

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

**New Frontier Wind Project
McHenry County, North Dakota**

Case No. PU-11-69

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Submitted by:

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ACRONYMS AND ABBREVIATIONS

ABPP	Avian and Bat Protection Plan
Act	North Dakota Energy Conversion and Transmission Facility Siting Act
AM	amplitude modulation
ANSI	American National Standards Institute
APLIC	Avian Powerline Interaction Committee
ATV	all-terrain vehicle
AWEA	American Wind Energy Association
BGEPA	Bald and Golden Eagle Protection Act
BMPs	Best Management Practices
Certificate	Certificate of Site Compatibility
CFR	Code of Federal Regulations
Commission	North Dakota Public Service Commission
CPI	Center Pivot Irrigation
CRP	Conservation Reserve Program
CREP	Conservation Reserve Enhancement Program
CUP	Conditional Use Permit
DOE	U.S. Department of Energy
EAPC	EAPC Architects Engineers
EIA	Energy Information Administration
Element	Element Power US, LLC
EMF	Electromagnetic Fields
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act or Environmental Site Assessment
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FM	frequency modulation
ft	feet/foot
GE	General Electric
GIS	geographic information system

HCP	Habitat Conservation Plan
HDR	HDR Engineering, Inc.
Hz	Hertz
kV	kilovolt
m	meter
m ²	meters squared
m/s	meters per second
mi	mile
McHenry County JDA	McHenry County Jobs Development Authority
Meadowlark	Meadowlark Wind I LLC
MISO	Midwest Independent Transmission System Operator
MBTA	Migratory Bird Treaty Act
MW	megawatt
MWh	megawatt hours
ND	North Dakota
NDAC	North Dakota Administrative Code
NDCC	North Dakota Century Code
NDDOH	North Dakota Department of Health
NDDOT	North Dakota Department of Transportation
NDGFD	North Dakota Game and Fish Department
NDPRD	North Dakota Parks and Recreation Department
NDSL	North Dakota State Land Department
NDSWC	North Dakota State Water Commission
NERC	North American Electric Reliability Corporation
NHID	Natural Heritage Inventory Database
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NRCS	Natural Resources Conservation Service
NREL	National Renewable Energy Laboratory
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
NWR	National Wildlife Refuge
O&M	operation and maintenance

PLOTS	Private Lands Open to Sportsmen
Project	New Frontier Wind Project
Project Area	Boundary of the New Frontier Wind Project
PTC	production tax credit
REC	recognized environmental condition
ROW	right-of-way
SCADA	Supervisory Control and Data Acquisition
SHPO	State Historic Preservation Office
SoCP	Species of Conservation Priority
SPCC Plan	Spill Prevention Control and Countermeasure Plan
sq ft	square feet
SUP	Special Use Permit
SWPPP	Storm Water Pollution Prevention Plan
TVA	Tennessee Valley Authority
U.S.	United States
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WAPA	Western Area Power Administration
WCFZ	Worst Case Fresnel Zone
WEST	Western EcoSystems Technology, Inc.
WMA	Wildlife Management Area
WMD	Wetland Management District
WPA	Waterfowl Production Area

1.0 INTRODUCTION

Meadowlark Wind I LLC (Meadowlark), a wholly owned subsidiary of Element Power US, LLC (Element), respectfully submits this application to the North Dakota Public Service Commission (Commission) for a Certificate of Site Compatibility (Certificate) for the New Frontier Wind Project (the Project). Meadowlark submitted a Letter of Intent to file this application to the Commission on February 22, 2011. The Project will be located in McHenry County, North Dakota, and will provide up to 102 megawatts (MW) (gross capacity) of renewable wind energy (Figure 1). The Project plans to interconnect to the existing electrical transmission system at the McHenry Substation near Voltaire, North Dakota. From the Project’s Substation, an approximately 12-mile-long 115 kilovolt (kV) generator lead line will be constructed to facilitate the Project’s interconnection at the McHenry Substation. In accordance with Section 49-22-03(12)(a) of the North Dakota Century Code (NDCC), the proposed generator lead line falls outside of the Commission’s siting jurisdiction and will be permitted through McHenry County. Therefore, the generator lead line is not discussed in detail in this application.

Meadowlark’s parent company, Element, is a global renewable energy developer that builds, owns, and operates renewable energy projects. Element’s management team has developed more than 6,000 megawatts of renewable energy projects currently in operation or under construction. Element Power is backed by Hudson Clean Energy Partners, a leading private equity firm that specializes in investing in clean energy companies (www.hudsoncep.com).

1.1 COMPLIANCE WITH THE ENERGY CONVERSION AND TRANSMISSION FACILITY SITING ACT, NDCC CHAPTER 49-22

The North Dakota Energy Conversion and Transmission Facility Siting Act (Act), NDCC Chapter 49-22, requires the proponent of an energy conversion facility to obtain a Certificate from the Commission in order to locate, construct, and operate the facility in the State of North Dakota. The Act specifies that 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). An application for a Certificate must meet certain criteria set forth in the Act, as well as in the Commission’s Siting Rules (see Article 69-06 of the North Dakota Administrative Code (NDAC)).

Within this application, Meadowlark presents the information required by the Act and the Commission’s Siting Rules. Meadowlark discusses its consideration of the exclusion areas, avoidance areas, selection criteria, and policy criteria set forth in Section 69-06-08-01 of the NDAC in the design of the Project, as well as the factors set forth in NDCC Section 49-22-09. Project design and technical information have also been provided. Table 1.1-1 outlines the information required to fulfill the requirements for an application for a Certificate from the Commission and where these requirements are addressed in this application.

Table 1.1-1. Certificate Completion Checklist

State Authority	Description	Section
NDCC 49-22-08	Commission Guidelines: Energy Conversion and Transmission Facility Siting (November 1979)	
Section A	Description	
1.	Type: Describe the type of energy conversion facility proposed and provide a diagram of the major process system or a flow diagram	1.2, 4.1; Figure 5a and 6
2.	Product: Describe in general terms and technical terms	1.2.3, 6.1, 6.3; Figure 6

State Authority	Description	Section
	the products to be produced by the proposed facility.	
3.	Size and Design: Provide the following description of the production capacity and design:	1.2.1, 1.2.3, 5.1; Appendix B
a.	Gross design capacity;	1.2.3
b.	Net design capacity;	1.2.3
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	1.2.1, 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:	1.3
a.	Certificate of Site Compatibility;	1.3
b.	Land acquisition complete;	1.3
c.	Construction state date;	1.3
d.	Construction complete;	1.3
e.	Test operations;	1.3
f.	Commercial production date;	1.3
g.	100 percent capacity factor; and	1.3
h.	Any expansion or additions.	1.3
Section B	Studies	
1.	Provide a copy of an evaluative studies or assessments of the environmental impact of the proposed facility submitted to any federal, regional, state, or local agency	Appendix C
Section C	Need for Facility	
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.	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.	1.2.1, 5.1, 10.0; Figures 1-3
2.	Discuss the utility's policies and commitments to limit the environmental impact of its facilities, including copies	Appendix A

State Authority	Description	Section
	of board resolutions and management directives.	
3.	Identify and map the criteria that led to the proposed facility location within the study area.	1.2, 3.0; Figures 4 and 9
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
5.	The criteria to be evaluated shall include at a minimum all of the following which are within the study area:	3.0
a.	Exclusion areas;	3.1; Figure 4
b.	Avoidance areas;	3.2; Figure 4
c.	Selection criteria;	3.3
d.	Policy criteria;	3.4
e.	Design and construction limitations; and	3.5
f.	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.	List the qualifications of the people in the various disciplines that contributed to the facility site location study.	11.0
8.	Maps	Figures
a.	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 1/2 inch = 1 mile. All maps shall be at the same scale unless otherwise specified.	Figures 1-4, 7, 9-14
b.	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.	Not included. Commission supports not providing a Mylar map, requirement is outdated.
NDCC 49-22-09	Factors to be considered in evaluating applications and designation of sites, corridors, and routes.	
1.	Available research and investigations relating to the effects of the location, construction, and operation of the proposed facility on public health and welfare, natural resources, and the environment.	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	10.4

State Authority	Description	Section
	cannot be avoided should the proposed site or route be designated.	
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.	10.11

1.2 PROJECT SUMMARY

The Project will be located in southwestern McHenry County, North Dakota, just north of Ruso, North Dakota (Figures 1, 2, and 3). The Project will consist of up to 102 MW (gross capacity) of renewable wind energy capacity. The Project Area boundary shown on the Figures is approximately 11,352 acres. Project facilities will include:

- wind turbines and related equipment;
- new gravel access roads and improvements to existing roads;
- underground electrical collection lines;
- an operation and maintenance (O&M) building;
- Project substation facility;
- two permanent meteorological towers up to 80 m tall; and
- a temporary batch plant area and staging/laydown area for construction of the Project.

The Project will interconnect at the McHenry Substation near Voltaire, North Dakota. An approximately 12-mile-long, 115 kV generator lead line will be constructed to facilitate the Project's interconnection at the McHenry Substation.

1.2.1 Project Area

The Project Area is comprised of numerous parcels of private land subject to easement agreements between Meadowlark and landowners. The Project Area was selected to include all areas necessary to optimize the wind resource while avoiding and minimizing impact on environmental resources (see Section 5.1). Table 1.2-1 presents the McHenry County townships, sections, and ranges in the Project Area.

Table 2.2-1. Project Area Location

Township	Range	Sections
151N	80W	8-9, 16-23, 26-35

1.2.2 Project Layout

Meadowlark developed a preliminary Project layout within the Project Area in order to identify possible impacts. A final Project layout will be provided to the Commission for review prior to the public hearing on the Certificate application. Meadowlark's turbine layout will optimize electrical generation and efficiency based on the existing wind resource. Project turbines and ancillary facilities will be arranged subject to required and voluntary setbacks from environmentally sensitive areas, roads, occupied residences, or other restricted areas defined in the easement agreements, Certificate conditions, and other applicable local, state, or federal permit conditions.

Meadowlark will follow Element's internal siting process, and complete any studies required by all applicable permits and/or regulatory agencies related to the Project, including the Commission. Meadowlark will also evaluate the Project Area based on engineering considerations, efficient construction of the Project, and additional input from landowners on micrositing of wind turbines and associated facilities on their property.

Following issuance of a Certificate by the Commission, a pre-construction meeting will be held with Commission staff to ensure the site plan conforms to Certificate requirements. Following completion of construction, as-built site plans will be filed with the Commission.

1.2.3 Projected Output

The Project will have a nameplate (gross) generating capacity of up to approximately 102 MW, with projected average annual output of up to 484,000 megawatt hours (MWh) per year (assuming a net capacity factor of between 45 and 55 percent). The net capacity delivered to the electrical transmission system will be 99 MW. As with all wind projects, the actual Project output will be determined by wind resource, final design, site-specific features, and equipment.

1.3 PROJECT SCHEDULE

The anticipated schedule for the Project's Certificate, land acquisition, construction, testing, and commercial operation is provided below.

- Certificate of Site Compatibility: Meadowlark anticipates the Certificate will be approved in January 2012.
- Land Acquisition: Complete.
- Construction: Meadowlark anticipates beginning construction the second quarter of 2012. Meadowlark anticipates completing construction the fourth quarter of 2012.

- Test Operations: Testing for the Project would begin in the fourth quarter of 2012 following completion of construction.
- Commercial Production Date: Commercial operation for the Project would begin in the fourth quarter of 2012 following completion of construction.

The capacity factor is dependent upon the final design equipment and site-specific features. The typical capacity factor for wind projects in the Great Plains Region is approximately 35 to 40 percent. At between 45 and 55 percent, the capacity factor for this Project is expected to be higher than the typical capacity factor for a wind project in the Great Plains Region.

Though not anticipated, the Project may be built in phases but the net capacity delivered to the electrical transmission system will remain 99 MW.

No expansions or modifications to the Project are anticipated at this time.

1.4 PROJECT OWNERSHIP

Meadowlark plans to own and operate the Project, as well as manage the construction of all equipment and associated facilities related to the Project. If the utility purchasing the power or third party may want to own the Project, Meadowlark would consider selling the Project. Meadowlark will procure the turbine and tower package directly from an original equipment manufacturer, while a third-party contractor will perform all other activities associated with engineering, procurement, and construction of the Project.

2.0 NEED FOR FACILITY

2.1 NEED ANALYSIS

The proposed Project is intended to satisfy the needs of the State of North Dakota, which has committed to becoming a leading supplier of renewable energy to the nation, as well as other neighboring states with Renewable Portfolio Standards. Existing and potential future state and federal policies, combined with the declining costs of wind energy generation, have made wind energy more attractive to utilities seeking to diversify their generation portfolios. Several states have established Renewable Portfolio Standards that require the development of renewable energy projects.

The Project is consistent with North Dakota's commitment to increasing the renewable energy portfolio of both the state and the nation. Table 2.1-1 shows the existing (through first quarter 2011) and potential wind power development for North Dakota and the surrounding states.

Table 2.1-1. North Dakota and Midwest Wind Power

State	Existing MW Online	Estimated MW Needed to meet RPS	Renewable Portfolio Standard
Illinois	2,286	3,600	25% by 2025
Iowa	3,675	None	None
Minnesota	2,485	2,897	25% by 2025

State	Existing MW Online	Estimated MW Needed to meet RPS	Renewable Portfolio Standard
Nebraska	294	None	None
North Dakota	1,424	192	10% by 2015
South Dakota	784	140	10% by 2015
Wisconsin	469	1,002	10% by 2015

Source: AWEA 2011

The Project offers North Dakota the opportunity to add to capacity adequacy requirements, to stabilize wholesale power prices, and to provide electricity from a clean, cost-effective renewable energy generation facility. Meadowlark intends for the Project to be a significant source of energy for meeting the region's needs over the next 25-50 years. The Project will satisfy the state of North Dakota's goal of expanding the clean renewable energy portfolio of the entire United States (U.S.) and help potential offtakers satisfy their commitments to environmental stewardship, providing affordable energy, and supporting regional economic growth.

At this time, the specific offtaker for the Project has not been identified. However, potential offtakers for the Project include Midwest Independent System Operator (MISO) and Western Area Power Administration (WAPA) utilities, or utilities in service territories adjacent to MISO or WAPA, that need to satisfy Renewable Portfolio Standards, which may include utilities that have load in North Dakota. Table 2.1-1 displays the general market for renewables, but does not specifically indicate which individual utilities in these states have not met their load requirements.

2.2 ALTERNATIVES

Traditional alternatives to wind energy development include the burning of coal or natural gas. However, the Project is intended to satisfy is the need for additional renewable electric generation necessary to satisfy State Renewable Portfolio Standards. As such, non-renewable generation sources are not a viable alternative.

Other types of renewable generation were considered, however, given limitations associated with solar, hydroelectric, and biomass, wind energy is currently the most economic and technologically feasible of the renewable alternatives for this site. The Midwest, specifically North Dakota, does not have a good solar resource. The Project Area is not compatible with solar installation given its rolling hill terrain and abundant small pockets of wetlands. The added construction cost to prepare the Project Area for a solar energy facility, along with the relatively low solar resource, makes the energy output not economically comparable to wind. Large scale hydroelectric generation is not feasible in the Project Area given the surface water characteristics. Hydroelectric generation is also environmentally intensive with the amount of area it permanently disturbs. Biomass could be considered for this area, but current pricing for product and hauling the fuel makes the energy costs significantly higher than wind. As a result, Meadowlark did not consider such alternatives for this Project

Meadowlark used a number of criteria to locate the Project when looking for a site in North Dakota (i.e., high quality wind resource, available land, available transmission, and environmental constraints). Meadowlark reviewed many locations within North Dakota and based on the criteria above, this Project

Area was selected. This Project Area has an unusually high wind resource, even compared to other North Dakota sites. A major factor in Meadowlark's siting of this Project was its proximity to available transmission capacity. In North Dakota, transmission capacity is very constrained and very limited. Outside of building new, substantial regional backbone transmission lines, the least intrusive way of siting a wind project is near existing transmission capacity. The Project site was also selected due to its highly cultivated landscape. Several projects Meadowlark considered were not pursued because areas of heavy natural prairie or other sensitive features were present. Meadowlark also pursued this Project Area because the impacts on this site would be less than others that were considered. An example is that sites with federally designated critical habitat for piping plover were not considered. This was one of several attributes of environmental impacts that were weighed with the other critical aspects discussed above.

