Oliver Wind III Energy Center
Oliver Wind III, LLC
Morton County, North Dakota

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

Prepared for:
Oliver Wind III, LLC
700 Universe Boulevard
Juno Beach, Florida 33408

Prepared by:
Tetra Tech EC, Inc.
160 Federal Street
Boston, MA 02110

OLIVER WIND III ENERGY CENTER

Case No.: PU-11-561

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

October 2011

Prepared for:

Oliver Wind III, LLC
A subsidiary of

NEXTera ENERGY RESOURCES

NextEra Energy Resources, LLC
700 Universe Boulevard
Juno Beach, Florida 33408

Prepared by:

TETRA TECH EC, INC.

Tetra Tech EC, Inc.
160 Federal Street
Boston, MA 02110

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1. INTRODUCTION

Oliver Wind III, LLC (Oliver III), a subsidiary of NextEra Energy Resources, LLC ("NextEra Energy", formerly FPL Energy, LLC), is submitting this application for a Certificate of Site Compatibility (Certificate) to construct the Oliver Wind III Energy Center (the Project). NextEra submitted a letter of intent to file this application to the North Dakota Public Service Commission (PSC) on August 22, 2011. The Project is located in Morton County, North Dakota, (**Figures 1-3**) and would have a nameplate capacity of 48 megawatts (MW) consisting of 30 GE 1.6 MW xle wind turbine generators. Additional facilities include meteorological towers, a collection substation, a construction laydown area, access roads up to 36 feet in width, and electrical collection systems and cabling.

The Project will interconnect into the Square Butte facilities and deliver power into the Midwest ISO (MISO) system. The collection substation would include a power transformer to step up the voltage from 34.5 kV to 230 kV, enabling the interconnection to the Oliver III transmission line, permitted separately on April 20, 2011 (PU-09-724).

NextEra Energy develops environmentally responsible electric generation projects throughout the United States. According to NextEra's 2010 Sustainability Report (Appendix A), NextEra is the largest generator of wind-powered electricity in North America. NextEra has almost 8,500 megawatts of capacity at 85 facilities in 17 states and three provinces in Canada as of September 30, 2011 (NextEra, personal communication 2011). The roughly 9,000 wind turbines are capable of producing enough emissions-free energy to power approximately 1.9 million homes. NextEra's share of total U.S. wind energy capacity is more than 20 percent. In North Dakota specifically, NextEra has developed, constructed, and operates 990 MW of generation while owning over 850 MW.

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 ("the Act") requires an application for a certificate to meet the criteria set forth in North Dakota Century Code (NDCC) 49-22 and Article 69-06 of the North Dakota Administrative Code (NDAC). 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).

Exclusion and avoidance areas and selection and policy criteria set forth in Article 69-06 have been considered by Oliver III in the design of the Project and have been provided in this application to the extent available. 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 (PSC 1979) and where these requirements are addressed in this document.

Table 1. Certificate Completion Checklist

State Authority	Description	Section
NDCC 49-22-08	PSC Guidelines: Energy Conversion and Transmission Facility Siting	1.1
Section A	Description	1.0, 4.4, 6.0-6.6, 9.0
1.	Type: Describe the type of energy conversion facility proposed and provide a diagram of the major process system or a flow diagram.	1.0, 4.1, Figures 6 and 7
2.	Product: Describe in general terms and technical terms the products to be produced by the proposed facility.	1.3.2, 6.1, 6.3, Figure 5
3.	Size and Design: Provide the following description of the production capacity and design	1.3.2, 4.1, 4.2, 4.3, 6.0
a.	Gross design capacity;	1.3.2
b.	Net design capacity;	1.3.2
c.	Estimated thermal efficiency of the energy conversion process and the assumptions upon which the estimate is based;	N/A
d.	The number of acres that the proposed facility will occupy; and	1.3.1, 4.3, 5.1
e.	One (1) copy of all design data reports separate from the application.	Appendix B
4.	Time Schedule: Provide the anticipated time schedule for the accomplishment of the following:	1.4
a.	Certificate of Site Compatibility;	1.4
b.	Land acquisition complete;	1.4
c.	Construction start date;	1.4
d.	Construction complete;	1.4
e.	Test operations;	1.4
f.	Commercial production date;	1.4
g.	100 percent capacity factor; and	1.4
h.	Any expansion or additions.	1.4
Section B	Studies	
	Provide a copy of any evaluative studies or assessments of the environmental impact of the proposed facility submitted to any Local, State or Federal agency.	Appendix C
Section C	Need for Facility	2.0
1.	An analysis of the need for the proposed facility based on present and projected demand for the product or products to be produced by the proposed facility, including the most recent system studies supporting the analysis of the need.	2.1
2.	A description of any feasible alternative methods of serving the need.	2.2
3.	A statement justifying any deviations from the most recent Ten-Year Plan which the proposed facility may present.	2.3
Section D	Location	1.3.1
1.	Select a study area, which includes the proposed facility site, of sufficient size to enable the Commission to evaluate the factors addressed in Section 49-22-09, NDCC.	1.3.1, 1.3.2, 10.0-10.12, Figures 1-3
2.	Discuss the utility's policies and commitments to limit the environmental impact of its facilities, including copies of board resolutions and management directives.	Appendix A
3.	Identify and map the criteria that led to the proposed facility location within the study area.	Figure 4, 1.2, 3.0
4.	Discuss in detail the relative value of each criteria and how the proposed facility location was selected giving consideration to all criteria.	3.0

State Authority	Description	Section
5.	The criteria to be evaluated shall include at a minimum all of the following which are within the study area:	3.0
	Exclusion areas;	3.1, Figure 4
	Avoidance areas;	3.2, Figure 4
	Selection criteria;	3.3
	Policy criteria;	3.4
	Design and construction limitations; and	3.5
	Economic considerations.	3.6
6.	Discuss the mitigative measures that will be taken 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
7.	List the qualifications of the people in the various disciplines that contributed to the facility site location study	11.0
8.	Maps	Figures
	Map the criteria within the study area showing the proposed facility location. Several different criteria may be shown on each map, depending on the map scale and the density and nature of the criteria. Minimum map scale shall be ½ inch = 1 mile. All maps shall be at the same scale unless otherwise specified.	Figures
	Furnish one Mylar map, separate from the application, of the same scale as the criteria maps and showing the same basic features as the criteria maps, including the study area, but not the proposed facility location.	(PSC Staff supports not providing a Mylar map)
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 III identified the Project Area (see **Figures 1-3**) for further investigation. Oliver III then conducted environmental desktop and field studies in the Project Area, the results of which are incorporated in the appropriate sections of this application, and further assessed wind resource and transmission availability and interconnection points. The identified Project Area is considered optimal from a wind resource perspective.

Oliver III has entered into agreements with landowners that are interested in having wind turbines and associated facilities placed on their property. Simultaneously, Oliver 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. Preliminary site plans are the commonly accepted standard for applications in other jurisdictions. Oliver III is not seeking a permit for each wind turbine indicated on **Figure 1** through **Figure 3**. Instead, the preliminary layout indicates areas of the site with good wind resource and no known siting issues.

Oliver III seeks a Certificate of Site Compatibility for the Project Area, not the specific turbine locations. Oliver III suggests that the certificate define the Project Area, number of turbines, and structures related to wind generation to be located within the Project Area. Within the permitted Project Area, Oliver III proposes to locate turbines and other structures related to wind generation subject to required setbacks from environmentally sensitive areas, roads, residences, or other setbacks described in the permit.

Once the PSC issues the Certificate, Oliver III will complete any additional studies required by the Certificate or Oliver III's siting process, including geotechnical studies. Oliver III will also further evaluate the Project Area based on efficient construction of the Project. In addition, Oliver III will seek further input from landowners regarding the location of wind turbines and associated facilities. Once these additional studies and communications are completed, preliminary turbine locations will be re-evaluated for their appropriateness with the Certificate conditions and buffers. A final site plan for the Project will be submitted to the PSC prior to construction and a pre-construction meeting will be held with PSC staff to ensure that the site plan conforms to the Certificate requirements.

Wind facility siting is unique in that the Project occupies a large area and must conform to Certificate conditions while optimizing the wind resource at the site. Ideally, the Certificate provides the parameters within which the developer may optimize the Project layout. With Certificate conditions in place, the developer is able to proceed with planning and development.

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

1.3 Project Summary

Oliver III evaluated wind resources in North Dakota for siting a 48-MW wind generation facility. Based on this review, Oliver III selected a Project Area approximately 12 miles south of Center,

North Dakota for additional study and preparation of an application for a Certificate to the PSC. No other areas were considered for development of the Project. The proposed Project Area was identified as optimal from wind resource, transmission interconnection, environmental, and economic perspectives. The proposed Project Area was selected considering the exclusion and avoidance criteria outlined in NDAC 69-06-08.

1.3.1 Proposed Project Area

The Project Area is the location within which leases from landowners has been obtained for the Project. The Project Area was selected to include all areas necessary for Oliver III to optimize the wind resource while avoiding and minimizing impacts to environmental resources. The Project is located in Morton County within the following townships, ranges, and sections (**Table 2**):

Table 2. Project Area Location

County	Township	Range	Sections
Morton	140N	82W	7, 18, 19, 30
		83W	1-29, 35
		84W	1, 2, 11, 12, 13
	141N	83W	32-36

The Project Area encompasses approximately 17,380 acres (25 square miles) approximately twelve miles south of Center, North Dakota. The turbines will be placed throughout the Project Area. However, the Project structures will only occupy approximately 63 acres (see **Tables 3 and 4 below**), or less than one percent of the total land area. **Table 3** summarizes the assumptions used to calculate impacts by Project facility. Permanent impacts are considered to be soil disturbance impacts that will occur due to the 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 Project footprint during operation. **Table 4** summarizes the estimated impact for each Project component for both construction (temporary) and operation (permanent). The Project Area and Project layout are shown on **Figures 1-3**.

Table 3. Project Impact Assumptions

Project Component	Temporary Disturbance (Construction Only)	Permanent Disturbance (Operation)
Wind Turbines a\	0.3 acres per turbine	0.2 acres per turbine
Access Roads b\	14 feet per linear foot of road	36 feet per linear foot of road
Collection Lines c\	50 ft per linear foot	0 feet
Collection Substation d\	0 acres	9.85 acres
Construction Laydown Area e\	10 acres	0 acres

a\ Impacts during operation account for a 40-ft x 100-ft gravel pad with a 15-ft buffer. Impacts per turbine during construction are estimated at 0.5 acre, so net construction impact is 0.5 - 0.2 = 0.3 acre. For the purposes of the impact analysis using GIS software, a radius of 83.26 feet and 53.82 feet was used to approximate the 0.5 acres and 0.2 acres, respectively.

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 36 feet wide; other access roads may be built at 18 feet or reduced later to 18 feet. Access road impacts also assume all proposed roads are new access roads and do not consider improvements to existing roads separately.

c\ Assuming collection lines are not co-located with access roads. Where collection lines run parallel to access roads, the centerlines in the layout design include a separation distance of 150 feet, and as a result, impact buffers generally do not overlap.

d\ Acreage based on shapefiles provided by NextEra.

e\ Acreage based on information provided by NextEra; location undetermined.

Table 4. Project Impacts

Project Component	Temporary Impact (Construction Only)	Permanent Impact (Operation)	Total Impact (Temporary and Permanent)
Wind Turbines a\	9 acres	6 acres	15 acres
Access Roads b\	18.57 acres (11.2 miles)	48.41 acres (11.2 miles)	66.98 acres (11.2 miles)
Collection Lines	73.19 acres (14.5 miles)	0 acres	73.19 acres (14.5 miles)
Collection Substation	0 acres	10 acres	10 acres
Construction Laydown Area	10 acres	0 acres	10 acres
Total	110.76 acres	64.41 acres	175.17 acres

a\ Assumes 30 turbines x 0.5 acres of ground disturbance during construction, 0.2 acre/turbine of that remaining as permanent. The four alternate turbines were not included in the calculation.

b\ Assumes a 50-ft wide easement for roads during construction, 36 feet of that remaining during operation. The overlapping area for turbines and substation were excluded. Total road length is 11.2 miles.

c\ The overlapping area with the access road corridor buffers were removed from impact calculation. Approximately 10 miles of collection lines run parallel to the access roads, with a 150-foot distance designed between the collection line and access road centerlines.

1.3.2 Projected Output

The Project will have a nameplate (gross) capacity of up to 48 MW. Assuming net capacity factors of 50 percent, the projected average annual output is estimated at 210,240 megawatt hours (MWh) 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. Construction of the Project is expected to begin in June 2012 with completion by December 2012, provided all pre-construction permits and approvals have been obtained.

1. Certificate of Site Compatibility: Oliver III anticipates the Certificate will be approved in January 2012.

2. Land Acquisition: Oliver III completed the acquisition of easements from landowners in December 2009.

3. Permits: Oliver 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 Project and will allow Oliver III to move forward with other commitments on the Project.

4. Equipment Procurement, Manufacture and Delivery: Oliver III will order the wind turbine components as soon as practicable.

5. Construction: Construction is scheduled to begin as early as June 2012, subject to road restrictions and weather. The engineering, procurement, and construction (EPC) contractor will be responsible for completing all project construction, including roads, wind turbine assembly, electrical, and communications work. The construction will take approximately six months to complete.

6. Test and Operations: Oliver III anticipates testing and operation to begin September 2012.

7. Commercial Operation: Oliver III anticipates commercial operation of the Project to begin producing energy in November 2012.

1.5 Project Ownership

Oliver III will own the entire Project and, as a result, will manage the construction of all equipment and associated facilities related to the Project. Oliver III will likely select a third-party contractor to perform the majority of the engineering and construction (E&C) of the wind farm. Oliver III will procure the turbine/tower package directly from a manufacturer.

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. According to the Energy Information Administration (2009), 89 percent of electricity generated in the state of North Dakota is produced from coal-fired power plants. 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 generated from renewable sources by 2015. While the state leads the nation in potential wind power capacity, at the end of 2008, North Dakota had 714 MW of installed wind energy capacity -- 11th in the nation (Windustry 2009).

According to a March 2009 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 2025 (EmPower ND 2009). North Dakota's goals include the following: general economic development, new wind project investments and construction, new landowner income, and new long-term jobs from broad professional services (such as wind project design, wind resource monitoring, legal and accounting services), from commercial project Operations and Maintenance (O&M), and from the manufacturing of wind turbine components. In support of this effort, NextEra Energy is cooperating with regional utilities to add wind generation to their energy portfolios.

North Dakota has been identified as having more available wind for development than any other state. In recent years, the Mid-Continent Area Power Pool (MAPP) has consistently reinforced the regional need for increased generating capacity in the coming decade. Cost fluctuations and reliability problems serve to reinforce the need for sufficient capacity, low-cost energy, and diverse generation sources. Independent power producers such as NextEra Energy are widely recognized as essential to meeting regional energy needs, stabilizing energy costs, and enhancing energy reliability. The Project offers North Dakota and the MAPP region the opportunity to add to capacity, to stabilize wholesale power prices, and to provide electricity from a clean, cost-effective renewable energy generation facility.

