground level inversion. Though a physical impracticality, the ISO 9613-2 standard simulates omnidirectional downwind propagation. For receivers located between discrete WTG locations or WTG groupings, the acoustic model may result in over-prediction. In addition, the acoustic modeling algorithms essentially assume laminar atmospheric conditions, in which neighboring layers of air do not mix. This conservative assumption does not take into consideration turbulent eddies and micrometeorological inhomogeneities that may form when winds change speed or direction, which can interfere with the sound wave propagation path and increase attenuation effects.

Conversely, there may be meteorological conditions from time to time that will aid in the long-range propagation of sound. These anomalous meteorological conditions may include well-developed moderate ground-based temperature inversions, such as commonly occurs at nighttime and during early morning hours, and wind gradients which can bend sound downwards, which may occur any time depending on weather conditions. Per ISO 9613-2, the effects of meteorological conditions on sound propagation are small for short distances, and also small for longer distances at greater source and receptor heights. Over extended distances when the influences of wind or temperature gradients are most prevalent, atmospheric effects may cause fluctuations in received sound levels, but will typically attenuate noise to levels below those predicted. Propagation for anomalous meteorological conditions are presented to show that for comparatively short periods of time received sound levels may be higher than the mean.

3.2 Acoustic Modeling Input Parameters

In order to assist project developers and acoustical engineers, wind turbine manufacturers report WTG sound power data at integer wind speeds referenced to the effective hub height, ranging from cut-in to full rated power per International Electrotechnical Commission (IEC) standard IEC 61400-11:2006 Wind Turbine Generator Systems—Part 11: Acoustic Noise Measurement Techniques. This accepted IEC standard was developed to ensure consistent and comparable sound emission data of utility-scale WTGs between manufacturers. Tables 3 and 4 present a summary of sound power data for the GE 1.79-100 and GE 2.1-116 WTGs during normal operations correlated to 10 meter height integer wind speeds 10 meter above ground level (AGL) with a stated roughness length[1] of 0.05 meters, which is representative of level grass-covered terrain (GE 2015). The sound power data for the GE 2.1-116 WTG is not yet available, so data for the GE 2.3-116 WTG was used. GE stated that the sound power profile for the GE 2.3-116 WTG is effectively the same as the profile for the GE 2.1-116 WTG, and therefore this data substitution should not impact results.

The specification for the WTGs includes an expected warranty confidence interval, or k-factor, of 2 dB, which was added to the nominal sound power level in the acoustic model. This confidence interval incorporates the uncertainty in independent sound power level measurements conducted, the applied probability level and standard deviation for test measurement reproducibility, and product variability.

Table 3. Broadband Sound Power Levels (dBA) Correlated with Wind Speed (GE 1.79-100)

	WTG L_{max} Sound Power Level (L_W) at Reference Wind Speed							
10-meter AGL Wind Speed	11.2 mph (5 m/s)	12.3 mph (5.5 m/s)	13.4 mph (6 m/s)	14.5 mph (6.5 m/s)	15.7 mph (7 m/s)	17.9 mph (8 m/s)	20.1 mph (9 m/s)	22.4 mph (10 m/s)
GE 1.79-100	98.6	101.0	103.2	105.5	107.2	107.5	107.5	107.5

[1] The roughness length describes the vertical wind profile per IEC specification in a neutral atmosphere with the wind profile following a logarithmic curve.

Table 4. Broadband Sound Power Levels (dBA) Correlated with Wind Speed (GE 2.3-116)

	WTG L_{max} Sound Power Level (L_W) at Reference Wind Speed									
Wind Speed	8.9 mph (4.0 m/s)	11.2 mph (5.0 m/s)	13.4 mph (6.0 m/s)	15.7 mph (7.0 m/s)	17.9 mph (8.0 m/s)	20.1 mph (9.0 m/s)	22.4 mph (10.0 m/s)	24.6 mph (11.0 m/s)	26.8 mph (12.0 m/s)	29.1 mph (13.0 m/s)
GE 2.3-116	95.0	95.8	98.2	101.6	104.5	105.8	107.5	107.5	107.5	107.5

Wind turbines can be somewhat directional, radiating more sound in some directions than others. The IEC test measurement protocol requires that sound measurements are made for the maximum downwind directional location when reporting apparent sound power levels. Thus, it is assumed that WTG directivity and sound generating efficiencies are inherently incorporated in the sound source data and used in acoustic model development. A summary of sound power data by octave band center frequency for both WTG models operating at maximum rotation are presented in Table 5 (1/1 octave band frequency data provided with stated intended use limited for informational purposes only).

Table 5. Sound Power Level by Octave Band Center Frequency

Frequency (Hz)	**Octave Band Sound Power Level (dBA)**								**Broadband (dBA)**
	63	125	250	500	1000	2000	4000	8000	
GE 1.79-100	91.0	96.1	98.0	100.8	103.3	100.0	90.3	70.6	107.5
GE 2.3-116	89.0	95.1	99.6	102.8	102.5	97.6	87.4	66.8	107.5

3.3 Acoustic Modeling Results

Acoustic modeling was completed for WTG cut-in and maximum rotational operating conditions, thereby describing resultant sound pressure levels over the entire operational range of the Project for both the “With Alternates” and “No Alternates” scenarios. In addition, sound energy contribution from the Project substation was included in the acoustic modeling analysis. When calculating received sound levels, it was assumed that the Project substation and all WTGs were operating concurrently at the given operating condition. Sound contour plots displaying Project operational sound levels in color-coded isopleths are provided in Figures 2 through 8 in the Appendix. Figures 2 and display the broadband operational sound levels under low-level wind speeds sufficient for the WTGs to operate at initial cut-in rotational speeds. Figures 4 and 5 display broadband operational sound levels at wind speeds sufficient to sustain WTG operation at maximum rotational speeds for moderate downwind propagation. Figures 6 and 7 display broadband operational sound levels at wind speeds sufficient to sustain WTG operation at maximum rotational speeds under anomalous meteorological conditions.

Table 6 presents the results of the Oliver III Wind Energy Center acoustic modeling analysis and includes the ID, Universal Transverse Mercator (UTM) coordinates, receptor status and the received sound levels at each receptor for both scenarios. Received sound levels are rounded to the nearest whole decimal for consistency with the state of North Dakota noise limit, which is an absolute value of 50 dBA. In addition, a 100-foot buffer was included around the receptors, corresponding to the point of compliance identified in the PSC 50 dBA noise limit.

The acoustic modeling results shown in Table 6 demonstrate that received sound levels are all below the PSC 50 dBA noise limit with the exception of two receptors, NSR IDs 30008 and 810021. NSR ID 30008 was identified as an unoccupied structure; therefore, it is not considered noise sensitive and demonstrating compliance with the limit is not required. NSR ID 810021 was identified as an occupied structure; however Oliver Wind III is in the process of obtaining a waiver of the 50 dBA requirement from the owner of this occupied residence. If a waiver cannot be obtained, Oliver Wind III will ensure that the proposed Project complies with the PSC's 50 dBA noise limit.

Table 6. Oliver III Wind Energy Center – Acoustic Modeling Results

NSR ID	NSR Status	UTM Coordinates (NAD83 UTM Zone 14 meters)		No Alternates			With Alternates		
		Easting (m)	Northing (m)	Cut-in Rotation (dBA)	Maximum Rotation (dBA)	Maximum Rotation under Anomalous (dBA)	Cut-in Rotation (dBA)	Maximum Rotation (dBA)	Maximum Rotation under Anomalous (dBA)
107	Occupied	328318	5199223	15	27	30	15	27	30
111	Occupied	332294	5197910	18	31	33	18	31	33
113	Occupied	333315	5198704	22	34	36	22	34	36
117	Unoccupied	334380	5197276	15	28	30	16	28	30
120	Unoccupied	339638	5195765	19	32	34	20	33	35
123	Unoccupied	340219	5195497	19	31	33	20	32	34
125	Unoccupied	342224	5195776	16	28	31	17	29	32
130	Occupied	342338	5201598	18	29	32	18	30	33
131	Occupied	342481	5201792	17	29	31	17	30	32
134	Occupied	342502	5201888	18	30	32	18	30	33
138	Occupied	342586	5201880	18	30	32	18	30	33
170	Unoccupied	327196	5203001	15	28	30	15	28	30
172	Occupied	326573	5203121	18	30	33	18	30	33
173	Unoccupied	326614	5203107	18	30	33	18	30	33
175	Occupied	336480	5210588	10	21	23	10	21	23
5013	Occupied	331662	5210195	16	27	30	16	27	30
5015	Occupied	335015	5210254	11	22	24	11	22	24
5016	Occupied	335270	5210159	15	26	28	15	26	28
5017	Occupied	335141	5210664	10	21	23	10	21	23
5018	Occupied	334958	5209903	16	27	29	16	27	29
5020	Occupied	334149	5206673	24	35	37	24	35	37
5021	Occupied	334144	5206664	24	35	37	24	35	37

Table 6. Oliver III Wind Energy Center – Acoustic Modeling Results

NSR ID	NSR Status	UTM Coordinates (NAD83 UTM Zone 14 meters)		No Alternates			With Alternates		
		Easting (m)	Northing (m)	Cut-in Rotation (dBA)	Maximum Rotation (dBA)	Maximum Rotation under Anomalous (dBA)	Cut-in Rotation (dBA)	Maximum Rotation (dBA)	Maximum Rotation under Anomalous (dBA)
5026	Occupied	331919	5207710	19	31	33	19	31	33
6002	Unoccupied	335368	5206778	26	36	38	26	36	38
6003	Unoccupied	335435	5204641	33	43	44	33	43	44
6004	Occupied	334582	5203847	33	45	46	33	45	46
6005	Occupied	335894	5202102	32	45	46	33	45	46
6006	Occupied	335875	5202206	33	45	47	33	46	47
6008	Occupied	338714	5201739	28	40	42	28	41	42
6009	Unoccupied	338753	5201759	28	40	42	29	41	42
6010	Occupied	335722	5198836	26	39	40	27	39	41
6011	Occupied	336821	5199125	30	43	44	30	43	44
6012	Unoccupied	335789	5197882	23	36	38	24	36	39
6013	Occupied	336785	5196966	22	35	37	24	37	39
6014	Unoccupied	337857	5198463	33	46	46	34	46	47
7002	Occupied	339472	5200083	30	43	43	32	44	45
7004	Unoccupied	339106	5200837	28	40	41	34	47	47
7007	Occupied	338286	5203461	30	42	43	30	42	43
7010	Occupied	338391	5204385	28	38	40	28	38	40
7016	Occupied	337949	5204464	30	39	41	30	40	41
7020	Occupied	341032	5200597	21	33	36	22	35	37
7023	Occupied	342191	5197153	20	33	35	21	33	35
7027	Occupied	342126	5197130	20	33	35	21	34	36
7029	Occupied	341907	5197106	21	34	35	22	34	36
30008	Unoccupied	337240	5201768	39	52	52	40	52	52
500009	Occupied	336405	5207685	23	32	34	23	32	34