2.3 TEN-YEAR PLAN

Meadowlark filed a Ten-Year Plan with the Commission on June 20, 2011, and the Project is consistent with that Plan (see Case No. PU-11-301).

3.0 SITE SELECTION CRITERIA

To develop a project that is both economically and technically feasible, wind energy developers follow a siting process that weighs alternatives — both at the level of general location and specific layout. Included below are the siting criteria used in identifying general project locations. Each of these criteria needs to be satisfied for a Project to be economically and technically feasible and practical.

- **Quality of Wind Resource.** Given current turbine technologies, the siting of commercial scale wind projects is constrained by the need for a location with sufficient wind speeds on a regular basis throughout the year. The lack of a suitable wind resource could lead to operational problems.
- **Available Land.** Land owners must be willing to execute lease agreements or otherwise allow the use of the land for wind turbines and associated facilities. Existing land uses must not conflict with wind energy facilities.
- **Suitable Transmission.** Large-scale wind energy facilities must be sited in a manner that allows for the economical delivery of power to customers on the electrical transmission system. A reasonable distance is determined by the capital cost of transmission line construction.
- **Environmental Issues.** Large scale wind energy projects must be sited in areas where environmental issues or existing land uses or activities would not prohibit project development.

After each of these criteria were satisfied, the next step in the development process was to secure the site by entering into agreements with landowners interested in having Meadowlark place wind turbines and associated facilities on their properties. Once the site was selected and secured, preliminary turbine locations were identified based on an efficient Project design, initial site inspection, topographic maps, known environmentally sensitive areas, review of North Dakota's power plant siting exclusion and avoidance areas, landowner input, and communications with local, state and federal agencies.

During fall 2011, Meadowlark will conduct field studies such as wetland, biological, cultural resource, and geotechnical surveys. Once these additional studies are completed, preliminary turbine and access road locations will be reevaluated for their appropriateness and compliance with setback requirements and any buffers. Meadowlark will then provide the Commission with the final layout prior to the public hearing.

Meadowlark believes that the aforementioned siting process is consistent with North Dakota siting rules and provides the flexibility necessary to develop this Project in a timely, cost-effective, and environmentally responsible manner. North Dakota has several site selection criteria that are considered by the Commission to determine suitability of the site. Meadowlark has reviewed the criteria in Section 69-06-08-01 of the NDAC, and has factored these criteria into site design. These criteria are discussed in this section.

3.1 EXCLUSION AREAS

Per Section 69-06-08-01(1) of the NDAC, “[t]he following geographical areas shall be excluded in the consideration of a site for an energy conversion facility, and shall include a buffer zone of a reasonable width to protect the integrity of the area” (see Table 3.1-1). Exclusion areas are mapped on Figure 4.

Table 3.1-1. Exclusion Areas

Exclusion Area	Present within Project Area?	Description and Proposed Buffer	Section Addressed
Designated or registered national: parks; memorial parks; historic sites and landmarks; natural landmarks; historic districts; monuments; wilderness areas; wildlife areas; wild, scenic, or recreational rivers; wildlife refuges; and grasslands.	No	No buffer is proposed.	7.3, 7.7, 7.8, 7.15, 7.16
Designated or registered state: parks; forests; forest management lands; historic sites; monuments; historical markers; archaeological sites; grasslands; wild, scenic, or recreational rivers; game refuges; game management areas; management areas; and nature preserves.	No	No buffer is proposed.	7.3, 7.7, 7.8, 7.15, 7.16
County parks and recreational areas; municipal parks; parks owned or administered by other governmental subdivisions; hardwood draws; and enrolled woodlands.	No	No buffer is proposed.	7.3, 7.8, 7.10
Prime farmland and unique farmland, as defined by the land inventory and monitoring division of the soil conservation service, United States Department of Agriculture (USDA), in 7 C.F.R. Part 657; provided, however, that if the Commission finds that the prime farmland and unique farmland that will be removed from use for the life of the facility is of such small acreage as to be of negligible impact on agricultural productions, such exclusion shall not apply.	Yes	The acreage to be removed from use for the life of the Project will have a negligible impact on agricultural productions. No buffer is proposed.	7.10, 7.11 Figure 11
Irrigated land.	No	No center pivot irrigation (CPI) systems are present.	7.3, 7.11

Exclusion Area	Present within Project Area?	Description and Proposed Buffer	Section Addressed
		No buffer is proposed.	
Areas critical to the life stages of threatened or endangered animal or plant species.	No	No buffer is proposed.	7.16 Figures 4 and 14
Areas where animal or plant species that are unique or rare to this state would be irreversibly damaged.	No	No buffer is proposed.	7.14, 7.15, 7.16

3.2 AVOIDANCE AREAS

Per Section 69-06-08-01(2) of the NDAC, “[t]he following geographical areas 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” (see Table 3.2-1). In determining whether an avoidance area should be designated for a facility, the Commission may consider among other things, the proposed management of adverse impacts, the orderly siting of facilities, system reliability and integrity, the efficient use of resources, and alternative sites. Avoidance areas are mapped on Figure 4.

Table 3.2-1. Avoidance Areas

Avoidance Area	Present within Project Area?	Description and Proposed Buffer	Section Addressed
Historical resources which are not designated as exclusion areas.	Yes ¹	Meadowlark completed a literature search for cultural resources within the Project Area. Meadowlark will also complete field surveys for cultural resources during fall 2011.	7.7
Areas within the city limits of a city or the boundaries of a military installation.	No	The Minot Air Force Base’s Missile Launch Facility is adjacent to the Project Area. Meadowlark is coordinating with the Minot Air Force Base and will adhere to the setbacks determined by the U.S. Air Force.	7.3
Areas within known floodplains as defined by the geographical boundaries of the hundred-year flood.	No	Floodplains have not been mapped by the Federal Emergency Management Agency (FEMA) in the Project Area. Per the North	7.12

¹ Known important historical resources will be avoided during development of the Project layout. Meadowlark will complete field surveys to locate any previously unidentified historical resources that may occur in the Project Area. Any important historical resources identified during these surveys will also be avoided during development of the final Project layout.

Avoidance Area	Present within Project Area?	Description and Proposed Buffer	Section Addressed
		Dakota State Water Commission (NDSWC), no identified floodplains exist within the Project Area). Meadowlark will avoid impacts to surface water to the extent practicable.	
Areas that are geologically unstable.	No	No buffer is proposed.	7.11
Woodlands and wetlands.	Yes	Wetlands will be avoided to the extent practicable. If impacts are unavoidable, appropriate permits will be obtained. Woodland impacts will be minimal because the extent of woodlands (residential groves and agricultural windbreaks) is limited. No buffers are proposed.	7.3, 7.10, 7.13, 7.14 Figures 10 and 13
Areas of recreational significance which are not designated as exclusion areas.	No	No buffer is proposed.	7.8

3.3 SELECTION CRITERIA

Per Section 69-06-08-01(3) of the NDAC, “[a] site shall be approved in an area only when it is demonstrated to the Commission by the applicant that any significant adverse effects resulting from the location, construction, and operation of the facility in that area, as they relate to the following, will be at an acceptable minimum, or that those effects will be managed and maintained at an acceptable minimum” (see Table 3.3-1).

Table 3.3-1. Selection Criteria

Selection Criteria	Potential Adverse Effects	Section Addressed
The impact upon agriculture:		
Agricultural production.	A final layout has not been determined for the Project, so exact impacts to agricultural production areas are not known at this time. Permanent Project facilities will remove land from crop production or rangeland, but the amount of land removed is not anticipated to be significant. Table 5.1-1 estimates temporary and permanent Project impacts based on a preliminary layout. Depending upon the turbine type selected, 52 to 69 acres of land may be permanently disturbed for the Project.	7.3, 7.10

Selection Criteria	Potential Adverse Effects	Section Addressed
Family farms and ranches.	No turbines will be placed within 1,400 feet (ft) of occupied residences. The potential adverse effects to family farms are land area lost to Project facilities and aesthetic impacts. Wind lease payments will provide a supplemental source of income in excess of normal farming operations.	7.2, 7.3, 7.10
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.	7.3, 7.10, 7.11 Figures 3, 11 and 12
Surface drainage patterns and ground water flow patterns.	No adverse effects are anticipated.	7.11, 7.12, Figure 13
The agricultural quality of the cropland.	No impacts to the agricultural quality of cropland are anticipated. If compaction of soils occurs during construction or drain tiles are damaged, Meadowlark will work with the landowners to alleviate the compaction and/or repair the drain tiles.	7.3, 7.10, 7.11
The impact upon the availability and adequacy of:		
Law enforcement.	No adverse effects are anticipated.	7.4
School systems and education programs.	No adverse effects are anticipated.	7.4
Governmental services and facilities.	No adverse effects are anticipated.	7.4
General and mental health care facilities.	No adverse effects are anticipated.	7.4
Recreational programs and facilities.	No adverse effects are anticipated.	7.4, 7.8
Transportation facilities and networks.	During construction, there will likely be an increase in vehicle trips per day. During operation no adverse effects to transportation facilities or networks are anticipated. Meadowlark intends to enter into a Road Agreement with McHenry County and or Townships if applicable.	7.4
Retail service facilities.	No adverse effects are anticipated. During construction, with the influx of people involved in the Project, there may be a positive impact on retail services.	7.4
Utility services.	No adverse effects are anticipated.	6.0, 7.4

Selection Criteria	Potential Adverse Effects	Section Addressed
The impact upon:		
Local institutions.	No adverse effects are anticipated.	7.4
Noise-sensitive land uses.	No adverse effects are anticipated. Noise-sensitive receptors are occupied residences of landowners who are parties to easement agreements with Meadowlark. Turbines will be setback at least 1,400 ft from occupied residences.	7.6
Rural residences and businesses.	No adverse effects are anticipated. Turbines will be setback at least 1,400 ft from occupied residences.	7.2, 7.3
Aquifers.	No adverse effects are anticipated.	7.12
Human health and safety.	With implementation of the mitigative measures discussed in Section 7.5.3, no adverse effects to human health and safety are anticipated.	6.5, 7.5
Animal health and safety.	No adverse effects to livestock are anticipated from the Project. There is a potential for avian and bat collisions with the turbines for the Project and displacement, injury, or mortality for other wildlife species. Mitigative measures as discussed in Sections 7.15.3 and 7.16.3 will minimize the potential for these impacts. Meadowlark is coordinating with the U.S. Fish and Wildlife Service (USFWS) and North Dakota Game and Fish Department (NDGFD) regarding appropriate mitigation measures to protect animal health and safety.	7.10, 7.15, 7.16
Plant life.	A final layout has not been determined for the Project, so exact impacts to plant life are not known at this time. Table 5.1-1 estimates temporary and permanent Project impacts based on a preliminary layout.	7.14 Figure 10
Temporary and permanent housing.	Temporary housing will be utilized during construction. It is likely employees during Project operation will live near the Project and create a positive effect on the housing market by renting or purchasing available housing. No adverse effects are anticipated.	7.2
Temporary and permanent skilled and unskilled labor.	No adverse effects to temporary and permanent skilled and unskilled labor are anticipated. Project construction and operations should yield a benefit to the labor community, both short- and long-term.	7.2
Cumulative impact:		

Selection Criteria	Potential Adverse Effects	Section Addressed
The cumulative effects of the location of the facility in relation to existing and planned facilities and other industrial development.	No significant adverse cumulative effects due to the location of the Project in relation to existing or planned facilities and other industrial development are anticipated.	7.3, 7.4

3.4 POLICY CRITERIA

In accordance with Section 69-06-08-01(4) of the NDAC, “[t]he Commission may give preference to an applicant that will maximize benefits that result from the adoption of the following policies, and practices and in a proper case may require the adoption of such policies and practices.” These policy criteria are addressed in Table 3.4-1.

Table 3.4-1. 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.	Meadowlark will develop a site layout that optimizes wind resources while minimizing the impact on land resources and any sensitive areas. A doubling of the wind speed will increase the available energy by a factor of eight times. Meadowlark will minimize the amount of underground collection lines to the extent practicable to reduce energy line losses between the generation point and the Project Substation.	4.2
Training and utilization of available labor in this state for the general and specialized skills required.	Meadowlark will use local labor to the extent practicable.	7.2
Use of a primary energy source or raw material located within the state.	The energy generated at the site will utilize the wind resources in the state of North Dakota.	5.2
Non-relocation of residents.	No residents will be relocated as a result of the Project.	7.2, 7.3
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. Meadowlark is coordinating with USFWS on appropriate mitigation measures.	7.3, 7.8, 7.15, Figures 7 and 9
Economies of construction and operation.	Meadowlark will use local labor to the extent practicable. Meadowlark intends to use the	7.2

Policy Criteria	Suitable Policy or Practice of Applicant	Section Addressed
	same construction crew to construct both the generator lead line and Project. Meadowlark also intends to use the same operations and maintenance crew to oversee the generator lead line and the Project.	
Secondary uses of appropriate associated facilities for recreation and the enhancement of wildlife.	None are proposed; the Project will be constructed on private lands owned by third parties.	N/A
Use of citizen coordinating committees.	Meadowlark has and will continue to work with landowners in the development of the Project; thus, a citizen coordinating committee is not necessary.	8.0
A commitment of a portion of the energy produced for use in this state.	The Project will interconnect with the electrical transmission system at the McHenry Substation. The Project's output may be sold to offtakers potentially in North Dakota, which would serve load in North Dakota.	2.1,6.1
Labor relations.	The Project will have an employment policy consistent with industry practices. Labor relations are not anticipated to be an issue and will be handled by experienced contractors. Oversight of contractors will be provided by Meadowlark during construction and operation of the Project.	6.4.1, 7.2
The coordination of facilities.	Existing facilities and facility corridors were considered in the location of the Project.	3.6, 7.4
Monitoring of impacts.	Meadowlark and the construction contractor will employ Best Management Practices (BMPs) during construction and will conduct monitoring as directed by permitting authorities and regulatory approvals required for the Project.	7.11, 7.15, 7.16

3.5 DESIGN AND CONSTRUCTION LIMITATIONS

Design and construction limitations that apply to all wind projects include wind resources, interconnection to the electrical transmission system, land availability, and environmental constraints. Wind resource is essential in selecting and designing a wind project. Meadowlark has conducted an assessment of the meteorological conditions of the Project Area to ensure the site has enough wind energy to generate electricity. Capability for interconnection to the existing electrical transmission system is a significant factor in Project design due to the fact that development of new, extensive transmission facilities is costly from both environmental and economic perspectives. The Project will interconnect at the McHenry Substation near Voltaire, North Dakota, via a relatively short (approximately 12 mi in length) 115 kV generator lead line. Site control is also critical to the Project. Meadowlark has secured voluntary land easement agreements with landowners in order to develop the Project.

There are also several limiting factors in design and construction that are specific to the Project. These include but are not limited to:

- Setback requirements from occupied residences, property lines and existing roads;
- Avoidance of microwave beam paths;
- Avoidance of missile silos and underground cabling;
- Avoidance or mitigation of impacts on archeological sites;
- Turbine spacing requirements;
- Engineering considerations (slopes) and geotechnical considerations; and
- Minimization of permanent impacts on wetlands and waterbodies.