There is a future need for additional energy production in the MAPP region. The July 1, 2003, MAPP Load and Capability Report stated that, under the minimum reserve requirements, deficits were expected as soon as 2006. MAPP members were urged to build additional capacity in order to maintain reserve levels higher than the MAPP minimum. The most recent MAPP report available (2009) indicates that deficits are now expected by 2017 (**Table 5**), suggesting that MAPP members answered the call and additional capacity was added in recent years.

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).

North Dakota has a unique opportunity to begin providing capacity to meet those forecasted deficits with clean, efficient, renewable energy. Once completed, the Project will be a significant source of energy for meeting the region's needs over the next 30 years.

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.

Although the Project will include 30 turbines, an additional four alternate turbine locations have been included in the Project layout in order to provide siting flexibility based on on-going environmental studies and landowner preferences.

2.3 Ten Year Plan

Oliver III will file a Ten-Year Plan with the PSC and the Morton County auditor by July 1, 2013.

3. SITE SELECTION CRITERIA

Oliver III is evaluating the proposed 17,380-acre (25.5 square miles) Project Area to determine the best locations for up to 30 GE 1.6 MW xle wind turbines. Siting turbines is a process through which input from several different entities is considered. The Project Area was singled out as an optimal site from environmental, wind resource, transmission, and economic perspectives. Cities are considered avoidance areas.

Oliver 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 Morton County and state wind siting requirements, and communications with Local, State, and Federal agencies. NextEra Energy has used this siting process in recent wind turbine projects, including projects in North Dakota. Through this process, Oliver III not only addresses environmental issues that commonly arise during project development, but also 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 III has reviewed the criteria in Chapter 69-06-08 and has considered these criteria in Project design. These criteria are discussed in this section.

3.1 Exclusion Areas

In accordance with NDAC Section 69-06-08-01-1, 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 4**.

3.2 Avoidance Areas

In accordance with NDAC Section 69-06-08-01-2, 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 4**.

Table 6. Exclusion Areas

Exclusion Area	Present within 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	7.7, 7.9, 7.13, 7.14, 7.15, Figure 4
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 archeological survey was completed and all NRHP-eligible archaeological sites will be avoided.	7.7, 7.8, 7.9, 7.15, 7.17, Figures 4
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
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	Prime farmland has been avoided to the extent practicable. None of the turbines would be located in prime farmland soils. Impacts to prime farmland are expected to be up to 5.4 acres, which is a negligible percentage of the Project Area.	7.9, 7.10, Figure 13
Irrigated land	None	N/A	7.9
Areas critical to threatened or endangered animal or plant species	Present	The Project Area is in the whooping crane migration corridor, although little suitable wetland habitat is present. No jurisdictional wetlands would be negatively affected by the Project since they will be avoided. Also, there are no recorded whooping cranes observations in the project area to date.	7.16
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

Table 7. Avoidance Areas

Avoidance Areas	Present within Project Area?	Description and Proposed Buffer	Section Addressed
Historical resources which are not designated as exclusion areas	None	N/A	7.7
Areas within the city limits of a city or the boundaries of a military installation	City limits-None Military-None	N/A	7.3, Figures 1-3
Areas within known floodplains as defined by the geographical boundaries of the 100-year flood	None	The Project Area is located in Flood Hazard Zone D: Areas in which flood hazards are undetermined, but possible.	7.12
Areas that are geologically unstable	Present	Two abandoned coal mines are found in the Project Area. Subsidence hazards related to the potential presence of abandoned underground coal mines will be mitigated by thorough field studies and geotechnical analyses and subsequent micrositing.	7.11
Woodlands and wetlands	Present	Wetlands will be avoided to the extent practicable. Woodland impacts are not anticipated.	7.13, 7.14, Figures 4, 12 and 15
Areas of recreational significance which are not designated as exclusion areas	None	N/A	7.8

3.1 Selection Criteria

In accordance with NDAC Section 69-06-08-01-3, 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	Assuming 30 1.6-MW turbines, approximately 64 acres of land will be impacted due to turbine placement, associated access roads, and a Project substation. Approximately 101 acres will be temporarily disturbed due to road construction and construction line trenching. An additional 10 acres will be temporarily impacted as a laydown and construction staging area. Wind turbine configuration will not result in significant impacts to agricultural production.	7.3, 7.9
Family farms and ranches	No turbines will be placed within 1,400 feet of occupied residences. Although some land area will be lost to the construction of access roads and turbines, wind lease payments to farmers will provide a supplemental source of income.	7.2, 7.3, 7.10, Figure 4
Land which the owner demonstrates has soil, topography, drainage, and an available water supply that cause the land to be economically suitable for irrigation	No owner, where impacts are expected, has expressed concerns related to economically suitable irrigation on their land. Currently no irrigation is occurring within the Project Area.	7.9, 7.10, Figures 13 and 14

Selection Criteria	Potential Adverse Effects	Section Addressed
Surface drainage patterns and ground water flow patterns	No impacts to surface drainage patterns or groundwater flow patterns will occur.	7.11, 7.12, 7.13, Figure 15
The agricultural quality of the cropland	No impacts to the agricultural quality of the cropland are anticipated. If compaction of soils occurs during construction, Oliver 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 impacts are anticipated.	7.4
School systems and education programs	No adverse effects are expected.	7.4
Governmental services and facilities	Governmental services and facilities will not be negatively affected.	7.4
General and mental health care facilities	General and mental health care facilities will not be negatively affected.	7.4
Recreational programs and facilities	No impacts are anticipated.	7.4
Transportation facilities and networks	During construction, an increase in vehicle trips per day is anticipated for the duration of Project construction. During facility operation no significant impacts are anticipated.	7.4, Figure 9
Retail service facilities	No adverse impacts anticipated. Local services such as motels, restaurants, and convenience stores are likely to experience an increase in business during Project construction.	7.4
Utility services	Oliver III will utilize station service from Roughrider Electrical Cooperative, which will suggest appropriate configurations for the electrical system, and Oliver III will abide by the recommendations to prevent impacts to the transmission system.	2.0, 6.0, 7.4
The impact upon:		
Local institutions	No impacts are anticipated.	7.4
Noise sensitive land uses	The noise sensitive land uses within the Project Area are the residences near turbine locations.	7.6
Rural residences and businesses	No turbines will be placed within 1,400 feet of occupied residences.	7.2, 7.3, 7.10, Figure 4
Aquifers	No impacts will occur.	7.11
The impact upon:		
Human health and safety	If mitigative measures are implemented as discussed in **Section 7.5.3** and maintenance schedules are met, no impacts to human health and safety are anticipated.	6.3, 6.5.2, 6.5.3, 7.5

Selection Criteria	Potential Adverse Effects	Section Addressed
Animal health and safety	No impacts to livestock are anticipated from construction or operation of the facility. The most commonly observed species in the 2008 spring avian surveys, the western meadowlark, redwinged blackbird, ring-necked pheasant, and horned lark are all widespread species and have relatively stable populations. Thus, local mortality is not expected to have population-level consequences for the most commonly observed species. In the 2008 fall avian surveys, the horned lark was the third most commonly observed species and is the most common species found dead at existing wind farms, so some mortality may be expected. Although red-tailed hawks were the most commonly observed raptors in both seasons, mean raptor use was generally low compared to other wind facilities. Oliver III will implement measures to avoid and minimize effects to wildlife by siting facilities away from active raptor nests and wetlands and woodlands to the extent practicable. In addition, Oliver III will mark the transmission line associated with the project and will implement a post-construction Wildlife Response and Reporting System (WRRS) for the Project in order to monitor avian/turbine interaction.	7.10, 7.16, 7.15, Appendix C
Plant life	Assuming 30 1.6-MW turbines, approximately 63 acres of land will be used for the turbines, the substation, and access/service roads. Land where the turbines will be sited is primarily cropland and undeveloped prairie.	7.9, 7.14, Figure 12
Temporary and permanent housing	Temporary housing will be utilized during construction. No adverse impacts are anticipated.	7.2
Temporary and permanent skilled and unskilled labor	No adverse effects are anticipated. Local contractors employed for construction will result in increased wages.	7.2
The cumulative 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 development.	10.11

3.2 Policy Criteria

In accordance with NDAC Section 69-06-08-01-4, 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 in a proper case may require the adoption of such policies and practices.

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 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. 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 (a doubling of the wind speed will increase the available energy by a factor of eight times).	4.2
Training and utilization of available labor in this state for the general and specialized skills required	Oliver 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 Project.	6.5, 7.2, 7.3, 7.9
The dedication of an area adjacent to the facility to land uses such as recreation, agriculture, or wildlife management	The Project will not interfere with adjacent land uses. As such, it is not anticipated that areas adjacent will be dedicated to recreation, agriculture, or wildlife management issues.	7.3, 7.8, 7.9, 7.15, Figure 4
Economies of construction and operation	Oliver 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 III will work with landowners of properties for the Project.	8.0
A commitment of a portion of the energy produced for use in this state	Energy transmitted will interconnect and deliver power into the Midwest ISO (MISO) system and will be produced entirely for use in the state of North Dakota.	2.1, 6.1
Labor relations	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 the associated facilities.	3.0, 3.6
Monitoring of impacts	Oliver III and the EPC contractor will employ best management practices (BMPs) during construction to monitor soil impacts and segregate topsoil. A storm water prevention plan will be prepared for the Project.	7.11, 7.15, 7.16

3.3 Design and Construction Limitations

In general, there are two design and construction limitations when building any wind farm: wind resources and landowner easements. The wind resource is essential to selecting and designing a wind farm. Oliver 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 Project. Oliver III has secured voluntary land agreements with landowners necessary to develop the Project.

There are no federal lands such as U.S. Fish and Wildlife Service (USFWS)-administered Waterfowl Production Areas (WPA) and wetland and grassland easements or state land such as school trust land or Wildlife Management Areas (WMA) within the Project Area.

3.4 Economic Considerations

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

Another economic factor considered is the availability of a transmission system in the vicinity of the Project. Furthermore, having permission to interconnect into an existing transmission system is essential. If no transmission system is present, the cost of interconnection increases due to the need of constructing a lengthy transmission line and large substation to an existing electricity service provider. Power generated from the Project will be delivered from the Project substation in Section 4, Township 140N, Range 83W in Morton County via the Oliver III 230-kV transmission line and injected into the MISO system at the Square Butte 230 kV Substation in Section 33, Township 142 North, Range 83 West in Oliver County.

One of the most important economic considerations related to the Project is the need to qualify for the Federal production tax credit (PTC). The PTC is an income tax credit of 2.2 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. Through the American Recovery and Reinvestment Act (passed in February 2009), Congress acted to provide a three-year extension of the PTC through December 31, 2012. Early approval of a Certificate is not only consistent with circumstances unique to wind project siting, but it is also essential to timing, given the uncertainty and limited duration of the Federal PTC available for wind project development.

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 III is proposing to install up to 30 GE 1.6MW xle turbines.

The GE 1.6 MW xle utility-grade wind turbine has a nominal nameplate rating of 1.6 MW. Each turbine will have an 80-meter (262 feet) hub height and an 82.5-meter (271 feet) rotor diameter (RD) (**Figure 5**). The GE 1.6 MW xle turbine begins operation in wind speeds of 3.5 meters per second (m/s), or 7.8 mph, and reaches its rated capacity (1.6 MW) at a wind speed of 11.5 m/s (25.7 mph). The turbine is designed to operate in wind speeds of up to 25 m/s (56 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 34.5 kV. The electricity is collected by a system of underground power collection lines within the Project Area (**Figure 6**). Both power collection lines and communication cables will be direct-buried on private property or public right-of-way. Typically, this infrastructure is run adjacent to the Project access roads or along public rights-of-way or easements. In cases where such infrastructure must be sited on property that is not governed by the existing wind easement and land lease options, Oliver III Wind will obtain easements for the necessary property.

Each wind turbine will be accessible via all-weather, aggregate-surfaced roads between 18 and 36 feet in width which 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 Project substation. **Figure 6** is a diagram of the path of energy from the wind farm to energy users and **Figure 7** shows a typical wind farm facility layout. The power will be transformed to 230 kV at the Project collection substation which will be constructed in Section 4 of Township 140 North, Range 83 West (**Figures 2 and 3**). The Project substation transfer power to the Oliver III Transmission Line (**Figure 8**).

4.1.1 Wind Energy Center Layout

Oliver III will develop a wind farm layout that optimizes 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 and turbulence, and electrical line losses.

In addition to several setback requirements for wind energy facilities (**Table 10**), Morton County also requires a minimum ground clearance of at least 75 feet from the blade tip at its lowest point.

Table 10. Morton County Setback Distances for Wind Turbines

Setback Type	Distance
Perimeter of wind energy facility	1.5 times rotor diameter*
Occupied residence, commercial building, publicly used structure and state/county parks	1,320 feet or 1.25 times the total height (whichever is greater)
Public roads and overhead transmission lines	250 feet from center line of right-of-way

*A variance may be granted for a reduced setback if affected party agrees.

Oliver III has established a more restrictive setback from public roads and existing transmission lines of 1.1 times the total turbine height, or approximately 400 feet, and a setback of 1,400 feet from occupied residences.

4.2 Associated Facilities

The electricity generated by each turbine is stepped up to a power collection line voltage of 34.5 kV via a pad-mounted transformer at the base of each turbine. The electricity generated at each turbine is collected by a system of underground power collection lines within the Project Area and brought to the Project substation. The Project also includes access roads. No new O&M facility will be constructed. Oliver III has erected two meteorological towers within the Project Area boundary and will construct up to two additional towers.

4.3 Land Rights

Oliver III has obtained easements for the proposed 48-MW Project. Land rights will encompass the proposed wind farm and all associated facilities, including but not limited to wind and buffer easements, wind turbines, meteorological towers, access roads, and underground collection lines.

5. PROPOSED SITE

5.1 Identification of Project Area

The Project Area was selected based on its wind resource. Land-use patterns and environmentally sensitive features were considered in the site selection criteria. The Project Area boundary encompasses an area of 16,380 acres. However, the land occupied by turbines and other wind farm infrastructure will be less than one percent of this area. It is anticipated that the area of direct land use will be: approximately 64 acres for the turbines, aggregate-surfaced access or service roads up to 36 feet wide, and a substation. Total land disturbance for the wind farm and infrastructure is expected to be up to 175 acres, including temporary disturbance due to road construction and collection line trenching (101 acres) and the laydown/construction staging area (10 acres). See **Table 4** and **Section 7.0** for a detailed description of the Project Area impacts. **Figures 2-3** show proposed turbine locations, which are subject to minor shifts during micrositing.

5.2 Wind Resource Areas – General

The Department of Energy's Wind Program and the National Renewable Energy Laboratory (NREL) 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 Project vicinity consist of Class 3 winds or greater (DOE 2011).

5.3 Wind Characteristics in Project Area

Oliver III utilized wind data from meteorological towers in the Project Area. Oliver III has secured information from other long-term references to aid in correlating the wind data on-site, including 40-year re-analysis data processed by WindLogics. WindPRO and WAsP software 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. There is good correlation between the long-term wind measurements and the short-term Project-specific wind measurements.

