Baldwin Wind Energy Center
Baldwin Wind, LLC
Burleigh County, North Dakota

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

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BALDWIN WIND ENERGY CENTER

Case No.: PU-09-668

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March 2010

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- Native Prairie Report
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1. INTRODUCTION

Baldwin Wind, LLC (Baldwin Wind), 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 Baldwin Wind Energy Center (the Project). NextEra Energy submitted a letter of intent to file this application to the North Dakota Public Service Commission (PSC) on October 2, 2009. The Project is located in Burleigh County, North Dakota, (**Figures 1-3**) and would have a nameplate capacity of 99 megawatts (MW) consisting of 62 GE Xle 1.6-MW wind turbine generators. Additional facilities include a collection substation, a construction laydown area, access roads up to 32 feet in width, and electrical collection systems and cabling.

The Project will interconnect to the existing Ecklund Substation and transmit power into Western Area Power Administration (Western)'s transmission system at Western's existing Hilken substation. 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 Ecklund substation.

NextEra Energy develops environmentally responsible electric generation projects throughout the United States. According to FPL Group's 2006 Sustainability Report (**Appendix A**), NextEra Energy entities collectively own and operate 4,016 MW of wind energy generation capacity in 24 states, including projects in Iowa, Wisconsin, Minnesota, North Dakota, and South Dakota with a combined energy generation of over 750 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 Baldwin Wind 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, Baldwin Wind identified the Project Area (see **Figures 1-3**) for further investigation. Baldwin Wind then conducted environmental desktop and field studies in the Project Area, the results of which are incorporated in the appropriate sections of this application, and further assessed wind resource and transmission availability and interconnection points. The identified Project Area is considered optimal from a wind resource perspective.

Baldwin Wind has entered into agreements with landowners that are interested in having wind turbines and associated facilities placed on their property. Simultaneously, Baldwin Wind 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. Baldwin Wind 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.

Baldwin Wind seeks a Certificate of Site Compatibility for the Project Area, not the specific turbine locations. Baldwin Wind 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, Baldwin Wind 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, Baldwin Wind will complete any additional studies required by the Certificate or Baldwin Wind's siting process, including geotechnical studies. Baldwin Wind will also further evaluate the Project Area based on efficient construction of the Project. In addition, Baldwin Wind 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.

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

1.3 Project Summary

Baldwin Wind evaluated wind resources in North Dakota for siting a 99-MW wind generation facility. Based on this review, Baldwin Wind selected a Project Area approximately four miles southeast of Wilton, 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 Baldwin Wind to optimize the wind resource while avoiding and minimizing impacts to environmental resources. The Project is located in Burleigh County within the following townships, ranges, and sections (**Table 2**):

Table 2. Project Area Location

County	Township Name	Township	Range	Sections
	Crofte	141N	79W	2-5, 8-15, 24
	Ecklund	142N	79W	4- 6, 19-23, 26-30, 33-35
			80W	1, 12, 25
	Grass Lake	143N	79W	21-23, 26-30, 32, 33

The Project Area encompasses approximately 21,000 acres (33 square miles) near Wilton, North Dakota. The turbines will be placed throughout the Project Area. However, the Project structures will only occupy 412[1] acres, or two percent of the total land area. The Project Area and Project layout are shown on **Figures 1-3**.

1.3.2 Projected Output

The Project will have a nameplate (gross) capacity of up to 99 MW. Assuming net capacity factors of 45 percent, the projected average annual output is estimated at 197,100 megawatt hours (MWh) per year. As with all wind projects, output is dependent upon wind resource, final design, site-specific features, and equipment.

[1]Assuming 279 acres for 62 turbines (250-foot radius each), 99.3 acres for 32-foot wide access roads, and 33.3 acres for the substation.

1.4 Project Schedule

The commercial operation date is dependent upon permitting, equipment deliveries, and other development activities. Baldwin Wind is targeting construction for July 1, 2010 provided all pre-construction permits and approvals have been obtained.

1. Certificate of Site Compatibility: Baldwin Wind anticipates the Certificate will be approved in June 2010.

2. Land Acquisition: Baldwin Wind completed the acquisition of easements from landowners in Ecklund and Crofte townships in November 2009; easements are still being acquired in Grass Lake Township.

3. Permits: Baldwin Wind 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 Baldwin Wind to move forward with other commitments on the Project.

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

5. Construction: Construction is scheduled to begin in July 2010, 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 seven months to complete.

6. Test and Operations: Baldwin Wind anticipates testing and operation to begin October 2010.

7. Commercial Operation: Baldwin Wind anticipates commercial operation of the Project to begin producing energy in December 2010.

1.5 Project Ownership

It is anticipated that Baldwin Wind will own the entire Project and, as a result, will manage the construction of all equipment and associated facilities related to the Project. Baldwin Wind will likely select a third-party contractor to perform the majority of the engineering and construction (E&C) of the wind farm. Baldwin Wind 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 critical 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 indicates that deficits are now expected by 2013 (**Table 3**), suggesting that MAPP members answered the call and additional capacity was added in recent years.

Table 3. MAPP Summer Season Surplus/Deficit

Year	MW	Reserve Margin Percentage
2008	1,721	6.5%
2009	1,187	4.3%
2010	665	2.3%
2011	490	1.7%
2012	336	1.1%
2013	-7.5	-0.02%
2014	-261	-0.9%
2015	-977	-3.1%
2016	-1,448	-4.6%
2017	-1,804	-5.6%

Source: Page III-3 of the MAPP 2008 Load and Capability Report (MAPP, 2008).

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 62 turbines, an additional 50 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

Baldwin Wind will file a Ten-Year Plan with the PSC and the Burleigh County auditor by July 1, 2010.

3. SITE SELECTION CRITERIA

Baldwin Wind is evaluating the proposed 20,921-acre (32.7 square miles) Project Area to determine the best locations for up to 62 1.6-MW 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.

Baldwin Wind has secured voluntary wind option agreements with landowners and identified preliminary turbine locations based on site inspection, topographic maps, known environmentally sensitive areas, review of North Dakota's power plant siting exclusion and avoidance areas, review of Burleigh County and state wind siting requirements, and communications with Local, State, and Federal agencies. Baldwin Wind has used this siting process in recent wind turbine projects, including projects in North Dakota. Through this process, Baldwin Wind 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. Baldwin Wind 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 4** 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 5** 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 4. 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	USFWS wetland easements are part of the National Wildlife Refuge system. There are three wetland easements adjacent to the Project Area, but they will not be impacted by the Project facilities.	7.7, 7.9, 7.13, 7.14, 7.15, Figures 4 and 8
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.	None	The Wilton Mine State Game Management Area is located east of Wilton and adjacent to the Project Area. No Project facilities would be located on state land. In consultation with the North Dakota SHPO, a professional archaeologist surveyed the Project Area. Six potentially NRHP-eligible archaeological sites and two likely ineligible architectural sites will be avoided. Surveys of the Grass Lake portion of the Project Area will be completed in spring 2010.	7.7, 7.8, 7.9, 7.15, 7.17, Figures 4 and 8
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. Three turbines (and 5 alternates) would be located in prime farmland soils. Impacts to prime farmland are expected to be up to 16 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 wetlands would be negatively affected by the Project since they will all 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 5. 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 majority of 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	Abandoned coal mines, mined areas, and filled sinkholes are found throughout 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. 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 6**, will be at an acceptable minimum, or that those effects will be managed and maintained at an acceptable minimum.

Table 6. Selection Criteria

Selection Criteria	Potential Adverse Effects	Section Addressed
The impact upon agriculture:		
Agricultural production	Assuming 62 1.6-MW turbines, approximately 412 acres of land will be impacted due to turbine placement, associated access roads, and a Project substation. Approximately 40 acres will be temporarily disturbed due to construction line trenching. An additional 5 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

Selection Criteria	Potential Adverse Effects	Section Addressed
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
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, Baldwin Wind 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	Baldwin Wind will utilize station service from Central Electric, which will suggest appropriate configurations for the electrical system, and Baldwin Wind 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. Although the northern portion of the project area has not been surveyed to date (but will be surveyed in Spring 2010), species with the highest encounter rates during the 2008 fall and 2009 spring avian surveys were sandhill cranes, Canada geese, and red-winged blackbirds. Mean raptor and non-raptor use was generally low compared to other wind facilities. Baldwin Wind 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. There will be no permanent impacts to wetlands, reducing impacts to migratory birds. In addition, Baldwin Wind will implement a post-construction Wildlife Response and Reporting System (WRRS) for the Project in order to monitor avian/turbine interaction. If whooping cranes are observed, Baldwin Wind will shut down specific turbines located within 1 mile of the birds, until such time as the birds are no longer observed in the area. Baldwin Wind will also provide the U.S. Fish and Wildlife Service with whooping crane survey data for 3 years following construction and preserving up to 180 acres as whooping crane stop-over habitat.	7.10, 7.16, 7.15, Appendix C
Plant life	Assuming 62 1.6-MW turbines, approximately 412 acres of land will be used for the turbines, the substation, and access/service roads. Land where the turbines will be sited is primarily 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. To offset potential loss of whooping crane roosting habitat, Baldwin Wind has committed to the purchase of conservation easements for 180 acres: 80 acres to compensate for this Project and an additional 100 acres to compensate for the cumulative impacts of other wind projects in the area.	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 7**, and in a proper case may require the adoption of such policies and practices.