3.6 ECONOMIC CONSIDERATIONS

Economics were an important consideration 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 at a high capacity factor. Another controlling factor of the economics of the Project site is proximity to a point of interconnection with the existing transmission network. The Project site enjoys a favorable location, requiring only a relatively short (12-mi) generator lead line to connect with the existing McHenry Substation.

The American Recovery and Reinvestment Act of 2009 extends the federal Production Tax Credit (PTC) to any project in operation by the end of 2012. Approval of permits will help ensure the Project is operational before the 2012 expiration of the PTC. There is uncertainty in the PTC past the year 2012 and potential offtakers are taking advantage of the 2012 PTC certainty.

As noted above, it is important to select a site with a wind resource capable of generating energy in order to provide a reliable, productive, and economically sustainable wind project. Having permission to interconnect into the existing transmission system is also essential. If a transmission system were not present, or if connection were not permitted, the cost of interconnection would increase due to the need to construct a transmission line and large substation in order to interconnect to an existing electric service provider.

4.0 GENERAL DESCRIPTION OF THE PROPOSED FACILITY

4.1 WIND POWER TECHNOLOGY

As 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. Figure 5a shows a representative wind turbine with dimensions characteristic of the turbine types being considered for this Project.

Depending on the model selected, the Project could install up to 63 turbines to meet full generation capacity (see Section 6.2). The exact turbine model to be used is subject to change in order to ensure that the turbine model ultimately selected is both cost-effective and optimizes land and wind resources.

Each tower will be secured by a concrete foundation. The design of this foundation may vary based upon local soil and other geotechnical 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 control system, which indicates when sufficient winds are present for operation. The turbine features 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 or overhead power collection lines within the Project site. Both power collection lines and communication cables will be buried underground or may be constructed as overhead lines where site specific considerations require. Typically, this infrastructure is run adjacent to the Project access roads or along public rights-of-way (ROW) or easements. Where underground collection lines are not co-located in access roads, they most often take a more direct path from the point of generation back to the substation and will also be buried at a depth of approximately 4 ft. The 34.5 kV collector system transmits power to the Project collector substation.

All-weather, permanent gravel access roads approximately 16 to 18 ft in width will connect wind turbines to the existing county and local road network. At the intersection of the access roads and public roads, the underground communication and collection lines will continue as feeder lines, distributing power to the Project Substation. At the Project Substation, the power will again be stepped up to 115 kV and transmitted via a 115-kV interconnection station to the existing McHenry County Substation. Project interconnection to the electrical transmission system will adhere to standards detailed in the Interconnection Agreement.

Figure 6 depicts the general path of energy from the Project to energy users.

4.2 WIND ENERGY PROJECT LAYOUT

Meadowlark will develop a Project layout that optimizes wind resource, minimizes the impact on land resources and potentially sensitive areas, and conforms to the energy conversion facility siting criteria described in NDAC 69-06-08-01. The most important consideration in adequate and reliable generation of wind-powered electricity is the localized availability of the wind resource. 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. Design of the turbine array and collection system will minimize energy loss due to wind turbine wakes and turbulence and electrical line losses.

Table 4.2-1 identifies the minimum setbacks Meadowlark is applying to the Project.

Table 4.2-1. Setback Distances for the Project

Setback Type from Project Turbines	Distance
Project Boundary	1.1 x blade tip height
Occupied Residence	1,400 ft
Missile Facility (Building)	2,640 ft
Township and County Roads	1.1 x blade tip height
State and Federal Highways	1.1 x blade tip height
Overhead Transmission and Distribution Lines	1.1 x blade tip height

4.3 ASSOCIATED FACILITIES

In addition to the wind turbines and the step-up transformers, the Project will include several miles of permanent access roads that allow for easy access to the wind turbines year-round. These roads will typically be 16 to 18 ft wide and low profile to allow cross-travel by farm equipment and turbine maintenance equipment. Meadowlark will work closely with the landowners in locating access roads to minimize land use disruptions. Consideration will be taken in locating access roads to minimize impact on current or future row crop agriculture, grazing, and environmentally sensitive areas.

As noted in Section 4.1, minor facilities associated with the Project's electrical system include pad-mounted transformers at the base of each turbine, and a system of underground electrical collection lines. The electricity generated at each turbine is collected by a system of underground power collection lines within the Project site and brought to the Project collector substation. An O&M building will be constructed within the Project site. The footprint of the Project Substation and O&M building will be approximately 10 acres. Meadowlark has constructed two temporary meteorological towers within the Project site. It is anticipated that the site will include two permanent meteorological towers.

Additional temporary facilities associated with construction of the Project will include a concrete batch plant and laydown area.

4.4 LAND RIGHTS

Meadowlark has obtained wind rights and easements for a 102 MW (gross capacity) project. Land rights encompass the Project and all associated facilities, including but not limited to wind and buffer easements, wind turbines, access roads, underground and overhead collector and feeder lines. In addition, Meadowlark would consider obtaining rights to land in order to mitigate environmental impacts incurred due to the Project.

5.0 PROPOSED SITE

5.1 IDENTIFICATION OF PROJECT AREA

Meadowlark selected the Project Area and larger surrounding vicinity (study area) to analyze the wind resource, land availability, transmission interconnection, environmental resources and economic potential for a wind project (Figure 1). From the study area, the Project Area was selected based on good land compatibility and accessibility, excellent wind resources, and proximity to an electrical transmission system interconnection point. North-central North Dakota is well suited for wind development because it features large open terrain and has land available for wind turbine siting. The Project Area was identified as an optimal site from an environmental, wind resource, and economic perspective. Meadowlark secured wind lease easements and then 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, and communications with local landowners and other authorities.

Project facilities will be located on land primarily consisting of rangeland and cultivated cropland with a few rural residences and farmsteads. Turbines and ancillary facilities will be placed throughout the leased portion of the Project Area. Table 5.1-1 presents a summary of conservative Project impact assumptions for both temporary impacts (construction footprint) and permanent impacts (operational footprint) based on a preliminary Project layout of the minimum and maximum number of turbines (see Section 6.2).

Table 5.1-1. Estimated Project Impacts for Project Facilities

Project Facilities	Temporary Impacts		Permanent Impacts	
	Impact Assumption (Conservative)	Anticipated Range of Impacts	Impact Assumption (Conservative)	Anticipated Range of Impacts
Turbines	Each turbine will require approximately 1.6 acres (70,650 sq ft) for construction pad/laydown area	70 to 100 acres	Each turbine will require approximately 0.08 acres (3,600 sq ft)	3.5 to 5 acres
Access Roads – Temporary	Each turbine will require approximately 1,320 ft of crane access road (assumes 40-ft-wide access road between turbines (crane walk))	53 to 76 acres	N/A	N/A
Access Roads – Permanent	N/A	N/A N/A	Each turbine will require about 2,065 ft of access road (assumes 18-ft-wide access road)	38 to 54 acres
Staging Areas	10 acres	10 acres	N/A	N/A
Collector Line	Each turbine will require approximately 2,600 ft of collector line (assumes a 24-ft-wide by 4-ft-deep construction trench)	63 to 90 acres	N/A	N/A
Collector Substation	N/A	N/A	5 acres	5 acres
O&M Facility	N/A	N/A	5 acres	5 acres
Meteorological Tower	N/A	N/A	900 sq ft (0.02 acre)	.04 acres
Total	N/A	196 to 276 acres	N/A	52 to 69 acres

5.2 WIND CHARACTERISTICS IN PROJECT AREA

According to the National Renewable Energy Laboratory’s “Wind Powering America,” wind resources within the Project’s region range from 8 to 9 meters per second (m/s) at 80 m height (DOE 2011).

In June 2009, EAPC Architects Engineers (EAPC) prepared a preliminary layout and energy production estimates for the Project. On-site wind data from two 60 m NRG tilt up towers installed by EAPC were used for this study. Two 60 m towers from a separate project located to the southeast of the Project site

were also used. Long-term data was available from the North Dakota Agricultural Weather Network Turtle Lake station. Meadowlark also performed an internal wind speed analysis for the Project Area in August 2010 using the same meteorological towers and data sources.

These site-specific wind analyses indicate the Project has highly suitable wind resource for economical, sustainable, and reliable production of power. In order to continue meteorological data collection over the lifetime of the Project and verify wind turbine power curves, up to two permanent meteorological towers will be installed as part of the Project.

6.0 ENGINEERING AND OPERATIONAL DESIGN ANALYSIS

6.1 PROJECT LAYOUT AND ASSOCIATED FACILITIES

A summary of the Project’s design information is included in the Design Data Report (Appendix B). The Project will consist of up to 63 wind turbines, depending upon the final turbine type selected (see Figure 5a). Improvements to existing roads, construction of new gravel access roads, installation of underground electrical collection lines, construction of an O&M building, erection of up to two 80 m tall permanent meteorological towers, and construction of an interconnection substation facility are also part of the Project. A temporary staging and laydown area as well as a batch plant are also planned for the construction phase of the Project. The network of access roads, O&M building, and location of any on-site facility operating structures will minimize disturbance on the site, yet provide optimal access to all turbines during operations. Drainage systems, access roads, crane pads, foundations, storage areas, and O&M facilities will be installed as necessary to fully accommodate all aspects of Project construction, operation, and maintenance. The proposed Project will interconnect to the MISO electric transmission system via an on-site 115-kV generator lead line to the McHenry Substation near Voltaire, North Dakota.

6.2 DESCRIPTION OF WIND TURBINES

Table 6.2-1 compares three turbine types under consideration for the Project. Meadowlark reserves the right to select alternate turbines representative of the same class of turbine. The wind turbines will operate automatically, self-starting when the wind speed reaches the designed cut-in speed, specific to each turbine type under consideration for the Project. Once rated power is achieved, the wind turbine will regulate to maintain the rated power. The wind turbine will shut down once the maximum operational limit is reached and restart automatically once the wind drops below a preset restart wind speed. The standard braking system works through feathering of turbine blades, and a mechanical brake is fitted to the gearbox provides additional safety.

Table 6.2-1. Turbine Type Characteristics for the Project

Turbine Type	Rotor Diameter	Rotor Swept Area	Cut-In Wind Speed	Rated Power	Cut-Out Wind Speed	Blade Length	Hub Height	Blade Height (Highest)	Blade Height (Lowest)	Max # of Project Turbines
Siemens SWT-2.3-113	113 m (371 ft)	10,000 m ² (107,639 ft ²)	3 m/s (7 mph)	12-13 m/s (27 – 29 mph)	25 m/s (56 mph)	55 m (180 ft)	80 m or site specific	136.5 m (448 ft)	23.5 m (77 ft)	44

Turbine Type	Rotor Diameter	Rotor Swept Area	Cut-In Wind Speed	Rated Power	Cut-Out Wind Speed	Blade Length	Hub Height	Blade Height (Highest)	Blade Height (Lowest)	Max # of Project Turbines
				mph)						
Siemens SWT-2.3-101	101 m (331 ft)	8,000 m ² (86,111 ft ²)	3-4 m/s (7-9 mph)	12-13 m/s (27 – 29 mph)	25 m/s (56 mph)	49 m (161 ft)	80 m or site specific	130.5 m (428 ft)	29.5 m (97 ft)	44
Vestas V90-1.8	90 m (295 ft)	6,362 m ² (68,480 ft ²)	4 m/s (9 mph)	12 m/s (27 mph)	25 m/s (56 mph)	44 m (144 ft)	80 m or site specific	125 m (410 ft)	35 m (115 ft)	56
GE 1.6-82.5	82.5 m (271 ft)	5,345 m ² (57,533 ft ²)	3.5 m/s (8 mph)	11.5 m/s (26 mph)	25 m/s (56 mph)	40.3 m (132 ft)	80 m or site specific (262 ft)	121.25 m (398 ft)	38.75 m (127 ft)	63
Minimum/Maximum Range	82.5 – 113 m (271 – 371 ft)	5,345 – 10,000 m ²	3-4 m/s (7-9 mph)	11.5 - 13 m/s (26 – 29 mph)	25 m/s (56 mph)	40.3 – 55 m (132 – 180 ft)	80 m or site specific (262 ft)	121.25 – 136.5 m (398 – 448 ft)	23.5 – 38.75 m (77 – 127 ft)	44 - 63

Source: Siemens AG 2011; Siemens AG 2009; Vestas Wind Systems 2011; GE 2011; WEM 2011

The wind turbine will be mounted on a tubular steel tower with internal ascent and direct access to the yaw system and nacelle. It will be equipped with platforms and internal electric lighting. Access to the turbine is through a lockable steel door at the base of the tower. Four platforms are connected with a ladder and a fall arresting safety system for access to the nacelle. A controller cabinet will be located inside each tower base. The turbine tower, on which the nacelle is mounted, consists of three to four sections manufactured from certified steel plates. All welds are made in automatically controlled power-welding machines and are ultrasonically inspected during manufacturing per American National Standards Institute (ANSI) specifications. All surfaces are sandblasted and multi-layer coated for protection against corrosion. The towers are uniformly painted with a non-reflective white paint.

The rotor is a three-bladed cantilevered construction mounted upwind of the tower. A yawing system will rotate the rotor around the turbine, to keep it upwind of the tower. The power output will be controlled by pitch regulation, with a variable rotor speed to maximize efficiency. The turbine uses a Supervisory Control and Data Acquisition (SCADA) system, which allows remote control and monitoring of the status of all turbines in the Project. The monitoring system provides status views of electrical and mechanical data, operation and fault status, meteorological data, and grid station data.

Lightning protection will be consistent with the wind turbine supplier’s design and specifications and local utility or code requirements. Individual components are designed with specific lightning protection systems. Some of the lightning protection systems are lightning receptors, pick-up systems, integrated conductors along key components to ground, and surge arrestors.

Turbines will be lit per Federal Aviation Administration (FAA) requirements.

6.3 DESCRIPTION OF ELECTRICAL SYSTEM

The electrical system design and interconnection details will be determined through studies and discussions with MISO.

At the base of each turbine a step-up transformer will be installed to raise the voltage to power collection-line voltage of 34.5 kV. Power will run through an underground collection system to the Project's 34.5/115 kV collector substation. Overhead collection lines may be required in certain areas if site conditions dictate. A new 115 kV generator lead line will exit the Project collector substation and will transmit power to the McHenry Substation, where it will interconnect with the electrical transmission system (see Figure 6).

6.4 PROJECT CONSTRUCTION

Construction activities expected for the Project include:

- Order all necessary wind turbine components including towers, nacelles, hubs and blades;
- Complete environmental and archaeological surveys;
- Complete preliminary survey and design to establish locations of wind turbine generators, access roadways, collector system, and collector substation;
- Complete soil borings, testing, and analysis for proper foundation design and materials;
- Finalize turbine micrositing;
- Obtain all required regulatory approvals;
- Complete final design and construction of laydown area, access roads, and crane pads;
- Complete final design and construction of wind turbine generator foundations;
- Complete final design and construction of underground electrical collector system and communication system;
- Design and construct the Project collector substation;
- Design and construct O&M facility;
- Complete tower placement and wind turbine erection;
- Complete commissioning and testing of facility; and
- Begin commercial production.

As discussed in Section 6.4.3, access roads will be designed and constructed along turbine strings or arrays to provide all-weather access for delivery of turbine components and erection equipment. Meadowlark will develop an improved crane-traveling surface that will be integrated with the access roads. The temporary improved surface will be up to 40 ft wide, and consist of compacted earth or aggregate depending on soil conditions. These roads will accommodate cranes with approximately 33 ft track width. The driving surface (aggregate surfacing) will be 16 to 18 ft in width (roads will have to be wider at turns).

Grading design and construction will also include preparation of working surfaces for assembly and erection of the wind turbine generators (see Figure 5b). As discussed in Section 6.4.2, foundations for the wind turbine generators will likely be cast-in-place reinforced-concrete spread foundations. Construction will include excavation, formwork, placement of anchor bolts, reinforcing steel, and placement and finishing of the ready-mix concrete.