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6. ENGINEERING AND OPERATIONAL DESIGN ANALYSIS

This section provides a summary description of the Project, which includes a description of the Project layout, turbines, electrical system, and associated facilities. A summary of this information is included in the Design Data Report (**Appendix B**). Additional design components addressed in this section are Project construction, schedule, operation, and decommissioning of the site. There are other turbines that are feasible choices for the Project Area that are available from various manufacturers and Oliver III wishes to reserve the right to select alternative turbines representative of the 1.6-MW class of machines. Turbine type may affect the number and configuration of the turbine array. Details for the GE Xle 1.6-MW machine are presented below.

6.1 Oliver III Project Layout and Associated Facilities

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

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

Electrical system design and interconnection details will be determined as a result of studies and discussions with MISO. The 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 III will be responsible for project operation and maintenance for the life of the Project and will contract with the most appropriate supplier of operations and maintenance services at the time of operation, to assure timely and efficient operations.

6.2 Description of Wind Turbines

The Project is currently designed to include GE 1.6 MW xle turbines. Oliver III reserves the right to select the most appropriate technology for the Project at the time of construction to ensure optimization of wind and land resources and cost efficiency.

6.2.1 Turbine

The Project consists of up to 30 1.6-MW turbines. The turbine begins operation in wind speeds of 3.5 m/s (7.8 mph) and reaches its rated capacity (1.6 MW) at a wind speed of 12.5 m/s (28 mph). The turbine is designed to operate in wind speeds of up to 20 m/s (45 mph).

The turbines have active yaw and pitch regulation and asynchronous generators. The turbines use a bedplate drive train design, where all nacelle components are joined on common structures to improve durability.

The turbines have SCADA communication technology to allow control and monitoring of the wind farm. The SCADA communications system permits automatic, independent operation and remote supervision, thus allowing the simultaneous control of many wind turbines. Operations,

maintenance and service for the Oliver III Wind Energy Center 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 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 preliminary turbine design identifies an 82.5-meter (271 feet) rotor diameter, with a swept area of 5,346 square meters (57,544 square feet) and a rotor speed of 10.1-18.7 revolutions per minute (rpm).

6.2.3 Tower

The towers are conical tubular steel with a hub height of up to 80 meters (262 feet). 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 (ANSI) 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 is grounded and shielded to protect against lightning. The grounding system will be installed during foundation work, and must be designed for local soil conditions. The resistance to neutral earth 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 raise the voltage to the power collection line voltage of 34.5 kV. The power from these transformers will be run through an underground collection system consisting of various sized direct-buried cables that are generally located alongside the Project access roads. At the point where the access and public roads meet, the collection system will continue as underground lines. Eventually, all the collection system cables will terminate at an on-site collector substation, which raises the Project voltage to 230 kV and provides the necessary protection and control for interconnection to the transmission grid. The substation area is 9.8 acres, but the substation structure is anticipated to measure approximately 200 feet x 380 feet, and the transformer will measure 18 feet x 23 feet x 31 feet.

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

6.4 Oliver III Wind Energy Center Construction

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

- Ordering of all necessary components including 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 Project substation;
- Installation of tower foundations;
- Installation of underground and aboveground cables;
- Tower placement and wind turbine setting;
- Acceptance testing of facility; and
- Commencement of commercial production date.

Private turbine access roads will be built adjacent to the towers, allowing access to the turbines during and after construction. These roads will be 18-36 feet wide and will have an aggregate surface as cover, and will be adequate to support the size and weight of maintenance vehicles. The specific turbine placement will determine the amount of private roadway that will be constructed for the Project.

During the construction phase, several types of light, medium and heavy-duty construction vehicles will travel to and from the site, as well as private vehicles used by the construction personnel. Oliver III estimates that there will be approximately 50 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.

6.4.1 Construction Management

An EPC contractor will be primarily responsible for the construction management of the Project. The EPC contractor will use the services of local contractors, where possible, to assist in Project 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;

- Complete surveying and geotechnical investigations; and
- Forecast Project 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, machines, and blades, as well as the coordination of materials receiving, inventory, and distribution. The Project will be constructed under the direct supervision of an on-site construction manager with the assistance of local contractors. The construction consists of the following tasks:

- Site development, including roads;
- Foundation excavation;
- Concrete foundations;
- 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 Project construction manager will help to coordinate all aspects of the Project, including ongoing communication with local officials, citizens groups and landowners. Even before the Project becomes fully operational, the O&M staff is integrated into the construction phase of the Project. 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.

6.4.2 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 shall be prepared by a registered professional engineer licensed to practice in the State of North Dakota.

6.4.3 Civil Works

Completion of the 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. They 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 18 to 36 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 regraded, filled, and dressed as needed.

6.4.4 Commissioning

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

6.5 Project Operation and Maintenance

In addition to regularly scheduled on-site visits, Oliver III and the appropriate supplier will control, monitor, operate, and maintain the Project by means of a SCADA computer software program. The operation of the entire wind farm, including discrete settings for individual turbines, is managed by the centralized SCADA system. The Project will be operated and maintained by NextEra Energy Operating Services.

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.

6.5.1 Maintenance Schedule

NextEra Energy will remotely monitor the Project on a daily basis. This will be accompanied by a visual inspection by the on-site operating staff. Several daily checks will be made in the first three months of commercial operation to see that the Project is operating within expected parameters.

Once installed, the 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 event is logged.

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, checking and testing of oil and grease, balance check, and tightness of terminal connectors.

6.5.2 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 Project structures, access roads, drainage systems and other facilities necessary for the operation;

- Maintenance of all O&M field maintenance manuals, service bulletins, revisions, and documentation for the Project;
- Maintenance of all parts, price lists, and computer software;
- Maintenance and operation of Project 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; and
- Implementation of appropriate security methods.

6.5.3 Operations and Maintenance Facility

No new O&M Facility will be constructed as part of the Project.

6.6 Decommissioning and Restoration

Oliver III has a contractual obligation to the landowners to remove the wind facilities, including foundations to a depth of four feet, when the wind easement expires. Oliver III also reserves the right to explore alternatives regarding Project decommissioning at the end of the Project Certificate term. 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. Based on estimated costs of decommissioning and the salvage value of decommissioned equipment, the salvage value of the wind farm will exceed the cost of decommissioning.

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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. NextEra Energy's safety and environmental policy is included in **Appendix A**.

7.1 Description of Environmental Setting

The Project Area is located in central Morton County, a primarily rural agricultural area located approximately 10 miles northwest of Mandan, North Dakota.

7.2 Demographics

7.2.1 Description of Resources

The proposed Project is located in Morton County, North Dakota, a primarily rural agricultural area located north of Interstate 94 and east of State Highway 31, approximately 15 miles northwest of Bismarck, North Dakota. There is no indication of any new residential construction on the site. According to the 2010 Census, the population of Morton County was 27,471, an increase of almost nine percent from the 2000 Census count of 25,303. The county contains 1,926 square miles of land, with a density of just over 13 persons per square mile. Approximately 95 percent of the population is composed of white persons who are not of Hispanic or Latino origin. The median age of Morton County residents is estimated at 39.3 years. It is estimated that 14.6 percent of the county population is 65 years or older while only 7.0 percent of the population is under five years of age (US Census Bureau, 2010 Census).

The Project Area is approximately 15 miles northwest of Bismarck, the capital of North Dakota, county seat of Burleigh County, and second most populous city in the state after Fargo. The population of Bismarck according to the 2010 Census was 61,272.

There are a few small communities near the Project Area. The city of New Salem (2010 population 946) is located approximately 10 miles to the southwest; the city of Center (2010 population 571) is located approximately nine miles north of the Project. The unincorporated town of Judson is located approximately seven miles to the southwest; census data was not available for Judson.

The economy of Morton County is primarily tied to government jobs in Bismarck. According to the 2000 Census, almost 20 percent of the workforce worked in education, health, and social services; manufacturing and retail trade were the second and third industries by employment. Median household income was $37,028 and 9.6 percent of the population lived below the poverty level, compared to 12.4 percent nationwide.

Agriculture continues to play a significant role in the county's land use and economy. In 2007, there were 836 farms in Morton County, comprising almost 95 percent of the land area. According to the 2007 Census of Agriculture (USDA 2007), total market value of agricultural products produced in

Morton County was $117,251,000, 52 percent of which was from crops and 48 percent from livestock sales. The primary livestock is cattle and the principal crops include wheat and forage. Barley, sunflowers, and oats are also grown.

7.2.2 Impacts

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. A recent case study evaluated the socioeconomic impacts of a wind energy facility constructed in 2007 and 2008 in Cavalier County, northeastern North Dakota (Leistritz and Coon 2009). The study authors felt that the project area was typical of Great Plains communities where many similar wind energy projects are being constructed, and that the impacts would be similar for other wind energy projects of the same size in the region. Leistritz and Coon (2009) found that the 159-MW project resulted in a peak workforce of 269 workers during construction, 10 permanent jobs, and $1.4 million in annual expenditures to local businesses and households. This includes payments to landowners totaling $413,000 the first year, annual local property taxes to the County and school district, and direct payments for wages and materials in Cavalier County and adjacent counties. **Table 11** summarizes the economic impacts from the construction and operation of the project.

Table 11. Economic Impacts of Wind Project in Cavalier County, ND

Impact	Construction (one-time) in millions of dollars	Operation (annual) in millions of dollars
Direct	$56.4	$1.4
Secondary (indirect and induced)	$169.3	$3.0
Total	**$225.7**	**$4.4**

During construction, temporary housing in Cavalier County was full, and local service businesses (hotels, restaurants, etc.) experienced a short-term increase. An increase in traffic on local roadways during shift changes was noticeable. There little or no impacts to public services, as only five percent of the construction workers brought their families and most of the long-term jobs were filled locally. There were no added costs to the County, school district, or state. The increase in property taxes to the school district and the County were largely due to payments from the project, but also due to an anticipated increase in residential and property values (Leistritz and Coon 2009).

On a per-megawatt basis, the project's economic impacts were: $8,900 in local expenditures during construction; $2,600 per year in landowner payments; and $2,900 per year in property taxes. Project-specific impacts would vary based on the local availability of materials, services, and labor. Assuming the same economic impacts for the 48-MW Oliver III Wind Energy Center would result in $691,200 being spent locally, including construction, landowner payments, and property taxes.

Up to 64 acres of the total Project Area will be permanently affected due to conversion to turbine sites, access roads, and a Project substation and O&M facility. Landowner compensation will be established under individual lease agreements. 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 will provide

stability to farm incomes and thus will help assure the continued viability of farming in the Project Area. Project construction will not cause additional impacts to leading industries within the Project Area. There is no indication that any minority or low-income population is concentrated in any one area of the Project, or that the wind turbines will be placed in an area occupied primarily by any minority group.

To the extent that local contractors are used for portions of the construction, total wages and salaries paid to contractors and workers in Morton County 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.

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

No effects on permanent housing are anticipated. During construction, out-of-town laborers will likely use lodging facilities in and around the city of Bismarck. Operation and maintenance of the facility will require few laborers. Sufficient permanent housing is available within the county to accommodate these laborers.

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 southeast North Dakota. In addition, establishing the central region of North Dakota as an important producer of renewable energy, such as wind, may spur the development of wind-related businesses in the area and in turn contribute to the economic growth in the region.

7.2.3 Mitigative Measures

Socioeconomic impacts associated with the project will be primarily positive, with an influx of wages and expenditures made at local businesses during the Project construction and an increase in the county's tax base 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 in Morton County within the Project Area boundary is primarily agricultural with scattered farmstead residences. The Project will be located privately owned land in central Morton County, ten miles northwest of Mandan, ND. The Project proposes to install approximately 48 MW of wind power, consisting of up to 30 wind turbines within a 25.5-square mile (16,380-acre) Project Area. Current land use within the Project Area is rural agricultural, supporting both crops and livestock

grazing. The Project Area is not within any city limits or within an area of any known military installation. The Project Area does not include any federal or state lands. In addition, no federal or state easements have been identified in the Project Area.

Table 12 identifies current land use in the Project Area based on 2006 USGS National Land Cover data. Land use in the Project Area is dominated by cultivated crops (49 percent) and grassland/herbaceous (32 percent). Approximately 12 percent of the Project Area was pasture/hay and four percent was developed/open space. All remaining land cover categories, such as deciduous forest, woody wetlands, shrub/scrub, emergent herbaceous wetlands, and open water, were each one percent or less of the Project Area.

Table 12. Land Cover within the Project Area

Land Cover	Acreage	Percent of Project Area
Cultivated Crops	8,085	49%
Grassland/Herbaceous	5,248	32%
Pasture/Hay	1,992	12%
Developed, Open Space	585	4%
Deciduous Forest	160	1%
Woody Wetlands	108	1%
Shrub/Scrub	80	Less than 1
Emergent Herbaceous Wetlands	66	Less than 1
Barren Land	31	Less than 1
Open Water	21	Less than 1
Developed, Low Intensity	3	Less than 1
Evergreen Forest	2	Less than 1
Total	16,380	

Source: USGS 2006.

7.3.2 Impacts

The development of the Project will not result in a significant change in land use. The development of the Project will not displace any residents or existing or planned industrial facilities. Wind turbines will be sited a minimum of 1,400 feet from occupied residences. The area will retain the rural sense and remote characteristics of the vicinity. At other wind developments in the region, including Oliver I and II, landowners frequently plant crops and/or graze livestock to the edge of the access roads and turbine pads. The access roads will be 18 to 36 feet wide and low profile, so they are easily crossed while farming. Oliver 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.

While the permanent site layout has not yet been determined, it is estimated that installation of up to 30 turbines, and the associated access roads and collection substation and O&M facility, will result in the conversion of up to 64 acres of land (see **Table 4**). Oliver III is seeking to obtain an easement of

approximately 10 acres for laydown and contractor staging areas, which will be temporarily affected during the construction phase of the Project.

At other wind farms, the public has expressed concerns over potential devaluation of property in and adjacent to proposed wind projects. A study published in October 2002, *"Economic Impacts of Wind Power in Kittitas County, Final Report,"* conducted by Dr. Stephen Grover of ECONorthwest of Portland, OR, summarized survey results as follows:

> "Views of wind turbines will not negatively impact property values. Based on a nationwide survey conducted of tax assessors in other areas with wind power projects, we found no evidence supporting the claim that views of wind farms decrease property values" (Grover 2002, p.2).

More recently, the Lawrence Berkeley National Laboratory conducted a three-year study on the impact of wind power projects on residential property values in the U.S. While the full report has not yet been publicly released, one of the study's authors has presented preliminary results (Hoen and Wiser 2009). The study included literature review, data collection for residential sales transactions at multiple study areas, visits to each home to measure turbine visibility and quality of scenic vista, use of multiple statistical models. The study concluded that:

- there was no statistical evidence that homes sold after announcement or construction of wind facilities have reduced property values;
- there was no statistical difference in sale prices between homes with a view of wind turbines and homes without such views; or
- there was no statistical difference in sale prices between homes within one mile of wind turbines and homes more than five miles away or those that had been sold prior to facility announcement.