Table 6. Oliver III Wind Energy Center – Acoustic Modeling Results

NSR ID	NSR Status	UTM Coordinates (NAD83 UTM Zone 14 meters)		No Alternates			With Alternates		
		Easting (m)	Northing (m)	Cut-in Rotation (dBA)	Maximum Rotation (dBA)	Maximum Rotation under Anomalous (dBA)	Cut-in Rotation (dBA)	Maximum Rotation (dBA)	Maximum Rotation under Anomalous (dBA)
500013	Unoccupied	330397	5207060	22	34	37	22	35	37
500015	Occupied	329972	5208020	19	31	34	19	31	34
500016	Unoccupied	330022	5206923	21	34	36	21	34	36
500023	Unoccupied	328917	5203693	32	44	44	32	44	45
500034	Occupied	337954	5210133	15	25	28	15	25	28
500038	Occupied	337720	5211843	6	17	19	6	17	19
500042	Occupied	335296	5211142	9	20	22	9	20	22
500046	Occupied	335293	5211109	9	20	22	9	20	22
500048	Occupied	335435	5209595	12	23	26	12	23	26
810004	Occupied	340144	5209297	15	25	28	15	25	28
810006	Occupied	339698	5209012	14	24	27	14	24	27
810009	Unoccupied	336106	5208385	21	31	34	21	31	34
810013	Occupied	336115	5209049	19	30	32	19	30	32
810021	Occupied	331249	5204371	38	51	51	38	51	51
810023	Unoccupied	330451	5204493	34	46	47	34	46	47
810029	Unoccupied	330511	5205949	29	41	42	29	41	42
810036	Occupied	341396	5194840	12	25	27	13	26	28
810040	Occupied	340215	5195314	18	30	33	19	31	34
810043	Occupied	338198	5195469	16	29	31	20	32	34
810044	Occupied	338224	5195477	19	31	33	21	34	36
810048	Occupied	337653	5195304	19	32	34	21	34	36
810051	Occupied	337439	5194605	17	30	32	19	31	33
810054	Occupied	337303	5194404	14	26	29	16	28	31
810058	Occupied	337338	5196332	18	31	33	24	36	37

Table 6. Oliver III Wind Energy Center – Acoustic Modeling Results

NSR ID	NSR Status	UTM Coordinates (NAD83 UTM Zone 14 meters)		No Alternates			With Alternates		
		Easting (m)	Northing (m)	Cut-in Rotation (dBA)	Maximum Rotation (dBA)	Maximum Rotation under Anomalous (dBA)	Cut-in Rotation (dBA)	Maximum Rotation (dBA)	Maximum Rotation under Anomalous (dBA)
810063	Occupied	337149	5195323	18	31	33	20	33	35
810068	Occupied	336713	5195341	18	30	32	19	32	34
810070	Occupied	336646	5195342	17	29	32	19	31	33
810074	Occupied	336623	5195344	17	29	32	19	31	34
810079	Occupied	336099	5195320	16	29	31	18	30	33
810083	Occupied	335553	5195486	16	29	31	17	30	32
810087	Occupied	335690	5195807	18	31	33	19	32	34
810094	Occupied	335659	5196501	19	32	34	20	33	35
810101	Occupied	333216	5199405	24	36	39	24	37	39
810102	Occupied	333166	5199373	23	36	38	23	36	38
810109	Occupied	332567	5199511	24	37	39	24	37	39
810110	Unoccupied	332347	5200690	29	41	43	29	42	43
810116	Occupied	336094	5195437	18	30	33	19	31	34
810118	Occupied	327470	5200229	14	27	29	14	27	29
810126	Unoccupied	329809	5200210	22	34	37	22	35	37
810132	Unoccupied	338217	5201930	31	44	45	32	44	45
810144	Unoccupied	337177	5202967	37	49	49	37	49	50
810242	Occupied	340658	5196713	25	38	39	26	38	39
810365	Unoccupied	329428	5201283	23	36	38	24	36	38
810366	Unoccupied	329219	5201020	23	35	37	23	35	37
810614	Unoccupied	338133	5200625	36	48	49	37	49	49
810628	Unoccupied	338043	5195338	18	31	33	21	33	35
810634	Unoccupied	327032	5203541	19	31	34	19	31	34

4.0 OTHER SOUND CONSIDERATIONS

4.1 Substation Noise

Substations have switching, protection and control equipment and typically one or more transformers, which generate the sound generally described as a low humming. There are three main sound sources associated with a transformer: core noise, load noise and noise generated by the operation of the cooling equipment. The core vibrational noise is the principal noise source and does not vary significantly with electrical load. Transformers are designed and catalogued by MVA ratings. Just as horsepower ratings designate the power capacity of an electric motor, a transformer's MVA rating indicates its maximum power output capacity. The National Electrical Manufacturers Association (NEMA) published NEMA Standards TR1-1993 (R2000), which establish the maximum noise level allowed for transformers, voltage regulators, and shunt reactors based on the equipment's method of cooling its dielectric fluid (air-cooled vs. oil-cooled) and the electric power rating.

Transformer noise is generated and will attenuate with distance at different rates depending on the transformer dimensions, voltage rating, and design. The noise produced by substation transformers is primarily caused by the load current in the transformer's conducting coils (or windings) and consequently the main frequency of this sound is twice the supply frequency. The characteristic humming sound consists of tonal components generated at harmonics of 120 Hz. Most of the acoustical energy resides in the fundamental tone (120 Hz) and the first 3 or 4 harmonics (240, 360, 480, 600 Hz). In addition to core vibration noise, transformer cooling fans may generate broadband noise, limited to periods when high heat loads require additional cooling capacity. The resulting audible sound is a combination of core noise and the broadband fan noise. Circuit-breaker operations may also cause audible noise, particularly the operation of air-blast breakers which is characterized as an impulsive sound event of very short duration. This is expected to occur only a few times throughout the year, and was therefore not considered in this analysis.

The proposed Project electrical substation would be located near the center of the Project Area along 32nd Street near the intersection of 32nd Street and 33rd Avenue. The transformer at this substation location was modeled using the latest version of CadnaA implementing ISO 9613-2. Transformer sound source levels for the Project substation were provided based on a 170 MVA transformer similar to the HICO 170 MVA transformer in use at other NEER energy facilities. Table 7 presents the transformer sound source data by octave band center frequency calculated based on the estimated transformer NEMA and MVA ratings using standardized engineering guidelines.

Table 7. Transformer Sound Power Level

	Octave Band Sound Power Level (dB)								Broadband (dBA)
Frequency (Hz)	63	125	250	500	1000	2000	4000	8000	
170 MVA Transformer	93	99	101	94	90	85	80	73	97

Transformers the size of the one proposed for the Project can present a noise concern if the separation distance is less than a few hundred feet between the transformer and noise-sensitive receptors. The proposed Project transformer location is approximately 1,683 feet (513 meters) from the nearest noise sensitive receptor and poses little concern from a noise perspective. That being said, transformer noise may be periodically audible at nearby receptors on occasions when background sound levels are very low.

4.2 Construction Noise

The development of Oliver III Wind Energy Center will involve construction to establish access roads, excavate and form WTG foundations, prepare the site for crane-lifting and assemble and commission the WTGs. Work on large-scale wind projects such as Oliver III Wind Energy Center is generally divided into four phases consisting of the following:

1. *Site Clearing*: The initial site mobilization phase includes the establishment of temporary site offices, workshops, stores, and other on-site facilities. Installation of erosion and sedimentation control measures will be completed as well as the preparation of initial haulage routes.

2. *Grading*: This phase would begin with the grading and formation of access roads and preparation of laydown areas. Excavation for the concrete turbine foundations would also be completed.

3. *Foundation Work*: Construction of the reinforced concrete turbine foundations would take place in addition to installation of the internal transmission network.

4. *WTG Installation*: Delivery of the turbine components would occur followed by their installation and commissioning.

Work on these construction activities is expected to overlap. It is likely that the WTGs will be erected in small groupings. Each grouping may undergo periodic testing and commissioning prior to commencement of full commercial operation. Other construction activities include those for the supporting infrastructure such as the substation, maintenance building, and the overhead transmission line.

The construction of the Project may cause short-term but unavoidable noise 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. The list of construction equipment that may be used on the Project and estimates of near and far sound source levels are presented in Table 8.

Table 8. Estimated L_{max} Sound Pressure Levels from Construction Equipment

Equipment*	Estimated Sound Pressure Level at 50 feet (dBA)	Estimated Sound Pressure Level at 2000 feet (dBA)
Crane	85	53
Forklift	80	48
Backhoe	80	48
Grader	85	53
Man basket	85	53
Dozer	83–88	51–56
Loader	83–88	51–56
Scissor Lift	85	53
Truck	84	52
Welder	73	41
Compressor	80	48
Concrete Pump	77	45

Source: FHWA 2006; Bolt et al. 1977

Sounds generated by construction activities are typically exempt from state and local noise oversight provided that they occur within weekday, daytime periods as may be specified under local zoning or legal codes. All reasonable efforts will be made to minimize the impact of noise resulting from construction activities. As the design of the Project progresses and construction scheduling is finalized, the construction engineer normally notifies the community via public notice or alternative method of the expected Project construction commencement and duration to help minimize the effects of construction noise. In addition, the location of stationary equipment and the siting of construction laydown areas will be carefully selected to be as far removed from existing noise-sensitive receptors as is practical. Candidate construction noise mitigation measures include scheduling louder construction activities during daytime hours and equipping internal combustion engines with appropriate sized muffler systems to minimize noise excessive emissions.

Construction activity will generate traffic having potential noise effects, such as trucks travelling 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 noise is categorized into two categories: (1) the noise 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.

5.0 CONCLUSIONS

Project operational sound has been calculated and compared to the 50 dBA PSC noise limit. Acoustic modeling analysis per ISO 9613-2 and inclusive of a number of conservative assumptions under operational conditions demonstrates the Project will comply with the PSC noise limit at the majority of occupied NSRs with the exception of the occupied residence referenced as NSR ID 810021. However, Oliver Wind III is currently in the process of obtaining a waiver of the 50 dBA requirement from the owner of this occupied residence. If a waiver cannot be obtained, Oliver Wind III will ensure that the proposed Project complies with the PSC's 50 dBA noise limit.

6.0 TECHNICAL REFERENCES

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FHWA (Federal Highway Administration). 2006. FHWA Roadway Construction Noise Model User's Guide, FHWA-HEP-05-054, January.

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ISO (International Organization for Standardization). 1989. Standard ISO 9613-2 Acoustics—Attenuation of Sound During Propagation Outdoors. Part 2 General Method of Calculation. Geneva, Switzerland.

Technical Documentation: Wind Turbine Generator Systems GE 1.79-100—50Hz and 60Hz, Noise emission characteristics Normal operation according to IEC, GE Wind Energy GmbH, 2013.

Technical Documentation: Wind Turbine Generator Systems GE 2.3-116 1-2 MW, Noise emission characteristics Normal operation according to IEC, GE Wind Energy GmbH, 2015.