Table 7. 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	Baldwin Wind is developing the site to maximize energy output and will develop a site layout that optimizes wind resources while minimizing the impact on land resources and any potentially sensitive areas. Wind-powered electric generation is entirely dependent on the	4.2

Policy Criteria	Suitable Policy or Practice of Applicant	Section Addressed
	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.	
Training and utilization of available labor in this state for the general and specialized skills required	Baldwin Wind will use local labor to the extent practicable.	7.2
Use of a primary energy source or raw material located within the state	The energy generated at the site will utilize the wind resources 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, Figures 4 and 8
Economies of construction and operation	Baldwin Wind 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	Baldwin Wind 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 be injected into Western's 230-kV line at the Hilken Substation via the Ecklund Substation 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	Baldwin Wind and the EPC contractor will employ best management practices (BMPs) during construction to monitor soil impacts and segregate topsoil. Storm water prevention plans will be prepared for all disturbance sites exceeding size threshold. Environmental monitors will be onsite during construction to ensure there will be no impacts to wetlands and documented archeological sites that require avoidance.	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. Baldwin Wind 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. Baldwin Wind is securing voluntary land agreements with landowners necessary to develop the Project.

Specific to the Project, there are few additional items that are limiting factors when designing and constructing the Project. Baldwin Wind has secured a conditional use permit (CUP) for the proposed Project from Crofte Township. Land development in Ecklund Township is regulated by

Burleigh County, and Baldwin Wind is currently in discussions with the County to secure the necessary building permit for the portion of the Project in Ecklund and Grass Lake townships.

The U.S. Fish and Wildlife Service (USFWS) administers fee title Waterfowl Production Areas (WPA) and wetland and grassland easements on private property as part of its National Wildlife Refuge System. There are limitations to construction on these lands. There are no USFWS WPAs or easements within the Project Area. There are two wetland easements immediately adjacent to the northern portion of the Project Area, and one wetland easement adjacent to the southeast portion of the Project Area (**Figures 4** and **8**). None of these would be negatively affected by the Project.

In terms of constructability and safety, multiple sources indicate that lignite (coal) was historically mined in various sections of the Project Area (**Figure 4**). The PSC Reclamation and Abandoned Mine Land (AML) Division has identified a total of 32 abandoned surface and underground mines within 10 different sections in the Project Area (Johnson pers. comm. 2010). The North Dakota Geological Survey (NDGS) has also delineated the approximate extent of historically mined coal areas. Within the northern portion of the Project Area, mined areas are located in T142N, R79W, Sections 5 and 6 and T142N, R80W, Section 1. Within the southern portion of the Project Area, mined areas are located within T142N, R79W, Sections 23 and 34 (Murphy pers. comm. 2009; Murphy 2008a; Murphy 2008b; Murphy 2008c). The AML has also identified the extent of a former underground mine in the northern portion of the Project Area, primarily within T142N, R79W, Section 5, but also extending into T142N, R79W, Section 6 and T143N, R79W, Section 32 (Johnson pers. comm. 2010). USDA soils data includes units identified as "Dumps and Pits, mine" that correspond to the mined areas identified by the NDGS and AML (USDA 2009).

Due to the previous underground mining operations, sinkholes are a potential geologic hazard within the Project Area. The PSC AML Division hired contractors to fill underground mine sinkhole in portions of T142N, R29W, Sections 33 and 34 and T141N, R79W, Section 2 (located in the east-central portion of the Project Area), where no mine maps were available (Deutsch pers. comm. 2009). None of the mines or sinkholes were observed during environmental field surveys conducted by the Project team in 2009. 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.

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 distributed via an existing Western 230-kV transmission line.

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 2.1 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. Additionally, wind project developers can choose to receive a 30 percent investment tax credit (ITC) in place of the PTC for facilities placed in service in 2009 and 2010, and also for facilities placed in service before 2013 if construction begins before the end of 2010 (AWEA 2009). 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. Baldwin Wind is proposing to install up to 62 GE Xle 1.6-MW turbines.

The GE Xle 1.6-MW 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 Xle 1.6-MW 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 12.5 m/s (28 mph). The turbine is designed to operate in wind speeds of up to 20 m/s (45 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 right-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, Baldwin Wind will obtain easements for the necessary property.

Each wind turbine will be accessible via all-weather, aggregate-surfaced roads up to 32 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 on Section 20 of Township 142 North, Range 79 West (**Figures 2 and 3**). The Project substation will be located across the street from the existing Ecklund substation and be connected to the existing transmission line via approximately 240 feet of rerouted transmission line (**Figure 8**). The power will travel approximately six miles along an existing transmission line to Western's Hilken substation.

4.1.1 Wind Energy Center Layout

Baldwin Wind 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.

Burleigh County has established a setback of 200 feet from the roadway for buildings and trees, but no specific setbacks or standards for wind energy facilities. Based on experience with other wind farms, Baldwin Wind proposes setbacks of 440 feet (110% of turbine tip height) from transmission lines, roads, and railroads, and will maintain a setback of 1,400 feet from occupied residences, consistent with their policy at other wind energy facilities (**Table 8**).

Table 8. Setback Distances for Wind Turbines

Setback Type	Distance
Property Lines	440 feet
Occupied Residence	1,400 feet
Waterfowl Production Area	1,320 feet
Roads and Overhead Transmission Lines	440 feet

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. Because the Project will use the existing Wilton I and II O&M facility, no new facility will be constructed.

Baldwin Wind has erected seven meteorological towers within the Project Area boundary.

4.3 Land Rights

Baldwin Wind has obtained easements for the proposed 99-MW Project in Crofte and Ecklund townships, and is securing easements in the Grass Lake Township. Land rights will encompass the proposed wind farm and all associated facilities, including but not limited to wind and buffer easements, wind turbines, access roads, 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 20,921 acres. However, the land occupied by turbines and other wind farm infrastructure will be approximately three percent of this area. It is anticipated that the area of direct land use will be: approximately 412 acres for the turbines, aggregate-surfaced access or service roads up to 32 feet wide, and a substation. Total land disturbance for the wind farm and infrastructure is expected to be up to 457 acres, including temporary disturbance due to collection line trenching (40 acres) and the laydown/construction staging area (5 acres). See **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 United States Department of Energy (DOE) and the North Dakota Division of Community Services have conducted wind resource assessment studies in North Dakota. The May 2004 DOE wind map for the state of North Dakota indicates that wind resources within the Project vicinity consist of Class 3 winds or greater (DOE 2004). Class 3 winds have an average annual wind speed of 14 miles per hour.

5.3 Wind Characteristics in Project Area

Baldwin Wind utilized wind data from meteorological towers in the Project Area. The data from the Project Area were supplemented using NDAWN and NOAA data. Baldwin Wind 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 Baldwin Wind 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 Baldwin 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 Western. 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. Baldwin Wind 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 Xle 1.6-MW turbines. Baldwin Wind 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 62 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 Baldwin 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. Baldwin Wind will maintain a computer program and database for tracking each wind turbine's operational history.

Other specifications of the turbines include:

- Rotor blade pitch regulation;
- Gearbox with three-stage planetary/helical system;
- Double fed three-phase asynchronous 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 Project substation will be located across the street from the existing Ecklund substation and be connected

via approximately 240 feet of 230-kV overhead tie line across 279th Avenue NE (**Figure 8**). The line will be connected to the pole structures at approximately 40 feet in height. Across the roadway, the minimum distance to the ground would be 26 feet. The power will travel approximately 6 miles along an existing transmission line to Western's Hilken substation.

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

6.4 Baldwin 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 32 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. Baldwin Wind 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 32 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, Baldwin Wind 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

The existing O&M facility for the Wilton Wind Energy Center will be used for this Project. No new O&M Facility will be required for the proposed Baldwin Wind Energy Center.

6.6 Decommissioning and Restoration

Baldwin Wind 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. Baldwin Wind 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 Burleigh County in central North Dakota, a primarily rural agricultural area located east and south of Wilton, North Dakota.

7.2 Demographics

7.2.1 Description of Resources

The proposed Project is located in Burleigh County, North Dakota, a primarily rural agricultural county located east of U.S. Highway 83 and north of Interstate 94 approximately 15 miles north of Bismarck, North Dakota. There is no indication of any new residential construction on the site. In the 2006-2008 American Community Survey, the US Census Bureau (2008) estimated the county population at 77,194, an increase of 11 percent from the 2000 Census count of 69,416. The county contains 1,633 square miles of land, with a density of just over 48 persons per square mile. Approximately 93 percent of the population is composed of white persons who are not of Hispanic or Latino origin. The median age of Burleigh County residents is estimated at 36.3 years. It is estimated that 13.1 percent of the county population is 65 years or older while only 6.3 percent of the population is under five years of age (US Census Bureau 2008).