7.3.3 Mitigative Measures

Oliver 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 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 Services

The Project is located in a lightly 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 Project. The closest towns to the Project are New Salem and Center and the unincorporated community of Judson. Bismarck, the state capital and county seat, is located approximately 15 miles southwest of the Project Area. Bismarck provides sanitary sewer, water, utility services, educational facilities, and recreational facilities and parks to its

residents and visitors. Bismarck's local services include emergency services, ambulance service, hospitals, clinics, a landfill, and a police department.

Electrical Service

Electrical service is provided to the region by Roughrider Electric Cooperative, Inc.

Roads

County and township (section line) roads characterize the existing roadway infrastructure in and around the Project. The Project Area is accessed via U.S. Interstate 94, 37th Avenue, County Road 83, and local two-lane paved and gravel county roads.

Traffic

Existing traffic volumes on the area's major roadways are documented in **Table 13** and **Figure 10**. 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 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 13. Existing Daily Traffic Levels

Roadway Segment	Existing Average Annual Daily Traffic (AADT)/ Commercial Truck Traffic
I-94 east of SH 31	7,495/1,910
I-94 west of SH 31	7,000/1,445
SH 31 at I-94	1,075/190

Source: 2010 Traffic Volume Map, State of North Dakota (NDDOT 2010).

Water Supply

Townships have limited public infrastructure services. Homes typically utilize septic systems and water wells for their household needs.

Telephone, Fiber Optic and Microwave Communications

A beam path study was conducted to identify all non-federal microwave telecommunication systems, as well as AM, FM, cellular, and television tower locations (**Appendix C**). The Worst Case Fresnel Zone (WCFZ) was calculated for microwave paths in the vicinity of the Project Area. The mid-point of a full microwave path is the location where the widest (or worst case) Fresnel Zone occurs. The calculated WCFZ radius represents the area where planned wind turbines should be avoided, if possible.

7.4.2 Impacts

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

Local Services

No impact is expected to local services.

Electrical Service

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

Roads

Construction of the Project will require approximately 11 miles of new aggregate-surfaced access roads. During operation of the Project, the access roads will be used by operation and maintenance crews while inspecting and servicing the wind turbines. The access roads will be between towers, offset as necessary to allow for adequate crane access. One road will be required for each string of turbines. Although a 50-foot easement will be used during construction, the permanent access roads will be between 18 and 36 feet wide and low profile to allow cross-travel by farm equipment.

Traffic

The maximum construction workforce is expected to generate approximately 50 additional vehicle trips per day. Using any combination of state and county highways and other township roads throughout the Project Area, the traffic impacts are considered negligible. The capacity of any route and level-of-service to the traveling public will not be affected.

Truck access to the Project Area is provided by I-94 and County Road 83. 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 Project will not significantly impact the water supply. The abandonment of any wells is not required for the Project. The Project will not require appropriation of surface water or permanent dewatering. Temporary dewatering of groundwater may be required during construction of turbine foundations.

Telephone, Fiber Optic and Microwave Communications

Telephone and fiber optic cables will be located in the field by the respective utility companies prior to construction and will not be negatively affected during construction. The National Telecommunications and Information Administration (NTIA) was contacted regarding the proposed Project. After a 45-day period of review, no concerns were identified (**Appendix D**).

The media impact study did not identify any beam paths crossing the Project Area. The microwave interference study and WCFZ calculations are attached as **Appendix C**.

7.4.3 Mitigative Measures

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

Local Services

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

Electrical Service

Oliver III will purchase station service from Roughrider Electric Cooperative, which will suggest appropriate configurations for the electrical system that Oliver III will abide by to prevent impacts to the transmission system. Oliver III has established a setback of 1.1 times the turbine height, or approximately 400 feet from existing transmission lines. No additional mitigation is necessary.

Roads

Oliver III is working closely with the 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 **Figures 2-3**.

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

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).

Telephone, Fiber Optic and Microwave Communications

An underground utilities locator company will be contacted prior to construction to locate and avoid underground facilities. To the extent Project facilities cross or otherwise affect existing telephone or fiber optic lines or equipment, Oliver III will enter into agreements with service providers so as to avoid interference with their facilities.

7.5 Human Health and Safety

7.5.1 Description of Resources

Air Traffic

There is one private use turf runway (Z.P. Field Airport, FAA ID 64ND) approximately 3 miles south of the Project Area. The nearest airport certified for commercial carrier operations is the Bismarck Municipal Airport (FAA ID BIS), located approximately 17 miles southeast of the Project Area.

Electromagnetic Fields

The term electromagnetic fields (EMF) refer to electric and magnetic fields that are present around any electrical device. Electric fields arise from voltage, or electrical charges, and magnetic fields arise from current, or the flow of electricity that travels along transmission lines, electrical collection lines, substation transformers, house wiring, and electrical appliances. The intensity of the electric field is related to the voltage of the line and the intensity of the magnetic field is related to the current flow through the conductors (wire). EMF can occur indoors and outdoors. However, there are no known discernible health impacts from power lines. Turbines and collector lines will be no closer than 1,400 feet to occupied residences, where EMF will be at background levels.

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 old gasoline facilities, landfill sites, and private activities. An assessment of the Project Area will be conducted in the spring of 2012 to identify any recognized environmental conditions that may exist.

Potentially hazardous materials associated with the Project include fluids found in association with turbines and substation/transformer equipment. There will be three types of fluids used in the operation of the wind turbines, all of which are petroleum products. These fluids are necessary for the operation of each turbine and include gear box oil, hydraulic fluid, and gear grease. The transformers contain mineral oil.

Security

The Project Area is located in an area that has a low population density. Construction and operation of the Project will have minimal impacts 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. However, no new transmission lines will be constructed as part of the Project, and the wind turbines and meteorological towers will have lighting and markings that comply with Federal Aviation Administration (FAA) requirements. In addition, the FAA's review included the evaluation of any potential interference with air traffic. FAA's response for each turbine is included in **Appendix D**.

Electromagnetic Fields

While the general consensus is that EMFs pose no risk to humans, the question of whether exposure to magnetic fields can cause biological responses or health effects continues to be the subject of research and debate. Based on the most current research on electromagnetic fields, and the distance between any turbines or collector lines and houses, the Project will have no impact to public health and safety due to EMF (National Institute of Environmental Health Sciences EMF-RAPID Program Staff, 1999).

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 there are no transmitter towers located within the Project Area and turbines will be constructed a sufficient distance from each dwelling. With the switch to Digital Television (DTV) in 2009, the concern of ghost images and flickering caused by wind turbine interference with analogue signals is no longer an issue.

Shadow Flicker

An analysis of potential shadow flicker impacts from the Project was conducted using the WindPro software package (Tetra Tech 2011a; **Appendix C**). The turbine array dated September 6, 2011, which includes 30 turbines and 4 alternate locations, was included in the analysis. The WindPro analysis was conducted to determine shadow flicker impacts under realistic impact conditions (actual expected shadow flicker). This analysis calculated the total amount of time (hours and minutes per year) that shadow flicker could occur at receptors out to 1,500 meters (4,921.3 feet). None of the 31 receptors modeled had expected shadow flicker impacts predicted for more than 30 hours per year. The maximum predicted shadow flicker impact at any receptor, for the range of potential wind turbine options, is 22 hours, 58 minutes per year, which is approximately 0.5 percent of the potential available daylight hours.

Hazardous Materials / Hazardous Waste

An 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. The Applicant does not anticipate generating any hazardous wastes.

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 III submitted a request to FAA to determine whether the Project layout and lighting will impact navigable airspace or communications technology used in aviation operations. The Project turbines received a Determination of No Hazard (DNH) on May 3, 2010 (**Appendix D**). Wind

turbines and meteorological towers will have lighting and markings according to FAA requirements that minimize any potential for air traffic impacts.

Electromagnetic Fields

Oliver III will follow prudent avoidance methods to minimize EMF exposure, such as encouraging conservation and distributed generation, and will continue to monitor EMF research.

Shadow Flicker

The primary mitigation measure used for wind turbines is setback distance. Oliver III is committed to a minimum 1,400-foot setback distance from all existing occupied residential structures. 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 440 feet from road right-of-way and 1,400 feet from occupied homes. These distances are considered to be safe based on developer experience, and are consistent with the required local setbacks; they also serve to reduce noise.
- Security measures will be taken during the construction and operation of the project, including temporary and permanent (safety) fencing, warning signs, and locks on equipment and wind power facilities.
- Turbines will sit on solid steel-enclosed tubular towers in which all electrical equipment will be located, except for the pad-mounted transformer. Access to the tower is only through a solid steel door that will be locked when not in use.
- Where necessary or requested by landowners, Oliver III will construct gates or fences such as those around the collection substation.

7.6 Noise

7.6.1 Description of Resources

The Project Area is essentially rural and agricultural. The acoustic environment is defined primarily by distant transportation noises, aircraft flyover events, farming equipment and local traffic. Wind turbine generators are currently operational on land adjacent to the Project Area. 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. Generally, the ambient acoustic environment in the Project Area is expected to remain relatively low.

7.6.2 Impacts

Morton County does not currently have noise standards or ordinances that are applicable to the Project, although turbines are required to be set back at least 1.25 times the total turbine height or 1,320 feet from residences and commercial and public buildings. NextEra uses a more restrictive setback of 1,400 feet from residences. At the state level, the North Dakota Administrative Code (Article 69-06-08, Section 3) requires that the potential for adverse impacts at noise sensitive receptors be assessed during the site selection process; there are no numerical decibel limits, however, or explicit definitions of the locations of compliance given either by the North Dakota PSC or any other agency at the state level. Oliver III will employ appropriate environmental noise criteria such as the guidelines provided by the U.S. Environmental Protection Agency and the generally accepted average noise impact threshold level for wind turbines of less than 50 dBA at any residence, day or night.

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 passed 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 October 2011, 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 Project construction and maintenance activities (Tetra Tech 2011b, **Appendix C**).

Wind turbine operation was analyzed for the Project layout dated September 6, 2011, which employed the GE xle 1.6-MW turbine model and a substation located in Section 4 of Township 140 North, Range 83 West. Acoustic modeling was completed at both wind turbine cut-in and maximum rotational conditions, inclusive of the entire range of future Project operational conditions. Project compliance was assessed at a total of 31potential receptors, eight of which were determined to be either abandoned or not currently in use for residential purposes. Acoustic modeling was also conducted to determine sound emissions for the Project electrical substation operation. The noise modeling results indicate that the received sound levels are all below the most stringent EPA guideline, except for at one occupied residence, which may potentially exceed the most stringent EPA guideline during anomalous meteorological conditions.

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. All 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 III is committed to a minimum 1,400-foot setback distance from all existing occupied residential structures. This setback distance has proven sufficient and the resulting relatively low sound levels have been found to be generally acceptable, at several permitted and operational NextEra Energy wind farms located throughout the state of North Dakota.

Special conditions can occur which are difficult to predict, such as high wind shear events where there is little masking wind noise at surface level but at hub-height there is sufficient wind for energy generation. In addition, residents in homes which are poorly insulated or highly exposed in the environment with limited nearby vegetation may be subject to a higher perceptibility. If a complaint is registered and sound is measured above the 55 dBA level on more than a rare occasion, Oliver III can provide improved insulation, landscaping, or other appropriate candidate mitigation measures. It should be noted that the acoustic model conservatively predicts outdoor sound levels and assumes no shielding or attenuation by trees or other vegetation.

7.7 Cultural and Archaeological Impacts

7.7.1 Description of Resources

Tetra Tech completed a cultural resources investigation to provide the necessary information for the State Historical Society of North Dakota (SHSND) review by performing a Class I Literature Review of the Area of Potential Effects (APE) for direct and visual effects; performing a Class II Reconnaissance Survey for architectural properties identified by the State Historic Preservation Office (SHPO); and performing a Class III Pedestrian Survey of the proposed APE for direct effects.

Class I Literature Review

The initial file review was conducted on July 22-23, 2009 and included identifying archaeological sites and surveys, and structures, bridges, and cemeteries within 1.5 mi (2.4 km) of the Project design dated July 2, 2009. An updated file review was conducted on June 30, 2011 which focused on archaeological sites and surveys within 1 mi (1.6 km) of the turbine layout dated October 9, 2009 and architectural history properties within the SHPO-defined APE for visual effects.

The Class I Literature Review revealed that three investigations have occurred in the area including an earlier Class I Literature Review for the Oliver III Project and a Class III Cultural Resources Investigation for the Oliver III Transmission Line. A Class III Cultural Resources Investigation for a

proposed microwave facility was also completed in the Project area. No previously recorded archaeological sites or site leads have been documented within the APE for direct effects; however, three site leads have been documented within 1 mi (1.6 km) of the APE for direct effects. These site leads are Euro-American mines and have not been evaluated for listing on the National Register of Historic Places (National Register). No architectural properties have been documented within the APE for direct effects or within 1 mi (1.6 km) of the proposed turbine layout. The SHPO identified two previously documented properties and three undocumented properties within the SHPO-defined APE for visual effects which extended approximately 2.5 mi (4.0 km) from the proposed turbine layout. One property, the St. Vincent Cemetery (32MO186), is considered to be potentially eligible for inclusion to the National Register.

Class II Reconnaissance Survey

A Class II Reconnaissance Survey of the five properties identified by the SHPO during consultation in March 2010 involved photo-documenting the properties and taking line-of-sight photographs from the properties toward the proposed turbine locations. The SHPO did not require a determination of effects for these properties; however, Tetra Tech was encouraged to provide field observations.

Class III Pedestrian Survey

Tetra Tech conducted a Class III Pedestrian Survey of the APE for direct effects based on the Project layout dated October 13, 2011. This layout included 30 1.6-MW GE wind turbine generators with 4 alternate locations; approximately 11.2 mi (18 km) of service roads to be constructed or improved; approximately 14.3 mi (23.0 km) of electrical collection lines; and a 10-acre (4.0 hectares) area that includes the substation, operations and maintenance (O & M) building, and temporary laydown areas. To provide some additional layout areas and allow for some flexibility in construction, Tetra Tech surveyed a 500-ft (152.4-m) diameter circle for each of the proposed turbine locations; a 200-ft (61 m) corridor for service roads, and a 100-ft (30.5-m) corridor for collection line routes.

The Class III pedestrian survey was conducted from October 13 to October 19, 2009; April 5 to April 9, 2010; September 15, 2011; and October 13, 2011. The main portion of the survey was completed in October 2009; however, the survey was halted due to inclement weather. In April 2010, the remainder of the survey was completed. Recommendations for reroutes were provided to NextEra in July 2011 and a revised layout was provided to Tetra Tech in August 2011. Tetra Tech completed the survey of the reroutes in September 2011 and October 2011.

During the pedestrian survey, Tetra Tech documented five archaeological sites, one site lead, and four Euro-American stone piles within the current APE for direct effects. These include one prehistoric stone feature site (32MO1088) and one prehistoric isolated find (979.013); two historic linear stone alignments (32MO1085 and 32MO1087), one stone foundation (32MO1084); and one stone pile of indeterminate cultural affiliation (979.201).