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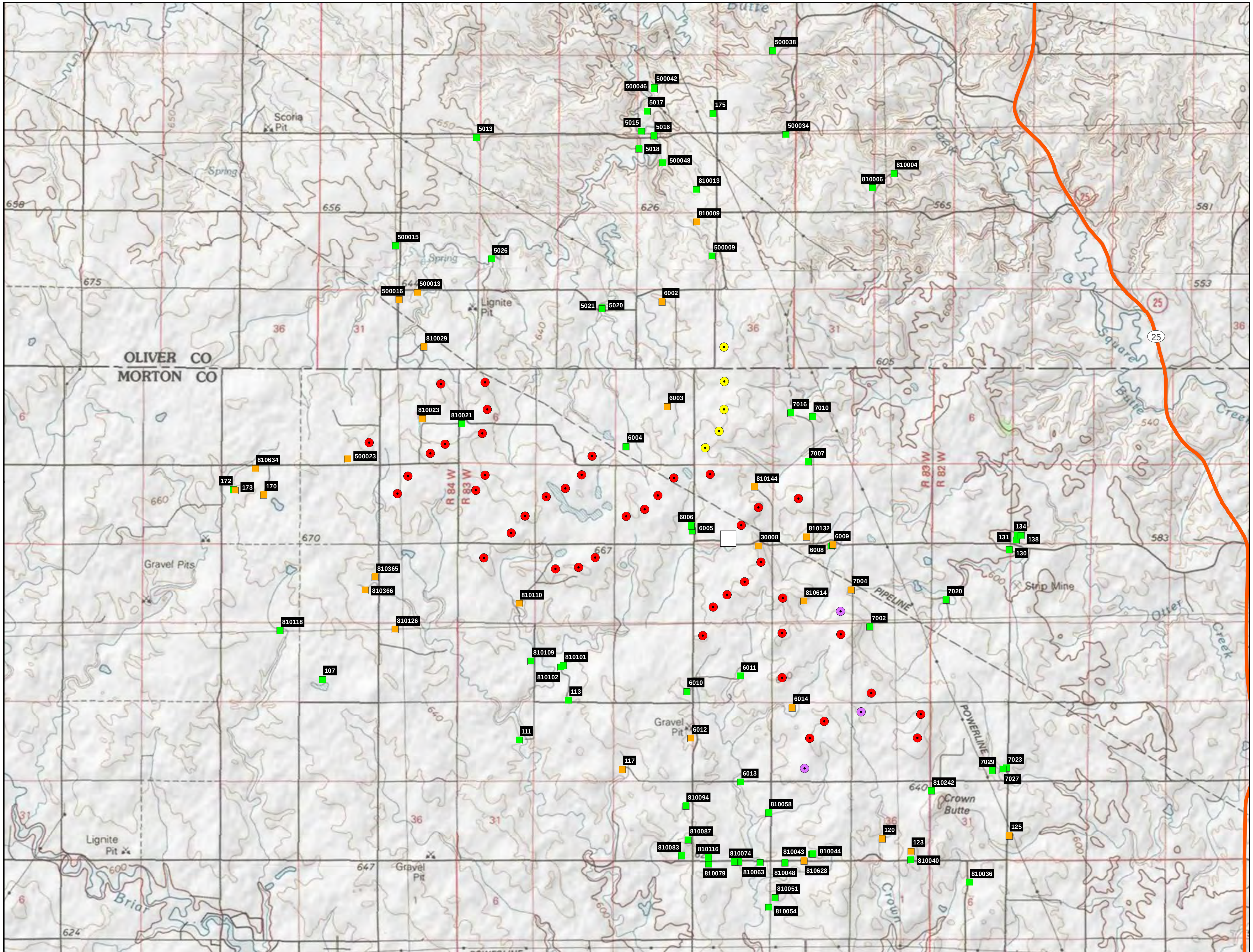
APPENDIX

Figures



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OLIVER III WIND PROJECT
OLIVER AND MORTON COUNTIES, NORTH DAKOTA

FIGURE 1
PROJECT LAYOUT

FEBRUARY 2016

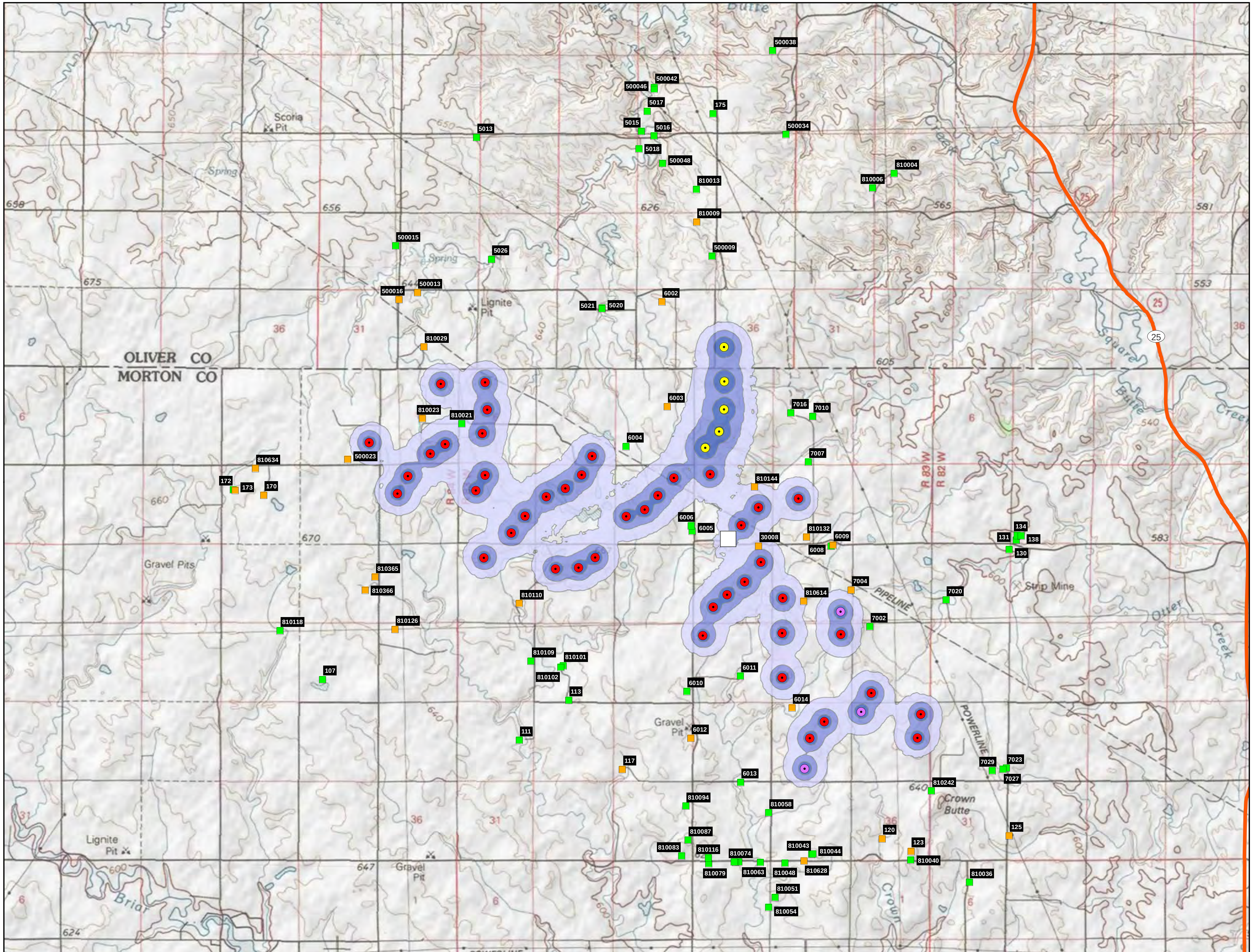
Proposed Turbine Array (1/20/2016)
- GE 2.1-116 Turbine
- GE 2.1-116 Turbine (Alt)
- GE Xle 1.79-100 Turbine

Receptors
- Occupied
- Unoccupied
- Substation
- Major Road

N

0 0.5 1 1.5 2 MILES

REFERENCE MAP



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OLIVER AND MORTON COUNTIES, NORTH DAKOTA

FIGURE 2
WITH ALTERNATES:
RECEIVED SOUND LEVELS - WIND TURBINES AT CUT-IN WIND SPEED

FEBRUARY 2016

Proposed Turbine Array (1/20/2016)
- GE 2.1-116 Turbine
- GE 2.1-116 Turbine (Alt)
- GE Xle 1.79-100 Turbine

Receptors
- Occupied
- Unoccupied
- Substation
- Major Road

Sound Level Contour Ranges (dBA)
- 35-40
- >40-45
- >45-50
- >50

N

0 0.5 1 1.5 2 MILES

REFERENCE MAP

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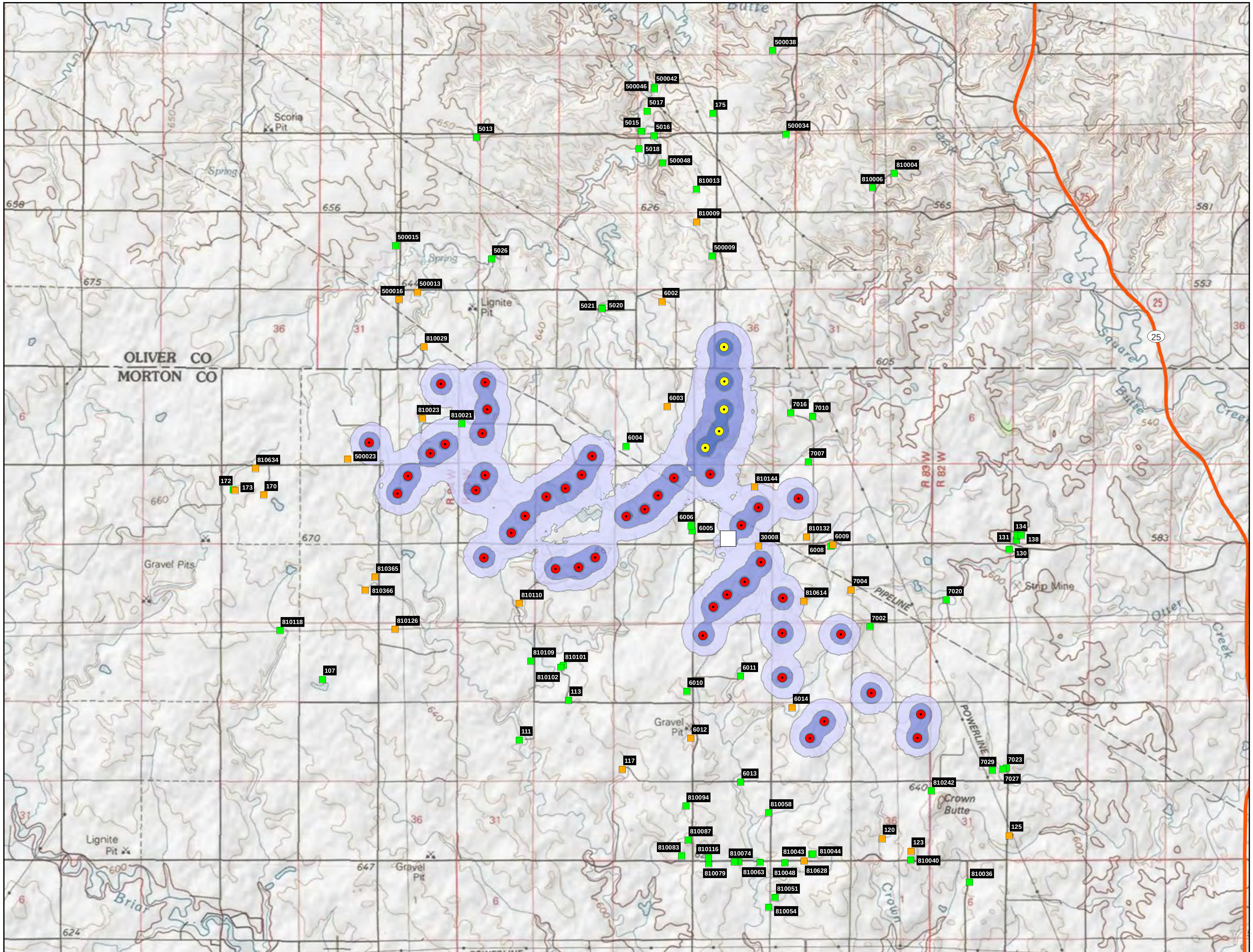