The Project Area is approximately 15 miles north 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 2000 Census was 55,532, but the 2008 population estimate was 104,944.

There are several small cities and one unincorporated town near the Project Area. Wilton (2000 population 807) is located approximately 0.5-mile to the west; Regan (2000 population 43) is located approximately five miles to the east of the Project; and Wing (2000 population 124) , is located approximately 14 miles to the east. The unincorporated town of Baldwin is located approximately one mile to the southwest; census data was not available for Baldwin.

The economy of Burleigh County is primarily tied to government jobs in Bismarck. According to the 2000 Census, almost a quarter of the workforce worked in education, health, and social services, and almost another ten percent in public administration. Retail trade accounts for over 13 percent of the jobs in the county. Per capita income in 1999 was $20,436; median household income was $41,309. Approximately 7.8 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 1,026 farms in Burleigh County, comprising approximately 84 percent of the land area. According to the 2007 Census of Agriculture (USDA 2007), total market value of agricultural products produced in Burleigh County was $82,236,000, 62 percent of which was from crops and 38 percent from livestock sales. The primary livestock is cattle and the principal crops include wheat and forage. Sunflowers, corn, and barley 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. 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 9** summarizes the economic impacts from the construction and operation of the project.

Table 9. 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.

Up to 412 acres of the total Project Area will be permanently affected due to conversion to turbine sites, access roads, and a Project substation. 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 Burleigh 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 Burleigh County within the Project Area boundary is primarily agricultural with scattered farmstead residences. The Project will be located privately owned land in north central Burleigh County, four miles southeast of Wilton. The Project proposes to install approximately 99 MW of wind power, consisting of up to 62 wind turbines within a 33-square mile (20,921-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.

The USFWS has been purchasing wetland easements in the Prairie Pothole Region since 1989. Easement wetlands are part of the National Wildlife Refuge System. A wetland easement is a legal agreement that pays landowners to permanently protect wetlands. Wetlands covered by an easement cannot be drained, filled, leveled, or burned. When these wetlands dry up naturally, they can be farmed, grazed, or hayed. No signs are placed on the property and the easement does not affect hunting or mineral rights (USFWS 2009a). The USFWS holds three wetland easements adjacent to the Project Area (**Figure 4** and **Figure 8**).

The NRCS administers a number of conservation-based programs for private landowners. The Conservation Reserve Program (CRP) conserves soil and water resources and provides wildlife habitat by removing enrolled tracts from agricultural production, generally for a period of 10 years. These tracts cannot be hayed, tilled, seeded, or otherwise disturbed without the authorization of the NRCS. Within the Project Area there are nine known sections with portions of their acreage enrolled in CRP, totaling 2,480 acres, or 12 percent of the Project Area (**Table 10**).

Table 10. Project Parcels Enrolled in CRP

Land Owner	Acres	Section	Township	Range
Sheldon, Toby	320	011	141N	079W
Anderson, Robert	640	022	142N	079W
Anderson, Robert	320	023	142N	079W
Franklund, Dwight & Marlene	160	035	142N	079W
Hilken, E. Gene and Vivian	80	020	142N	079W
Hilken, E. Gene and Vivian	160	021	142N	079W
Hilken, E. Gene and Vivian	160	021	142N	079W
Hilken, E. Gene and Vivian	480	028	142N	079W
Hilken, E. Gene and Vivian	160	028	142N	079W

Table 11 identifies current land use in the Project Area based on 2001 USGS National Land Cover data. Land use in the Project Area is dominated by grassland (46 percent) and cultivated crops (43 percent). Pasture/hay and developed/open space each covered less than four percent of the Project Area, while forests and water features were each less than one percent of the Project Area.

Table 11. Land Cover within the Project Area

Land Cover	Acreage	Percent of Project Area
Grassland/Herbaceous	9,740	46
Cultivated Crops	9,202	43
Pasture/Hay	992	5
Developed, Open Space	778	4
Emergent Herbaceous Wetlands	176	Less than 1
Open Water	10	Less than 1
Deciduous Forest	11	Less than 1
Woody Wetlands	8	Less than 1
Evergreen Forest	3	Less than 1
Developed, Low Intensity	2	Less than 1

Source: USGS 2001.

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 upper Midwest, landowners frequently plant crops and/or graze livestock to the edge of the access roads and turbine pads. The access roads are 32 feet wide and low profile, so they are easily crossed while farming. Baldwin Wind 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 62 turbines, and the associated access roads and collection substation, will result in the conversion of up to 412[2] acres of land. Baldwin Wind is seeking to obtain an easement of approximately five 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).

[2] Assuming 279 acres for 62 turbines (250-foot radius each), 99.3 acres for 32-foot wide access roads, and 33.3 acres for the substation. Temporary impacts from collection line trenching are estimated at 40 acres. The 50 alternate turbines, if constructed, would impact approximately 230 acres, and the associated collection lines would temporarily impact approximately 27 acres.

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

Baldwin Wind is working closely with landowners, the USFWS, and other 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 Wilton and the unincorporated community of Baldwin. 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 Central Power 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. Highway 83, North Dakota State Road 36, and other local two-lane paved and gravel county roads.

Traffic

Existing traffic volumes on the area's major roadways are documented in **Table 12** and **Figure 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 12. Existing Daily Traffic Levels

Roadway Segment	Existing Average Annual Daily Traffic (AADT)/Commercial Truck Traffic
US 83 in Wilton	4,900/560
US 83 south of Wilton	5,800/750; 6,300/760*
SH 36 east of Wilton	320/55; 500/60*

Source: 2007 Traffic Volumes (NDDOT 2007).

*Traffic counts on US 83 and SH 36 were taken in more than one location.

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 100 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. The permanent access roads will be up to 32 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 site is provided by US-83 north from Bismarck, then ND-36 east. 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, only the Department of Commerce (DOC) identified concerns regarding blockage of their radio frequency transmissions. The proposed Project will be in the radar line of sight of the Bismarck, ND Weather Surveillance Radar-1988 Doppler (WSR-88D) and may impact radar data (**Appendix D**). Baldwin Wind has discussed this issue with the Radar Operations Center and has informed the local Weather Forecast Office of the potential impact (Savage pers. comm. 2009).

The media impact study identified several beam paths crossing the Project Area that could be affected by two turbines. A more detailed examination of the beam path data indicates that the turbines would not impact the beam paths (Savage pers. comm. 2009). 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

Baldwin Wind will purchase station service from Central Power Electric Cooperative, which will suggest appropriate configurations for the electrical system that Baldwin Wind will abide by to prevent impacts to the transmission system. Baldwin Wind has established a setback of 440 feet from existing transmission lines. No additional mitigation is necessary.

Roads

Baldwin Wind 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, Baldwin Wind 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 are two private airports and no public airports within six nautical miles of the Project Area. Nautical miles are the standard measure for aviation; one nautical mile is equal to 1.15 statute miles. The Spitzer Airport, FAA ID ND80, is located three nautical miles northeast of Baldwin in or near the Project Area. It is privately owned and permission is required prior to landing. There is no control tower. The Soderquist Airport, FAA ID 2NA0, is located six nautical miles north of Wilton. It is also privately owned, with no control tower, and permission is required prior to landing (Airnav 2009). The nearest airport certified for commercial carrier operations is the Bismarck Municipal Airport (FAA ID BIS), located three nautical miles southeast of Bismarck and approximately 18 nautical miles south of the Project Area.

Electromagnetic Fields

The term electromagnetic fields (EMF) refers 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.

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 2010 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 will include the evaluation of any potential interference with air traffic. FAA's response will be submitted once received.

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 (Media Impact Analysis, **Appendix C**).

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

Baldwin Wind will submit a request to FAA to determine whether the Project layout and lighting will impact navigable airspace or communications technology used in aviation operations. The response will be forwarded when received. Wind turbines and meteorological towers will have lighting and markings according to FAA requirements that minimize any potential for air traffic impacts.

Electromagnetic Fields

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

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, Baldwin Wind 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

Burleigh County does not currently have noise standards or ordinances that are applicable to the Project. 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. Baldwin Wind 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 2009, 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 2009a, **Appendix C**).

Wind turbine operation was analyzed for the Project layout dated September 10, 2009, which employed the GE xle 1.5-MW turbine model. 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 46 potential receptors; however, several receptors were later 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 Project was found to fully comply with the applicable noise criterion at all occupied noise sensitive receptors, including the closest receptor located approximately 800 meters (2,625 feet) north of the substation. Nevertheless, it was determined that the operation of the Project may result in periodically audible sound at receptors under certain operational and meteorological conditions.

The Baldwin acoustic assessment did not include the wind turbines in Grass Lake Township. A revised analysis that models the 1.6-MW turbine and includes the new Project layout is in progress and results will be submitted upon completion.