Site 32MO1088 consists of an alignment of seven Native American cairns, two stone circles, and one chipped stone flake. At this time, Site 32MO1088 has not been evaluated for its eligibility for

inclusion to the National Register; however, the site does contain numerous intact archaeological features and may also contain traditional religious and cultural importance to regional Native American tribes which may meet the criteria for inclusion on the National Register (36 CFR 800.16[I][1]). Site Lead 979.013 is a Native American isolated find identified within a cultivated field. Since the isolated find is located within a cultivated field in upland setting (i.e., non-depositional setting) and contains no culturally-diagnostic artifacts, it is Tetra Tech's opinion that Site Lead 979.013 be recommended as not eligible for inclusion to the National Register.

Sites 32MO1085 and 32MO1087 are Euro-American stone alignments created during agricultural field clearing activities and placed along property boundaries. At this time, Sites 32MO1085 and 32MO1087 have not been evaluated for its eligibility for inclusion to the National Register; however, it is Tetra Tech's observation that these stone alignments lack length, consistency, and an association with other historic features. Therefore, Tetra Tech does not consider these sites to represent significant archaeological resources. Site 32MO1084 is a Euro-American stone foundation not associated with any historically-documented features on reviewed plat maps and aerial photographs. Although there is an absence of historic documentation for this farmstead, it is Tetra Tech's opinion that this farmstead was likely established in the early 1900s and abandoned in the 1950s. At this time, Site 32MO1084 has not been evaluated for its eligibility for inclusion to the National Register; however, it is Tetra Tech's opinion that the site may contain intact archaeological deposits associated with early Euro-American settlement of the area and additional testing would be necessary to determine presence of these deposits and the actual eligibility of the site.

Site 979.201 consists of a single stone pile of indeterminate cultural affiliation. The site, located on the crest of a relatively less prominent ridge in a native prairie and near a cultivated field, included several smaller boulders and two very large boulders resting upon the southern end of a large glacial erratic that was flush with the ground surface. It is Tetra Tech's opinion that the site could be a Native American cairn that was added to at a later date by Euro-Americans performing rock-clearing activities in the nearby cultivated field. Site 979.201 has not been evaluated for its eligibility for inclusion to the National Register; however, the site may contain traditional religious and cultural importance to regional Native American tribes which may meet the criteria for inclusion on the National Register (36 CFR 800.16[I][1]).

Tetra Tech also documented the locations of the four Euro-American stone piles (Field Numbers 979.028, 979.029, 979.202, and 979.203). These piles, located adjacent to cultivated fields, appeared to have been created during field clearing activities. Upon the request of the SHPO, these sites were not recorded with the state and were not given an official site number. These sites have not been evaluated for eligibility for inclusion to the National Register and are not considered to be eligible for inclusion in the National Register by the SHPO.

7.7.2 Impacts

Class II Reconnaissance Survey

Based on the layout dated October 13, 2011, it is Tetra Tech's opinion that the five properties reviewed under the Class II Reconnaissance Survey will not be adversely impacted by the proposed project. Properties 32MO1337 (St. Vincent Catholic Church) and 32MO186 (St. Vincent Cemetery) are located over 2 mi (3.2 km) south of the nearest proposed turbines. The main entrance for the

church is located on the west side of the structure and no turbines would be visible while entering or exiting the church. The cemetery entrances are located off of 36th Street and no turbines would be visible while viewing the cemetery from the road, from the east, or from the west. It is possible that portions of the windpark may be visible while viewing the cemetery from the south side, but natural screening and topography to the north may mask the locations of turbines. The remaining three properties (farmsteads) have not been documented by the SHPO. Farmstead 979.500 appears to be a modern farmstead (1960s) which would not be adversely impacted by the project to its age and lack of historic significance. Farmstead 979.501 appears to be from the early 1900s; however, the farmstead is abandoned and most of the structures are in disrepair. The lack of integrity to these structures in addition to the intrusion of a mobile trailer and non-operational farm equipment leads Tetra Tech to believe this farmstead would not be adversely impacted by the proposed Project. The last farmstead, 979.502, appears to be an early 1900s farmstead with a newer farmhouse and newer outbuildings, scattered among older outbuildings. Tetra Tech does not feel this property would be adversely impacted by the proposed Project dues to the lack of historic integrity.

Class III Pedestrian Survey

Based on the layout dated October 13, 2011, the five archaeological sites, the one site lead, and the four Euro-American stone piles are located in the APE for direct effects. As currently designed, the five archaeological sites and one Euro-American stone pile will be avoided during construction. The cultural resources inventory report will be submitted to the North Dakota State Historic Preservation Officer (SHPO) for comment once it is complete.

7.7.3 Mitigative Measures

The five archaeological sites and one Euro-American stone pile that will be avoided during construction will be fenced to reduce the potential that they will be inadvertently disturbed.

If areas beyond the currently surveyed APE for direct effects are to be utilized during construction, then Tetra Tech recommends that a Class III cultural resource survey be conducted to determine the presence of cultural resources within these areas. Tetra Tech recommends the development of an unanticipated discoveries plan to accommodate any archaeological materials that may unexcavated during project construction.

If archaeological resources should be inadvertently encountered during Project construction and/or operation, work in the area should stop and the discoveries should be reported to the Tetra Tech. Tetra Tech will work with the SHPO and the client to document the resource and mitigate impacts in a timely manner. If human remains are inadvertently disturbed during construction, all work within the vicinity of the discovery should be halted and the local law enforcement agency shall be notified immediately. The local law enforcement agency shall, as soon as practicable, report the receipt of such notification to SHPO and the North Dakota State Department of Health and Consolidated Laboratories (NDSDHCL).

Although there are no reservations or Bureau of Indian Affairs trust lands in Morton County, the following Tribal Historic Preservation Officers (THPO) or Tribal Cultural Preservation Officers (TCPO) may be contacted if archaeological resources or other properties of Tribal interest are identified prior to or during construction:

Tim Mentz, THPO Standing Rock Sioux Tribe Phone: 701.854.2120	Elgin Crows Breast, TCPO Spirit Lake Nation Phone: 701.996.4477	Ambrose Littleghost, THPO Mandan, Hidatsa, and Arikara Nation (Three Affiliated Tribes) Phone: 701.627.4781

The Native American Graves Protection and Repatriation Act of 1990 allow tribes to protect American Indian graves and to repatriate human remains. The proponent must comply with this act if a burial site is encountered during construction, as the aforementioned act applies to all developments regardless of the funding source. Any burial site identified, including tribal or pioneer, must be referred to the North Dakota Intertribal Reinterment Committee and the State Historical Society of North Dakota.

7.8 Recreational Resources

7.8.1 Description of Resources

Recreational opportunities in Morton County include hunting and wildlife observation. Review of state and federal databases indicates that no registered national wildlife refuges, state game refuges, nature preserves, county parks, or formal recreational areas are present within or near the Project Area.

7.8.2 Impacts

In general, recreational impacts will be visual in nature and limited to individuals using public or private property in and near the Project Area for hunting, fishing, or nature observation.

7.8.3 Mitigative Measures

Since it is not anticipated that any significant recreational resources will be removed from service by implementation of the Project, no mitigation measures are proposed.

7.9 Effects on Land-Based Economies

7.9.1 Description of Resources

Agriculture/Farming

The majority of the Project Area is either cropland or grazing land (**Figures 11**). Current property use is almost exclusively limited to pastures used for cattle grazing and cultivated fields planted with corn, soybeans, sunflower or wheat.

While the economy of Morton County is primarily tied to government jobs in Bismarck, agriculture continues to play a significant role in the county's land use and economy. In 2007, there were 836 farms in Morton County, comprising approximately 95 percent of the land area. According to the 2007 Census of Agriculture (USDA 2007), total market value of agricultural products produced in Morton County was $117,251,000, 52 percent of which was from crops and 48 percent from livestock sales. The primary livestock is cattle and the principal crops include wheat and forage. Barley, sunflowers, and oats are also grown.

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 National Resource Conservation Service (NRCS) has two classifications for prime farmland. The first is where all areas of the soil series are

classified prime farmland. The second is where only the drained areas of the soil series are prime farmland. 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 14** lists the soils within the Project Area, including those considered prime farmland and soils of statewide or local importance. **Figure 12** shows the prime farmland soil distribution in the Project Area.

There are four prime farmland soils within the Project Area, comprising 847 acres or 5.1 percent of the Project Area; 28 soil types are considered farmland of statewide importance, totaling 7,615 acres or approximately 46 percent of the Project Area.

Woodlands

Economically important forestry resources are not found in the Project Area. Trees and shrubs in the Project Area are limited to small patches throughout the Project Area (**Figure 12**) and comprise about 160 acres, or 1 percent of the Project Area.

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 Project facilities will be available for grazing.

Actual impacts to agricultural production will be determined once turbine and road locations are finalized. Exact impact acreages will not be known until turbine siting is finalized, but expected permanent impacts will be approximately 64 acres, including turbine foundations, access roads, and the Project 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 Project layout includes approximately 2 acres of Project infrastructure in prime farmland, 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 Morton County.

No turbines will be placed within 1,400 feet of occupied homes. Other impacts to homes 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 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 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, Natural Resource Conservation Service (NRCS) mapped 64 soil map units in the Project Area (NRCS 2011), with individual soils each comprising less than 10 percent of area. **Table 14** provides a summary of the soil map units in the Project Area. The soils are primarily well-drained loams, silt loams, and silty clay loams derived from the underlying glacial deposits and sedimentary bedrock units.

Table 14. Soil Map Units Within the Project Area

Map Unit Symbol	Map Unit Name	Area (acres)	Percentage of Project Area	Farmland Classification
5	Dimmick silty clay, 0 to 1 percent slopes	80	0.5	Not prime farmland
6	Heil silt loam, 0 to 1 percent slopes	26	0.2	Not prime farmland
9	Straw and Velva soils, channeled, 0 to 2 percent slopes	62	0.4	Not prime farmland
10	Arnegard loam, 0 to 2 percent slopes	300	1.8	All areas are prime farmland
10B	Arnegard loam, 2 to 6 percent slopes	186	1.1	All areas are prime farmland
11	Amor-Arnegard loams, 0 to 3 percent slopes	35	0.2	Farmland of statewide importance
11B	Amor-Shambo loams, 3 to 6 percent slopes	505	3.1	Farmland of statewide importance
12C	Amor-Cabba loams, 6 to 9 percent slopes	1,087	6.6	Not prime farmland
13D	Amor-Cabba loams, 9 to 15 percent slopes	656	4.0	Not prime farmland
15B	Chama-Cabba silt loams, 3 to 6 percent slopes	376	2.3	Not prime farmland
15C	Chama-Cabba-Sen silt loams, 6 to 9 percent slopes	1,163	7.1	Not prime farmland
15D	Cabba-Chama-Sen silt loams, 9 to 15 percent slopes	471	2.9	Not prime farmland
15F	Cabba-Chama-Arnegard complex, 15 to 70 percent slopes	324	2.0	Not prime farmland
17B	Sen-Chama silt loams, 3 to 6 percent slopes	212	1.3	Farmland of statewide importance
18B	Reeder-Farnuf loams, 3 to 6 percent slopes	68	0.4	Farmland of statewide importance
19	Farland silt loam, 0 to 2 percent slopes	8	0.1	Farmland of statewide importance
19B	Farland silt loam, 2 to 6 percent slopes	811	5.0	Farmland of statewide importance

Map Unit Symbol	Map Unit Name	Area (acres)	Percentage of Project Area	Farmland Classification
19C	Farland silt loam, 6 to 9 percent slopes	48	0.3	Farmland of statewide importance
20	Shambo loam, 0 to 2 percent slopes	1	0.0	Farmland of statewide importance
20B	Shambo loam, 2 to 6 percent slopes	34	0.2	Farmland of statewide importance
21B	Morton-Farland silt loams, 3 to 6 percent slopes	188	1.1	Farmland of statewide importance
22F	Cabba-Rock outcrop-Chama complex, 15 to 70 percent slopes	18	0.1	Not prime farmland
23C	Morton-Cabba silt loams, 3 to 9 percent slopes	440	2.7	Farmland of statewide importance
26	Grail silty clay loam, 0 to 2 percent slopes	231	1.4	All areas are prime farmland
27	Belfield-Grail silty clay loams, 0 to 2 percent slopes	561	3.4	Farmland of statewide importance
27B	Grail-Belfield silty clay loams, 2 to 6 percent slopes	803	4.9	Farmland of statewide importance
28	Belfield-Daglum silt loams, 0 to 2 percent slopes	243	1.5	Not prime farmland
28B	Belfield-Daglum silt loams, 2 to 6 percent slopes	500	3.1	Not prime farmland
29	Savage silty clay loam, 0 to 2 percent slopes	38	0.2	Farmland of statewide importance
29B	Savage silty clay loam, 2 to 6 percent slopes	719	4.4	Farmland of statewide importance
29C	Savage silty clay loam, 6 to 9 percent slopes	102	0.6	Farmland of statewide importance
30	Regent-Savage silty clay loams, 0 to 3 percent slopes	13	0.1	Farmland of statewide importance
30B	Regent-Savage silty clay loams, 3 to 6 percent slopes	241	1.5	Farmland of statewide importance
30C	Regent-savage silty clay loams, 6 to 9 percent slopes	150	0.9	Farmland of statewide importance
31B	Regent-Janesburg complex, 0 to 6 percent slopes	366	2.2	Not prime farmland
31C	Regent-Janesburg complex, 6 to 9 percent slopes	60	0.4	Not prime farmland
35B	Moreau silty clay, 0 to 6 percent slopes	23	0.1	Farmland of statewide importance
35C	Moreau-Wayden silty clays, 6 to 9 percent slopes	14	0.1	Not prime farmland
35D	Moreau-Wayden silty clays, 9 to 15 percent slopes	13	0.1	Not prime farmland
41B	Daglum-Rhoades complex, 0 to 6 percent slopes	181	1.1	Not prime farmland
45	Harriet silt loam, 0 to 2 percent slopes	89	0.5	Not prime farmland
51D	Vebar-Flasher-Tally complex, 9 to 15 percent slopes	315	1.9	Not prime farmland
51F	Flasher-Vebar-Parshall complex, 9 to 35 percent slopes	88	0.5	Not prime farmland
52B	Vebar-Parshall fine sandy loams, 0 to 6 percent slopes	124	0.8	Farmland of statewide importance
53B	Tally-Parshall fine sandy loams, 0 to 6 percent slopes	218	1.3	Farmland of statewide importance
53C	Tally-Parshall fine sandy loams, 6 to 9 percent slopes	53	0.3	Not prime farmland
54C	Vebar-Flasher complex, 6 to 9 percent slopes	466	2.8	Not prime farmland
56	Parshall fine sandy loam, 0 to 2 percent slopes	16	0.1	Farmland of statewide importance
57D	Beisigl-Flasher loamy fine sands, 6 to 15 percent slopes	26	0.2	Not prime farmland
59F	Flasher-Rock outcrop-Vebar complex, 9 to 70 percent slopes	33	0.2	Not prime farmland
60D	Wabek-Manning complex, 6 to 15 percent slopes	37	0.2	Not prime farmland
62B	Manning fine sandy loam, 0 to 6 percent slopes	78	0.5	Not prime farmland
63B	Lehr-Stady loams, 0 to 6 percent slopes	69	0.4	Not prime farmland
64	Stady loam, 0 to 2 percent slopes	69	0.4	Farmland of statewide importance
65	Wanagan loam, 0 to 2 percent slopes	6	0.0	Farmland of statewide importance
66F	Wabek-Cabba-Shambo complex, 6 to 35 percent	18	0.1	Not prime farmland

Map Unit Symbol	Map Unit Name	Area (acres)	Percentage of Project Area	Farmland Classification
	slopes			
70	Bowbells loam, 0 to 3 percent slopes	130	0.8	All areas are prime farmland
71	Williams-Bowbells loams, 0 to 3 percent slopes	16	0.1	Farmland of statewide importance
71B	Williams-Bowbells loams, 3 to 6 percent slopes	1,465	8.9	Farmland of statewide importance
73B	Williams-Reeder loams, 3 to 6 percent slopes	701	4.3	Farmland of statewide importance
76C	Williams-Zahl loams, 6 to 9 percent slopes	880	5.4	Not prime farmland
76F	Zahl-Williams loams, dissected, 15 to 45 percent slopes	105	0.6	Not prime farmland
100	Pits, gravel and sand	3	0.0	Not prime farmland
W	Water	14	0.1	Not prime farmland

Source: NRCS 2011.