The underground 34.5 kV electrical collector system and fiber optic communication system will likely be installed in a common trench. The 34.5/115 kV collector substation will require construction of cast-in-place reinforced concrete foundations, erection of structural steel supports for electrical bus work and equipment, and installation of transformers, circuit breakers, switches, instrument transformers, and other electrical equipment. The collector substation will be fenced and will include a prefabricated electrical equipment building with control, protection, and communications panels.

An O&M facility will be designed and constructed to accommodate personnel and equipment required for ongoing operation and maintenance. Meadowlark will develop a well to provide potable water for the facility. Wastewater treatment facilities will be provided in accordance with all applicable state and local requirements.

6.4.1 Construction Management

Meadowlark will designate an on-site construction manager with responsibility for scheduling and coordinating the activities of an engineering, procurement and construction contractor. The construction manager will be supported by project managers in the regional office who specialize in permitting, meteorology, accounting, environmental compliance, land entitlement and GIS mapping.

Throughout the construction phase, ongoing coordination occurs between the Project development, design, and construction teams. The construction manager coordinates execution of the work including safety and quality control programs, cost and schedule forecasting as well as site security ongoing communication with local officials, citizen groups, and landowners.

Following commissioning and the declaration of facility commercial operation, care, custody, and control of the facility is transferred from the construction team to the Meadowlark O&M staff. The construction manager will work with Meadowlark's O&M staff and the turbine supplier as well as erection, commissioning and maintenance personnel to ensure a smooth transition through construction, testing and commissioning into commercial operation of the Project. The O&M staff shall have full responsibility for the facility to ensure operations and maintenance are conducted in compliance with approved permits, prudent industry practice and equipment manufacturer recommendations for the turbines, civil works, buildings and grounds and on-site electrical infrastructure.

6.4.2 Foundation Design

Foundation design will involve an engineered foundation as required by the soil conditions and turbine manufacturer recommendations. Geotechnical investigations will be conducted to determine the engineering properties of the soils at the Project site. The tubular tower will be connected by anchor bolts to a cast-in-place reinforced-concrete foundation. The design of the turbine foundations will accommodate turbine tower load specifications provided by the turbine supplier. The final dimensions of the foundations are dependent on soil conditions encountered at the site; however, foundations for similar sized turbines are typically 45 to 65 ft across and 7 to 10 ft thick. The final design parameters of the foundations at the Project will be based upon geotechnical surveys, turbine tower load specifications, and cost considerations. Figure 5b shows a typical wind turbine construction site.

6.4.3 Civil Works

Completion of the Project will require various types of civil works and physical improvements to the land. Civil works will include the civil infrastructure, turbine foundations, and the underground electrical collection and grounding system. These civil works will include:

- Improvements to existing access roads required for transportation of equipment and components;
- Construction of roads adjacent to the wind turbine strings to allow construction and continued servicing of the wind turbines;
- Trenching and burying of underground 34.5 kV electrical collector cables and fiber optic cables;
- Clearing and grading for wind turbine tower foundation installations;
- Clearing and grading for pad-mount transformers and other installations;
- Clearing and grading for Project 34.5/115 kV collector substation and O&M building; and
- Installation of site fencing and security.

Improvements to existing public roads may include increasing width, modifying and/or improving subgrade, adding aggregate surfacing, and installation of approaches and culverts to transition to new Project access roads. Improvements to existing public roads will be performed with the consent of township and county highway department officials and the North Dakota Department of Transportation (NDDOT), if required.

Access roads will be designed and constructed along turbine strings or arrays to provide all-weather access for delivery of turbine components and erection equipment. No asphalt or other paving is anticipated. Roads used to facilitate both construction (cranes) and continued operation and maintenance will be sited in consultation with local landowners and completed in accordance with local building requirements. Siting roads in areas with unstable soil will be avoided wherever possible. All roads will include appropriate drainage and culverts while allowing for the crossing of farm equipment wherever practical. The roads will be approximately 16 to 18 ft wide and will be covered with aggregate surfacing to provide a stable driving surface under all weather conditions. Roads will likely consist of compacted subgrade covered with geotextile and compacted aggregate surfacing. Roads will meet state and local requirements. The specific turbine placement will determine the amount of roadway that will be constructed for the Project. Once construction is completed, roads will be regraded, resurfaced, or dressed as needed.

6.4.4 Commissioning

The Project will undergo detailed inspection and testing procedures prior to final turbine commissioning. Inspection and testing must occur for each component of the wind turbines, as well as the communication system, meteorological system, high voltage collection and feeder system, and the SCADA system.

6.5 PROJECT OPERATIONS AND MAINTENANCE

6.5.1 Maintenance Schedule

The maintenance schedule for the wind turbines and any balance of plant equipment will be consistent with prudent industry practices and original equipment manufacturer recommendations. An initial maintenance inspection of each turbine will be performed after commercial operation. Following this initial inspection, each turbine will then receive annual inspections that will include more significant inspections of the various components (wind braking system, lubricants, balance, terminal checks).

In addition to regularly scheduled site visits, the Project will be continuously monitored via the SCADA system. The SCADA system offers access to wind turbine generation or production data, availability, meteorological and communications data, as well as alarms and communication error information. The SCADA systems will monitor wind project status, allow for autonomous turbine operation, alert operations personnel, collect meteorological performance data, and provide diagnostic capabilities.

The turbine supplier will remotely monitor the Project on a daily basis. This will be accompanied by periodic visual inspections by qualified technicians. More frequent inspections will be made in the first three months of commercial operation to verify the Project is operating within expected parameters.

6.5.2 General Maintenance Duties

On-site personnel will perform all O&M services for the Project including maintenance on the wind turbines, roads, buildings, and electrical infrastructure. Some common maintenance duties may include:

- Track and perform the maintenance schedule;
- Conduct or coordinate the execution of corrective maintenance;
- Maintain all parts and tools;
- Perform or cooperate with required wildlife monitoring and reporting; and
- Maintain all computer software and file any required reports.

6.5.3 Operations and Maintenance Building

The O&M facility will be located near the Project Substation. Typically, buildings used for this purpose are 5,000 square ft, and house all the necessary equipment to operate and maintain the Project. The O&M building will allow the plant maintenance staff to conduct on-site diagnostics, repairs, predictive maintenance, and preventive maintenance that cannot be conducted in the field. This facility will also serve as the warehouse for critical spares.

6.6 DECOMMISSIONING AND RESTORATION

Meadowlark will remove the wind facilities in accordance with North Dakota Wind Turbine Decommissioning guidelines (NDAC Chapter 69-09-09). This includes:

- Dismantling and removal of all towers, turbine generators, transformers, and overhead cables;
- Removal of underground cables to a depth of twenty-four inches (60.96 centimeters);
- Removal of foundations, buildings, and ancillary equipment to a depth of 3 ft;
- Removal of surface road material and restoration of the roads and turbine sites to substantially the same physical condition that existed immediately before construction; and

- Grading, adding topsoil, and reseeded according to Natural Resource Conservation Service (NRCS) technical guide recommendations and other agency recommendation, areas disturbed by the construction of the facility or decommissioning activities, unless the landowner requests in writing that the access roads or other land surface areas be retained.

Meadowlark 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 Project 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 facility will exceed the cost of decommissioning.

Meadowlark will file a decommissioning plan with the Commission in accordance with North Dakota Decommissioning Guidelines (NDAC Section 69-09-09-06).

7.0 ENVIRONMENTAL ANALYSIS

Maps of the Project were generated that indicate the presence or absence of the criteria included in NDAC Section 69-06-08-01. Appendix C includes environmental studies conducted for the Project.

7.1 DESCRIPTION OF ENVIRONMENTAL SETTING

The Project is within the Level IV Drift Prairie and Missouri Coteau Ecoregions (WEST 2011 (USEPA 2010; Figure 2)). Both of these ecoregions were influenced by glacial activity which created the “prairie pothole” landscape. The Drift Prairie is flatter with more seasonal and temporary wetlands while the Missouri Coteau is undulating with more permanent type wetlands. Historically, vegetation within both ecoregions was a transition zone of tall-grass to short-grass prairie. Today, most of these ecoregions have been converted to agricultural use with crop production the primary use in the Drift Prairie while livestock grazing is more predominant in the Missouri Coteau. Today, trees and shrubs can be found around farmsteads, within planted shelter belts, and along drainages in the transition zone between ecoregions. Wetland drainage has occurred throughout the ecoregions, especially for the smaller temporary and seasonal wetlands in the Drift Prairie.

The town of Ruso is located approximately 0.5 mi south of the Project. With the exception of paved ND State Highway 41 (ND 41), transportation consists of gravel and two-track roads that, in more level terrain, are laid out on section lines. Most areas of rolling terrain are used as rangeland and have not been improved with public transportation features. Land use within and surrounding the Project Area is rural in nature, with cultivation and rangeland being the primary uses.

7.2 DEMOGRAPHICS

7.2.1 Description of Resources

Table 7-1 presents population information obtained from the U.S. Census Bureau: 2000 Census and 2008 Census Estimates for the municipalities and small towns near the Project. Ruso and Benedict are the nearest communities to the Project, located approximately 0.5 mi south and 3.5 mi southwest of the Project, respectively. Voltaire is located north of the Project.

Population characteristics considered relevant to the social setting of the Project and McHenry County include the total population, estimated population, per capita income, and poverty status. Based on the 2000 U.S. Census, the population of McHenry County is 5,987 and the estimated 2010 population is 5,395. Per capita income in 2009 inflation-adjusted dollars is \$23,172. Approximately seven percent of

families and thirteen percent of individuals are below the poverty level. The largest industry employing residents of McHenry County is Educational Services, Health Care, and Social Assistance, and the second largest industry is Agriculture.

7.2.2 Impacts

Permanent agricultural land conversion associated with Project facilities will constitute a small socioeconomic impact to those landowners with facilities on their land. In general, areas surrounding each turbine can still be farmed or used for grazing. Landowner compensation will be established by individual lease agreements. There is no indication that any minority or low-income population is concentrated in any one area of the Project, or that wind turbines will be placed in an area occupied primarily by any minority group.

Construction of the Project will provide temporary increases to the total personal income of the area by providing housing, lodging, food services, and general supplies to the major contractors. Opportunity exists for sub-contracting to local contractors for gravel, fill, and civil work. Additional personal income will also be generated by circulation and recirculation of dollars paid out by Meadowlark as business expenditures and state and local taxes.

General skilled labor is likely available either in McHenry County or the state of North Dakota to serve the basic infrastructure and site development needs of the Project. Specialized labor will be required for certain aspects of the Project; it is likely that this labor will be imported from other areas of the state or 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 would likely alleviate any potential labor relation issues.

No effects on permanent housing are anticipated. During construction, out-of-town laborers will likely use lodging facilities nearby. Operation and maintenance of the facility will require few laborers; sufficient permanent housing is available within McHenry County to accommodate these laborers.

7.2.3 Mitigative Measures

Socioeconomic impacts associated with the Project will be positive. Wages will be paid and expenditures will be made to local businesses during Project construction, and construction and operation of the Project will increase the County's tax base. In addition, lease payments paid to landowners will offset potential financial losses associated with removing a portion of their land from agricultural production.

Continuing to establish the central region of North Dakota as an important producer of alternative energy sources, such as wind, may spur the development of wind-related businesses in the area, in turn contributing to the economic growth in the region.

7.3 LAND USE AND MANAGED LANDS

7.3.1 Description of Resources

Agriculture

Land use within and surrounding the study area is rural in nature, with cultivated cropland and rangeland (grassland) being the primary land uses. Some of the grasslands are used for hay. Numerous farmsteads are scattered within the study area, near accessible roads. Center pivot irrigation (CPI) systems are not present within the Project Area. Table 7.3-1 summarizes the acres and percentage of agricultural and other land uses within the Project.

Table 7.3-1. Land Cover for the Project

Land Cover Type	Acres in Project Area	Percent of Project Area
Cropland	3,859.9	34.0
Developed (Low Intensity/Open Space)	390.0	3.4
Grassland Herbaceous	3,023.3	26.6
Pasture (Grass/Hay/Other)	2,385.8	21.0
Wetland (Herbaceous/Woody)	753.3	6.6
Open Water	452.4	4.0
Deciduous Forest	323.1	2.8

Source: NASS

Human Settlement

The Project is not within any city limits. There will be no displacement of occupied residences or industrial facilities as a result of construction and operation of the Project. Thirteen residences are within the Project Area using aerial photos and platt maps.

Mining

Economic coal deposits were identified adjacent to the northwestern portion of the Project Area. An active strip mine is located adjacent to the northwest of the Project Area and the mine is listed as being owned by the Consolidated Coal Company (HDR 2010).

No gravel pits are located within the Project Area.

Missile Facilities

A Minot Air Force Base Missile Alert Facility (Launch Control Facility) is adjacent to the northeast portion of the Project Area boundary, along ND 41, in Section 9 of Bjornson Township (T151N, R80W). The U.S. Air Force conducts extensive helicopter flight operations (often at night) at this location. The U.S. Air Force also has many miles of buried missile cable in the area.

Federal Conservation Areas

U.S. Fish and Wildlife Service (USFWS) grassland and wetland easements are present in the Project Area (HDR 2010) (see Figure 7). Grassland easements are legal agreements with landowners that permanently protect grassland vegetation from being destroyed or developed. Wetland easements are legal agreements with private landowners that permanently protect wetland basins from being drained, burned, leveled, or filled. NRCS Conservation Reserve Program (CRP) and Conservation Reserve Enhancement Program (CREP) parcels may also be present in the Project Area. Various levels of legal protection have been assigned to these USFWS and NRCS conservation areas. These areas are intended to serve as wildlife habitat, to protect rare natural features or to preserve water quality. While the extent of these USFWS and NRCS conservation areas is generally known, Meadowlark will contact USFWS and NRCS to determine exact locations of the wetland basins protected within the wetland easements, grassland easements and CRP parcels.

National Wildlife Refuges (NWRs) are federal lands that are administered by the USFWS for the mission of conservation, management, and, where appropriate, restoration of fish, wildlife, and plant resources

within the United States. No NWRs were identified within the Project Area. Wintering River NWR is located approximately 4 mi northeast of the Project and is managed as part of the J. Clark Salyer NWR and Wetland Management District (WMD).

Waterfowl Production Areas (WPAs) are lands that are owned and managed by the USFWS that are primarily managed for waterfowl production and public uses such as hunting, fishing, and trapping. No WPAs are within the Project Area. The closest WPA is the Vendler Johnson WPA approximately 1 mi west of the northwest corner of the Project Area.

State Conservation Areas

Wildlife Management Areas (WMAs) are state-owned lands managed by the North Dakota Game and Fish Department (NDGFD) for wildlife habitat. There are no WMAs within the Project Area or nearby the Project Area.

State Lands

School trust lands and surface tracts are managed through the North Dakota State Land Department (NDSLDD). These lands are dedicated to producing income for schools and trust funds in North Dakota. About 99 percent of school trust lands are leased to farmers and ranchers. In addition, about 99 percent of school trust lands are open to the public for non-vehicular use (NDSLDD 2009). There are no school trust lands within the Project Area. Three school trust properties are adjacent to the southwest corner of the Project Area.

7.3.2 Impacts

A final site layout has not been determined but Table 5.1-1 estimates the Project's impacts based on a preliminary layout. These areas will be converted from agricultural land use to wind facility use for the life of the Project.

Agriculture

The development of the Project will not result in a significant change in land use. The area would retain its rural sense and remote characteristics. At other wind developments in the upper Midwest and other areas of the United States, landowners frequently plant crops and/or graze livestock to the edge of the access roads and turbine pads. Wind farm access roads will be low profile so they can be easily crossed by farming equipment.

For construction that takes place outside of the winter months, temporary impacts to agriculture could occur as a result of construction activity. These impacts could include, but are not limited to, loss of planting opportunity, crop damage, and soil compaction. An impact of the Project may be potential interference with agricultural activities including equipment maneuvering around structures and aerial spraying.