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. Baldwin Wind 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 50 dBA level on more than a rare occasion, Baldwin Wind 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

A search of the State Historical Society of North Dakota's site and manuscript files was conducted by Metcalf Archaeology for the Project Area (excluding the portion in Grass Lake Township) and a one-mile buffer. Metcalf Archaeology also conducted a Class III Cultural Resources Inventory of blocks around the proposed turbine locations (56 blocks of 500 feet by 500 feet and 20 blocks of 600 feet by 700 feet for the turbines at the end of strings), based on the Project layout dated September 9, 2009. In addition, 200-foot corridors along proposed access road and collector line locations were surveyed. The survey report will be made available once it is complete. The portion of the Project Area that is located in Grass Lake Township will be surveyed as weather permits in spring 2010, and file search and survey results will be made available.

The Class I file search revealed that 11 investigations have occurred in the area including three related to the wind farm immediately to the north of the Project. Other investigations included two bridge surveys and a historic coal mine district study. The search revealed nine historic site leads (including six coal mines), 13 prehistoric chipped stone isolated finds, four historic/architectural sites (two churches, one bridge, and one railroad), and three prehistoric sites within one mile of the Project.

The Class III pedestrian survey was conducted in October 2009. The majority of the inventoried areas lie in cultivated farm land. Six prehistoric stone feature sites were documented, all in prairie land, and three prehistoric chipped stone isolated finds were documented in cultivated fields. Two architectural sites were also documented (**Figure 4**).

Five of the prehistoric sites (MAC-BWF-1 and MAC-BWF 6 through 9) consist of single rock cairns. Cairns are known to have served a variety of functions, including marking caches, marking trails and important locations, serving as burial caps, and other domestic and ceremonial purposes. Although the sites have not been evaluated for the National Register of Historic Places (NRHP), they may be properties "of traditional religious and cultural importance to an Indian tribe…and that meet(s) the National Register criteria" (36 CFR 800.16[I][1]).

Prehistoric site MAC-BWF-10 is a single stone circle. Stone circles are viewed by archaeologists as having a number of possible functions. They are most commonly viewed as having been used in the construction of tipis, but other less familiar, though significant, functions involve a variety of social/ceremonial activities. Some circles may be the remains of stone effigies and often still hold significance for contemporary Native American tribes. Although the site has not been evaluated for the NRHP, it may be a property "of traditional religious and cultural importance to an Indian tribe…and that meet(s) the National Register criteria" (36 CFR 800.16[I][1]).

The two architectural sites consist of a farmstead with three structures and a school house. Neither appears to be eligible for the National Register.

The isolated finds are recommended as not eligible for the National Register, and no avoidance or further investigation is recommended at their locations.

7.7.2 Impacts

As currently designed, all six prehistoric stone feature sites would be avoided and fenced during construction. The two architectural sites would not be directly affected by the Project. Provided that the prehistoric sites are fenced and avoided, a finding of No Historic Properties Affected has been recommended for the Project by Metcalf Archaeology.

Construction and operation of the proposed Project would not directly impact these sites, and any sites that are encountered during the spring 2010 survey will be avoided. A visual impact assessment of historic resources within one mile from each turbine is underway. The cultural resources inventory report will be submitted once it is complete. Once completed, a report produced by Metcalf Archaeology will be provided to the North Dakota State Historic Preservation Officer (SHPO) for comment.

7.7.3 Mitigative Measures

Although none of the newly recorded sites have been formally evaluated for the NRHP, Metcalf Archaeology recommends that six prehistoric sites are potentially eligible for listing in the NRHP, and recommends that these sites should therefore be avoided. All of the sites will be avoided and fenced during construction.

Should previously unknown archaeological resources or human remains be inadvertently encountered during Project construction and/or operation, the discoveries will be reported to the SHPO. With regard to a discovery of human remains, procedures will be followed to ensure that the appropriate authorities become involved quickly and in accordance with local and state guidelines.

Although there are no reservations or Bureau of Indian Affairs trust lands in Burleigh 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 allows 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 Burleigh 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 the Project Area. The

Wilton Mine State Game Management Area is located east of Wilton adjacent to the northern portion of 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 11-12**). 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 Burleigh 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 1,026 farms in Burleigh County, comprising approximately 84 percent of the land area. According to the 2007 Census of Agriculture (USDA 2007), total market value of agricultural products produced in Burleigh County was $82,236,000, 62 percent of which was from crops and 38 percent from livestock sales. The primary livestock is cattle and the principal crops include wheat and forage. Sunflowers, corn, and barley 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 13** lists the soils within the Project Area, including those considered prime farmland and soils of statewide or local importance. **Figure 13** shows the prime farmland soil distribution in the Project Area.

There are six prime farmland soils within the Project Area, comprising 3,168 acres or 15 percent of the Project Area; one soil type is considered prime farmland if drained, and comprises 36 acres or 0.2 percent of the Project Area. There are four soil types considered farmland of statewide importance, totaling 1,823 acres or approximately nine 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 mostly windbreaks around residential properties and between fields and include species such as juneberry (*Amelanchier* sp.), leadplant (*Amorpha canescens Pursh*), and Siberian Elm (*Ulmus pumila*).

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 412 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 dated March 1, 2010 includes up to 16 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 Burleigh 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. Baldwin Wind 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 has mapped 42 soil map units within the Project Area (USDA 2009). These soils are primarily well-drained loams and silt loams derived from the underlying glacial deposits and, to a lesser extent, the underlying sandstones and siltstones. Nine soil types comprise over 87 percent of the Project Area (**Figure 14**). The most extensive of these are "Williams loam, undulating" (approximately 38 percent of the Project Area), "Williams loam, rolling" (approximately 14 percent), and "Arnegard and Grassna silt loams, level" (approximately 12 percent). **Table 13** provides a summary of the soil map units within the Project Area, including their acreages and percentages of the Project Area.

Table 13. Soil Map Units Within the Project Area

Map Unit Symbol	Map Unit Name	Area (acres)	Percentage of Project Area	Farmland Classification
WsB	Williams loam, undulating	8158	38.39	N/A
WsC	Williams loam, rolling	3058	14.39	N/A
AgA	Arnegard and Grassna silt loams, level	2519	11.85	All areas are prime farmland
WsA	Williams loam, nearly level	1540	7.25	N/A
SnB	Sen silt loam, 3 to 6 percent slopes	912	4.29	Farmland of statewide importance
Mt	Dumps and Pits, mine	767	3.61	N/A
SnC	Sen silt loam, 6 to 9 percent slopes	689	3.24	Farmland of statewide importance
WeE	Werner-Morton-Sen complex, 9 to 15 percent slopes	522	2.46	N/A
WzE	Williams-Zahl loams, hilly	461	2.17	N/A
WsD	Williams loam, hilly	351	1.65	N/A
RwA	Roseglen-Tansem silt loams, nearly level	349	1.64	N/A
AgB	Arnegard and Grassna silt loams, gently sloping	272	1.28	All areas are prime farmland
GlA	Grail silt loam, level	198	0.93	All areas are prime farmland
FmE	Flasher-Vebar complex, 9 to 15 percent slopes	173	0.81	N/A
VbC	Vebar fine sandy loam, 6 to 9 percent slopes	148	0.70	N/A
GrA	Grail silty clay loam, level	132	0.62	All areas are prime farmland
VbB	Vebar fine sandy loam, 3 to 6 percent slopes	128	0.60	Farmland of statewide importance
LeA	Lehr loam, nearly level	93	0.44	N/A
Pa	Parnell silty clay loam, very poorly drained	84	0.40	N/A
Rc	Regan silty clay loam	70	0.33	N/A
SnD	Sen silt loam, 9 to 15 percent slopes	69	0.33	N/A
WlC	Werner-Sen loams, 6 to 9 percent slopes	60	0.28	N/A
RhB	Regent-Grail silty clay loams, 3 to 6 percent slopes	52	0.24	Farmland of statewide importance
RgC	Regent silty clay loam, 6 to 9 percent slopes	42	0.20	Farmland of statewide importance
Hk	Harriet and Regan soils, strongly saline	41	0.19	N/A
WcF	Werner complex, 15 to 35 percent slopes	38	0.18	N/A
Ch	Colvin silty clay loam	36	0.17	Prime farmland if drained
TgB	Tansem-Roseglen silt loams, gently sloping	33	0.16	N/A
TnA	Temvik silt loam, nearly level	32	0.15	N/A
Tp	Tonka and Parnell soils	31	0.14	N/A
WaD	Wabek soils, hilly	26	0.12	N/A
MkA	Makoti silty clay loam, level	25	0.12	All areas are prime farmland
LeB	Lehr loam, undulating	24	0.11	N/A
TeA	Tansem-Lehr loams, nearly level	23	0.11	N/A

Map Unit Symbol	Map Unit Name	Area (acres)	Percentage of Project Area	Farmland Classification
SeA	Savage silt loam, level	19	0.09	N/A
GlB	Grail silt loam, gently sloping	17	0.08	All areas are prime farmland
W	Water	16	0.08	N/A
SgA	Savage silty clay loam, level	15	0.07	N/A
Rm	Rhoades complex	9	0.04	N/A
TnB	Temvik silt loam, undulating	5	0.02	N/A
WoC	Williams very stony loam, rolling	5	0.02	N/A
Pg	Pits, gravel and sand	2	0.01	N/A

Source: USDA 2009.