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OLIVER AND MORTON COUNTIES, NORTH DAKOTA

FIGURE 3
NO ALTERNATES:
RECEIVED SOUND LEVELS - WIND TURBINES AT CUT-IN WIND SPEED

FEBRUARY 2016

Proposed Turbine Array (1/20/2016)
- GE 2.1-116 Turbine
- GE Xle 1.79-100 Turbine

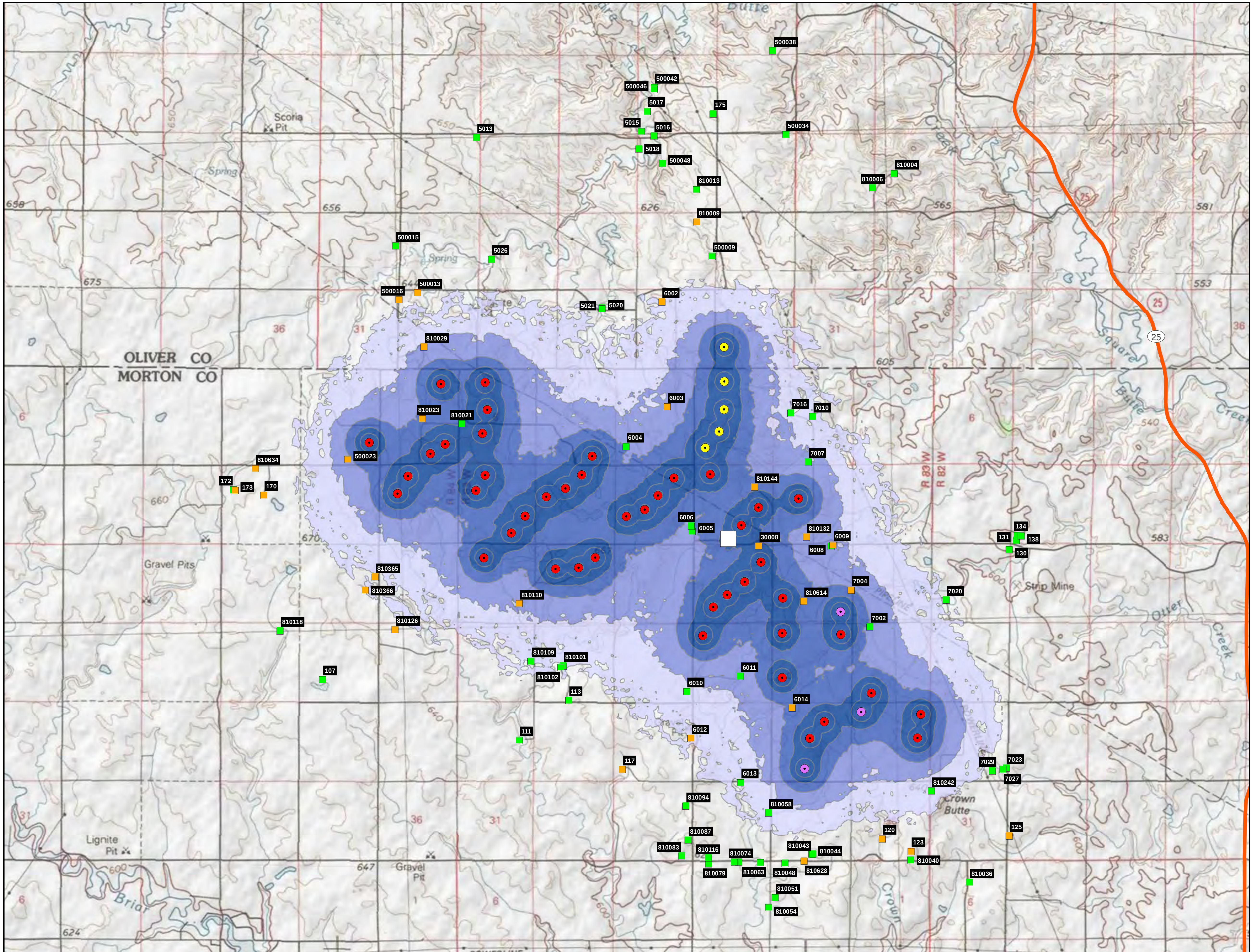
Receptors
- Occupied
- Unoccupied
- Substation
- Major Road

Sound Level Contour Ranges (dBA)
- 35-40
- >40-45
- >45-50
- >50

N

0 0.5 1 1.5 2 MILES

REFERENCE MAP



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OLIVER III WIND PROJECT
OLIVER AND MORTON COUNTIES, NORTH DAKOTA

FIGURE 4
WITH ALTERNATES:
RECEIVED SOUND LEVELS - WIND TURBINES AT MAXIMUM ROTATIONAL WIND SPEED

FEBRUARY 2016

Proposed Turbine Array (1/20/2016)

- GE 2.1-116 Turbine
- GE 2.1-116 Turbine
- GE XLe 1.79-100 Turbine

Receptors

- Occupied
- Unoccupied
- Substation
- Major Road

Sound Level Contour Ranges (dBA)

- 35-40
- >40-45
- >45-50
- >50

N

0 0.5 1 1.5 2 MILES

REFERENCE MAP

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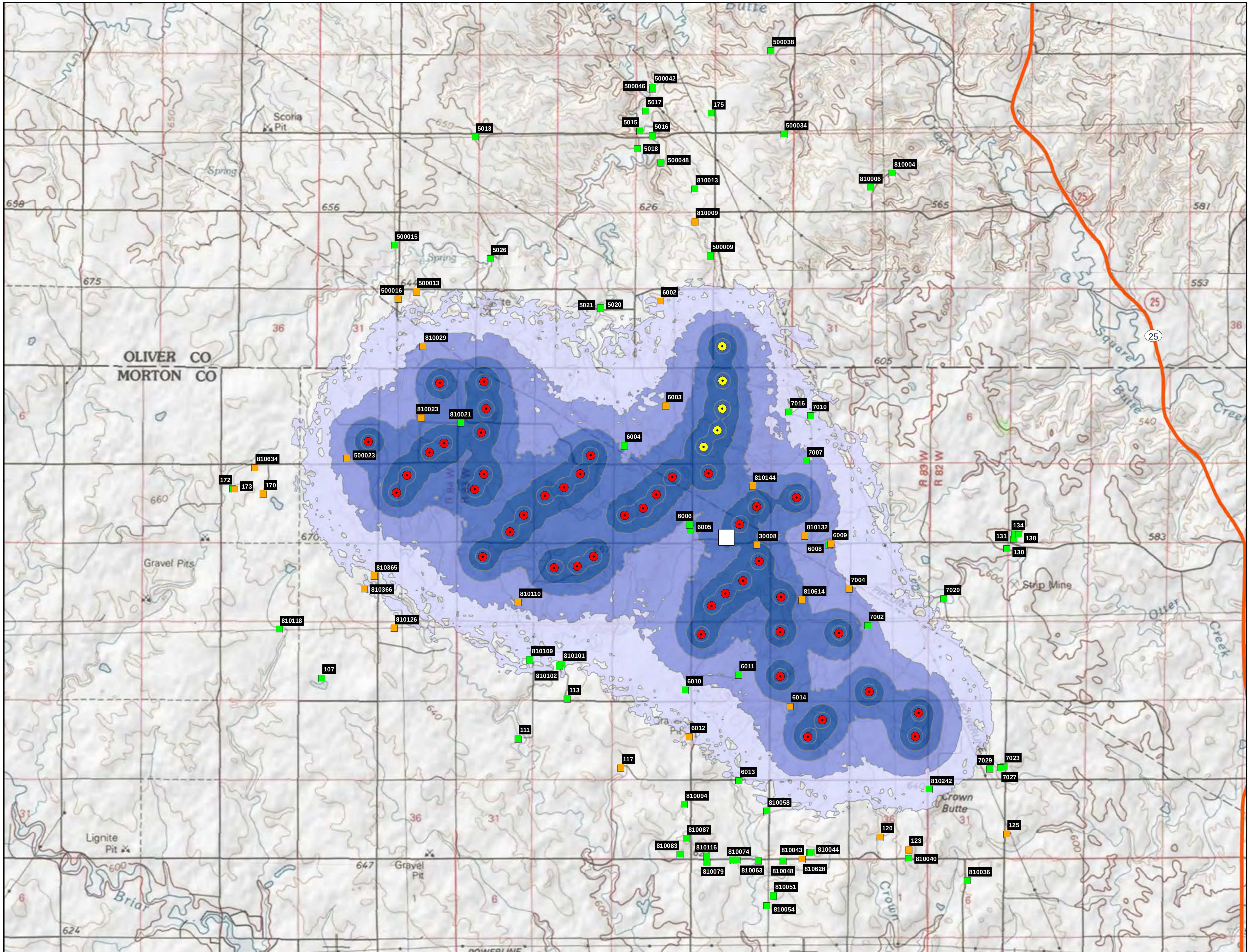

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OLIVER III WIND PROJECT
OLIVER AND MORTON COUNTIES, NORTH DAKOTA

FIGURE 5
NO ALTERNATES: RECEIVED SOUND LEVELS - WIND TURBINES AT MAXIMUM ROTATIONAL WIND SPEED

FEBRUARY 2016

Proposed Turbine Array (1/20/2016)
- GE 2.1-116 Turbine
- GE Xle 1.79-100 Turbine