NRCS (2011) classified approximately 5 percent of the soils in the Project Area as prime farmland, and about half (46 percent) as farmland of statewide importance (**Table 14**). Less than one percent of the Project Area is covered by soils classified as "all hydric"; the remaining area consists of partially hydric soils (i.e., soils containing hydric inclusions) (21 percent) and non-hydric soils (79 percent). Most of the area is relatively flat, with slope gradients less than 10 percent covering 87 percent of the Project Area. The lack of steep slopes combined with the soil textures mapped throughout the Project Area suggest low to moderate susceptibility to erosion by water. Most of the soils (75 percent) also have low to moderate susceptibility to wind erosion (i.e., NRCS Wind Erosion Groups 6 or greater).

7.10.2 Impacts

The impact to soils within the Project Area will be limited to areas removed from agricultural production by occupancy of Project components, including turbines, roads, collection lines, and a Project substation. Access roads will be 18- to 36-foot wide aggregate-surfaced roadways. Estimated impacts include up to 64 acres of permanent soil disturbance from turbine placement, access road construction, and a Project substation.

7.10.3 Mitigative Measures

Water and wind erosion hazards are low to moderate for Project Area soils. To minimize erosion during and after construction, best management practices (BMPs) for erosion and sediment control will be implemented and monitored. Construction sites will maintain sediment control practices in accordance with the Stormwater Pollution Prevention Plan (SWPPP). Proposed BMPs include seeding, mulching, installing filter strips, using erosion blankets, and stabilizing sod. If cuts are made for site grading during construction, topsoil will be segregated and reapplied after final contours are established.

7.11 Geologic and Groundwater Resources

7.11.1 Description of Resources

Central North Dakota lies within the Glaciated Missouri Plateau and the Unglaciated Missouri Plateau sections of the Great Plains physiographic province. Morton County spans several physiographic districts within these sections, including the Missouri River Trench, the Glaciated Missouri Slope, and the Unglaciated Missouri Slope. The Project Area is located entirely within the

Glaciated Missouri Slope, the glaciated strip of dissected plateau west of the Missouri River (Kume and Hansen 1965).

The physiography and surficial geology of southwestern North Dakota are primarily products of repeated glacial advances and retreats during the Wisconsin Glaciation. The topography of the Project Area is undulating with gentle relief, resulting from glaciation over the pre-existing stream-eroded bedrock topography. Quaternary (2.6 million year ago or younger) glacial sediment discontinuously covers the Project Area (NDGS 1980). The surface geology for the remainder of the Project Area consists of three Paleocene (65.5 to 55.8 million years ago) sedimentary bedrock units comprised of interbedded silt, sand, clay, sandstone, and lignite, as wells as river, lake, and swamp sediment (NDGS 1980). Most of the western half of the Project Area is underlain by the gray-brown Sentinel Butte Formation, which reaches up to 600 feet in thickness. Most of the eastern Project Area is underlain by the yellow-brown Bullion Creek Formation, also up to 600 feet thick. The gray-brown Slope Formation (up to 300 feet) underlies a small extent along the eastern boundary of the Project Area.

According to the North Dakota Geologic Survey (NDGS), North Dakota is located in an area of very low earthquake probability. Active tectonic features are not known to occur in southwestern North Dakota, and the deep basement formations underlying the state are expected to be geologically stable (Bluemle 1991). This information is supported by U.S. Geological Survey (USGS) seismic hazard maps, which show that the Project Area is located in an area with very low seismic risk (USGS 2008). Related geologic hazards, such as soil liquefaction, are therefore unlikely.

According to the ND PSC's Abandoned Mine Lands Division, there are two abandoned mines in the Project Area in Section 10 of T140N, R083W in Morton County (**Figure 4**). There are also other mines recorded in the vicinity of the Project Area. The mine located in the northeast quadrant of Section 10 is an abandoned surface coal mine where lignite was strip mined; the second mine is located in the southwest quadrant of Section 10; no information is available on this mine. The first mine is visible on aerial imagery, but no historic mining activity is apparent for the mine reported in the SW of Sec. 10. Oliver III has noted this location and will be aware of indicators of historic mining, such as sinkholes, depressions and slack piles during construction.

Groundwater in Morton County is available from aquifers in bedrock formations and from glacial deposits and alluvium (Ackerman 1980). Quaternary sands and gravels of alluvial and glacial deposits provide the highest yields and best quality water; however, these aquifers are limited in the Project Area. Bedrock aquifers are more widely distributed and provide the primary source for most domestic and stock wells in the county. Major bedrock aquifers occur in the Fox Hills, Hell Creek, Cannonball and Ludlow, and Bullion Creek formations. The sandstones that form these aquifers are very fine to fine-grained. The Fox Hills aquifer is the largest and most continuous bedrock aquifer in Morton County, underlying the entire county at depths greater than 1,500 feet in some areas. Water from these bedrock aquifers is typically hard (i.e., elevated in sodium bicarbonate or sodium biocarbonate-sulfate), but adequate for domestic, stock, and some industrial uses. Yields are generally less than 100 gallons per minute (gpm) (Ackerman 1980).

7.11.2 Impacts

Impacts of the Project to available mineral resources are likely to be highly limited. No sand, gravel, or coal resources are known to be actively mined in the Project Area. Oliver III has noted historic coal mine locations and will be aware of indicators of historic mining, such as sinkholes, depressions and slack piles during construction. Subsidence hazards related to the potential presence of abandoned underground coal mines will be minimized by thorough field studies and geotechnical analyses and subsequent micrositing.

Impacts to groundwater resources in the Project Area are anticipated to be minimal. Major withdrawals of groundwater will not be necessary because of the limited water supply needs of the Project. No new wells will be drilled. Based on the small amount of increased impervious surface area that will be created by Project components relative to the separation of these components and the size of the entire Project Area, the Project will likely have minimal impacts to regional groundwater recharge. Based on the generally deep water levels associated with bedrock aquifers in the area, Project construction activities such as excavation and construction of foundations are unlikely to affect groundwater quality or flow patterns. If impacts were to occur, they would likely be minor and highly localized, and unlikely to adversely affect local water supply wells. In addition, each turbine will 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 near the structures they serve.

Development of the turbine foundations may require subsurface blasting, which could fracture bedrock and affect groundwater flow in the immediate vicinity of the disturbance. If subsurface blasting is required, a blasting plan will be developed and implemented to keep the impacts localized and fracture the least amount of bedrock necessary for construction. Any blasting disturbances would be localized and temporary, with groundwater likely to resume its natural course of flow downgradient of the foundation. Dewatering of excavations is not anticipated to be necessary.

7.11.3 Mitigative Measures

As stated above, a geotechnical study and field studies will be completed for the Project. No further mitigation for geologic resources or groundwater is anticipated to be necessary.

7.12 Surface Water and Floodplain Resources

7.12.1 Description of Resources

Surface water and floodplain resources for the Project Area were identified by reviewing U.S. Geological Survey topographic maps, FEMA Flood Insurance Rate Maps (FIRM), and USFWS National Wetlands Inventory (NWI) data. There are no major rivers or traditional navigable waters found within the Project Area. Otter Creek as well as tributaries of Crown Butte Creek (which drains to Heart River) and Square Butte Creek are found in the Project Area; these all drain to the Missouri River.

The Project Area is located in FEMA Map Panel ID # 38059C0175D, 38059C0200D, and 38059C0225D. The Project is located entirely within FEMA Zone D. This is defined as: "Areas with possible but undetermined flood hazards. No flood hazard analysis has been conducted. Flood insurance rates are commensurate with the uncertainty of the flood risk" (FEMA 2009).

7.12.2 Impacts

Construction of the wind turbines, transformer pads, and access roads will disturb land within the Project Area. The wind turbines will be built on uplands in order to avoid intermittent streams located in the lower elevations of the landscape. Access roads to the turbines will be built to avoid impacts to surface waters.

Assuming that the proposed wind turbines and associated structures are not placed in potential flooding areas, it is reasonable to assume that floodplains will not be affected and are not a significant issue from a regulatory perspective.

7.12.3 Mitigative Measures

Access roads constructed adjacent to intermittent streams and drainageways 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 DOH prior to construction of the project.

7.13 Wetlands

7.13.1 Description of Resources

Wetlands and riparian areas are important resources because they provide habitat utilized by both resident and migratory wildlife. Wetlands also perform a variety of hydrologic (flood attenuation and groundwater recharge) and water quality (sediment attenuation and nutrient removal) functions.

A wetland delineation was conducted for the Project in the fall of 2009 and again in the fall of 2011. Off-site (desktop) determination methods were first used to identify probable locations of wetlands and waterbodies, while on-site methods were employed to verify wetland identifications and gather information to support the assessment of probable jurisdictional determinations. The wetland delineation report will be submitted when complete.

Two features (intermitten streatms, PY-13 and PY-14) in the Project Area were determined to be USACE jurisdictional wetlands (**Figure 4 and Figure 14**). Other delineated features that were determined to not be jurisdictional include drainage swales and seasonally flooded wetlands.

7.13.2 Impacts

Avoidance and horizontal directional drilling are recommended to avoid impacts to intermittent streams delineated as PY-13 and PY-14. Both of these features are within the survey corridor for collection line along County Road 83 south of County Road 140. If the collection line is bored using horizontal directional drilling, any potential impacts from the installation of the line would be eliminated, provided the boring initiated and terminated beyond the delineated boundaries of the drainage.

The Project is below the 0.5-acre threshold, making it eligible under the USACE Nationwide Permit (NWP) 12 for Utility Line Activities. Given the assumptions above, the Project is also below the 0.1-acre notification and mitigation thresholds of NWP 12. Application for a Section 404 Permit as well as notification to the USACE-Omaha District office is unnecessary.

A stormwater runoff permit would be obtained prior to construction. Compliance with this permit and the associated SWPPP would ensure that surface water is not adversely affected by runoff from disturbances and construction areas.

7.13.3 Mitigative Measures

Oliver III has avoided wetland impacts where possible. Horizontal directional drilling will be used to install the collection lines if necessary. All jurisdictional wetlands will be avoided during the construction phase of the Project.

7.14 Vegetation

7.14.1 Description of Resources

The Project Area is a rural location with farming and livestock grazing and related agricultural operations dominating the land use. A Tetra Tech biologist conducted field surveys in July 2008 and 2009 to determine the extent of native prairie within the Project Area (Tetra Tech 2009a). Approximately 3,770 acres (22 percent of the Project Area) were classified as native prairie, and 465 acres (3 percent of the Project Area) were classified as tame grasslands; the remaining acreage consists primarily of agricultural croplands. See the full native prairie report in **Appendix C**.

7.14.2 Impacts

Within the Project Area, potential impacts to plant communities due to construction activities were analyzed. The proposed turbine layout included 30 1.6-MW GE wind turbines and 4 alternative locations. Fifteen (15) turbines (plus 1 alternate) would be located in native prairie. Approximately 38 acres of native prairie would be disturbed during construction for the turbines, access roads, and collection line; 17 acres of that would be permanently disturbed.

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. Where disturbance is significant, effects can be mitigated by reseeding the trenched areas with native grasses following completion of construction activities.

7.14.3 Mitigative Measures

Oliver 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.

7.15 Wildlife

7.15.1 Description of Resources

A detailed list of wildlife species is not readily available for the Project Area. Based on issues identified at wind generation sites throughout the U.S., those species of greatest concern are federally or state-protected species, avian species, and bats that may occur in the Project Area.

Avian Species

Avian use surveys were conducted in the spring and fall of 2008 for most of the current Project Area as well as a large portion of Oliver County and sections of northern Morton County (Tetra Tech 2008a, 2008b). The surveys included 36 point count locations. The spring surveys also included raptor nest surveys and grouse lek surveys. Songbirds had the highest mean use out of all species groups observed. The most commonly observed species, the western meadowlark), redwinged blackbird, ring-necked pheasant, and horned lark are all widespread species and have relatively stable populations.

Fourteen of the 28 identified raptor nests were active. The nests were most commonly found outside the current Project Area. The species included red-tailed hawks, great-horned owl, and Swainson's hawks. Fifteen sharp-tailed grouse leks were observed, including eight in or near the current Project Area.

During the fall surveys, the same 36 point count locations were used. The most commonly observed species include European starling, Brewer's blackbird, and horned lark. No federally listed species were observed in the spring or fall surveys.

Bats

According to the USGS Northern Prairie Wildlife Research Center (2006), there are nine bat species that can be found in North Dakota, including the little brown bat (*Myotis lucifugus*), silver-haired bat (*Lasionycteris noctivagans*), big brown bat (*Eptesicus fuscus*), eastern red bat (*Lasiurus borealis*), hoary bat (*Lasiurus cinereus*), western long-eared myotis (*M. evotis*), western small-footed myotis (*M. ciliolabrum*), Keen's myotis (*M. keenii*), and long-legged myotis (*M. volans*).

Bats typically use farm buildings and dead/dying trees with cavities and loose bark as roosting and maternity habitat, and use riparian corridors and wetlands as feeding habitat. Tetra Tech developed a likelihood index based on habitat-based variables and species-based variables for determining the likelihood of bats occurring in the Project Area (Tetra Tech 2009b). Habitat-based variables include the amount of suitable foraging and roosting habitat, the number of natural areas, number of perennial streams, and number of human developments. Species-based variables included bat species known to occur in the region and behavioral characteristics. The likelihood index does not predict how many bats will occur or the anticipated bat mortality level, rather it scores a site based on a suite of variables that are related to bats.