Human Settlement

Concerns over property values from the development of wind energy projects have been raised across the United States. There is no evidence to suggest wind projects have a negative impact on property values (Poletti and Associates 2005; EcoNorthwest 2002; Sterzinger et al 2003; Hoen 2006; Hoen et al. 2009). No direct impacts (either positive or negative) on property values are anticipated as a result of the Project.

Mining

No impacts to the adjacent coal strip mine are anticipated. No gravel pits are within the Project Area (HDR 2010) so no impacts are anticipated to aggregate mining activities.

Missile Facilities

Meadowlark has been in contact with the U.S. Air Force for any potential impacts and setbacks from these facilities. The U.S. Air Force has a turbine setback distance from any missile facility and has conditions for their buried missile cable. Meadowlark will not place Project turbines within 2,640 feet of the missile facility, or within 100 ft of any missile cabling. Meadowlark's conformance to the U.S. Air Force's setbacks will result in no anticipated impacts to the missile facility.

Federal and State Conservation Areas

Meadowlark will contact the USFWS and NRCS to identify exact locations of federal conservation areas and to minimize impacts if Project facilities will impact these areas. The Project will be designed to completely avoid grassland easements, so no impacts to USFWS grassland easements are anticipated. USFWS often maps wetland easements by identifying a larger parcel of land (e.g., the public land survey sections, quarter-sections) rather than the actual basin under easement. Only the basins within these parcels are under easement; uplands are not protected as part of the wetland easement. Though a final Project layout has not been determined, Meadowlark does not anticipate impacts to wetland basins within the wetland easements.

No WMAs are within the Project Area so no impacts are anticipated.

State Lands

No school trust lands or surface tracts are within the Project Area so no impacts are anticipated.

7.3.3 Mitigative Measures

Agriculture

Areas temporarily disturbed will be returned to their original contours to the extent practicable and reseeded as necessary. Meadowlark will work with landowners to minimize or avoid impacts during construction and to provide appropriate compensation for lost planting opportunities, crop damage, and drainage tile systems. Meadowlark will confirm with landowners that CPI systems are not present or planned within the Project Area. If necessary, soils compacted by construction activities will be restored using a deep tillage practice, such as sub-soiling. Meadowlark will coordinate with landowners in order to site access roads in a manner that preserves existing land uses to the greatest extent practicable.

After the Project is constructed, aerial sprayers will need to employ the same flight patterns as used when working adjacent to tree rows, distribution lines, or communication structures.

Human Settlement

Wind turbines will be sited a minimum of 1,400 ft from occupied residences.

Mining, Missile Facilities, School Trust Lands

No impacts are anticipated so no mitigation measures are proposed.

Federal and State Conservation Areas

If Project facilities will impact wetland easements or CRP parcels, Meadowlark will work with the USFWS, NRCS, and private landowners to minimize impacts. Meadowlark will obtain any necessary permits or approvals from USFWS and NRCS, if required.

7.4 PUBLIC SERVICES AND EXISTING INFRASTRUCTURE

7.4.1 Description of Resources

Local Services

The Project is located in a lightly populated rural area in north-central North Dakota. An established transportation and utility network provides access and necessary services to light industry, small cities, homesteads, and farms near the Project. McHenry County communities include Anamoose, Drake, Granville, Kief, Towner, and Velva. Recreational activities in McHenry County include hunting, fishing, golf, softball, baseball, and parks (McHenry County JDA 2011). The McHenry County courthouse is in Towner, ND (NDACo 2011). The County provides emergency services, education, water, sewer, utilities, healthcare, highway, and social services (Towner ND 2010).

Water Supply

Townships typically have limited public infrastructure services, with homes using septic systems and water wells for their household needs. The North Dakota State Water Commission's (NDSWC) data for McHenry County indicates two domestic wells in the Project Area; no lithology data is available (NDSWC 2009).

Transportation and Traffic

ND 41 runs north-south through the center of the Project, and is the only paved roadway. The primary east-west road is 32nd Street North, which is gravel. Other than this road and a short section of 33rd Street North, there are very few roads west of ND 41 within the Project Area. East of ND 41 the roads are mostly two-track trails that follow section lines. The functional capacity of a two-lane paved rural highway is approximately 5,000 vehicles per day. Existing traffic volumes on the highways in and near the Project Area are presented on Figure 8. It is likely the county and township roads in the Project Area have far lower daily traffic level than the nearby highways (NDDOT 2009).

An east-west rail line, owned by Canadian Pacific Railway, runs within 0.25 mi of the south Project Area boundary.

Airports/Helipad

FAA data documents three public airports and eight private airports within 25 mi of the Project Area (HDR 2010) (see Appendix C).

As discussed above, the Minot Air Force Base Missile Facility is adjacent to the northeast portion of the Project Area boundary, along ND 41, in Section 9 of Bjornson Township (T151N, R80W). The U.S. Air Force conducts extensive helicopter flight operations at this location.

Tower Infrastructure and Telecommunications

A 230 kV transmission line trends northeast-southwest along the bluff on the west side of ND 41. Distribution lines are present along roadways leading to residences.

Two temporary meteorological towers for the Project are located in Sections 18 and 27 of Bjornson Township (T151N, R80W).

No Federal Communications Commission (FCC) communication towers are located within the Project Area. Obstacles located between the transmitter and the receiver in a microwave link, including wind turbines, affect the received signal strength in wireless communication. However, no active microwave links intersect the Project Area (ATDI 2010).

7.4.2 Impacts

Local Services

Many public services near the Project are located within municipality boundaries, but rural water, fiber optic, transmission lines, and distribution lines are located outside of municipalities. Potential impacts to public services, mainly emergency services, are related to construction activities that may disrupt roadways and access.

Water Supply

Water supply is assumed to be provided primarily from private groundwater wells for construction and operation for activities such as dust abatement, blade washing, and for the concrete batch plant. No wells are required to be abandoned 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 the turbine foundations. The Project will require one low-volume well for the O&M facility.

Transportation and Traffic

During the construction phase several types of construction vehicles will travel to and from the site, along with private vehicles used by construction personnel. Meadowlark estimates there will be 30 to 40 trips per day in the area during peak construction periods, when the majority of the foundation and tower assembly is taking place. Many of the roadways have minimal traffic and the addition of 30 to 40 vehicle trips represents a large percentage increase (and likely would be perceptible). Slow moving construction vehicles may cause delays on smaller roads, similar to farm equipment during harvest. Specific truck routes will be dictated by the location required for delivery.

Airports/Helipad

The installation of wind turbines creates potential for air traffic collision. Meadowlark has already received a Determination of No Hazard from the FAA for the Project's preliminary turbine locations.

Meadowlark is coordinating with the U.S. Air Force regarding the Project. Meadowlark's conformance to the U.S. Air Force's setbacks (discussed in Section 7.3.2) will result in no anticipated impacts to the missile facility.

Tower Infrastructure and Telecommunications

Table 4.2-1 discusses setback distances for the Project from existing infrastructure (see Figure 9). With these setbacks in place, no impacts are anticipated for tower infrastructure occurring in the Project Area. If site conditions require aboveground electrical collection lines, they are expected to be similar to distribution lines that are already present (located along the edges of fields and roadways).

Telecommunications infrastructure and services that could potentially be impacted by Project construction or operation include underground telephone and fiber optic cables, amplitude modulation (AM) and frequency modulation (FM) radio broadcasts, off-air television, non-federal government microwaves, and land mobile radio. No impacts to telecommunication services and infrastructure are anticipated.

7.4.3 Mitigative Measures

Local Services

Generally, construction activities will not close public roads for any substantial period. Emergency access for local residents, should they need emergency services, will be provided by halting construction and relocating equipment so emergency vehicles could access the residence. Once construction is complete, the Project will not impede emergency services.

Water Supply

In the unlikely event that wells must be abandoned due to Project construction, they will be sealed as required by North Dakota law. Any temporary dewatering of groundwater during Project construction will be conducted under the requirements of the National Pollutant Discharge Elimination System (NPDES) permit and Storm Water Pollution Prevention Plan (SWPPP). Meadowlark will follow the *Construction and Environmental Disturbance Requirements* as provided by the North Dakota Department of Health (NDDOH).

Transportation and Traffic

Operating permits (i.e., oversize or overweight) will be acquired from the state, county, and/or township, as necessary. Meadowlark will work with McHenry County and Bjornson Township to develop construction traffic plans.

Airports/Helipad

Meadowlark will seek approval from the FAA for the final turbine layout. The FAA's review will include evaluation of any potential interference with air traffic. Meadowlark has already received a Determination of No Hazard for the Project's preliminary turbine locations. Wind turbines and meteorological towers will have lighting and markings according to FAA requirements that minimize potential for air traffic impacts.

Meadowlark will comply with the U.S. Air Force's turbine setbacks (discussed in Section 7.3.2) (see Figure 9).

Tower Infrastructure and Telecommunications

Meadowlark will comply with North American Electric Reliability Corporation (NERC) and MISO regulations and any requirements of the Interconnection Agreement for the Project.

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

The final Project layout will not interfere with microwave beam path's Worst Case Fresnel Zone (WCFZ) because no active paths exist in the Project Area.

No impacts to telecommunication services and infrastructure are anticipated so specific mitigation measures are not proposed.

7.5 HUMAN HEALTH AND SAFETY

7.5.1 Description of Resources

Electromagnetic Fields

Electromagnetic fields (EMF) references two separate fields: electric fields and magnetic fields. Electric fields are produced by the line voltage, and magnetic fields are produced by the electric current in the lines. An electric field results from the voltage on an electrical wire as caused by electric charges, and electric fields can exert forces on other nearby charges. A magnetic field is created when charges move along a wire. The moving charges produce an electric current. Electric fields and magnetic fields are produced both by the natural world around us and the electricity we use on a daily basis. Common examples of EMF sources include transmission lines, substations, and household appliances such as refrigerators, hair dryers, computers, ovens and dishwashers. Both the electric and magnetic fields that constitute EMF are strongest close to the sources of voltage and current, and decrease rapidly with distance.

The existing primary source of EMF within the Project Area is the 230 kV transmission line that trends northeast-southwest along the bluff on the west side of ND 41.

Hazardous Materials and Waste

The site is located in a rural area of north-central 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. There are no hazardous waste handler sites located within the Project Area (HDR 2010). An area mapped as a sanitary landfill by an ESRI dataset is located in the Project Area but aerial photos and observations from a site visit indicate the area appears to be used for personal storage (HDR 2010).

The U.S. Environmental Protection Agency (EPA) Superfund National Priorities List (NPL) database was reviewed to determine the potential major hazardous material issues within the Project Area (HDR 2010). No NPL sites are present within the Project Area.

The closest hazardous facilities listed under EPA programs are near Voltaire and Velva, North Dakota (HDR 2010). The Archer Daniels Midland Processing Facility is located approximately 2 mi east of Voltaire. CF Industries, Inc – Velva Terminal is located adjacent to U.S. Hwy 52 and 13th Avenue North.

The Project will require the use of petroleum products, including fluids for turbines and substation/transformer equipment. Each turbine will use three petroleum-based fluids during operation: gear box oil, hydraulic fluid, and gear grease. Transformers will contain mineral oil. Heavy machinery used during Project construction will also use minor amounts of hydraulic fluid.

Security

The Project is located in an area with a low population density and crime rate (McHenry County JDA 2011).

Air Quality

North Dakota is one of only a handful of states that meet all national and state air quality standards (NDDOH 2008). Ambient air quality monitoring continues to show exceptionally clean air in North Dakota.

7.5.2 Impacts

Electromagnetic Fields

EMF will be associated with Project turbines, collection lines, and the Project Substation. After exhaustive scientific reviews of the link between EMF and public health, the scientific consensus and understanding among public health agencies and officials is that magnetic fields and electric fields are unlikely to impact human or animal health and safety (ACS 1996; ACGIH; AMA 1994; APS 2005; ICNIRP 2010; NAS 1997; NIEHS 2002; USDHHS 2010).

Hazardous Materials and Waste

A Phase I Environmental Site Assessment (ESA) of the Project Area will be conducted to identify any Recognized Environmental Conditions (RECs) that may exist including any hazardous and/or potentially hazardous sites.

Impacts include the potential for spills, leaks, and contamination from the use of petroleum products and hydraulic fluid.

Security

Impacts on the security and safety of local communities from construction and operation of the Project will be negligible.

Air Quality

Temporary air quality impacts caused by construction-vehicle emissions and fugitive dust from construction activities may occur, but will be minimal and temporary. No impacts to air quality due to the operation of the Project are anticipated.

7.5.3 Mitigative Measures

Electromagnetic Fields

As shown in Table 4.2-1, Meadowlark will set back wind turbines from all occupied residences, bury collection lines to a depth of approximately 4 ft, and fence off and place warning signs around the Project Substation.

Hazardous Materials and Waste

Meadowlark will generate minor amounts of petroleum waste products during Project construction and operation. Any petroleum waste will be handled and disposed of in accordance with local, state, and federal regulations. Additional handling, storage, and reporting requirements for hazardous material will be covered in association with NDDOH's *Construction and Environmental Disturbance Requirements*, the NPDES permit required for the Project and the SWPPP.

Security

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

- Table 4.2-1 discusses setback distances for the Project from existing infrastructure such as homes and roads.
- Temporary and permanent (safety) fencing will be used, as well as warning signs and locks on equipment and Project facilities.

- Access to wind turbines is only through a solid steel door that will be locked when not in use by O&M staff.
- Where necessary or requested by landowners, Meadowlark will construct gates or fences such as those that will be constructed around the Project Substation.

Air Quality

Meadowlark will take all necessary measures to minimize fugitive dust emissions during construction activities through water or chemical-based applications. Any complaints that arise will be dealt with in an efficient and effective manner.

7.6 SOUND AND NOISE

7.6.1 Description of Resources

Existing ambient sound levels are expected to be relatively low for the Project Area. Sound levels may be sporadically elevated in localized areas during periods of human activity, including agricultural activities, vehicle traffic, rail movements, and periodic aircraft activity. Natural sounds for the Project Area include bird activity, insects, and leaf or vegetation rustle during windy conditions.

Noise is defined as unwanted sound. Noise may include a variety of sounds of different intensities across the entire frequency spectrum. Noise sensitive resources within the Project Area include occupied residences.

McHenry County has not adopted a zoning ordinance specific to noise. At the state level, the NDAC Section Article 69-06-08-03 requires that the potential for adverse impacts at noise sensitive areas be assessed during the site selection process. No numerical decibel limits or formal compliance guidelines are provided either by the Commission or any other agency at the state level.

7.6.2 Impacts

Construction activities associated with the Project will generate noise temporarily. The proximity of sensitive noise receptors (occupied residences and humans) to construction activities will determine the level of noise perceived.

During operation, wind turbines can emit a perceptible sound. Sound is generated from turbulence at the blade tips, from mechanical systems in the hub or nacelle (which radiates throughout the structure), and from transformers at the base of the turbine mast. Blade noise increases with wind speed until maximum blade rotational speed is reached, which usually occurs when wind speeds reach 8 to 10 m/s at the turbine hub. O&M vehicle traffic during Project operations will also generate noise.

7.6.3 Mitigative Measures

Impacts to nearby residents and other potentially affected parties in terms of noise will be taken into consideration as of part turbine siting. A noise-analysis will be conducted prior to finalizing the Project layout. As shown in Table 4.2-1, Meadowlark will set back wind turbines from all occupied residences, which mitigates and minimizes adverse noise impacts (see Figure 9).

7.7 CULTURAL AND ARCHEOLOGICAL RESOURCES

7.7.1 Description of Resources

Archaeological, cultural, and historic facility resources are those places that represent the visible or otherwise tangible record of human activity on the landscape. These resources vary in size, shape, condition, and importance, among other considerations; some are clearly evident on the landscape, while others are buried or only visible to knowledgeable people.