Receptors
- Occupied
- Unoccupied
- Substation
- Major Road

Sound Level Contour Ranges (dBA)
- 35-40
- >40-45
- >45-50
- >50

N

0 0.5 1 1.5 2 MILES

REFERENCE MAP

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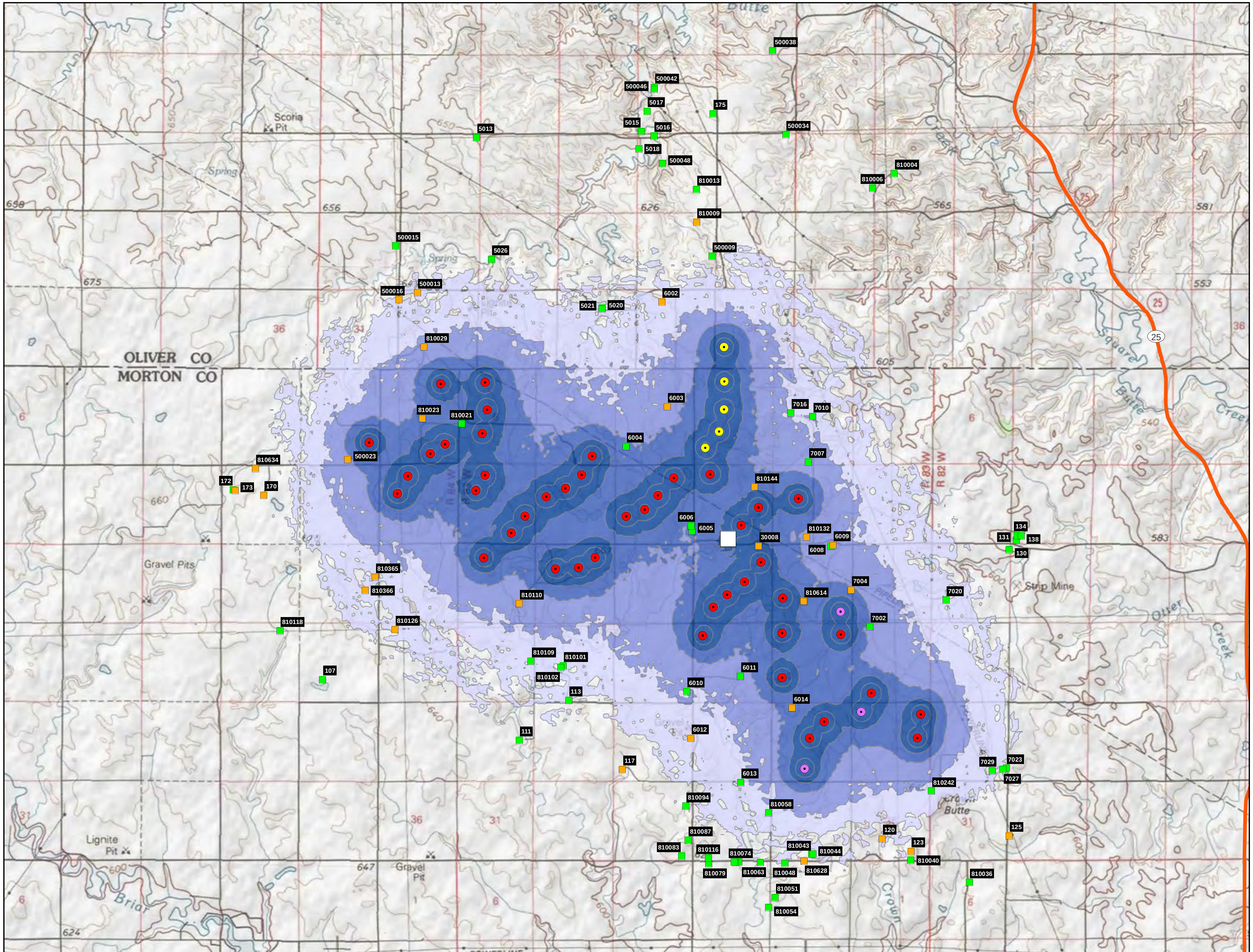


NEXTERA ENERGY RESOURCES, LLC

OLIVER III WIND PROJECT

OLIVER AND MORTON COUNTIES, NORTH DAKOTA

FIGURE 6
WITH ALTERNATES:
RECEIVED SOUND LEVELS - WIND TURBINES AT MAXIMUM ROTATIONAL WIND SPEED ANOMALOUS METEOROLOGICAL CONDITIONS

FEBRUARY 2016

Proposed Turbine Array (1/20/2016)

- GE 2.1-116 Turbine
- GE 2.1-116 Turbine (Alt)
- GE XLe 1.79-100 Turbine

Receptors

- Occupied
- Unoccupied
- Substation
- Major Road

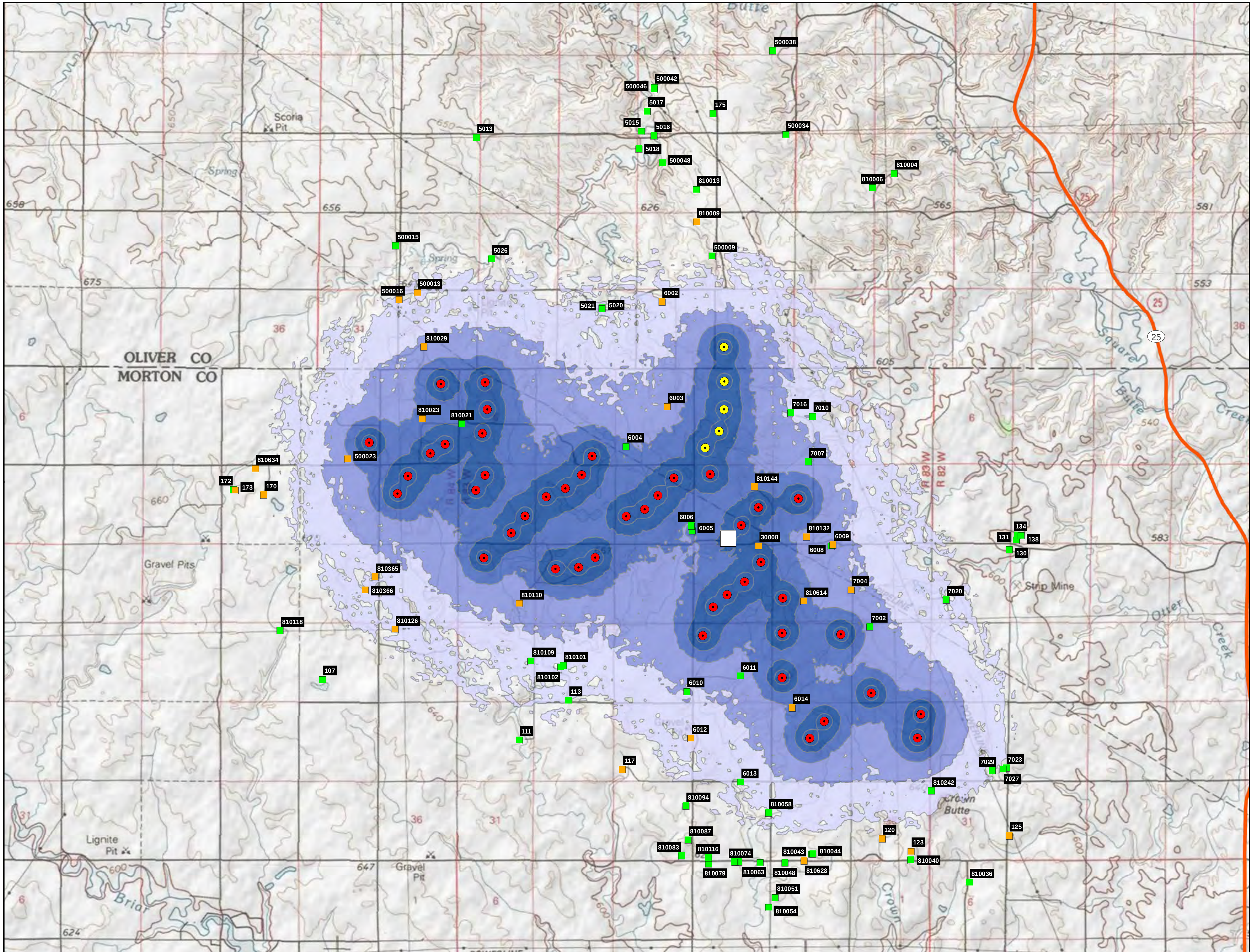
Sound Level Contour Ranges (dBA)

- 35-40
- >40-45
- >45-50
- >50

N

0 0.5 1 1.5 2 MILES

REFERENCE MAP



NEXTERA ENERGY RESOURCES, LLC
OLIVER III WIND PROJECT
OLIVER AND MORTON COUNTIES, NORTH DAKOTA

FIGURE 7
NO ALTERNATES:
RECEIVED SOUND LEVELS - WIND TURBINES AT MAXIMUM ROTATIONAL WIND SPEED
ANOMALOUS METEOROLOGICAL CONDITIONS

FEBRUARY 2016

Proposed Turbine Array (1/20/2016)
- GE 2.1-116 Turbine
- GE Xle 1.79-100 Turbine

Receptors
- Occupied
- Unoccupied
- Substation
- Major Road

Sound Level Contour Ranges (dBA)
- 35-40
- >40-45
- >45-50
- >50

N

0 0.5 1 1.5 2 MILES

REFERENCE MAP

Appendix C
Agency Correspondence

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Correspondence with U.S. Fish and Wildlife Service

From:	Griger, Anne Marie
To:	Wells, Kimberly (Kimberly.Wells@nexteraenergy.com)
Cc:	McCall, Sarah; Farmer, Chris
Subject:	FW: Project shapefiles for Brady, Brady II, and Oliver III
Date:	Wednesday, January 20, 2016 7:12:24 AM

Kim, see below. This is confirmation from USFWS that there are no easements or USFWS-owned lands in or adjacent to the Brady, Brady II, or Oliver III project areas. This was an action item from your December meeting with USFWS.

From: Sue Kvas [mailto:sue_kvas@fws.gov]
Sent: Wednesday, January 20, 2016 8:10 AM
To: Griger, Anne Marie <Anne-Marie.Griger@tetratech.com>
Subject: RE: Project shapefiles for Brady, Brady II, and Oliver III

Hey Anne-Marie,

I reviewed your project area and there are no USFWS interests in the areas you provided.

Thanks,

Sue

Susan Kvas
Supervisory Fish and Wildlife Biologist
US Fish & Wildlife Service
Habitat and Population Evaluation Team – HAPET
3425 Miriam Ave.
Bismarck, ND 58503
Office : 701-355-8541

From: Griger, Anne Marie [mailto:Anne-Marie.Griger@tetratech.com]
Sent: Tuesday, January 19, 2016 11:14 AM
To: sue_kvas@fws.gov
Subject: RE: Project shapefiles for Brady, Brady II, and Oliver III

Hello Sue,

Can you please let me know if you received this email from last week, or if you need me to re-send? I sent unzipped shapefiles.

Thank you,

Anne-Marie

From: Griger, Anne Marie
Sent: Monday, January 11, 2016 4:43 PM
To: 'sue_kvas@fws.gov' <sue_kvas@fws.gov>
Cc: Farmer, Chris <Chris.Farmer@tetratech.com>; Wells, Kimberly (Kimberly.Wells@nexteraenergy.com) <Kimberly.Wells@nexteraenergy.com>; 'laura.nagy@dnvgl.com' <laura.nagy@dnvgl.com>; McCall, Sarah <Sarah.McCall@tetratech.com>
Subject: Project shapefiles for Brady, Brady II, and Oliver III

Hello Sue,

Can you please confirm there are no easements or fee-title lands within or near the Brady, Brady II, and Oliver III project areas? Shapefiles of each are attached. I believe that there are no easements west of the Missouri River in North Dakota, but wanted to confirm.