The majority of the soils within the Project Area (76 percent) are neither prime farmland nor farmland of statewide importance. Approximately 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) (64 percent), non-hydric soils (35 percent), and unclassified soils (less than one percent). All of the soils in the Project Area (with the exception of areas mapped as "Water" and "Dumps and Pits, mine", which are unrated) have low to moderate susceptibility to erosion by water (i.e. K-factors from 0.1 to 0.4). Most of the soils (92 percent) also have low to moderate susceptibility to wind erosion (i.e., USDA Wind Erosion Groups 6 or greater) (USDA 2009).

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 32-foot wide aggregate-surfaced roadways. Estimated impacts include up to 412 acres of permanent disturbance due to turbine placement, access road construction, and a Project substation.

7.10.3 Mitigative Measures

Wind and water erosion are potential hazards for the soils found in the Project Area. To minimize erosion during and after construction, best management practices (BMPs) for erosion and sediment control will be utilized. Construction sites will maintain sediment control practices in accordance with the Stormwater Pollution Prevention Plan (SWPPP). Since towers will not be located on significant slopes, only non-structural practices should be required. These practices include temporary seeding, permanent seeding, mulching, filter strips, erosion blankets, and sod stabilization. If cuts are made during construction, top soil will be segregated and reapplied after final contours have been graded.

7.11 Geologic and Groundwater Resources

7.11.1 Description of Resources

South-central North Dakota lies within the Glaciated Missouri Plateau section of the Great Plains physiographic province. The Glaciated Missouri Plateau section is comprised of four physiographic districts, with Burleigh County spanning three: the Missouri River Trench, the Coteau Slope, and the Missouri Coteau. The Project Area is located entirely within the middle district, the Coteau Slope, a glaciated bedrock slope subject to active erosion (Kume and Hansen 1965).

The physiography and surficial geology of south-central North Dakota is primarily a product of repeated glacial advances and retreats during the Wisconsin Glaciation. The topography of the Project Area is undulating with gentle relief, resulting from a moderately thin sheet of glacial till deposits masking the underlying stream-eroded bedrock topography. The Project Area is covered extensively but discontinuously by glacial till of the Quaternary Coleharbor Formation. This unit is typically less than 10 feet in thickness; however, it may be thicker (up to 40 feet) in the northern portion of the Project Area (Kume and Hansen 1965; NDGS 1980). At the northeastern corner of the Project Area, these surficial sediments are underlain by the Cannonball Formation, a sedimentary bedrock unit comprised of interbedded marine sediments, including sandstones, siltstones, shales, and limestones. The bedrock throughout the remainder of the Project Area has been mapped as the Tertiary Bullion Creek (formerly known as Tongue River) Formation, another sedimentary bedrock unit consisting of interbedded sandstone, siltstone, shale, limestone, and lignite. This formation is mapped at the surface in a band across the central and eastern portions of the Project Area, likely corresponding to areas where glacial till is particularly thin or numerous isolated surface outcrops occur (Kume and Hansen 1965; NDGS 2001). Bedrock is likely exposed most extensively at the eastern extent of the Project Area, along the West Branch of Apple Creek (Kume and Hansen 1965).

The most important mineral resource in Burleigh County is sand and gravel. Burleigh County was historically a major producer of sand and gravel, ranking sixth in North Dakota in 1962 (Kume and Hansen 1965). North Dakota Geological Survey (NDGS) maps, U.S. Geological Survey (USGS) topographic maps, and USDA soils data all indicate the presence of a small, sand and gravel pit that was historically active at the northeastern edge of the Project Area (Kume and Hansen 1965; ESRI 2009; USDA 2009). The current status of this historic operation is unknown; however, USGS data dated 2003 does not identify it as an active operation monitored by the USGS Minerals Information Team (USGS 2005). Other surficial materials with potential economic uses in construction are also present in the county, including scoria (vesicular volcanic rock), boulders, and clay; however, none have been extracted commercially. No oil and gas production occurs in Burleigh County (Kume and Hansen 1965; DMR 2009)

Lignite (coal) from the Bullion Creek Formation is the other major mineral resource in Burleigh County (Kume and Hansen 1965). The NDGS has mapped economically viable coal deposits within the gap between the northern and southern portions of the Project Area, in T142N, R79W, Sections 4, 8 to 11, 14 to 17, and 20 to 22 (Murphy pers. comm. 2009; Murphy 2008a; Murphy 2008b). Although there are no active mines in the Project Area (Deutsch pers. comm. 2009; Johnson pers. comm. 2010), lignite was historically mined throughout the Project Area (**Figure 4**). The PSC Reclamation and Abandoned Mine Land (AML) Division has identified a total of 32 abandoned surface and underground mines within 10 different sections in the Project Area (Johnson pers. comm. 2010). The NDGS has also delineated the approximate extent of historically mined coal areas. Within the northern portion of the Project Area, mined areas are located in T142N, R79W, Sections 5 and 6 and T142N, R80W, Section 1. Within the southern portion of the Project Area, mined areas are located within T142N, R79W, Sections 23 and 34 (Murphy pers. comm. 2009; Murphy 2008a; Murphy 2008b; Murphy 2008c). The AML has also identified the extent of a former underground mine in the northern portion of the Project Area, primarily within T142N, R79W, Section 5, but also extending into T142N, R79W, Section 6 and T143N, R79W, Section 32 (Johnson pers. comm. 2010). USDA soils data includes units identified as "Dumps and Pits, mine" that correspond to the mined areas identified by the NDGS and AML (USDA 2009).

Due to the previous underground mining operations, sinkholes are a potential geologic hazard within the Project Area. The PSC Reclamation and Abandoned Mine Land (AML) Division hired contractors to fill underground mine sinkhole in portions of T142N, R29W, Sections 33 and 34 and T141N, R79W, Section 2 (located in the east-central portion of the Project Area), where no mine maps were available (Deutsch pers. comm. 2009).

According to the NDGS, North Dakota is located in an area of very low earthquake probability. There are no known active tectonic features in south-central North Dakota and the deep basement formations underlying North Dakota are expected to be geologically stable (Bluemle 1991). This information is supported by 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 also unlikely.

Groundwater resources in Burleigh County are available from both surficial and bedrock aquifers and are generally plentiful (Kume and Hansen 1965). Quaternary sands and gravels of alluvial and glacial outwash deposits provide the highest yields and best quality water; however, these aquifers are primarily concentrated in the south-central and northeast portions of the county, and in narrow bands along existing rivers in the rest of the county. Bedrock aquifers are more widely distributed throughout the county and provide the primary source for most domestic and stock wells. Along the eastern extent of the southern portion of the Project Area, a productive surficial aquifer is located within a narrow band of alluvial deposits along West Branch Apple Creek. Another narrow, productive, alluvial aquifer is located near the northeastern corner of the northern portion of the Project Area. With these two exceptions, the sedimentary bedrock of the Bullion Creek Formation provides the major source of groundwater in the Project Area. Water from these rocks is typically hard, but is adequate for use in domestic and stock wells. Yields are generally less than 20 gallons per minute (gpm) (Randich and Hatchett 1966).

Review of driller logs available from the North Dakota State Water Commission database indicates that at least 39 wells have been drilled within the Project Area, all of which are domestic wells, stock wells, or monitoring wells. Well logs indicate that static water levels in the Project Area range mainly from about 60 to 160 feet below ground surface (bgs). Along and outside the eastern edge of the southern portion of the Project Area, a few well logs describe much shallower static water levels, in surficial sediments at about 15 to 25 feet bgs (NDSWC 2009). Based on the proximity of these wells to the West Branch Apple Creek and one its tributaries, it is likely that they tap alluvial aquifers with locally elevated groundwater levels.

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, and economic deposits of the latter are constrained to the northern and southern margins of the two portions of 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. Consequently, geologic hazards are unlikely to impact the Project.

Impacts to groundwater resources in the Project Area are anticipated to be minimal. Major withdrawals of groundwater will not be necessary due to 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 would 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 recorded in well logs 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 would be located a minimal distance of 1,400 feet away from existing residential structures, thereby minimizing the risk of impacts to private wells in the area, which are assumed to be located in proximity to the structures they serve.

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

7.11.3 Mitigative Measures

Wind turbines will be sited so as to avoid sand and gravel resources identified in the Project Area. Where sand and gravel resources cannot be avoided, Baldwin Wind will coordinate with landowners regarding impacts and any necessary mitigation. No other mitigation is anticipated to be necessary.