A literature search conducted for the Project Area indicated eight records of site leads within the Project Area (Appendix D). Specific information (precise location and composition) about these records (cultural material scatters) will not be determined until the fall 2011 surveys are completed.

No National Register of Historic Places (NRHP) listed properties are located within the Project Area (HDR 2010). No known cemeteries are within the Project Area (HDR 2010).

It is possible there are both recorded and unrecorded resources within the study area that may be significant, but have not been evaluated nor their status determined.

7.7.2 Impacts

Any ground disturbing activity within the Project Area has the potential to impact known or unknown cultural resources. Possible concerns regarding visual impacts to recorded or unrecorded cultural resource properties may also occur.

7.7.3 Mitigative Measures

Meadowlark conducted a literature search of known cultural resources and archaeological properties within the Project Area. Meadowlark provided the North Dakota State Historic Preservation Office (SHPO) with the results of the literature search in a letter dated August 11, 2011 (Appendix D). Cultural resource field surveys will also be conducted in fall 2011 to confirm that the locations of Project facilities will not impact cultural resources.

Project design will avoid construction around ponds and stream drainages to the extent practicable where prehistoric and historic sites may be located. Meadowlark intends to avoid recorded archeological and cultural sites during Project design and construction and will coordinate with SHPO if new unrecorded sites are discovered. Meadowlark will develop and put into place an unanticipated discovery plan before construction in the Project site begins. The plan will detail how to deal with previously unknown archaeological resources or human remains should they be encountered during construction. Once it is developed, the plan will be submitted to the SHPO for review and approval.

7.8 RECREATIONAL RESOURCES

7.8.1 Description of Resources

Many recreational resources exist in the Project vicinity, including trails, rivers, lakes, federal lands, and state lands. Outdoor recreational opportunities include riding all-terrain vehicles (ATVs) and snowmobiles, hiking, boating, fishing, camping, swimming, hunting, and nature observation. There are no parks or trails that have been identified within the Project Area (HDR 2010).

Private Lands Open to Sportsmen (PLOTS) are private lands open to public hunting. These lands are enrolled in one of three NDGFD programs to enhance fish and wildlife populations for sustained public use. These lands may be jointly enrolled with other federal programs such as the CRP. There is one approximately 160-acre PLOTS parcel in the southwest corner of the Project Area (HDR 2010).

Section 7.3 discusses managed conservation lands in and near the Project that are also used recreationally, such as WMAs, WPAs, and NWRs. No such lands are present within the Project Area.

7.8.2 Impacts

Impacts to recreational resources will be visual in nature and limited to individuals using public or private property in the Project site for hiking, hunting, fishing, or nature observation. See Section 7.9 for discussion of anticipated visual impacts and mitigative measures. During construction, the noise from increased vehicle traffic and construction activities may temporarily alter the experience of those using recreational resources.

7.8.3 Mitigative Measures

To the extent practicable, Project facilities will be placed in a manner so as to avoid impacts to recreation resources.

7.9 VISUAL RESOURCES

7.9.1 Description of Resources

The topography of the Project site is a mixture of open plains and rolling fields broken by rolling hills and shallow drainages. Elevations in the vicinity range between 1,552 and 2,182 ft (473 to 665 m) above sea level and increase when moving north to south (WEST 2011). A topographic map of the Project site is shown in Figure 3. Generally, visual and aesthetic resources within the Project Area and surrounding vicinity include cultivated agricultural land, rural open space areas (i.e., rolling rangelands, CRP), and wetland areas.

Scattered areas of tree cover occur throughout the Project Area, primarily in areas considered unsuitable for farming, or planted as protection from the wind and sun around rural residences or farmsteads. High scenic integrity and significance areas include wildlife and habitat conservation easement areas. Land parcels in and near the Project Area considered to contain outstanding natural features and warrant protection or management have been placed into state and federal conservation easement programs.

7.9.2 Impacts

The Project will have an effect on the visual quality of the site and in nearby areas, but the aesthetic effect of the Project is based on subjective human response. Visual impacts from the presence of Project facilities will be most evident to people traveling north and south along ND 41 during the day and will be evident at night to those in proximity to the Project due to FAA lighting on the top of the turbines. These impacts will affect the rural visual quality of the landscape and the experience of the persons utilizing those areas. While turbines in background views of highway travelers will affect the visual characteristics of the landscape, the same could be said of any human habitation or activity in the vicinity.

For some viewers, the Project may be perceived as a visual intrusion, characterized as metal structures, intruding on the natural aesthetic value of the landscape. For other viewers, wind projects have positive aesthetic qualities, distinguishing them from other non-agricultural land uses. Depending on a viewer's physical location, the terrain conditions, and natural landscape features such as tree cover, a viewer's degree of discernable detail decreases as physical distance from an object increases.

The Project will not generate much traffic or significantly increase day-to-day human activity in the area. The Project will not involve any ongoing industrial use of non-renewable resources or emissions into the environment. Therefore, the Project will retain the rural aesthetic and remote characteristics of the area.

7.9.3 Mitigative Measures

Table 4.2-1 discusses setback distances for the Project from existing infrastructure. Turbines will only be illuminated to meet FAA regulations. Existing roads will be used for construction and maintenance where possible. Access roads created for the Project will be located on gentle grades to minimize visible cuts and fills. Temporarily disturbed areas will be reseeded per NRCS recommendations to blend in with existing vegetation. A shadow flicker analysis will be conducted for the Project.

7.10 EFFECTS ON LAND-BASED ECONOMICS

7.10.1 Description of Resources

Agriculture

According to the 2007 Census of Agriculture, McHenry County is ranked 16th overall in total value of agricultural products sold in North Dakota. McHenry County contains 928 farms, of which the top commodity is grains, the top crop is wheat, and cattle and calves are the primary livestock.

The market value of production in McHenry County in 2007 was approximately \$133,960,000. Crop sales account for approximately 67 percent of the total value.

Prime farmland is the land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. The NRCS 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 as high a yield as prime farmland soils if conditions are favorable. Table 7.10-1 lists the soils considered prime farmland and soils of statewide or local importance within the Project site. Figure 11 illustrates the prime farmland soil distribution in the Project Area.

Table 7.10-1. Prime Farmland in the Project Area

Soil Type	All Areas Prime Farmland	Prime Farmland Only When Drained	Area (acres)	Percentage of Project Area
Egeland fine sandy loam, 0 to 6 percent slopes	X		4.9	0.04
Hamerly loam, 0 to 3 percent slopes	X		29.5	0.3
Colvin silt loam, 0 to 1 percent slopes		X	39.7	0.4
Hamerly-Tonka complex, 0 to 3 percent slopes		X	18.2	0.2
Tonka silt loam, 0 to 1 percent slopes		X	21.3	0.2
Total			113.6	1.1

Source: SSURGO 2008

Woodlands

Economically important forestry resources are not found in the Project site. Woodlands are primarily associated with homes in the form of woodlots and windbreaks. Woodlands within the Project site are depicted on Figure 10.

7.10.2 Impacts

Agriculture

No impacts are anticipated to animal health and safety due to the construction or operation of the Project. Except for the physical locations of the turbines and access roads, the land surrounding the facility will be available for grazing and other agricultural activities.

The permanent site layout has not been determined but Table 5.1-1 estimates the Project's impacts based on a preliminary layout. Actual impacts to agriculture production will be determined once turbine and road locations are finalized.

Woodlands

Since a majority of the woodlands on the Project site are associated with homesteads and windbreaks, minimal impacts are anticipated. Some windbreaks may need to be minimally disturbed for access road locations.

7.10.3 Mitigative Measures

Agriculture

Only land for the turbine and permanent access roads will be unavailable for crop production or grazing. Once the wind turbines are constructed, all land surrounding the turbines can still be farmed or grazed.

Landowners will be consulted to minimize impacts on prime farmland and other productive farmland areas in the final Project layout. Only land for turbines, substation, O&M building, and access roads will be unavailable for crop production during the life of the Project. All construction areas will be separated from grazing animals.

The loss of land from construction and operation of the Project will have minimal impact on agricultural production. Meadowlark will compensate landowners for any crop damage and soil compaction that may occur during construction. Areas disturbed during construction will be repaired and restored to preconstruction contours to the extent practicable so that all surfaces drain naturally, blend with the natural terrain, and are left in a condition that will facilitate natural revegetation, provide for proper drainage, and prevent erosion.

Drain tiles may be present in the Project Area. Meadowlark will work with the landowners to identify locations of drainage tiles and will minimize interference with drain tile system, where possible. In the event that Meadowlark encounters a tile, Meadowlark will relocate the structure and repair the tile line, if damaged.

Woodlands

No impacts are anticipated to woodlands. If unavoidable impacts to woodlands arise, then individual trees will be replaced at a ratio of 2:1 and plantings will be monitored for three years per the Commission's tree and shrub mitigation specifications.

7.11 SOILS, GEOLOGY AND GROUNDWATER

7.11.1 Description of Resources

Soils

Soils are typical of historical grassland ecosystems (Mollisols soil order) and derived mainly from glacial till (see Figure 12). Table 7.11-1 provides a summary of the soil map units within the Project Area.

Table 7.11-1. Soil Types in the Project Area

Soil Type	Area (acres)	Percentage of Project Area
Arvilla sandy loam, 0 to 6 percent slopes	10.6	0.09
Colvin silt loam, 0 to 1 percent slopes	0.3	0.4
Egeland fine sandy loam, 0 to 6 percent slopes	4.9	0.04
Ferney-Cavour loams, 0 to 3 percent slopes	5.3	0.05
Hamerly loam, 0 to 3 percent slopes	29.5	0.3
Hamerly loam, saline, 0 to 3 percent slopes	16.4	0.1
Hamerly-Tonka complex, 0 to 3 percent slopes	18.2	0.2
Parnell silty clay loam, 0 to 1 percent slopes	351.8	3.1
Sioux gravelly sandy loam, 6 to 25 percent slopes	10.6	0.1
Southam silty clay loam, 0 to 1 percent slopes	382.6	3.4
Stirum fine sandy loam, 0 to 1 percent slopes	5.8	0.05
Tonka silt loam, 0 to 1 percent slopes	21.3	0.2
Williams loam, 0 to 3 percent slopes	286.8	2.5
Williams loam, 3 to 6 percent slopes	2507.1	22.1
Williams-Niobell loams, 0 to 3 percent slopes	82.8	0.7
Williams-Niobell loams, 3 to 6 percent slopes	46.4	0.4
Williams-Zahl loams, 6 to 9 percent slopes	4263.7	37.6
Zahl-Max-Bowbells loams, 6 to 60 percent slopes	402.3	3.5
Zahl-Williams loams, 9 to 25 percent slopes	2781.9	24.5

Source: SSURGO 2008

Geology and Groundwater

The Project Area lies on the eastern side of the Williston Basin and is part of the Missouri Coteau Physiographic Providence. The area is characterized by hilly, collapsed glacial sediment with numerous sloughs, lakes, and closely spaced hills.

The Project Area is underlain by 6,000 to 8,600 ft of Paleozoic, Mesozoic, and Cenozoic sedimentary rocks that dip towards the west. The Cannonball and Hell Creek formations directly underlay the glacial drift. The Tertiary Cannonball Formation is described as olive black, carbonaceous, and lignitic siltstone and shale, and micaceous, friable sandstone. The unit is generally 225 ft thick in the Project Area. The

underlying (older) Mesozoic Hell Creek Formation consists of gray, greenish-gray, and brown sandstone, mudstone, siltstone, carbonaceous shale, and thin lignite seams. The unit ranges from 200 to 275 ft in thickness where it is overlain by the Cannonball Formation (HDR 2010).

Surficial geology within the vicinity of the Project Area consists of glacial till deposits. The sediments are described as yellowish-brown to olive-gray unsorted, unbedded mixture of angular, subangular, and rounded blocks of rock, gravel, and sand in a stiff matrix of silt and clay. Discontinuous lenses of sand and gravel are common. In the Project Area, the deposits consist of a steeply sloping bouldery surface of glacial sediment. Hilly areas with numerous kettles with partially to non-integrated drainage are also present. Glacial sediment thickness ranges from approximately 100 to 200 ft in the Project Area (HDR 2010).

No recorded areas of seismic activity or subsistence were identified in the study area (HDR 2010).

Groundwater is mainly supplied in the study area by glacial-drift aquifers. The glacial-drift aquifers occur in buried sand and gravel deposits associated with bedrock valleys and glacioaqueous deposits. Bedrock aquifers also provide a source of water, but the quality and yield is significantly less. The Hell Creek and Fox Hill aquifers occur in medium-grained sandstone beds. The rural population and nearby surrounding communities depend on groundwater for their supply. Irrigational use outweighs other uses including rural, municipal, or industrial (HDR 2010). The Commission considers irrigated land an exclusion area under the Energy Conversion Facility Siting Criteria (Section 69-06-08-01(1) of the NDAC). As discussed in Section 7.3, CPI systems are not present in the Project Area.

7.11.2 Impacts

Soils

The impact to soils in the Project site will be limited to areas removed from agricultural production, either for turbines and associated structures, or for road construction. The permanent site layout has not been determined but Table 5.1-1 estimates the Project's impacts based on a preliminary layout. Grading may be required for roadway construction. Meadowlark will avoid wetland areas to the extent possible, so the potential for soil loss due to erosion or impacts on hydric soils, such as compaction, is low.

Geology and Groundwater

Impacts to groundwater resources are not anticipated as water supply needs will be quite limited. It is probable that operations and maintenance water requirements will be satisfied with a single domestic-sized water well.

The Project will likely have minimal impacts on regional groundwater recharge based on the small amount of increased impervious surface area that will be created by Project components. Project construction activities such as excavation and construction of foundations may encounter groundwater in isolated areas where the groundwater table is elevated. The construction of turbine foundations may affect shallow groundwater flow patterns. The groundwater will resume its normal course of flow down gradient of the foundation.

Construction of the turbine foundations will likely not require subsurface blasting. Disturbances to groundwater flow from newly fractured bedrock are not anticipated.

7.11.3 Mitigative Measures

Soils

Wind and water erosion are potential hazards for the soils found in the Project Area. Construction activities will be conducted under the requirements of the NPDES permit and SWPPP for the Project. Meadowlark will follow the *Construction and Environmental Disturbance Requirements* as provided by the NDDOH. These practices will include: temporary seeding, permanent seeding, mulching, filter strips, erosion blankets, grassed waterways, and sod stabilization. Topsoil will be segregated if cuts are made during construction and reapplied after final contours have been graded.

Geology and Groundwater

Each turbine will be located a minimum distance of 1,400 ft from occupied residences, thereby minimizing the risk of impacts on private wells in the area.

In the event that subsurface blasting is required, a blasting plan will be developed and implemented to keep the impacts localized and fracture the least amount of bedrock necessary for construction.

Any dewatering required during construction will be discharged to the surrounding surface, thereby allowing it to infiltrate back into the ground to minimize potential impacts.

7.12 SURFACE WATER AND FLOODPLAINS

7.12.1 Description of Resources

The Project Area lies within the Lower Souris Watershed basin (NDSWC 2011). As shown on Figure 13, there are intermittent streams, open water, and wetlands throughout the Project Area. There are no named creeks or rivers within the Project Area. Streams are generally restricted to the east side of the Project Area. According to land cover data, open water (wetlands) accounts for 12 percent of the entire Project Area (WEST 2011 (North Dakota Gap Analysis (USGS 2004))). Most streams within the study area are intermittent in nature and in some cases function as drainageways within tilled agricultural fields.

The Project Area is located in an area of McHenry County that has not been mapped by the Federal Emergency Management Agency (FEMA), and Flood Insurance Rate Maps (FIRMs) are not available (HDR 2010). Meadowlark sent a letter to the NDSWC on July 7, 2011 to notify the agency about the Project. Per the NDSWC's August 17, 2011 response, no identified floodplains exist within the Project Area (Appendix E).