Thank you,

Anne-Marie

Anne-Marie Griger, AICP | **Senior Environmental Planner**
Direct: 512. 213.8501
anne-marie.griger@tetratech.com

Tetra Tech, Inc.
8911 N. Capital of Texas Hwy, Bldg 2 Suite # 2310
Austin, TX 78759

Correspondence with North Dakota Game and Fish Department

From: Schumacher, John D.
To: McCall, Sarah
Subject: Oliver III Wind Energy Center
Date: Wednesday, February 10, 2016 10:15:04 AM
Attachments: OliverIII.pdf

Ms. McCall,

The North Dakota Game and Fish Department originally provided comments regarding this project on 24 December 2015. We have reviewed the project as updated and have nothing additional to offer. Our original comments are still applicable.

JOHN SCHUMACHER
RESOURCE BIOLOGIST
ND GAME AND FISH DEPT
701.328.6321

"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

December 24, 2015

Sarah McCall
Tetra Tech, Inc.
350 Indiana Street, Suite 500
Golden, CO 80401

Dear Ms. McCall:

RE: Oliver III Wind Energy Center – Oliver & Morton Counties, North Dakota
NextEra Energy Resources, LLC

The North Dakota Game and Fish Department has reviewed this project for wildlife concerns.

A primary concern with wind power development is the disturbance of native prairie associated with construction of turbines, access roads, and other associated facilities. We ask that work within native prairie be avoided to the extent possible. This could include micro-siting turbines onto adjacent previously disturbed land, locating access roads on existing section line trails rather than across undisturbed native prairie, etc. We also suggest the US Fish and Wildlife Service Land-Based Wind Energy Guidelines be implemented as appropriate during the development of this project.

The National Wetland Inventory indicates various wetlands located within the proposed project area. We recommend that any unavoidable wetland impacts be replaced in kind, above-ground appurtenances not be placed in wetland areas, and no alterations be made to existing drainage patterns.

We ask that collection lines be buried whenever possible, and any necessary overhead lines be marked when placed over perennial streams or sited in close proximity to wetland complexes to minimize possible avian impacts. The publication "Reducing Avian Collisions with Power Lines: the State of the Art in 2012" provides a range of management options which can be used to reduce avian losses.

Aerial surveys should be conducted for raptor nests before construction begins. A ½-mile construction buffer should be implemented around active eagle nest sites (known occupied within the past 5 years). Ms. Sandra Johnson, Conservation Biologist, can be contacted at 701-328-6327 for additional information on eagle nest sites in the state.

We also recommend that routine monitoring for avian and bat mortality be included as part of the facility maintenance plan for the life of the project. We would appreciate being kept informed as this project progresses, and if possible, we would like the GPS coordinates for each turbine after the site has been established.

Sincerely,

Greg Link

Greg Link
Chief
Conservation & Communication Division

js

From: Griger, Anne Marie
To: McCall, Sarah
Subject: FW: Prairie dog database
Date: Tuesday, January 26, 2016 10:49:50 AM

From: Johnson, Sandra K. [mailto:sajohnson@nd.gov]
Sent: Wednesday, January 13, 2016 3:03 PM
To: Griger, Anne Marie <Anne-Marie.Griger@tetratech.com>
Subject: RE: Prairie dog database

Anne-Marie,
Attached is a data sharing agreement for the prairie dog and burrowing owl data. There are no known locations within the Oliver III buffer. Please note that we have revised the agreement to include a 4th condition. Your organization has been courteous and provided eagle data in return to us in the past. However, others have not and therefore we added it to the agreement.
Thanks,
Sandy

Sandy Johnson
Conservation Biologist
North Dakota Game and Fish Department
100 N. Bismarck Expwy.
Bismarck, ND 58501-5095
Phone: 701-328-6382
sajohnson@nd.gov
http://gf.nd.gov/

From: Griger, Anne Marie [mailto:Anne-Marie.Griger@tetratech.com]
Sent: Monday, January 11, 2016 10:05 AM
To: Johnson, Sandra K. <sajohnson@nd.gov>
Cc: Wells, Kimberly (Kimberly.Wells@nexteraenergy.com) <Kimberly.Wells@nexteraenergy.com>; Farmer, Chris <Chris.Farmer@tetratech.com>; 'laura.nagy@dnvgl.com' <laura.nagy@dnvgl.com>; McCall, Sarah <Sarah.McCall@tetratech.com>
Subject: Prairie dog database

Hello Sandy,

As follow up from a meeting that John Schumacher attended with our client NextEra, I wanted to get further information regarding prairie dog colonies and grouse in Hettinger and Stark counties. Can you please provide the prairie dog database? I have attached shapefiles that show three project boundaries (Brady, Brady II, and Oliver III), plus a 10-mile buffer around each.

We have already signed a confidentiality agreement with you for eagle nests for all three projects, so let me know if we need to sign another. Also, I left you a voicemail last week, so please give me a call when you have a chance.

Thank you,

Anne-Marie

Anne-Marie Griger, AICP | **Senior Environmental Planner**
Direct: 512. 213.8501
anne-marie.griger@tetratech.com

Tetra Tech, Inc.
8911 N. Capital of Texas Hwy, Bldg 2 Suite # 2310
Austin, TX 78759

-

Griger, Anne Marie

From: Robinson, Aaron C. <acrobinson@nd.gov>
Sent: Wednesday, February 03, 2016 10:14 PM
To: Griger, Anne Marie
Subject: RE: Grouse info for Brady, Brady II and Oliver III projects

Anne – I looked through our database and the areas where you have the wind farms proposed do not overlap with our grouse census blocks. That does not mean that there are no grouse leks in the area, we just don't have the man power to survey the entire state. My recommendation would be to allow me to help design a survey protocol for both these areas. The oliver block it in prime grouse habitat and the Brady block is also in good sharp-tail habitat. Please give me a call so we can discuss this further.

Regards,
Aaron

****

Aaron Robinson
Upland Game Management Supervisor
North Dakota Game and Fish
225 30th Ave. SW
Dickinson, ND 58601
Cell: 701-290-1370
acrobinson@nd.gov
www.gf.nd.gov

From: Griger, Anne Marie [mailto:Anne-Marie.Griger@tetratech.com]
Sent: Monday, January 11, 2016 3:37 PM
To: Robinson, Aaron C. <acrobinson@nd.gov>
Cc: Farmer, Chris <Chris.Farmer@tetratech.com>; 'laura.nagy@dnvgl.com' <laura.nagy@dnvgl.com>; Wells, Kimberly (Kimberly.Wells@nexteraenergy.com) <Kimberly.Wells@nexteraenergy.com>; McCall, Sarah <Sarah.McCall@tetratech.com>
Subject: Grouse info for Brady, Brady II and Oliver III projects

Hello Aaron,

As follow up from a meeting that John Schumacher attended with our client NextEra, I would like to request information you have regarding sage grouse locations in Hettinger and Stark counties. I have attached shapefiles that show two project boundaries (Brady and Brady II), plus a 10-mile buffer around each. If you also have locations of other known grouse or grouse leks in the vicinity of these areas or near the Oliver III project in Morton and Oliver counties (shapefiles also attached), we would appreciate that information as well.

Thank you,

Anne-Marie

Anne-Marie Griger, AICP | **Senior Environmental Planner**
Direct: 512. 213.8501
anne-marie.griger@tetratech.com

Tetra Tech, Inc.
8911 N. Capital of Texas Hwy, Bldg 2 Suite # 2310
Austin, TX 78759

Correspondence with U.S. Army Corps of Engineers

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
NORTH DAKOTA REGULATORY OFFICE
1513 SOUTH 12TH STREET
BISMARCK ND 58504-6640

January 20, 2016

North Dakota Regulatory Office [NWO-2015-2305-BIS]

Ms. Sarah McCall
Tetra Tech
350 Indiana Street, Suite 500
Golden, Colorado 80401

Dear Ms. McCall:

This is in response to your letter dated January 14, 2016 requesting comments on the proposed Oliver III Wind Energy Center in Oliver and Morton counties. The project is located in several sections of townships 140 and 141 North, ranges 82, 83 and 84 West, Oliver and Morton counties, North Dakota.

U. S. Army Corps of Engineers Regulatory Offices administer Section 10 of the Rivers and Harbors Act (Section 10) and Section 404 of the Clean Water Act (Section 404). A Section 10 permit would be required for work impacting navigable waters, this includes work over, through, or under Section 10 waters. A Section 404 permit would be required for the discharge of dredge or fill material (temporarily or permanently) in waters of the United States. Waters of the United States may include, but are not limited to, rivers, streams, ditches, coulees, lakes, ponds, and their adjacent wetlands. Fill material includes, but is not limited to, rock, sand, soil, clay, plastics, construction debris, wood chips, overburden from mines or other excavation activities and materials used to create any structure or infrastructure in waters of the United States.

If the project requires a Section 10/404 permit, a permit application and instructions for completion may be found at http://www.usace.army.mil/Missions/CivilWorks/RegulatoryProgramandPermits/ObtainaPermit.aspx. If you do not have access to a computer, you may call this office and request a copy of the permit application and instructions be sent to you.

If we can be of further assistance or should you have any questions regarding our program, please do not hesitate to contact this office by letter or phone at (701) 255-0015.

Sincerely,

Benjamin D. Riele

for Patricia L. McQueary
Regulatory Program Manager
North Dakota

Received
JAN 25 2016
TETRA TECH
GOLDEN OFFICE

Correspondence with State Historical Society of North Dakota

From:	Quinnell, Susan L.
To:	Sexton, James; Griger, Anne Marie
Cc:	Holven, Adam; Wells, Kimberly (Kimberly.Wells@nexteraenergy.com); Estabrook, Richard (Richard.Estabrook@nexteraenergy.com); McCall, Sarah
Subject:	RE: 160485B ND PSC Proposed Oliver III (revised) Wind Energy Center
Date:	Tuesday, February 02, 2016 10:06:14 AM

Yes, it is set as stated.

Susan Quinnell
Review and Compliance Coordinator
ND State Historic Preservation Office
State Historical Society of North Dakota
North Dakota Heritage Center
612 East Boulevard Avenue
Bismarck ND 58505-0830

701-328-3576
701-328-3710 FAX

From: Sexton, James [mailto:James.Sexton@tetratech.com]
Sent: Tuesday, February 02, 2016 11:05 AM
To: Quinnell, Susan L.; Griger, Anne Marie
Cc: Holven, Adam; Wells, Kimberly (Kimberly.Wells@nexteraenergy.com); Estabrook, Richard (Richard.Estabrook@nexteraenergy.com); McCall, Sarah
Subject: 160485B ND PSC Proposed Oliver III (revised) Wind Energy Center

Hi, Susan –

I hope this finds you well. I wanted to touch base to clarify the Oliver III APE for historic architecture. As I am sure you remember, we spoke in the middle of January about the Oliver III APE as part of a call with NextEra and Tetra Tech discussing both the Oliver III and Brady Wind Energy Centers. After we provided you with shape files of the Project boundary you confirmed that a 2 mile APE would be sufficient for that project (see email below). About 10 days after receipt of your email our Golden, CO office received a letter from your office stating that the APE for the project would be 2 miles "but that APE may be modified larger or smaller, depending on those specific turbine locations." Can you confirm if the 2-mile APE is set at this time, assuming that there are no alterations to the current project boundary?