Of the 46 bat species in the United States, 10 occur in North Dakota. Of these 10 species, six potentially occur within the Project Area based on current known distribution ranges. None of these species are federally listed as threatened or endangered or listed as a state species of conservation concern. Limited suitable roosting and foraging habitat exists within the Project Area that may provide a marginal attractiveness for migrating bats. Overall, Tetra Tech calculates a low to moderate likelihood of occurrence for bat species for the Project Area.

7.15.2 Impacts

In general, most wildlife species do not use disturbed agricultural land as their primary habitat. As a result, there will be minimal impact to most species. Cranes, geese, and blackbirds all utilize agricultural land, however, especially during migration and in the winter. Potential impacts to sensitive species are discussed in more detail in **Section 7.16.2** below.

7.15.3 Mitigative Measures

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

- Siting access roads and turbines away from wetlands, waterbodies, and native prairies to the greatest extent practicable
- Minimizing the use of lights on turbines when practicable in accordance with state, federal, and local requirements
- Restricting construction and/or operation activities due to active raptor nests; mapping and flagging raptor nests found during construction; placing turbines as far away from raptor nests as project and engineering constraints permit and avoid removal of trees
- Minimizing impacts to native vegetation and wetlands during design and construction of turbines and associated infrastructure
- Reseeding or planting disturbed areas with native material
- Enhancing existing degraded habitat, where practicable, through the removal and replacement of invasive species with plants native to the site
- Developing a management plan to prevent the spread of noxious weeds throughout the Project Area or adjacent areas during construction and ongoing operations
- Implementing a Wildlife Response Reporting System (WRRS) once turbine construction is completed. The WRRS will include protocols for field technicians to report and document avian mortalities during routine maintenance operations.

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. The ESA makes it unlawful to "take" a listed species. Take is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect or attempt to engage in any such conduct." Significant modification or degradation of listed species' habitats is considered "harm" under ESA regulations. Projects that have such potential will require consultation with USFWS and may require special permitting or mitigation measures to avoid or reduce impacts to these species. Candidate species receive no statutory protection from the USFWS; however, they do receive full protection once listed.

There are six federally listed species and one candidate species that have the potential to occur in Morton County (USFWS 2011): the endangered whooping crane (*Grus americana*), interior least tern (*Sterna antillarum*), pallid sturgeon (*Scaphirhynchus albus*), black-footed ferret (*Mustela nigripes*), and gray wolf (*Canis Lupus*); the threatened piping plover (*Charadrius melodus*); and the candidate Sprague's pipit (*Anthus spragueii*).

Whooping Crane

The whooping crane is protected by both federal and state laws in the United States. It was considered endangered in the United States in 1970 and the endangered listing was 'grandfathered'

into the ESA in 1973. Under the North Dakota comprehensive wildlife conservation strategy guide, a level three species of conservation priority is a species of moderate priority but is believed to be peripheral or non-breeding in North Dakota (Hagen et al. 2005). State listing carries no regulatory protection in North Dakota, however.

One self-sustaining wild population of whooping cranes currently exists in the world. Members of this population breed primarily within the boundaries of Wood Buffalo National Park in Canada and migrate through the central United States in route to the wintering grounds at Aransas National Wildlife Refuge along the Gulf Coast of Texas. This flock is referred to as the Aransas-Wood Buffalo National Park Population. Due to intensive management, this population has increased from 15 birds in 1941 to 247 as of the start of spring migration in 2009 (USFWS 2009a).

Whooping cranes undertake a 5,000-mile annual round-trip migration from the breeding area in Canada to the wintering area in Texas. Individuals depart the breeding ground in Canada and travel south through Alberta, North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and reach the wintering ground on the Texas coast. The migration route is well defined and 94 percent of all observations occur within a 200-mile wide corridor during spring and fall migration (CWS and USFWS 2007). The Project Area is centrally located in the migration corridor. There were no recorded observations of whooping cranes within the Project Area during 2008 spring and fall avian surveys (see above).

Interior least tern

The interior population of the least tern was listed as endangered species in 1985 (USFWS 1985a). This tern 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, and on the Missouri and Yellowstone Rivers upstream of Lake Sakakawea (USFWS 2008).

Pallid sturgeon

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.

Black-footed ferret

The black-footed ferret inhabits short-grass prairies, always within close proximity to prairie dog towns. It was listed as an endangered species in 1967 (USFWS 2011). Black-footed ferrets once ranged throughout the Great Plains, but are now considered the rarest land mammal in North America. Their rapid decline has been linked to the eradication of the prairie dog for farming and grazing. Prairie dogs comprise approximately 90 percent of the black-footed ferret's diet. Unverified black-footed ferret sightings continue to be reported in the state, primarily from the southwestern portion. There are no known active prairie dog towns within the Project Area.

Gray wolf

The gray wolf was listed as an endangered species in 1978 (USFWS 1978). In 2003, the USFWS downgraded the two northern subpopulations (western and eastern distinct population segments) to threatened (USFWS 2003). While additional decisions regarding the western populations of gray wolf have been made more recently, the eastern population remains listed as threatened. Once common in forested habitats throughout North Dakota, the last confirmed sighting in the state was 1991, although there have been more recent but unconfirmed reports of sightings in the Turtle Mountains in the north-central portion of the state.

Piping Plover

The Great Plains population of the piping plover was listed as a threatened species in 1985 (USFWS 1985b). The plover nests in 23 counties in North Dakota, primarily in alkali wetlands in the Missouri Coteau with some on the Missouri River. Reasons for decline of the piping plover include habitat loss and nest depredation in the wetlands. The main reason for decline of the species along the Missouri River is habitat loss due to water development projects (e.g., Fort Peck Dam, Garrison Dam, and Oahe Dam) and loss of wetlands due to agriculture and other developments.

Critical habitat for the piping plover was listed on September 11, 2002 (USFWS 2002a), and includes the entire length of the Missouri River in North Dakota and the following locations in Burleigh County: Lake Arena, Long Lake National Wildlife Refuge, Rachel Hoff Waterfowl Production Area, and Rath Waterfowl Production Area. The closest parcel of critical habitat to the Project is approximately five miles away.

Sprague's Pipit

Sprague's Pipit is a migrant that prefers extensive tracts of native mixed-grass prairie. The Project Area falls within the primary range of Sprague's pipit and this species has a high likelihood of occurring in the Project Area.

Native Prairie Habitats

Native prairies serve as a vital ecological resource by improving water quality, providing erosion control, and supporting a diverse population of plants and animals. However, due to the native prairies' fertile soils and predominantly flat topography, large portions of the native prairie have been converted to agricultural lands. This wide spread loss of native prairie makes this an ecosystem of conservation concern and one of the most endangered ecosystems in North America (Samson et al. 2004).

Native prairies are important habitat used by prairie grouse (e.g., sharp-tailed grouse, greater prairie chicken) for lekking, nesting, brood rearing, and wintering. Grouse lek habitat is classified as open, short grass vegetation with minimal amounts of agriculture. Development in grouse lekking habitat could result in direct habitat loss, habitat loss through avoidance, predator facilitation, and construction-related disturbance. Most prairie grouse are considered gamebirds and are often managed locally by state fish and game agencies for hunting purposes.

As discussed in **Section 7.14**, a native prairie survey was conducted for the Project.

7.16.2 Impacts

No whooping cranes were observed during the surveys. Tetra Tech conducted a whooping crane likelihood assessment (Tetra Tech 2009c) based on: location in the migration corridor; attractiveness of the landscape; historical observations of whooping cranes; and presence of feeding and roosting sites. The analysis resulted in a low to moderate likelihood of whooping cranes occurring within the Project Area. The Project Area is located within the central portion of the migration corridor and there have been historical observations within ten miles of the Project Area, although there are few suitable wetlands within the Project Area, making it less attractive than the surrounding 35-mile buffer area.

The Project is located more than five miles to the east of interior least tern habitat, the Project Area contains no sizeable rivers with sandbars, and Project development will not affect water quantity or quality in the Missouri River or its major tributaries. Therefore, the Project will have no impact on breeding interior least terns. Furthermore, the limited extent of wetlands close to the Project and the low likelihood that existing wetlands (e.g., farm ponds) contain enough fish to attract foraging terns suggests that the likelihood of terns occurring near the Project is very low. The transmission line associated with the Project was permitted separately and will be marked. All new electrical collection lines will be buried. In the highly unlikely event of this species occurring in the Project Area, the potential for collisions with transmission lines will be minimized. To date, no interior least tern fatality has been reported at a wind farm. No interior least terns were observed during the 2008 spring and fall avian surveys (Tetra Tech 2008a and 2008b).

The Project would not affect water quantity or quality in the Missouri River or its major tributaries. It is unlikely that the sturgeon would occur in the ephemeral streams in the Project Area, and the Project is therefore unlikely to affect the pallid sturgeon.

Because there are no known active prairie dog towns within the Project Area, the black-footed ferret is very unlikely to occur within the Project Area and the Project is unlikely to affect this species. The Project is unlikely to affect current gray wolf habitat, and there has not been a confirmed wolf sighting in North Dakota since 1991.

There are no alkali lakes within 0.5 mile of the Project, eliminating the possibility of piping plovers breeding in the Project Area. The closest parcel of designated critical habitat to the Project (the Missouri River) is over five miles away; breeding piping plover rarely travel more than one mile from their nest sites during the breeding season (USFWS 2003b), thereby minimizing the potential for piping plovers to occur on site while foraging during the breeding season. In the highly unlikely event of this species occurring in the Project Area, the avoidance of permanent wetland impacts and the burying of all new utility lines will minimize potential impacts. To date, no piping plover fatality has been reported at a wind farm and no piping plover were observed during the spring and fall 2008 avian surveys (Tetra Tech 2008a and 2008b). As a result, the Project is unlikely to adversely affect the piping plover.

Sprague's pipit was observed during both the spring and fall avian surveys (Tetra Tech 2008a and 2008b), although it was not observed flying within the rotor swept area (RSA). To date, no Sprague's pipit fatality has been reported at a wind farm, although the species native prairie habitat would be impacted by the Project; native prairie impacts are discussed above in **Section 7.14.2**.

7.16.3 Mitigative Measures

Oliver III will avoid the resources identified to the extent practicable. Avoidance/minimization practices are discussed in **Sections 7.14.3** and **7.15.3**.

7.17 Summary of Impacts

Table 15 summarizes the resources that will be affected as a result of the 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
Land Use	Approximately 64 acres of land will be affected by 30 turbines, associated access roads, a substation, and O&M facility. Temporary impacts, including for collection line trenching and laydown and contractor staging, would be approximately 111 acres.	Oliver III will work with landowners and regulatory agencies to minimize impacts of the Project.
Public Services	No impacts are anticipated.	Oliver III 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 impacts are anticipated.	Turbines will be lighted to comply with FAA requirements. Oliver III will follow "prudent avoidance" methods to minimize EMF exposure. A variety of security measures will be implemented to reduce the chance of physical and property damage.
Noise	No impacts are anticipated to noise-sensitive resources.	Oliver III will locate turbines so the maximum level of 55 dBA is not exceeded at occupied residences.
Visual	Visual impacts will occur. The impacts are based on a subjective human response, and there are existing wind energy facilities in the Project vicinity.	Oliver III will work with landowners to site turbines. They will not be located in environmentally sensitive areas. Existing infrastructure will be used where possible. Cut and fill areas will be minimized and mitigated as appropriate.
Cultural and Archaeological	No impacts to previously identified cultural resources are anticipated.	Oliver III has conducted a Class III inventory for the Project. Turbines and other Project facilities were microsited to avoid impacts to archaeological sites. Six archeology sites will be fenced and avoided.
Recreational Resources	No impacts are anticipated.	N/A
Land Based Economies	Approximately 64 acres of land will be affected by 30 turbines, associated access roads, a substation, and O&M facility. Temporary impacts, including for collection line trenching and laydown and contractor staging, would be approximately 111 acres.	Oliver 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. Only land needed for the facility will be permanently affected. Temporarily disturbed areas will be restored.

Resource	Impact	Mitigation
Geologic and Groundwater Resources	No impacts to groundwater resources are anticipated.	N/A
Surface Water and Floodplain Resources	Access roads and turbines will be located and constructed in such a manner that no impacts are anticipated.	Impacts to surface waters will be avoided to the extent practicable. Oliver III will implement BMPs to minimize erosion and sedimentation at the site.
Wetlands	No impacts to jurisdictional wetlands are anticipated.	All impacts to jurisdictional wetlands will be avoided during construction of the Project; horizontal directional drilling will be used where necessary to avoid impacts to wetlands from collection line trenching.
Vegetation	Approximately 64 acres of land will be affected by 30 turbines, associated access roads, a substation, and O&M facility. Temporary impacts, including for collection line trenching and laydown and contractor staging, would be approximately 111 acres. 15 turbines (and 1 alternate) will be located in native prairie.	Oliver 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 per USFWS and NRCS recommendations. Native prairie will be avoided to the extent practicable and will be reseeded using native prairie mix.
Wildlife	Potential avian and bat collisions may occur, but are anticipated to be relatively few.	A variety of mitigative measures will be implemented, as discussed in **Section 7.15.3**. Oliver III's WRRS will be implemented after construction of the Project as described in **Section 7.15.3**.
Rare and Unique Natural Resources	The Project Area is in the whooping crane migration corridor, although little suitable wetland habitat is present. No other federally listed species are expected to be affected by the Project.	Wetlands will be avoided to the extent practicable by the Project. The transmission line associated with the project will be marked.

8. PUBLIC AND AGENCY COORDINATION

Per Section 69-06-01-05 of the North Dakota Public Service Commission (PSC)'s administrative rules, Oliver III and its representatives have contacted key local, state and federal agencies to inform them of the Project and for assistance in identifying concerns or issues within the Project Area. Agency correspondence and responses received as of October 26, 2011 are included in **Appendix D**. See **Section 10.12** for a summary of responses received from agencies.

Principal stakeholders in the Project are landowners that have entered or will be entering into agreements with Oliver III to provide wind rights for the Project. Oliver III will continue to meet with County officials as the Project moves forward and Oliver III seeks any necessary permits (e.g. access permit, sanitary permit) from the County.

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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 Project are shown in **Table 16**. Permits dependent on the final site layout will be applied for after receiving PSC approval, but prior to construction.

Table 16. Potential Permits and Approvals Required for Construction and Operation of the Proposed Facility

Agency	Type of Approval	Status*	Need
Federal Approvals			
U.S. Army Corps of Engineers (USACE)	Nationwide Permit	3	Wetland delineation complete.
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.
State of North Dakota			
Public Service Commission	Certificate of Site Compatibility	1	Required for construction of generation facility over 0.5 MW in size.
North Dakota Department of Health	NPDES Permit: General Construction Storm Water	2	Required for disturbance of over 1 acre of land. Must prepare a Storm Water Pollution Prevention Plan (SWPPP).
North Dakota Highway Patrol	Overheight/Overweight Permit	2	Permit required for hauling construction equipment and materials on State Highways.
North Dakota Department of Transportation	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 ROW.
Local Permits			
Morton County	Conditional Use Permit	1	CUP issued on November 10, 2009 (see **Appendix D**).
Morton County	Building Permits	2	

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

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10. FACTORS CONSIDERED

The North Dakota Energy Conversion and Transmission Facility Siting Act lists 11 factors to guide the Commission in the evaluation and designation of the site of the facility.