7.12.2 Impacts

Project facilities will be designed to avoid impacts on surface water resources to the extent practicable. Wind turbines will be sited on uplands to avoid surface water resources in the lower elevations to the extent practicable. Project facilities, such as underground electrical collector lines, access roads, turbine pads, and the O&M building, will impact surface water runoff within the Project Area. These impacts are expected to be minimal.

7.12.3 Mitigative Measures

Access roads constructed adjacent to wetlands or intermittent streams and drainageways will be designed in a manner so runoff from the upper portions of the watershed can flow unrestricted to the lower portion of the watershed. Construction activities will be conducted under the requirements of the NPDES permit and SWPPP for the Project. Meadowlark will follow the *Construction and Environmental Disturbance Requirements* as provided by the NDDOH.

7.13 WETLANDS

7.13.1 Description of Resources

The National Wetland Inventory (NWI) program was established by USFWS to provide maps of wetlands within the United States. These maps are frequently used as a preliminary source of information for wetland identification within an area. Table 7.13-1 provides the acreages of NWI wetlands that have been mapped within the Project Area. Figure 13 shows the locations of NWI wetlands. Most wetlands are less than 3 acres in size and are “prairie pothole” type wetlands.

Wetlands are most frequent trending toward the south and west boundaries of the Project Area. Most of these wetlands, as mentioned in Section 7.3, are held in USFWS wetland easements.

Table 7.13-1. NWI Wetlands in the Project Area

NWI Wetland Type	Area (acres)	Percentage of Project Area
Freshwater Emergent	694.4	6.1
Freshwater Pond	138.5	1.2
Lake	62.6	0.5
Total	895.5	7.9

Source: USFWS NWI

7.13.2 Impacts

The permanent site layout has not been determined, but Table 5.1-1 estimates the Project’s impacts based on a preliminary layout. Wetland delineations will be conducted in fall 2011 using the United States Army Corps of Engineers (USACE) standard methodology. Wetland impacts will be determined following the wetland delineations. Wetland delineations will determine whether or not wetlands in the Project Area fall under the jurisdiction of USACE, as defined by Section 404 of the Clean Water Act.

Though a final Project layout has not been determined, Meadowlark does not anticipate impacts to basins within wetland easements, as discussed in Section 7.3.

7.13.3 Mitigative Measures

Meadowlark will avoid impacts to wetlands to the extent possible. If impacts to USACE jurisdictional wetlands are unavoidable, then a Section 404 and 401 permit application will be submitted to USACE and State of North Dakota, respectively. Permanent impacts to jurisdictional wetlands and waters will be mitigated according to USACE requirements. It is anticipated that any impacts to USACE jurisdictional waters will be temporary and as a result, will not require compensatory mitigation.

Construction activities will be conducted under the requirements of the NPDES permit and SWPPP for the Project. Meadowlark will follow the *Construction and Environmental Disturbance Requirements* as provided by the NDDOH. Meadowlark will use Best Management Practices (BMPs) during construction and operation of the Project to protect topsoil and adjacent wetland resources and to minimize soil erosion. Practices may include containing excavated material, protecting exposed soil, stabilizing restored material, and revegetating disturbed areas with native species.

7.14 VEGETATION

7.14.1 Description of Resources

The east half of the Project Area is dominated by planted crops and the west half of the study area is grassland, used for rangeland and hayland (see Figure 10). Many of the rangeland areas support native mixed grass plant communities. Green needlegrass (*Nassella viridula*), little bluestem (*Schizachyrium Nees*), junegrass (*Koeleria Pers.*), blue grama (*Bouteloua gracilis*), wheatgrass (*Agropyron Gaertn.*), and sideoats grama (*Bouteloua curtipendula*) are species expected to occur in these native areas (HDR 2010). Moderate to heavy grazing has likely degraded the quality of some of these native grasslands. Hayed areas, usually in more level terrain, have typically been planted to non-native grasses, such as smooth brome and crested wheatgrass, or alfalfa.

Larger trees, such as cottonwood (*Populus L.*), green ash (*Fraxinus pennsylvanica*), and willow (*Salix L.*) are typically associated with farmsteads, windrows and stream channels (HDR 2010). Shrubs and small trees are scattered and found on steeper terrain. Shrub and small tree species include silverberry (*Elaeagnus commutate*), hawthorn (*Crataegus L.*), and chokecherry (*Prunus virginiana L.*). Wetlands with seasonal hydrology are expected to support species such as smartweed (*Cuscuta polygonorum*) and prairie cordgrass (*Spartina pectinata*). Deeper wetland habitats support submersed plants, and emergent species such as cattails (*Typha L.*).

7.14.2 Impacts

The permanent site layout has not been determined but Table 5.1-1 estimates the Project's impacts based on a preliminary layout. The amount of vegetation that will be permanently removed as a result of the Project will be determined once a site layout is finalized. During the construction of the Project, areas will be temporarily disturbed for contractor staging areas and underground collection lines.

7.14.3 Mitigative Measures

If impacts to individual trees and shrubs cannot be avoided, these resources will be replaced at a ratio of 2:1 and new plantings will be monitored for three years in accordance with the Commission's tree and shrub mitigation specifications. Construction activities will be conducted under the requirements of the NPDES permit and SWPPP for the Project. Meadowlark will follow the *Construction and Environmental Disturbance Requirements* as provided by the NDDOH. Meadowlark will use BMPs during construction and operation of the Project to protect topsoil and adjacent resources and to minimize soil erosion. Practices may include containing excavated material, protecting exposed soil, stabilizing restored material, and revegetating rangelands with native species. Temporarily disturbed areas will be reseeded per NRCS recommendations to blend with existing vegetation.

7.15 WILDLIFE

7.15.1 Description of Resources

Wildlife species associated with a mixed agricultural landscape (crop production and livestock grazing) are likely common in and around the Project (WEST 2011). These species include mammals such as badgers, beaver, ground squirrels, chipmunks, mice, voles, rats, moles, shrews, raccoons, skunk, and bats. Snakes, lizards, frogs, and toads are also found in the area. Birds in the area include songbirds, raptors, waterfowl, and other grassland birds. A wide variety of birds use the Project Area seasonally during migration. Migrating birds use local ponds and wetlands for stopovers and local birds use the marshland, shrubland, and forested habitat for nesting. Bats may be found within the Project Area due to the potential presence

of roosting habitat (human-made structures, dead or dying trees, etc.) and feeding habitat (riparian corridors and wetlands with higher nocturnal insect densities).

Terrestrial wildlife is most common in grasslands, fencerows, intermittent creeks, and wetland areas. These areas provide corridors for migration and foraging as well as ample cover for small mammals, raptors, waterfowl, upland game birds, and other common wildlife in the area.

Birds

The land cover within the Project Area is not unique to the region and it is unlikely the characteristics of the Project Area would attract concentrations of bird or bat species. Numerous birds, including raptors, and bats will utilize the area. The presence of larger trees in woodlots provides habitat for the tree-nesting species and grasslands provide nesting opportunities for ground-nesting birds.

In 2010, the closest Breeding Bird Survey (BBS) route (Denbigh) to the Project Area documented 89 species and 2,278 individuals. The Denbigh route is approximately 17 mi northeast of the Project. Canada geese (*Branta Canadensis*), red-winged blackbirds (*Agelaius phoeniceus*), western meadowlarks (*Stumella neglecta*), and brown-headed cowbirds (*Molothrus ater*) were the most abundant (WEST 2011). During a May 6, 2011 site visit conducted by Western EcoSystems Technology, Inc. (WEST), 33 bird species (two of which were raptors) were observed.

Raptors

The following raptor species could occur in or near the Project Area during some portion of the year: northern harrier (*Circus cyaneus*), sharp-shinned hawk (*Accipiter striatus*), Cooper's hawk (*A. cooperii*), broad-winged hawk (*Buteo platypterus*), northern goshawk (*A. gentilis*), red-tailed hawk (*B. jamaicensis*), Swainson's hawk (*Buteo swainsoni*), ferruginous hawk (*Buteo regalis*), rough-legged hawk (*B. lagopus*), golden eagle (*Aquila chrysaetos*), bald eagle (*Haliaeetus leucocephalus*), osprey (*Pandion haliaetus*), merlin (*Falco columbarius*), American kestrel (*F. sparverius*), and peregrine falcon (*F. peregrinus*). Other species often grouped with raptors that could be found in the project area include the snowy owl (*Nyctea scandiaca*), short-eared owl (*A. flammeus*), great-horned owl (*Bubo virginianus*), eastern screech owl (*Otus asio*), burrowing owl (*Athene cunicularia*), and turkey vulture (*Cathartes aura*; [Sibley 2000]). During a May 6, 2011 site visit conducted by WEST, red-tailed hawks and northern harriers were observed.

Several raptor nests were observed during WEST's site visit, and potential nest structures for above ground nesting species were present (living and dead trees). Grassland areas may provide nesting habitats for ground nesting raptors. No signs of colonial rodents were observed during WEST's site visit. Other potential raptor prey sources include other rodents, rabbits, and other birds. Overall prey densities are not expected to be different than areas outside the Project Area. There are no large hills, ridges, or other topographical features that might cause bottlenecks or updrafts where raptors could concentrate.

Bats

Six bat species (big brown bat (*Eptesicus fuscus*), hoary bat (*Lasiurus cinereus*), eastern red bat (*Lasiurus borealis*), little brown myotis (*Myotis lucifugus*), northern myotis (*Myotis septentrionalis*), and silver-haired bat (*Lasionycteris noctivagans*) (WEST 2011 (BCI website)) may be found in and around the Project. None of these species are listed by the federal government under the Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531-1544) or of conservation need by NDGFD. However, all six of these species have been documented as mortalities at other wind energy facilities. Trees and buildings in the area may provide potential roosting habitat for bats while open areas over agricultural fields, grasslands, streams, and wetlands could provide areas for foraging.

7.15.2 Impacts

The impact of the Project on wildlife is expected to be minimal. There is potential for avian and bat collisions with turbines or meteorological towers. Additional impacts may include a small reduction in the available habitat that some of the wildlife uses for forage or cover. Meadowlark is conducting or has completed the following biological assessments to aid in placement of turbines, roads, and associated facilities to avoid or minimize impacts to wildlife and habitat.

- Final New Frontier Wind Project Critical Issues Analysis June 2010 – HDR Engineering, Inc.
- Whooping Crane Habitat Review. New Frontier Wind Energy Project – Western EcoSystems Technology, Inc. February 2011.
- *Draft* Tier II Site Characterization Study of the New Frontier Wind Resource Area July 2011 – Western EcoSystems Technology, Inc.
- *Draft* Wildlife Baseline Studies for the New Frontier Wind Resource Area: Sharp-tailed Grouse Lek and Raptor Stick Nest Report Spring 2011 - Western EcoSystems Technology, Inc.
- Acoustic Bat Monitoring Fall 2011 and Spring 2012 – Western EcoSystems Technology, Inc.
- Avian Point Counts Fall 2011 and Spring 2012 - Western EcoSystems Technology, Inc.

The Project may result in direct and indirect impacts to wildlife. Direct impacts include strike mortality from turbine blades, power lines, and related infrastructure, electrocution from overhead collector lines, and loss of habitat. The presence of wind turbines may alter the landscape so wildlife use patterns change, resulting in displacement of wildlife from the Project Area. The greatest concerns with displacement impacts are for wind projects placed in native grasslands and other native habitats. The Project Area contains grasslands, some of which may be native. Some grassland-dependent species may be displaced from construction and/or operation of the Project. Both the NDGFD and USFWS have expressed concerns regarding wind project development within intact native landscapes. Most concern has been expressed regarding landscapes where 75 percent or more is comprised of native grasslands, wetlands, and other native features. The Project Area has less than 60 percent land cover that may be native and less than 50 percent native grassland and wetlands (WEST 2011).

Operation of the Project will likely result in the mortality of some bats. The magnitude of these fatalities and the degree to which bat species will be affected is difficult to determine, but they should be within the range documented at other sites in the Midwest, which has been generally low (WEST 2011).

7.15.3 Mitigative Measures

The following measures will be used, to the extent practicable, to help avoid potential impacts to wildlife in the Project site during siting of the turbine locations and subsequent development and operation:

- On behalf of Meadowlark, Western Ecosystems Technologies, Inc. (WEST) is coordinating with USFWS and NDGFD regarding wildlife and habitat impacts from the Project.
- Meadowlark will prepare and implement a Project-specific Avian and Bat Protection Plan (ABPP) during construction and operation of the Project.
- Meadowlark will conduct post-construction bird and bat mortality monitoring.
- Meadowlark proposes to place the electrical collection system from the turbines to the Project Substation underground, if site conditions are favorable.

- Meadowlark will follow the practices suggested by the Avian Powerline Interaction Committee (APLIC 1996) and install anti-perching devices on collector line pole tops and cross arms where the poles are located within ½ mi of turbines.
- Meadowlark will avoid or minimize disturbance of individual wetlands or drainage systems to the extent possible.
- Meadowlark will protect existing trees and shrubs where practicable. If impacts are unavoidable, Meadowlark will replace existing trees and shrubs at a 2:1 ratio at the site and will monitor plantings for three years, in accordance with the Commission’s tree and shrub mitigation specifications.
- Meadowlark will maintain appropriate water and soil conservation practices during construction and operation of the Project to protect topsoil and adjacent resources and to minimize soil erosion.
- Meadowlark will revegetate disturbed non-cropland areas with a native seed mix recommended by NRCS (and agreed to by the landowner).
- Meadowlark will establish and enforce reasonable driving speed limits within the Project to minimize potential for road killed wildlife or livestock that could attract foraging raptors.

7.16 RARE AND UNIQUE NATURAL RESOURCES

7.16.1 Description of Resources

Threatened and Endangered or Federally Protected Species

Migratory birds are protected under the Migratory Bird Treaty Act (MBTA) of 1918 (16 U.S.C. 703-712). The MBTA is distinct from the ESA because it protects migratory bird species that are not necessarily threatened or endangered. The bald eagle is federally protected under the Bald and Golden Eagle Protection Act (BGEPA) and the MBTA. The bald eagle is listed by the state of North Dakota as a species of conservation priority (SoCP). While bald eagles have been observed in North Dakota, they are unlikely to be nesting on or near the site due to the lack of suitable trees.

The USFWS provides federally threatened and endangered species data at the county level for public use. There are no federally threatened, endangered, or candidate plant species listed for McHenry County (WEST 2011 (ECOS 2011)). McHenry County supports two endangered, one threatened, and two candidate wildlife species (Table 7.16-1). There is also designated piping plover critical habitat (alkali lakes and wetlands) within McHenry County but not within the Project Area (Figure 14).

Table 7.16-1. Federally Listed Species in McHenry County

Species Name	Habitat	Status
Whooping crane (<i>Grus Americana</i>)	Shallow open water wetland habitat	Endangered
Gray wolf (<i>Canis lupus</i>)	Turtle Mountains	Endangered
Piping plover	Midstream sandbars of the Missouri	Threatened

Species Name	Habitat	Status
(<i>Charadrius melodus</i>)	and Yellowstone Rivers, and along shorelines of saline wetlands	
Sprague's pipit (<i>Anthus spragueii</i>)	Native and planted grassland at least 72 acres in size	Candidate
Dakota skipper (<i>Hesperia dactotae</i>)	High diversity native prairie	Candidate

Source: USFWS 2011

Whooping Cranes - Wetlands within the Project Area may have the potential to serve as suitable roosting and feeding habitat for migration stopover. As shown on Figure 14, the Project Area is within the central corridor (75 percent zone) within the 200-mi wide migratory corridor. According to available geographic information system (GIS) data, no sightings have been officially documented within the Project Area, but several sightings have been documented in proximity to the Project (HDR 2010). Both foraging (cropland and grasslands) and roosting (wetlands) habitat is present, making it possible for whooping cranes to utilize the Project Area.