Many thanks.
James

James Sexton, Ph. D. | Architectural Historian
Direct: 973.630.8408 | Fax: 973.630.8025 | Cell: 914.527.6416 James.Sexton@tetratech.com

Tetra Tech | Sciences
1000 The American Road | Morris Plains, NJ 07950 | www.tetratech.com

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From: Quinnell, Susan L. [mailto:squinnell@nd.gov]
Sent: Friday, January 15, 2016 1:53 PM
To: Griger, Anne Marie
Cc: Holven, Adam; Wells, Kimberly (Kimberly.Wells@nexteraenergy.com); Estabrook, Richard (Richard.Estabrook@nexteraenergy.com); Sexton, James; McCall, Sarah
Subject: RE: Brady II and Oliver III shapefiles

Yes, two miles would be adequate.

Susan Quinnell
Review and Compliance Coordinator
ND State Historic Preservation Office
State Historical Society of North Dakota
North Dakota Heritage Center
612 East Boulevard Avenue
Bismarck ND 58505-0830

701-328-3576
701-328-3710 FAX

From: Griger, Anne Marie [mailto:Anne-Marie.Griger@tetratech.com]
Sent: Friday, January 15, 2016 12:51 PM
To: Quinnell, Susan L.
Cc: Holven, Adam; Wells, Kimberly (Kimberly.Wells@nexteraenergy.com); Estabrook, Richard (Richard.Estabrook@nexteraenergy.com); Sexton, James; McCall, Sarah
Subject: RE: Brady II and Oliver III shapefiles

Thank you Susan. Can you please confirm that a survey area for architectural resources consisting of a 2-mile buffer around planned turbines is acceptable for the Brady II and Oliver III projects?

Thank you,

Anne-Marie

From: Quinnell, Susan L. [mailto:squinnell@nd.gov]
Sent: Friday, January 15, 2016 12:45 PM
To: Griger, Anne Marie <Anne-Marie.Griger@tetratech.com>

Subject: RE: Brady II and Oliver III shapefiles

Hi Anne-Marie,

I downloaded the shape files for these two and there isn't anything remarkable about these areas. Your cultural resource specialists should complete the Class I records search and the rest of the inventory per the usual instructions.
Our survey manual was recently updated but no major revisions:

http://history.nd.gov/hp/PDFinfo/North-Dakota-SHPO-Guidelines-Manual-for-Cultural-Resource-Inventory-Projects.pdf

Best wishes,

Susan Quinnell
Review and Compliance Coordinator
ND State Historic Preservation Office
State Historical Society of North Dakota
North Dakota Heritage Center
612 East Boulevard Avenue
Bismarck ND 58505-0830

701-328-3576
701-328-3710 FAX

From: Anne-Marie Griger [mailto:Anne-Marie.Griger@tetratech.com]
Sent: Friday, January 15, 2016 12:13 PM
To: Quinnell, Susan L.
Subject: Brady II and Oliver III shapefiles

Click the links below to download the files. Files will expire Fri Jan 29 12:11:49 2016.
BradyII_Boundary_PSC_Application.zip (4,005 bytes)
ND_Oliver_III_PrjBnd_Update_20160113.zip (19,572 bytes)

Package details:
From: AnneMarie.Griger@tt
To: squinnell@nd.gov
Subject: Brady II and Oliver III shapefiles
Arrived: Fri Jan 15 12:11:43 2016

Susan, these links are for the Brady II and Oliver III project boundary shapefiles. Please confirm receipt and let me know if you have any problems accessing the files.

Thank you,

Anne-Marie

Total file size: 23,577 bytes

STATE HISTORICAL SOCIETY
OF NORTH DAKOTA

Received
JAN 26 2016
TETRA TECH
GOLDEN OFFICE

January 20, 2016

Ms. Sarah McCall
Tetra Tech Inc.
350 Indiana Street, Suite 500
Golden, CO 80401

ND SHPO REF: 16-0485B ND PSC Proposed Oliver III (revised) Wind Energy Center by NextEra Energy Resources, LLC in Morton & Oliver Counties, North Dakota

Dear Ms. McCall,

Thank you for your preliminary information on ND SHPO REF: 16-0485 ND PSC Proposed Oliver III (revised) Wind Energy Center by NextEra Energy Resources, LLC in Morton & Oliver Counties, North Dakota. There is potential for unrecorded and recorded cultural resource properties in a variety of physiographic settings in the overall project area. As a potential federal/state undertaking, we encourage early agency consultation as part of the review process. Early consultation should also include tribal nations, and North Dakota Indian Affairs.

We recommend a Class I (file search), and a Class III 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, but that APE may be modified larger or smaller, depending on those specific turbine locations. When the wind farm project develops to the point that turbine locations are defined, we want to see a map of the turbine locations to see if there needs to be any modifications to the APE.

Class III archeological (pedestrian) surveys will be warranted for all areas directly impacted by the project, **including crane paths, met towers**, access roads, staging areas, transmissions lines and turbine pads. As part of the Class III Inventory, NDCRS site updates should be submitted on all sites resurveyed. If the project APE changes, we will request additional inventories, surveys and consultation. As you know, Class III surveys must wait until there is no snow on the ground.

Thank you for the opportunity to review this project to date. We look forward to further review of cultural resource surveys and site forms, and updates as the project siting occurs. If you have any questions please contact Paul Picha, Chief Archaeologist (701) 328-3574 or Susan Quinnell, Review and Compliance Coordinator at (701) 328-3576, e-mail squinnell@nd.gov

Sincerely,

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

North Dakota Heritage Center • 612 East Boulevard Avenue, Bismarck, ND 58505-0830 • Phone: 701-328-2666 • Fax: 701-328-3710
Email: histsoc@nd.gov • Web site: http://history.nd.gov • TTY: 1-800-366-6888

From:	Quinnell, Susan L.
To:	Griger, Anne Marie
Cc:	Holven, Adam; Wells, Kimberly (Kimberly.Wells@nexteraenergy.com); Estabrook, Richard (Richard.Estabrook@nexteraenergy.com); Sexton, James; McCall, Sarah
Subject:	RE: Brady II and Oliver III shapefiles
Date:	Friday, January 15, 2016 11:52:45 AM

Yes, two miles would be adequate.

Susan Quinnell
Review and Compliance Coordinator
ND State Historic Preservation Office
State Historical Society of North Dakota
North Dakota Heritage Center
612 East Boulevard Avenue
Bismarck ND 58505-0830

701-328-3576
701-328-3710 FAX

From: Griger, Anne Marie [mailto:Anne-Marie.Griger@tetratech.com]
Sent: Friday, January 15, 2016 12:51 PM
To: Quinnell, Susan L.
Cc: Holven, Adam; Wells, Kimberly (Kimberly.Wells@nexteraenergy.com); Estabrook, Richard (Richard.Estabrook@nexteraenergy.com); Sexton, James; McCall, Sarah
Subject: RE: Brady II and Oliver III shapefiles

Thank you Susan. Can you please confirm that a survey area for architectural resources consisting of a 2-mile buffer around planned turbines is acceptable for the Brady II and Oliver III projects?

Thank you,

Anne-Marie

From: Quinnell, Susan L. [mailto:squinnell@nd.gov]
Sent: Friday, January 15, 2016 12:45 PM
To: Griger, Anne Marie <Anne-Marie.Griger@tetratech.com>
Subject: RE: Brady II and Oliver III shapefiles

Hi Anne-Marie,

I downloaded the shape files for these two and there isn't anything remarkable about these areas. Your cultural resource specialists should complete the Class I records search and the rest of the inventory per the usual instructions.
Our survey manual was recently updated but no major revisions:

http://history.nd.gov/hp/PDFinfo/North-Dakota-SHPO-Guidelines-Manual-for-Cultural-Resource-Inventory-Projects.pdf

Best wishes,

Susan Quinnell
Review and Compliance Coordinator
ND State Historic Preservation Office
State Historical Society of North Dakota
North Dakota Heritage Center
612 East Boulevard Avenue
Bismarck ND 58505-0830

701-328-3576
701-328-3710 FAX

From: Anne-Marie Griger [mailto:Anne-Marie.Griger@tetratech.com]
Sent: Friday, January 15, 2016 12:13 PM
To: Quinnell, Susan L.
Subject: Brady II and Oliver III shapefiles

Click the links below to download the files. Files will expire Fri Jan 29 12:11:49 2016.
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ND_Oliver_III_PrjBnd_Update_20160113.zip (19,572 bytes)

Package details:
From: AnneMarie.Griger@tt
To: squinnell@nd.gov
Subject: Brady II and Oliver III shapefiles
Arrived: Fri Jan 15 12:11:43 2016

Susan, these links are for the Brady II and Oliver III project boundary shapefiles. Please confirm receipt and let me know if you have any problems accessing the files.

Thank you,

Anne-Marie

Total file size: 23,577 bytes

Correspondence with North Dakota Parks and Recreation Department

Jack Dalrymple, Governor
Mark A. Zimmerman, Director

1600 East Century Avenue, Suite 3
Bismarck, ND 58503-0649
Phone 701-328-5357
Fax 701-328-5363
E-mail parkrec@nd.gov
www.parkrec.nd.gov

February 12, 2016-Revised

Sarah McCall
Tetra Tech, Inc
350 Indiana Street, Suite 500
Golden, CO 80401

Re: Oliver III Wind Energy

Dear Ms. McCall,

The North Dakota Parks and Recreation Department has reviewed the above referenced proposed Oliver III Wind Energy Center Project in Oliver and Morton Counties.

Our agency scope of authority and expertise covers recreation and biological resources (in particular rare plants and ecological communities). The project as defined does not affect state park lands that we manage or affect state Land and Water Conservation Fund (LWCF) project sites that we manage.

The North Dakota Natural Heritage biological conservation database has been reviewed to determine if any plant or animal species of concern or other significant ecological communities are known to occur within an approximate one-mile radius of the project area. Based on this review, there are no documented significant ecological community, plant or animal species of concern occurrences in our database within or adjacent to project area. Because this information is not based on a comprehensive inventory, there may be species of concern or otherwise significant ecological communities in the area that are not represented in the database. The lack of data for any project area cannot be construed to mean that no significant features are present. The absence of data may indicate that the project area has not been surveyed, rather than confirm that the area lacks natural heritage resources. Regarding any reclamation efforts, we recommend that any impacted areas be revegetated with species native to the project area.

Given the potential for not only habitat disturbance and disruption but the threat to nesting, feeding and migratory bird and bats in the area we suggest that all efforts be made to avoid impacts to wildlife species and their habitats. In an effort to avoid or minimize impacts to wildlife and their habitats we encourage proper evaluation of all potential wind energy sites. To identify and assess adverse impacts to wildlife we suggest pre and post construction avian and bat monitoring studies be conducted.

We appreciate your commitment to rare plant, animal and ecological community conservation, management and inter-agency cooperation to date. For additional information please contact Kathy Duttenhefner (701-328-5370 or kgduttenhefner@nd.gov) of our staff. Thank you for the opportunity to comment on this proposed project.

Sincerely,

Kathy Duttenhefner

Kathy Duttenhefner, Coordinator
Natural Resources Division

R.USNDNHI*2016_019KD2.12.2016DL2.12.2016

Play in our backyard!