In order to mitigate any potential hazards from subsidence or sinkholes related historic coal mining operations, Baldwin Wind will conduct site-specific geotechnical surveys to evaluate the subsurface conditions at the location of each turbine and other significant project structures (i.e., substation, O&M building). Project components will then be microsited, as necessary, to avoid areas at risk for subsidence.

Wind turbine locations will not impact the use of existing water wells because the turbines will not be sited within 1,400 feet of occupied structures. In the event that subsurface blasting is required, a blasting plan would be developed and implemented to keep the impacts localized and fracture the least amount of bedrock necessary for construction. It may be necessary to pump out any accumulated groundwater in the excavation during construction. All dewatering of the excavation would be discharged to the surrounding surface, thereby allowing it to infiltrate back into the ground to minimize potential impacts.

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. An unnamed Tributary of Burnt Creek is found in the west portion

of the Project Area and drains to Burnt Creek then to the Missouri River. An unnamed tributary of West Branch Apple Creek is found in the eastern portion of the Project Area and drains to Apple Creek then to the Missouri River. An unnamed tributary of Apple Creek is found in the southern portion of the Project Area and drains to Apple Creek and then to the Missouri River.

According to FEMA (2009), the Project Area is located in FEMA Map Panel ID # 38015C0200C, 38015C0225C, 38015C0425C, 38015C0450C, and 38015C0400C. With the exception of the westernmost portions of the Project Area, 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." The westernmost portions (in Ecklund Township T142N, R80W) are located in Zone X. In this case, Zone X means "area of minimal flood hazard, above the 500 year flood elevation" (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. The delineation did not include the portion of the Project Area in Grass Lake Township. This survey will be conducted in spring 2010 and results will be made available once the fieldwork is complete. 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 is included in **Appendix C**.

Three features in the Project Area were determined to be USACE jurisdictional wetlands (**Figure 15**). Two features (E-20-1 and E-21-2) were classified as jurisdictional relatively permanent water wetland impoundments and one feature (E-28-1) was classified as a jurisdictional non-wetland impoundment. This latter feature occurred adjacent to an unnamed tributary of Burnt Creek. Feature E-20-1 is located along 266th Avenue NE east of 41st Street NE, between proposed turbines #Alt 6 and #12. Features E-21-2 and E-28-1 are located along 266th Avenue NE between 52nd Street NE and 66th Street NE, between proposed turbines #13a and 23.

7.13.2 Impacts

Three features were identified within the area of investigation. Feature E-20-1 lies within the 250-foot wide area that was surveyed for an underground electrical collection line. No physical crossing is planned at this location and no impacts are expected to result from construction activities. Features E-21-2 and E-28-1 are proposed locations of underground electrical collection lines and public road improvements. 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 width of the public road at these locations, which measures 36 feet, appears to be sufficient to facilitate construction activities without widening the existing road surface. Adding gravel to strengthen the road and upgrade its capacity to accommodate construction vehicles should not result in impacts to the jurisdictional drainage provided gravel is not allowed to enter the jurisdictional area. However, other modifications, such as widening of the road to facilitate construction access, would result in impacts to this jurisdictional 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

Baldwin Wind has committed to zero wetland impacts. Horizontal directional drilling will be used to install the collection lines at Features E-21-2 and E-28-1. All 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 field biologist conducted field surveys from September 18 to 21, 2009 to determine the extent of native prairie within the Project Area. The survey did not include the portion of the Project Area in Grass Lake Township. This area will be surveyed in summer 2010, and results will be made available once the survey is complete. The following results

are for the portion of the Project Area in Ecklund and Crofte townships, totaling approximately 14,460 acres. Approximately 2,900 acres (21 percent of the total area surveyed) were classified as native prairie, and 350 acres (2 percent of the total area surveyed) were classified as tame grasslands; the remaining acreage consists primarily of agricultural croplands. Large contiguous areas of native prairie were found in the central portions of the Project Area. Tame grasslands were found primarily in the portion of the Project Area southeast of Wilton. Grasslands (both native and tame) are more fragmented and less abundant in the remainder of the Project Area. Trees and shrubs in the Project Area are limited to mostly windbreaks around residential properties and between fields and include species such as juneberry (*Amelanchier* sp.), leadplant (*Amorpha canescens Pursh*), and Siberian Elm (*Ulmus pumila*). 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 dated March 1, 2010 included 62 1.6-MW GE wind turbines and 50 alternative locations. Based on the layout dated March 1, 2010, 13 turbines (plus 5 alternates) would be located in native prairie.

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

Baldwin Wind 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 replace 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 fall of 2008 and the spring of 2009 for an area slightly larger than the current Project Area (WEST 2009). The surveys included 18 point count locations. The survey did not include the portion of the Project Area in Grass Lake Township. This area will be surveyed in spring 2010 and results will be made available once the survey is complete. Waterfowl use was highest in the spring, and raptor use was highest in the summer and lowest in the fall. Three species (3.9% of all species) composed approximately 49 percent of the observations: sandhill crane (*Grus canadensis*), Canada goose (*Branta canadensis)*, and red-winged blackbird (*Agelaius phoeniceus*). The

most common raptors were red-tailed hawk (*Buteo jamaicensis*) and northern harriers (*Circus cyaneus*). Five active nests (three red-tailed hawk and two unidentified hawk) were mapped.

Two bird species of primary interest to wind energy development in the central and north-central United States are whooping cranes (*Grus americana*) and sharp-tailed grouse (*Tympanuchus phasianellus).* No whooping cranes or sharp-tailed grouse leks (mating displays) were observed during the surveys, although individual grouse were observed.

During the avian surveys, incidental mammal observations were recorded. The most abundant mammal species recorded was white-tailed deer (*Odocoileus virginianus*) with 164 individuals observed within 15 groups. Six coyote (*Canis latrans*), two white-tailed jack rabbits (*Lepus townsendii*), one fox squirrel (*Sciurus niger*), and one thirteen-lined ground squirrel (*Spermophilus tridecemlineatus*) were also observed.

In a site visit conducted in October 2009, American kestrel (*Falco sparverius*), northern harriers, and red-tailed hawks were observed, in addition to one flock of sandhill cranes, several ring-necked pheasants (*Phasianus colchicus*), horned larks (*Eremophila alpestris*), dark-eyed juncos (*Junco hyemalis*), and several species of sparrows. No site-specific amphibian, reptile, or mammal surveys were conducted within the Project Area.

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. During the October 2009 site visit, no abandoned farm buildings were observed and trees were limited to mostly windbreaks around residential properties and between fields, providing few options for roosting bats. Further, neither riparian corridors nor wetlands are present in the Project Area in significant amounts, indicating that the Project Area may not be very attractive to bats, although they could still pass through the region during migration.

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

Baldwin Wind 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 Baldwin Wind 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;
- Other than a 240-foot tie line across 279th street from the Baldwin substation to the Ecklund substation, no overhead power lines will be used;
- 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; and
- 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.

In its November 2009 reply to Western's consultation letter (**Appendix D**), the USFWS identified five wildlife species protected by the ESA that had the potential to occur in the vicinity of the Project: pallid sturgeon (*Scaphirhynchus albus*) – Endangered, interior least tern (*Sterna antillarum*) – Endangered, whooping crane – Endangered, gray wolf (*Canis lupus*) – Threatened, and piping plover (*Charadrius melodus*) - Threatened with Designated Critical Habitat in Project vicinity.

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 2009b).

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, although 79 observations have occurred within the 35-mile surrounding buffer area from 1961 to 2007.

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.

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).

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.

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.

State-listed Species

Although state-listed species in North Dakota receive no regulatory protection, the North Dakota Game and Fish Department (NDGFD) has identified 100 species of conservation priority, or those in greatest need of conservation in the state (NDGFD 2008). They are categorized into three levels according to the need to conserve them:

- Level I - Species in greatest need of conservation.
- Level II - Species in need of conservation, but have had support from other wildlife programs.
- Level III - Species in moderate need of conservation, but are believed to be on the edge of their range in North Dakota.

The interior least tern is a Level I species, the piping plover and pallid sturgeon are Level II species, and the whooping crane and gray wolf are Level III species. In a letter dated October 13, 2009 regarding the proposed Project, the NDGFD did not list particular species of concern that may be found in the Project Area; rather, the agency noted that disturbance of native prairie and wetlands are of primary concern with regard to wind energy development (**Appendix D**). During the avian surveys (WEST 2009), 17 species of conservation priority were observed.

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

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.

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. There will be no new transmission lines as part of the Project (with the exception of a 240-foot tie line across 279th Avenue NE) and 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 eliminated. To date, no interior least tern fatality has been reported at a wind farm. No interior least terns were observed during the fall 2008 and spring 2009 avian surveys (WEST 2009).

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 fall 2008 and spring 2009 avian surveys (WEST 2009).As a result, the Project is unlikely to adversely affect the piping plover. As there would be no construction in designated critical habitat and no changes to water quantity or quality associated with the Project, the Project will not result in the destruction or adverse modification of designated critical habitat.