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

The preceding sections discuss the research and investigations relating to the effects of the 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 III will utilize the most current technologies that minimize impacts to the environment. Current wind turbine technologies, including the equipment and siting tools, optimize the wind and land resources.

10.3 Potential for Beneficial Uses of Waste Energy

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

10.4 Unavoidable Adverse Environmental Effects

Unavoidable adverse environmental effects may include the visual impacts associated with the Project as well as those impacts related to the placement of Project facilities and the use of the land within the site. The visual character of the site will be changed due to the construction of the Project. In order to construct the facility, access roads and turbine pads are necessary for the operation and maintenance of the facility. The preliminary turbine, access road, and substation layout is expected to impact approximately 64 acres of land. An additional 111 acres of land will be temporarily affected, including collection line trenching and laydown and contractor staging areas.

10.5 Alternatives to the Proposed Site

No alternatives were considered for the development of the Project. Oliver III believes that the proposed site is the most viable alternative. Oliver 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 time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action. There are few commitments of resources associated with this Project that are irreversible and irretrievable, but these include those resources primarily related to construction. Construction of the Project will necessitate a one-time expenditure of funds, which is not retrievable.

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 anticipated economic benefits of the Project will balance the irretrievable commitment of resources resulting from the construction of the Project (see **Section 10.7**).

10.7 Direct and Indirect Economic Impacts

Economic impacts include impacts associated with the temporary conversion of up to 174 acres of land to turbine sites, associated access roads, and associated facilities. Permanent impacts will be substantially lower, at 63 acres. In general, agricultural areas surrounding each turbine can still be farmed, and landowner compensation will be established by 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 Morton County 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 northeastern North Dakota. Additional revenues are expected from property and income taxes.

Continuing to establish the southern 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

Tetra Tech conducted a Class II Reconnaissance Survey for architectural properities and a Class III Pedestrian Survey for archeological resources. Based on the layout dated October 13, 2011, five archaeological sites, the one site lead, and the four Euro-American stone piles are located in the APE for direct effects. As currently designed, the five archaeological sites and one Euro-American

stone pile will be avoided during construction. The cultural resources inventory report will be submitted to the North Dakota State Historic Preservation Officer (SHPO) for comment once it is complete.

Oliver III Wind is committed to minimize impacts to these resources and will avoid these resources and any additional resources identified throughout the life of the Project. If avoidance is not possible, Oliver III Wind will work with the North Dakota SHPO to mitigate potential impacts.

10.10 Effect of Site on Biological Resources

Oliver III will implement measures to avoid and minimize effects to biological resources at the proposed site. The impact of the Project on wildlife is expected to be minimal. There is potential for avian and bat collisions with facility turbines or meteorological towers. The site will be designed to minimize impacts to those species.

10.11 Cumulative Effects

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. The principal resources of concern for cumulative impacts are anticipated to be land use and vegetation, wildlife, and visual resources. With the increase in land being used for wind energy generation activities, farming may decrease slightly. The cumulative impacts will be a concern for the rural communities that have historically made their living from agricultural activities. The additional income from wind development on their land, however, may make it more feasible for farmers to keep most of their land in agricultural uses rather than being developed for suburban development. Wind energy development removes less total land from agricultural use than other forms of development.

Cumulative impacts for noise and shadow flicker were not considered because the closest existing wind energy project is over 10 miles away.

With regard to the cumulative impacts to wildlife, there is a concern that even if no wetlands and other sensitive habitat are directly affected by wind energy projects, the wetlands surrounding the projects will no longer be used by wildlife, and particularly to whooping cranes.

10.12 Agency Comments

Agencies were contacted in September 2011 to comment on the Project. The following summaries of comments received apply to the proposed Project.

10.12.1 North Dakota Game and Fish Department (NDGFD)

Oliver III submitted a letter to the NDGFD on September 19, 2011. The NDGFD stated in a response letter dated October 10, 2011 that the agency's primary concern with wind farm development is the disturbance of native prairie associated with project construction. In addition, some wetlands occur within the Project Area. The agency asked that work within native prairie be avoided, that aboveground appurtenances not be placed in wetland areas, that no alternations be made to existing drainage patterns, and that unavoidable wetland impacts be replaced in-kind. The

agency also recommended monitoring for avian and bat mortality for the life of the Project. The letters are included in **Appendix D**.

10.12.2 U.S. Fish and Wildlife Service (USFWS)

Oliver III submitted a letter to the USFWS on September 19, 2011 (**Appendix D**). No response has been received as of October 26, 2011.

10.12.3 State Historical Society of North Dakota

The State Historic Preservation Officer (SHPO) responded to Oliver III's letter on September 26, 2011 recommending a Class I Cultural Resource Inventory (file search) and Class II (reconnaissance) pedestrian survey for the Project. These inventories have been completed and the report will be sent to the SHPO for review once it is complete. A copy of the SHPO response letter is included in **Appendix D**.

10.12.4 North Dakota Geological Survey (NDGS)

Oliver III submitted a letter to the NDGS on September 19, 2011 (**Appendix D**). No response has been received as of October 26, 2011.

10.12.5 North Dakota Parks and Recreation Department

Oliver III submitted a letter to the North Dakota Parks and Recreation Department (NDPRD) on September 19, 2011 (**Appendix D**). No response has been received as of October 26, 2011.

10.12.6 North Dakota Department of Health

Oliver III submitted a letter to the North Dakota Department of Health (NDDoH) on September 19, 2011. In a letter dated September 29, 2011, the Environmental Health Section responded that environmental impacts from the proposed construction "will be minor and can be controlled by proper construction methods." The agency noted that measures should be taken to control fugitive dust, minimize impacts to water bodies. In addition, a stormwater permit should be obtained and construction should not occur in the early morning or late evening to minimize noise impacts. Both letters are found in **Appendix D**.

10.12.7 North Dakota Department of Transportation

Oliver III submitted a letter to the North Dakota Department of Transportation (DOT) on September 19, 2011 (**Appendix D**). No response has been received as of October 26, 2011.

10.12.8 North Dakota State Water Commission

Oliver III submitted a letter to the North Dakota State Water Commission on September 19, 2011 (**Appendix D**). In a response dated October 11, 2011, the agency stated that the Project is not located within an identified floodplain. All waste material associated with the Project must be disposed of properly and not placed in floodways. The agency does not have other concerns associated with the Project.

10.12.9 North Dakota State Land Department

Oliver III submitted a letter to the North Dakota State Land Department on September 19, 2011 (**Appendix D**). No response has been received as of October 26, 2011.

10.12.10 U.S. Army Corps of Engineers (USACE)

Oliver III submitted a letter to the USACE on September 19, 2011. In a response dated September 28, 2011, USACE indicated that a permit application must be submitted in order to determine if a Section 10 or Section 404 permit is required. The agency cannot provide additional information related to proposed NWP A as there is no final determination on the permit yet (**Appendix D**).

10.12.11 North Dakota Aeronautics Commission

Oliver III submitted a letter to the North Dakota Aeronautics Commission on September 19, 2011 (**Appendix D**). No response has been received as of October 26, 2011.

10.12.12 North Dakota Department of Agriculture

Oliver III submitted a letter to the North Dakota Department of Agriculture on September 19, 2011 (**Appendix D**). No response has been received as of October 26, 2011.

10.12.13 North Dakota Indian Affairs Commission

Oliver III submitted a letter to the North Dakota Indian Affairs Commission on September 19, 2011 (**Appendix D**). No response has been received as of October 26, 2011.

10.12.14 Morton County Soil Conservation District

Oliver III submitted a letter to the Morton County Soil Conservation District on September 19, 2011 (**Appendix D**). No response has been received as of October 26, 2011.

11. QUALIFICATIONS OF CONTRIBUTORS

NAME PROJECT ROLE	EDUCATION AND PROFESSIONAL EXPERIENCE
JOHN DIDONATO Executive Director, Project Development NextEra Energy Resources	John will lead negotiation of all key commercial agreements associated with the project including the PPA. John directs all wind energy development efforts in the Mid-Continent region (excluding Texas). Since 2000, John has developed over 2,000 MW of generation projects for FPL Energy. He has directed development efforts and negotiated the PPAs for all of the wind projects that FPL Energy has developed and constructed in the Dakotas, which will total over 410 MW by the end of 2007. Additionally, he also directed development efforts and negotiated nearly all of the critical agreements for the 680 MW Calhoun Energy Center, a gas fired simple cycle facility located in Oxford, Alabama. Over the past nine years with NextEra, John has led or played a major role in the development or acquisition of over $3 billion in electric generation assets utilizing wind and clean natural gas technologies. Bachelor's degree, Kent State University. Master's degree, Florida Atlantic University
SCOTT SCOVILL Project Manager, Project Development NextEra Energy Resources	Project developer representing Oliver III in all commercial and regulatory aspects of the project.
ALLEN WYNN Environmental Project Manager NextEra Energy Resources	Mr. Wynn has over 15 years of experience preparing NEPA documents and permitting for large linear projects and energy facilities. B.S., Southwest Texas State University, Natural Resource and Environmental Studies
DICK RAUSCH Construction Project Manager NextEra Energy Resources	Provided input on route from a "constructability" perspective.
TOM FACTOR Land Easement Specialist/ Route Mapping NextEra Energy Resources	Representing NextEra Energy Resources on wind resource, landowner discussions and selection of corridor.
TED WEISSMAN Land Easement Specialist NextEra Energy Resources	Representing NextEra Energy Resources on landowner discussions and selection of corridor.
BRIAN BJELLA Attorney for Applicants Crowley Fleck PLLP	Applicant's counsel. J.D. and Bachelor's degree, both from University of North Dakota.
TRACEY DUBUQUE, P.E. Project Manager Tetra Tech EC, Inc.	Ms. Dubuque has ten years of experience in the environmental consulting business. She has experience preparing and securing environmental permits for energy-related facilities, coordinating and managing biological and cultural field surveys, and contributing to National and State Environmental Policy Act (NEPA) documentation. Ms. Dubuque manages siting studies, prepares environmental permits, and conducts consultation with local, state and federal stakeholders for wind energy. Bachelor's degree in Civil Engineering, Merrimack College.

NAME PROJECT ROLE	EDUCATION AND PROFESSIONAL EXPERIENCE
ANNE-MARIE GRIGER, AICP Environmental Planner Tetra Tech EC, Inc.	Ms. Griger has six years experience preparing and securing environmental permits for large infrastructure and energy-related facilities, conducting socioeconomic and environmental justice analyses, and contributing to National Environmental Policy Act (NEPA) documents. She also has public involvement experience. Bachelor's Degree: Environmental Policy & Planning, Master's Degree: Urban & Regional Planning, both from Virginia Polytechnic Institute and State University.
KIMBERELY GORMAN GIS Analyst and Project Manager Tetra Tech	Ms. Gorman is a Certified GIS Professional with ten years of professional work experience in GIS/GPS design, analysis, and application. Ms. Gorman provides GIS analysis, GPS support, data conversion, editing and management, and cartographic production for the numerous project applications including NEPA analysis, critical issues analysis, siting for wind energy projects, TMDL modeling, contamination assessments, fuels reductions analysis, soils assessments, trails scoping, and cultural resource and critical ecosystem mapping.
TIM DOUGHERTY GIS Analyst Tetra Tech	Mr. Dougherty prepared the application figures, impact calculations, and other GIS tasks. Mr. Dougherty has five years of professional experience as a GIS Analyst, including but not limited to database design and management; GIS data conversion, development, migration, and integration; GIS/GPS Deployment. His expertise is in GIS projects involving utility systems, energy planning/siting, asset management, infrastructure, and constraint/impact analysis.
ADAM HOLVEN Archaeologist Tetra Tech	Mr. Holven led the Class I and Class III Cultural Resources Inventory for the 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.
KATHY BELLRICHARD Wetlands Biologist Tetra Tech	Ms. Bellrichard led the wetlands delineation surveys for the Project. She is trained in wetland delineation and has conducted wetland surveys and completed delineations in North Dakota, South Dakota, and Minnesota.

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13. DEFINITIONS

ADT	Average Daily Traffic
ANSI	American National Standards Institute
APE	Area of Potential Effects
ASTM	American Society for Testing and Materials
Asynchronous Generator	A cage-wound generator, also called an induction generator, used to generate alternating current
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
Class I Cultural Resources Inventory	Existing data inventory – a large-scale review and compilation of known cultural resource data
Class II/III Cultural Resources Inventory	Field inventory to identify cultural resources that could be affected by Project facilities within the Project Area
Aggregate Surface	Road cover used for proposed access roads
Commission or PSC	North Dakota Public Service Commission
CRP	Conservation Reserve Program
DA	Department of the Army
dBA	A-weighted decibel
Distribution	Relatively low-voltage lines that deliver electricity to the retail customer's home or business
DOE	US Department of Energy
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	Electric and Magnetic Field
EPC	Engineering, procurement, and construction
EPCRA	Emergency Planning and Community Right-to-Know Act
ESA	Environmental Site Assessment
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Maps
FPPA	Farmland Protection Policy Act
Ft	Foot/Feet
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

kW	kilowatt
MW	megawatt
M	meter
m/s	meter per second
MAPP	Mid-Continent Area Power Pool
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.
MISO	Midwest Independent System Operator
mph	miles per hour
Nacelle	A streamlined enclosure (as for an engine), which houses the gearbox, generator, brake, cooling system and other electrical and mechanical systems
NDDOT	North Dakota Department of Transportation
NESC	National Electric Safety Code
NDAC	North Dakota Administrative Code
NDCC	North Dakota Century Code
NDGFD	North Dakota Game and Fish Department
NDPRD	North Dakota Parks and Recreation Department
NHID	Natural Heritage Inventory Database
NPDES	National Pollutant Discharge Elimination System
NRCS	National Resource Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
NWP	Nationwide Permit
O&M	Operations and maintenance
Pitch	The action or a manner of pitching; especially an up-and-down movement
PPA	Power Purchase Agreement
Project, the	Oliver III Wind Energy Center
PSC or Commission	North Dakota Public Service Commission
PTC	Production Tax Credit
REC	Recognized Environmental Condition
Rotor	The rotor consists of three blades mounted to a rotor hub
RD	Rotor Diameter: Diameter of the rotor from the tip of a single blade to the tip of the opposite blade
ROW	Right-of-Way
rpm	Revolutions per minute
SCADA	Supervisory Control and Data Acquisitions (communications technology)
SHPO	North Dakota State Historic Preservation Office
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	US Army Corps of Engineers
USEPA	US Environmental Protection Agency
USFWS	US Fish and Wildlife Service
UT	Unincorporated Township
WMA	Wetland Management Area
WPA	Waterfowl Protection Area
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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