Correspondence with North Dakota Department of Health

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

February 2, 2016

Ms. Sarah McCall
Tetra Tech, Inc
340 Indiana Street, Suite 500
Golden, CO 80401

Re: Oliver III Wind Energy Center
Oliver and Mercer Counties, North Dakota

Dear Ms. McCall:

This department has reviewed the information concerning the above-referenced project submitted under date of January 14, 2016, 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. All necessary measures must be taken to minimize fugitive dust emissions created during construction activities. Any complaints that may arise are to be dealt with in an efficient and effective manner.

2. 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.

3. 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.

4. Noise from construction activities may have adverse effects on persons who live near the construction area. Noise levels can be minimized by ensuring that construction equipment is equipped with a recommended muffler in good working order. Noise effects can also be minimized by ensuring that construction activities are not conducted during early morning or late evening hours.

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.

Correspondence with North Dakota State Water Commission

North Dakota State Water Commission
900 EAST BOULEVARD AVENUE, DEPT 770 • BISMARCK, NORTH DAKOTA 58505-0850
701-328-2750 • TDD 701-328-2750 • FAX 701-328-3696 • INTERNET: http://swc.nd.gov

February 5, 2016

Received
FEB - 8 2016
TETRA TECH
GOLDEN OFFICE

Sarah McCall
Tetra Tech, Inc
350 Indiana Street, STE 500
Golden, CO 80401

Dear Ms. McCall:

This is in response to your request for review of environmental impacts associated with the Oliver III Wind Energy Center project located in Oliver and Morton Counties, ND. The project will interconnect to the electrical grid via a tap to the existing Minnkota's Center to Mandan 230kV Overhead Transmission Line located in the NE¼ of Section 23, Township 141N, R 83W, Oliver County, ND. The energy center would include portions of the following tracts: Morton County; T 140N, Range 82 W, Section 30; Township 140 N, 83 W, Sections 3-26; Township 140 N, Range 84 W, Sections 1, 2, 11-14; and Oliver County, Township 141N, Range 83W, Sections 25, 26, 32-36. The associated transmission line corridor includes the following tracts: Morton County, Township 140 N, Range 83 W, Sections 3, 10; and Oliver County, Township 141N, Range 83W, Sections 23-25, 36.

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

- There are no floodplains identified and/or mapped where this proposed project is to take place. The project takes place in Zone D. No floodplain permits are necessary from Morton and Oliver County relative to the National Flood Insurance Program.

- Please contact the Southwest Water Authority at 701-225-0241, regarding Southwest Pipeline Project infrastructure that may be located in the project area.

- It is the responsibility of the project sponsor to ensure that local, state and federal agencies are contacted for any required approvals, permits, and easements.

- All waste material associated with the project must be disposed of properly and not placed in identified floodway areas.

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

Sincerely,

Linda Weispfenning
Water Resource Planner

LW:dm/1570

Copy of Form Letter and List of Agencies Contacted

January 14, 2016

NAME
TITLE
AGENCY
ADDRESS
CITY, North Dakota ZIP

Subject: **Information Request for the Proposed Oliver III Wind Energy Center in Oliver and Morton Counties, ND**

Dear NAME:

Tetra Tech has been contracted by NextEra Energy Resources, LLC to prepare an application for a Certificate of Site Compatibility for the proposed Oliver III Wind Energy Center (the Project), in accordance with North Dakota Century Code (NDCC) Section 49-22-07. As part of that application, we are conducting an investigation of property in Oliver and Morton counties southeast of the city of Center. This proposed Project would consist of approximately 100 megawatts (MW). The Project area shown in the attached figure is the primary focus of our investigation.

The Project would interconnect to the electrical grid via a tap to the existing Minnkota's Center to Mandan 230kV Overhead Transmission Line located in the NE ¼ of Section 23, Township 141N, R 83W, Oliver County, North Dakota. This site is located approximately 14 miles S/SE of the City of Center, North Dakota. We will also prepare a separate application for a Certificate of Corridor Compatibility and Route Permit for the proposed transmission line.

The wind energy center would include portions of the following tracts:

County	Township	Range	Sections
Morton	140 N	82 W	30
Morton	140 N	83 W	3 – 26
Morton	140 N	84 W	1, 2, 11 – 14
Oliver	141N	83W	25, 26, 32 – 36

The associated transmission line corridor includes the following tracts:

County	Township	Range	Sections
Morton	140 N	83 W	3, 10
Oliver	141N	83W	23 – 25, 36

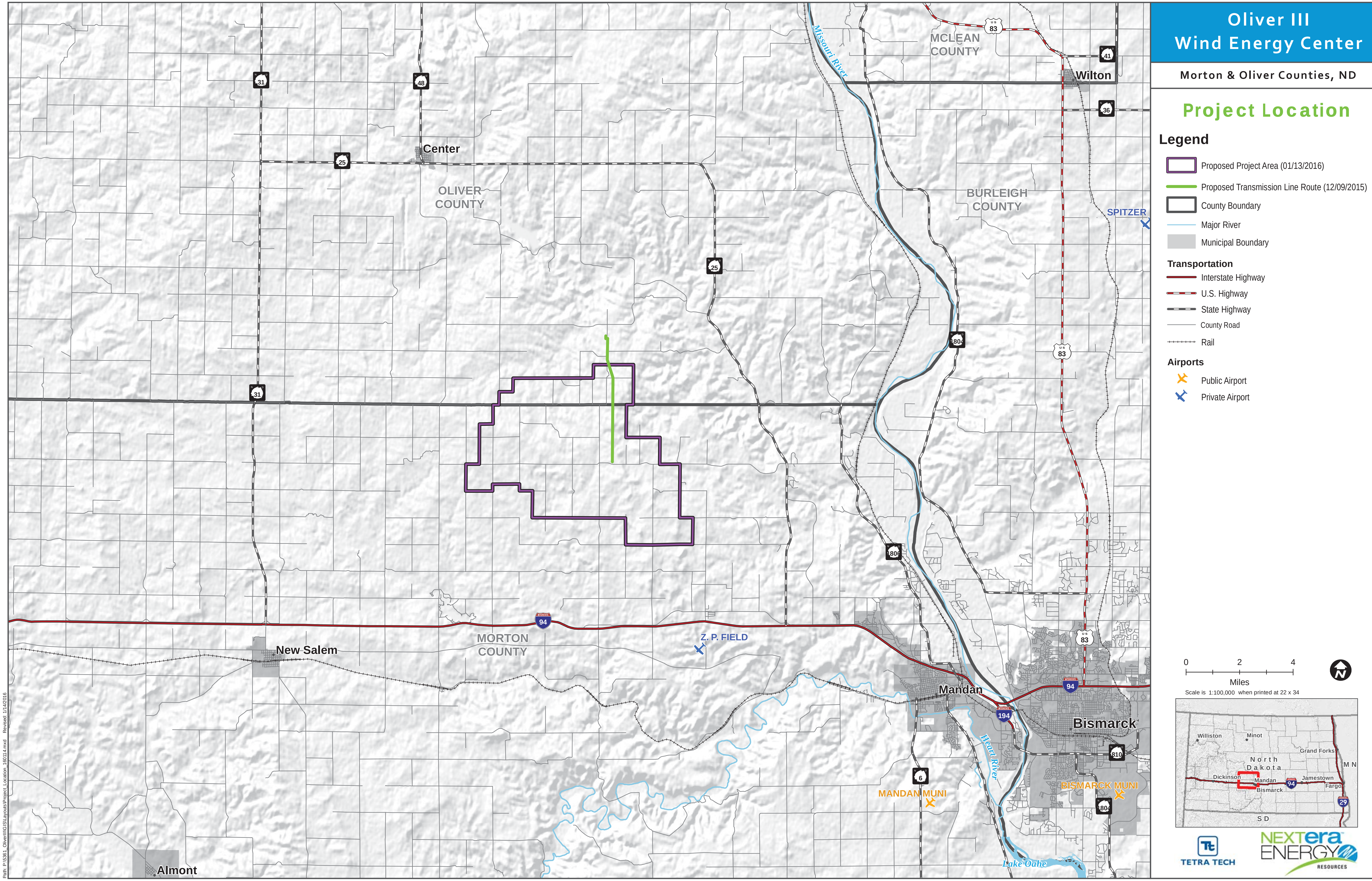
Per Section 69-06-01-05 of the North Dakota Public Service Commission (PSC)'s administrative rules, we are consulting your agency for assistance in identifying concerns or issues within the boundaries of the tracts listed above that would influence a decision regarding the use of the land, as well as applicable permits that may be required from your office.

This information will be used to help guide Project development in a manner that identifies and avoids impacts to sensitive resources where practicable. We have sent similar query letters to other agencies including, but not limited to, the U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, and North Dakota Game and Fish Department.

We would appreciate a response by February 12, 2016. Please contact me at (303) 980-3676 if you have any questions. Thank you for your assistance.

Respectfully submitted,

Sarah McCall
Tetra Tech, Inc
350 Indiana Street, Suite 500
Golden, CO 80401



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Agency List for Oliver III PSC Application Inquiry Letters

Mr. Larry Taborsky
Director
North Dakota Aeronautics Commission
P. O. Box 5020
Bismarck, North Dakota 58502-5020

Mr. Doug Goehring
Agriculture Commissioner
North Dakota Department of Agriculture
600 East Boulevard Avenue, Department 602
Bismarck, North Dakota 58505-0020

Dr. Terry Dwelle, M.D., M.P.H.T.M.
State Health Officer
North Dakota Department of Health
600 East Boulevard Avenue
Bismarck, North Dakota 58505-0200

Mr. Kevin Levi
District Engineer
North Dakota Department of Transportation, Bismarck District
1700 Third Avenue West, Suite 101
Dickinson, ND 58601-3009

Mr. Lance D. Gaebe
Commissioner
North Dakota Department of Trust Lands
P. O. Box 5523
Bismarck, North Dakota 58506-5523

Mr. Todd Sando
State Engineer
North Dakota State Water Commission
900 East Boulevard, Dept. 770
Bismarck, North Dakota 58505-0850

Mr. Edward C. Murphy
State Geologist
North Dakota Geological Survey
600 East Boulevard Avenue
Bismarck ND 58505-0840

Mr. Scott Davis
Executive Director
North Dakota Indian Affairs Commission
600 East Boulevard Avenue
1st Floor – Judicial Wing, Room #117
Bismarck, North Dakota 58505

Mr. Mark Zimmerman
Director
North Dakota Parks and Recreation Department
1600 E. Century Ave, Suite 3
Bismarck, North Dakota 58503

Mr. Ted Becker
Chair
Morton County Soil Conservation District
2540 Overlook Lane
Mandan, ND 58554

Merlan E. Paaverud, Jr.
Director
State Historical Society of North Dakota
612 East Boulevard Avenue
Bismarck, ND 58505

Mr. Daniel Cimarosti
Regulatory Program Manager
U.S. Army Corps of Engineers Omaha District, North Dakota Regulatory Office
1513 South 12th Street
Bismarck, ND 58504

Mr. Kevin Shelley
Acting ND Field Supervisor
USFWS North Dakota Field Office
3425 Miriam Avenue
Bismarck, North Dakota 58501-7926

Mr. Terry Steinwand
Director
North Dakota Game and Fish Department
100 N. Bismarck Expressway
Bismarck, ND 58501-5095