Baldwin Wind has commissioned a detailed likelihood of occurrence assessment for whooping cranes (Tetra Tech 2009c). Although the analysis did not include the portion of the Project in Grass Lake Township, results of this assessment indicate that the likelihood of crane occurrence within the Project Area is low. Although the Project is located within the 75-percent of observations migration corridor, there are no historical records of whooping cranes occurring within the Project Area (there are sightings within 35 miles). The landscape ratio of suitable wetland-agricultural matrix habitat is higher within the Project Area (61 percent; 8,874 of 14,460 acres) than it is in the surrounding 35-mile buffer (45 percent; 1,340,766 of 2,995,781 acres). However, the percentage of available wetlands within the Project Area is much lower than the surrounding 35-mile buffer area. Fifty-five (55) acres of potentially suitable wetland habitat occur within the Project Area (0.38 percent of Project Area), whereas 241,879 acres of wetland occur within the 35-mile buffer (8.1 percent of buffer area).

If the presence of a wind farm causes whooping cranes to avoid the Project Area, the Project may result in the long-term loss of the 55 acres of potential roosting habitat. Potential roosting habitat is not limiting on the landscape, however, thereby minimizing the impact of this potential habitat loss.

Based on the low magnitude of potential habitat loss, the low probability of site usage, and the avoidance and minimization measures (e.g., buried collection systems, no permanent impacts to wetlands), the potential for an adverse affect on whooping cranes is low. The assessment is currently being revised to include the portion of the Project Area in Grass Lake Township, and will be made available once it is completed.

Other minimization measures that are included in the Project include:

- Modification or curtailment of construction activities within 1 mile of whooping cranes observed onsite during the construction phase of the Project, and leaving birds undisturbed until they are no longer observed within the wind farm boundaries;
- Post-construction monitoring during spring and fall whooping crane migration seasons (spring: April 1 to May 15; fall: September 10 to October 31) for 3 years post-construction to detect the presence of whooping cranes within the Project Area. If a whooping crane is observed, Baldwin Wind will shut down specific turbines located within 1 mile of the birds, until such time as the birds are no longer observed in the area; and
- Shutting down all turbines if a dead whooping crane or sandhill crane is found in the Project area, since the area may be utilized by additional cranes.

The Project is unlikely to affect current gray wolf habitat, and there has not been a confirmed wolf sighting in North Dakota since 1991.

7.16.3 Mitigative Measures

Baldwin Wind 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 14 summarizes the resources that will be affected as a result of the Project and the appropriate mitigation.

Table 14. 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 412 acres of land will be affected by 62 turbines, associated access roads, and a substation. Temporary impacts for laydown and contractor staging would be approximately 45 acres.	Baldwin Wind will work with landowners and regulatory agencies to minimize impacts of the Project.
Public Services	No impacts are anticipated.	Baldwin Wind 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. Baldwin Wind will follow "prudent avoidance" methods to minimize EMF exposure. A variety of security measures will be implemented to

Resource	Impact	Mitigation
		reduce the chance of physical and property damage.
Noise	No impacts are anticipated to noise-sensitive resources.	Baldwin Wind will locate turbines so the maximum level of 50 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.	Baldwin Wind 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.	Baldwin Wind has conducted a Class III inventory for the proposed Project, which will be completed in spring 2010. Turbines and other Project facilities were microsited to avoid impacts to archaeological sites. Six prehistoric sites will be fenced and avoided. A Visual Impact Assessment is underway for historic architectural structures.
Recreational Resources	Visual impacts will likely occur at the Wilton Mine State Game Management Area.	Since no significant recreational resources will be removed from service due to the Project, no mitigation measures are proposed.
Land Based Economies	Approximately 412 acres of land will be permanently affected. Temporary impacts include 40 acres for collection lines and 5 acres for laydown and contractor staging.	Baldwin Wind will work 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.
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. Baldwin Wind will implement BMPs to minimize erosion and sedimentation at the site.
Wetlands	No impacts are anticipated.	All impacts to 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 412 acres of land will be permanently affected. Temporary impacts include 40 acres for collection lines and 5 acres for laydown and contractor staging. Based on the layout dated March 1, 2010, 13 turbines (and 5 alternates) will be located in native prairie.	Baldwin Wind 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**. Baldwin Wind'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.	No wetlands will be affected by the Project.

8. PUBLIC AND AGENCY COORDINATION

Keeping the public informed on the status of the Project is a key component to its success. Because the Project will interconnect to Western's power grid, Western is preparing an Environmental Assessment (EA) to comply with the National Environmental Policy Act (NEPA). A public scoping meeting was held on October 21, 2009 to inform the public about the Project and to solicit comments. Agency correspondence and public comments received are included in **Appendix D**. A summary of the public meeting is included in **Appendix E**. An additional meeting with affected and neighboring landowners was held on January 12, 2010.

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

As part of both the EA process and this permit application, Baldwin Wind and its representatives have contacted key local, state and federal agencies to inform them of the Project and to address their concerns. See **Section 10.12** for a summary of responses received from agencies. Baldwin Wind is committed to keeping key stakeholders engaged in the Project as it moves forward.

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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 15**. Permits dependent on the final site layout will be applied for after receiving PSC approval, but prior to construction.

Table 15. Potential Permits and Approvals Required for Construction and Operation of the Proposed Facility

Agency	Type of Approval	Status*	Need
Federal Approvals			
Western Area Power Administration	NEPA Environmental Assessment	1	Public meeting held October 21, 2009. Draft EA being reviewed by Western and USFWS.
USFWS	Biological Opinion	1	As a cooperating agency in the NEPA process, USFWS will provide a Biological Opinion.
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 60 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			
Crofte Township/Burleigh County	Building Permit and Conditional Use Permit	3	Application has been submitted to Burleigh County.
Ecklund Township	Conditional Use Permit	1	Permit already obtained for the portion of the Project in Ecklund Township.
Grass Lake Township	Conditional Use Permit	1	Application has been submitted to Grass Lake Township.

* 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

Baldwin Wind 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 412 acres of land. Approximately 45 acres of land will be temporarily affected due to 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. Baldwin Wind believes that the proposed site is the most viable alternative. Baldwin Wind 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 457 acres of land to turbine sites, associated access roads, and associated facilities. Permanent impacts will be lower, at 412 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 Burleigh 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

In October 2009, Metcalf Archaeology conducted a Class III Cultural Resource Inventory for a portion of the Project Area; the inventory will be completed in spring 2010 (see **Section 7.7** and **Appendix C**). During the course of the inventory, six prehistoric stone feature sites were documented, all in native prairie, and three prehistoric chipped stone isolated finds were

documented in cultivated fields. Two architectural sites (a farmstead with three structures and a school house) were identified within the Project Area. Neither of the sites would be directly impacted by the Project. A visual impact assessment on historic structures is currently underway and the northern portion of the Project Area will be surveyed in spring 2010. The results will be made available when completed.

The stone feature sites can be avoided by fencing during construction of the Project. The isolated finds are recommended as not eligible for the NRHP and no avoidance or further investigation is recommended. Provided that the prehistoric sites are fenced and avoided, a finding of *No Historic Properties Affected* is recommended for this Project.

Baldwin 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, Baldwin Wind will work with the North Dakota SHPO to mitigate potential impacts.

10.10 Effect of Site on Biological Resources

Baldwin Wind 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.

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. Baldwin Wind has committed to zero impacts to wetlands, and no new transmission line construction. To offset potential loss of whooping crane roosting habitat, Baldwin Wind has committed to the purchase of conservation easements for 180 acres: 80 acres to compensate for this Project and an additional 100 acres to compensate for the cumulative impacts of other wind projects in the area.

10.12 Agency Comments

Agencies were contacted in September 2009 to comment on the Project. The following summaries of comments received apply to the proposed Baldwin Wind Project.

10.12.1 North Dakota Game and Fish Department

Baldwin Wind submitted a letter to the NDGFD on September 22, 2009. The NDGFD stated in a response letter dated October 13, 2009 that the agency's primary concern with wind farm development is the disturbance of native prairie associated with project construction. In addition, numerous 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, 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 response letter received from the NDGFD is included in **Appendix D**.

10.12.2 U.S. Fish and Wildlife Service

A letter to both the USFWS North Dakota Field Office and the Long Lake Wetland Management District was sent on September 22, 2009 (**Appendix D**). No response has been received.

In a letter to Western dated November 11, 2009 regarding the EA for the proposed Project, the USFWS requested that several issues be addressed in the EA document, particularly migratory birds and native prairie. The agency recommended that its Interim Wind Turbine Siting Guidelines be used to evaluate potential sites, that an Avian Protection Plan be prepared for the Project, and that construction should be scheduled for late summer or fall/early winter to avoid the bird breeding season. If construction will occur during the breeding season USFWS recommends that absence/presence surveys be conducted for nesting migratory birds.

The USFWS included a list of threatened and endangered species and critical habitats that may occur in the Project Area. These include whooping crane, interior least tern, pallid sturgeon, gray wolf, piping plover, and designated critical habitat for the piping plover.

The agency further recommended that any affected wetlands be replaced, and that three years of post-construction mortality monitoring be conducted.

In a letter dated December 8, 2009, the USFWS agreed to serve as a cooperating agency for the NEPA review of this Project. Both of these letters are included in **Appendix D**.

10.12.3 State Historical Society of North Dakota

The State Historic Preservation Officer (SHPO) responded to Baldwin Wind's letter on September 30, 2009 recommending a Class I file search and Class III pedestrian survey for the Project. These inventories have been completed and the report will be sent to the SHPO for review once it is completed. A copy of the SHPO response letter is included in **Appendix D**.

10.12.4 North Dakota Geological Survey

The North Dakota Geological Survey (NDGS) responded to the query letter on September 20, 2009. The response letter included a map showing mineable coal deposits and the suspected locations of abandoned underground coal mines in Sections 19-23 in T142N, R79W. A copy of the response letter is included in **Appendix D**. See **Section 7.11** for more information on the geology of the Project Area.

10.12.5 North Dakota Parks and Recreation Department

A response was received from the North Dakota Parks and Recreation Department (NDPRD) on October 15, 2009. The Project does not affect state park lands that they manage or Land and Water Conservation Fund recreation projects that they coordinate. Based on NDPRD's review of the North Dakota Natural Heritage biological conservation database, there are no known occurrences of plant or animal species of concern or other significant ecological communities within or adjacent to the Project Area. NDPRD suggests that pre- and post-construction avian and bat monitoring be conducted in order to assess adverse impacts to wildlife. A copy of NDPRD's response letter is included in **Appendix D**.

10.12.6 North Dakota Department of Commerce

A query letter dated September 21, 2009 was sent to the North Dakota Department of Commerce Division of Economic Development and Finance and the Division of Community Services. The Division of Community Services responded that the office supports the development of the proposed Project and is not aware of any environmental concerns or issues. The query letters and the response are included in **Appendix D**.

10.12.7 North Dakota Department of Health

The North Dakota Department of Health (NDDOH) sent a response to the Project query letter stating that the department believes that environmental impacts from the proposed construction will be minor and can be controlled by proper construction methods. The NDDOH requested that measures be taken to minimize fugitive dust emissions, adverse effects on waters of the state, and noise levels during construction activities. The NDDOH also stated that a permit to discharge storm water during construction is required. The NDDOH included with their response a document titled, Construction and Environmental Disturbance Requirements. This document, along with the response received from NDDOH, are included in **Appendix D**.

10.12.8 North Dakota Department of Transportation

A query letter was sent to the North Dakota Department of Transportation (DOT). In a response letter dated September 28, 2009, the North Dakota DOT stated that permits must be obtained for any work done on North Dakota DOT right-of-way, and that permits must also be obtained from the North Dakota Highway Patrol for all overweight vehicles. The letter is included in **Appendix D**.

10.12.9 North Dakota State Water Commission

The North Dakota State Water Commission responded to the query letter on October 28, 2009. The agency indicated that the Project is not located in an identified floodplain and the Project will not affect an identified floodplain. The agency stated that all waste material associated with the Project must be disposed of properly and not placed in identified floodway areas. The letter also noted that no sole-source aquifers have been designated in North Dakota. The letter is included in **Appendix D**.

10.12.10 North Dakota State Land Department

A query letter dated September 21, 2009 was sent to the North Dakota State Land Department (**Appendix D**). No response has been received.

10.12.11 U.S. Army Corps of Engineers

A query letter dated September 21, 2009 was sent to the U.S. Army Corps of Engineers Omaha District (North Dakota Field Office). The USACE responded on September 28, 2009 that a permit application should be completed if a Section 10 and/or Section 404 permit is required for the Project. See **Appendix D** for the query letter and response from USACE.

10.12.12 North Dakota Aeronautics Commission

A query letter dated September 21, 2009 was sent to the North Dakota Aeronautics Commission (**Appendix D**). No response has been received.

10.12.13 North Dakota Department of Agriculture

A query letter dated September 21, 2009 was sent to the North Dakota Department of Agriculture (**Appendix D**). No response has been received.

10.12.14 North Dakota Department of Human Services

A query letter was sent to the North Dakota Department of Human Services on September 21, 2009 (**Appendix D**). No response has been received.

10.12.15 North Dakota Department of Labor

A query letter dated September 21, 2009 was sent to the North Dakota Department of Labor. The agency responded on September 29, 2009 that it takes no position on the Project (**Appendix D**).

10.12.16 North Dakota Department of Career and Technical Education

A query letter was sent to the North Dakota Department of Career and Technical Education on September 21, 2009 (**Appendix D**). No response has been received.

10.12.17 North Dakota Indian Affairs Commission

A query letter was sent to the North Dakota Indian Affairs Commission on September 21, 2009 (**Appendix D**). No response has been received.

10.12.18 Baldwin River Soil Conservation District

A query letter dated September 21, 2009 was sent to the Baldwin Soil Conservation District (**Appendix D**). No response has been received.

As part of the scoping process for the EA being conducted for the Western NEPA review of the proposed Project, the National Park Service (NPS), NRCS, and EPA provided comments. The NPS expressed concern regarding visual impacts for historic resources, particularly the Lewis and Clark National Historic Trail, and requested that these impacts be considered in the EA. The NRCS and EPA recommended that wetlands be avoided. These letters are included in **Appendix D**.

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 FPL, 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. John holds a BBA in Accounting from Kent State University and a Masters Degree in Taxation from Florida Atlantic University. Bachelor's degree, Kent State University. Master's degree, Florida Atlantic University
SCOTT SCOVILL Project Manager, Project Development NextEra Energy Resources	Project developer representing Baldwin Wind in all commercial and regulatory aspects of the project.
ALLEN WYNN Environmental Specialist 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 MARTORANO, P.E. Project Manager Tetra Tech EC, Inc.	Ms. Martorano 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. Martorano 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 over four 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.
JASON JONES, PH.D. Senior Ecologist Tetra Tech EC, Inc.	Dr. Jones reviewed the 2008 Fall Avian Report and provided input for wildlife and avian sections of this application. Dr. Jones has over 15 years experience as a wildlife ecologist, with a focus on avian and bat ecology and natural resource management. He has published more than 25 peer-reviewed scientific publications and has given dozens of invited seminars and scientific conference presentations on avian and bat ecology.
WILLIAM SCALES GIS Analyst Tetra Tech	Mr. Scales prepared the application figures, impact calculations, and other GIS tasks. Mr. Scales 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; Expertise in GIS projects involving marine and oceanographic data, utility systems, energy planning/siting, asset management, infrastructure, and constraint/impact analysis.
ED STINE Archaeologist Metcalf Archeology	Mr. Stine led the Class I and Class III Cultural Resources Inventory for the Project.
GREGORY C. DAWDY Senior Environmental Scientist/Project Manager	Mr. Dawdy led the wetland delineation effort for the Baldwin Wind Energy Center. Mr. Dawdy has over 20 years of experience in wetlands delineation/mitigation and permitting, sediment and surface water sampling, biological assessments, preliminary assessments, site investigations and remedial investigations/feasibility studies (RI/FS). Mr. Dawdy has served as project manager and project biologist for numerous wetland delineation/mitigation projects in Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Nebraska, Minnesota, Missouri, New York, North and South Dakota, Wisconsin and Wyoming. Society of Wetland Scientists American Fisheries Society BS, Biological Studies, Southern Illinois University, 1985

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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
BCA	Beaver Creek Archeology
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	Baldwin Wind Energy Center
PSC or Commission	North Dakota Public Service Commission
PTC	Production Tax Credit
REC	Recognized Environmental Condition
Resistance	The opposition offered by a body or substance to the passage through it of a steady electric current
Rotor	The rotor consists of three blades mounted to a rotor hub
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
Step-up Transformer	A transformer that increases voltage
Substation	A subsidiary station in which electric current is transformed

SWPPP	Storm Water Pollution Prevention Plan
Torque	A force that produces or tends to produce rotation or torsion; also a measure of the effectiveness of such a force that consists of the product of the force and the perpendicular distance from the line of action of the force to the axis of rotation : a turning or twisting force
Transformer	An electrical device by which alternating current of one voltage is changed to another voltage
Transmission	An assembly of parts including the speed-changing gears and the propeller shaft by which the power is transmitted from an automobile engine to a live axle; the speed-changing gears in such an assembly
USACE	US Army Corps of Engineers
USEPA	US Environmental Protection Agency
USFWS	US Fish and Wildlife Service
UT	Unincorporated Township
WMD	Wetland Management District
WPAs	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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Appendix A
FPL Group 2006 Sustainability Report and FPL Group 2007 Profile

Appendix B
Design Data Report

Appendix C
Studies and Assessments

Appendix D
Agency Correspondence and Public Comments

Appendix E
Public Scoping Meeting Summary