Gray Wolf - Wolves have most frequently been observed in the Turtle Mountains of North Dakota, approximately 75 mi from the Project Area (HDR 2010). It is unlikely gray wolves will occur in the Project Area, with the possible exception of an occasional transient animal.

Piping Plover and Critical Habitat - There is no USFWS-designated critical habitat for the piping plover in the Project Area (50 Code of Federal Regulations (CFR) Part 17); critical habitat has been designated for piping plovers approximately 15 mi to the southwest and approximately 10 mi to the east of the Project Area (WEST 2011 (USFWS 2002a)). Although no obvious alkali wetlands are visible on 2010 aerial imagery, piping plover may move or migrate across the Project Area (HDR 2010).

Sprague's Pipit - This federal candidate species is grassland dependent and prefers medium height native prairie with no shrubs or trees in relative large blocks (WEST 2011 (MNHP and MFWP 2011)). Grassland habitat, some of which is likely native prairie, is present within the Project Area.

Dakota Skipper – The Dakota skipper is typically associated with high quality native prairie ranging from wet-mesic tallgrass prairie to dry-mesic mixed grass prairie. These prairies usually have a high diversity of wildflowers and grasses. There is grassland habitat within the Project Area that may be suitable to Dakota skippers (WEST 2011).

Species of Conservation Priority

The State of North Dakota maintains a list of 100 SoCP (HDR 2010). The species are categorized by conservation need into three levels with Level I species having the greatest conservation need (WEST 2011 (Hagen et al. 2005)). According to WEST (2011), 19 species of Level I birds and four species of Level I amphibians/reptiles may occur in the Project Area. It is likely the Project does not contain specific habitats that would concentrate any one of these species. The overall disturbance of the Project Area by tilled agriculture and wetland drainage may diminish the potential for some of these species. Fifteen of the 19 state Level I bird species were also recorded along the previously mentioned BBS Denbigh route in 2010 (WEST 2011 (USGS 2011)).

Sharp-tailed grouse (*Tympanuchus phasianellus*) are common throughout most of North Dakota. Sharp-tailed grouse are ground-nesting game birds that have been recorded near the Project Area and are listed

as a state Level II species (WEST 2011 (Hagen et al. 2005)). Sharp-tailed grouse use grass-covered hilltops as breeding grounds, referred to as “leks.” Sharp-tailed grouse are known to re-use the same lek locations for consecutive years. Based on the location of and presence of grasslands, the Project will likely be utilized by sharp-tailed grouse.

The North Dakota Parks and Recreation Department (NDPRD) maintains a Natural Heritage Inventory Database (NHID), which is the most complete source of data on North Dakota's rare, endangered, or otherwise significant plant and animal species, plant communities, and other natural features. The NDPRD indicated no documented occurrences of rare, endangered, or otherwise significant plant and animal species, plant communities, and other natural features within or adjacent to the Project Area. However, the lack of data may mean the area has not been surveyed (Appendix D). Many species of rare plants without official state or federal status are tracked by the state's Natural Heritage Program. Thirty-five vascular plant species are listed for McHenry County and most of these species are globally ranked secure or apparently secure (WEST 2011 (NatureServe 2009)).

Sensitive Habitat

A Nature Conservancy conservation area is in McHenry County, approximately 25 mi to the south and northeast of the Project Area (WEST 2011 (The Nature Conservancy 2008)). There are no Audubon Society Important Bird Areas designated in North Dakota (WEST 2011 (National Audubon Society 2011)).

7.16.2 Impacts

As noted in Section 7.15.2, WEST conducted aerial sharp-tailed grouse lek and aerial and ground-based raptor stick nest surveys in April and May 2011. WEST will also conduct acoustic bat monitoring and avian point counts during fall 2011 and spring 2012. Information from these surveys will be used to identify potential impacts from the Project and aid in finalizing the Project layout.

Whooping Crane - Potential affects to the whooping cranes may be direct (e.g., collision mortality) or indirect (e.g., avoidance of the site resulting in cranes seeking alternate habitat).

Gray Wolf - If gray wolves entered during Project construction they could be struck by vehicles, but the chance of collisions is considered negligible, particularly since posted speed limits would be very low.

Piping Plover and Critical Habitat - A direct impact to piping plover could occur in the event of a collision with Project facilities. Project impacts to wetlands, if determined to be suitable piping plover habitat, would result in loss of habitat for this species.

Sprague's Pipit - Impacts to grasslands, if determined to be suitable habitat, would result in loss of habitat for this species. Collision with Project facilities may also occur.

Dakota Skipper - Given that suitable habitat may be present in the Project Area, impacts to the Dakota skipper may include habitat displacement.

Bald Eagle and Sharp-Tailed Grouse - On behalf of Meadowlark, WEST is conducting raptor nest location (including bald eagle nests) and lek surveys. Information from these surveys will be used to identify potential impacts from the Project and aid in finalizing the Project layout. Although not anticipated, impacts to bald eagles and sharp-tailed grouse may include habitat loss and collision with Project facilities.

Impacts to SoCP species are not anticipated, but may include habitat loss and collision with Project facilities.

7.16.3 Mitigative Measures

Refer to Section 7.15.3 for mitigation measures Meadowlark is implementing to minimize impacts to all wildlife and habitat, including the development of Project-specific ABPP.

Currently, the wind industry is working with the USFWS to develop a multi-state, multi-species, habitat conservation plan (HCP) – the Great Plains Wind Energy HCP (see <http://www.fws.gov/southwest/es/wind.html>). This HCP will seek to facilitate development of utility scale wind energy projects while conserving a variety of federally listed endangered, threatened, or candidate species that occur throughout the action area (the central U.S. from the Canadian border to the Gulf of Mexico). Element Power is participating in the development of this HCP and will seek to obtain incidental take coverage for the New Frontier Wind Project under this plan when it is finalized.

7.17 SUMMARY OF IMPACTS

Table 7.17-1 summarizes the impacts and mitigation measures for the Project

Table 7.17-1. Project Summary of Impacts and Mitigation

Resource	Potential Impacts	Mitigation Measures
Demographics	Primarily positive due to increased tax base and infusion of wages, payments to landowners, and expenditures from Project construction and operation. Negative impacts are minor and limited to removal of land from agricultural use for Project facilities.	Wages will be paid and expenditures will be made to local businesses during Project construction. The Project will increase the County’s tax base. Lease payments paid to landowners will offset potential financial losses.
Land Use and Managed Lands	The permanent site layout has not been determined but Table 5.1-1 estimates the Project’s impacts based on a preliminary layout. These impacts could include, but are not limited to, loss of planting opportunity, crop damage, and soil compaction. An impact of the Project may be potential interference with agricultural activities including equipment maneuvering around structures and aerial spraying. No impacts to human settlement, mining, missile facilities, or school trust lands are anticipated. The Project may potentially impact wetland easements or CRP parcels.	Meadowlark will provide appropriate compensation for lost planting opportunities, crop damage, and damage to drainage tiles. Soils compacted by construction activities will be restored. Meadowlark will coordinate with landowners to site access roads in a manner that preserves existing land uses to the greatest extent practicable. After the Project is constructed, aerial sprayers will need to employ the same flight patterns as used when working adjacent to tree rows, distribution lines, or communication structures. Wind turbines will be sited a minimum of 1,400 ft from occupied residences. If Project facilities will impact wetland easements or CRP parcels, Meadowlark will work with the USFWS, NRCS, and private landowners to minimize impacts.
Public Services and Existing	Potential impacts to public services, mainly emergency services, are related to	Meadowlark will accommodate emergency service providers in the area of construction

Resource	Potential Impacts	Mitigation Measures
Infrastructure	<p>construction activities that may disrupt roadways and access. Temporary dewatering of groundwater may be required during construction of the turbine foundations. Slow moving construction vehicles may cause delays on smaller roads, similar to farm equipment during harvest. Table 4.2-1 discusses setback distances for the Project from existing infrastructure. With these setbacks in place, no impacts are anticipated for tower infrastructure occurring in the Project Area. No impacts to telecommunication services and infrastructure are anticipated.</p>	<p>activities that may disrupt roadways and access. Meadowlark will be covered under a NPDES permit and SWPPP and will follow the <i>Construction and Environmental Disturbance Requirements</i> as provided by the NDDOH. Operating permits will be acquired from the state, county, and/or township, as necessary. Meadowlark will develop a construction traffic plan. Meadowlark will seek approval from the FAA for the final turbine layout and will abide by the U.S. Air Force’s turbine setback requirements from its missile facility. Meadowlark will comply with NERC and MISO regulations and any requirements of the Interconnection Agreement. An underground utilities locator company will be contacted prior to construction to locate underground facilities. The final Project layout will avoid interference with the microwave beam path’s WCFZ. Impacts on AM, FM, and off-air television broadcasts are not anticipated so specific mitigation measures are not proposed.</p>
Human Health and Safety	<p>A Phase I ESA of will be conducted to identify any RECs. Impacts on the security and safety of local communities will be negligible. Temporary air quality impacts caused by construction-vehicle emissions and fugitive dust from construction activities may occur.</p>	<p>As shown in Table 4.2-1, Meadowlark will set back wind turbines from all occupied residences, bury collection lines to a depth of approximately 4 ft, and fence off and place warning signs around the Project Substation. Any petroleum waste will be handled and disposed of in accordance with local, state, and federal regulations. Additional handling, storage, and reporting requirements for hazardous material will be covered in association with NDDOH’s <i>Construction and Environmental Disturbance Requirements</i>, the NPDES permit required for the Project and the SWPPP. Security measures will be taken to reduce the chance of physical and property damage, as well as personal injury. Meadowlark will take all necessary measures to minimize fugitive dust emissions.</p>
Sound and Noise	<p>Construction activities and O&M vehicles for the Project will generate noise. The proximity of sensitive noise receptors (occupied residences and humans) to construction activities will determine the</p>	<p>Impacts to nearby residents and other potentially affected parties in terms of noise will be taken into consideration as part of turbine siting. A noise-analysis will be conducted prior to finalizing the Project layout.</p>

Resource	Potential Impacts	Mitigation Measures
	level of noise perceived.	As shown in Table 4.2-1, Meadowlark will set back wind turbines at least 1,400 ft from all occupied residences, which mitigates and minimizes adverse noise impacts.
Cultural and Archaeological Resources	Any ground disturbing activity within the Project Area has the potential to impact known or unknown cultural resources. Possible concerns regarding visual impacts to recorded or unrecorded historic structures and properties may also occur.	Meadowlark conducted a literature search of known cultural resources and archaeological properties within the Project Area. Meadowlark provided the SHPO with the results of the literature search in a letter dated August 11, 2011 (Appendix D). Cultural resource field surveys will also be conducted fall 2011 to confirm that the locations of Project facilities will not impact cultural resources.
Recreational Resources	Impacts to recreational resources will be visual in nature and limited to individuals using public or private property in the Project site for hiking, hunting, fishing, or nature observation. During construction, the noise from increased vehicle traffic and construction activities may alter the experience of those using recreational areas, such as PLOTS.	To the extent practicable, Project facilities will be placed in a manner to avoid impacts to recreation resources.
Visual Resources	The Project will have an effect on the visual quality of the site and in nearby areas, but the aesthetic effect of the Project is based on subjective human response.	Table 4.2-1 discusses setback distances for the Project from existing infrastructure. Turbines will only be illuminated to meet FAA regulations. Existing roads will be used for construction and maintenance where possible. Access roads created for the Project will be located on gentle grades to minimize visible cuts and fills. Temporarily disturbed areas will be reseeded per NRCS recommendations to blend in with existing vegetation.
Effects on Land-Based Economics	No impacts are anticipated to livestock health and safety due to the construction or operation of the Project. Except for the physical locations of the turbines and access roads, the land surrounding the facility will be available for grazing and other agricultural activities. The permanent site layout has not been determined but Table 5.1-1 estimates the Project's minimal impacts based on a preliminary layout. Actual impacts to agriculture production will be determined once turbine and road locations are finalized. Depending upon the turbine type selected, 52 to 69 acres of land may	Only land for turbines, substation, O&M building, and access roads will be unavailable for crop production or grazing during the life of the Project. Meadowlark will work with the landowners to identify locations of drainage tiles and will minimize interference with drainage tile systems, where possible. Areas disturbed during construction will be repaired and restored to preconstruction contours to the extent practicable so that all surfaces drain naturally, blend with the natural terrain, and are left in a condition that will facilitate natural revegetation, provide for proper drainage, and prevent erosion. If unavoidable impacts to woodlands arise, then individual trees will be

Resource	Potential Impacts	Mitigation Measures
	<p>be permanently disturbed for the Project. Since a majority of the woodlands on the Project site are associated with homesteads and windbreaks, minimal impacts are anticipated.</p>	<p>replaced at a ratio of 2:1 and plantings will be monitored for three years per Commission requirements.</p>
<p>Soils, Geology, and Groundwater</p>	<p>The impact to soils in the Project site will be limited to areas removed from agricultural production, either for turbines and associated structures, or for road construction. The permanent site layout has not been determined but Table 5.1-1 estimates the Project's impacts based on a preliminary layout. Grading may be required for roadway construction. Meadowlark will avoid wetland areas to the extent possible, so the potential for soil loss due to erosion or impacts on hydric soils, such as compaction, is low. Impacts to groundwater resources are not anticipated as water supply needs will be quite limited. It is probable that operation and maintenance water requirements will be satisfied with a single domestic-sized water well.</p>	<p>Construction activities will be conducted under the requirements of the NPDES permit and SWPPP for the Project. Meadowlark will follow the <i>Construction and Environmental Disturbance Requirements</i> as provided by the NDDOH. Each turbine will be located a minimum distance of 1,400 ft from occupied residences, thereby minimizing the risk of impacts on private wells in the area. In the event that subsurface blasting is required, a blasting plan will be developed and implemented to keep the impacts localized and fracture the least amount of bedrock necessary for construction. Any dewatering required during construction will be discharged to the surrounding surface, thereby allowing it to infiltrate back into the ground to minimize potential impacts.</p>
<p>Surface Water and Floodplains</p>	<p>Project facilities will be designed to avoid impacts on surface water resources to the extent practicable. Wind turbines will be sited on uplands to avoid surface water resources in the lower elevations to the extent practicable. Project facilities, such as underground electrical collector lines, access roads, turbine pads, and the O&M building, will impact surface water runoff within the Project Area. These impacts are expected to be minimal.</p>	<p>Access roads constructed adjacent to wetlands or intermittent streams and drainageways will be designed in a manner so runoff from the upper portions of the watershed can flow unrestricted to the lower portion of the watershed. Construction activities will be conducted under the requirements of the NPDES permit and SWPPP for the Project. Meadowlark will follow the <i>Construction and Environmental Disturbance Requirements</i> as provided by the NDDOH.</p>
<p>Wetlands</p>	<p>The permanent site layout has not been determined but Table 5.1-1 estimates the Project's impacts based on a preliminary layout. Wetland delineations will be conducted fall 2011 using the USACE standard methodology. Wetland impacts will be determined following the wetland</p>	<p>Meadowlark will avoid impacts to wetlands to the extent possible. If impacts to USACE jurisdictional wetlands are unavoidable, then a Section 404 and 401 permit application will be submitted to USACE and State of North Dakota, respectively. Permanent impacts to jurisdictional wetlands and waters will be</p>

Resource	Potential Impacts	Mitigation Measures
	<p>delineations. Wetland delineations will determine whether or not wetlands in the Project Area fall under the jurisdiction of USACE, as defined by Section 404 of the Clean Water Act. Though a final Project layout has not been determined, Meadowlark does not anticipate impacts to basins within wetland easements, as discussed in Section 7.3.</p>	<p>mitigated according to USACE requirements. It is anticipated that any impacts to USACE jurisdictional waters will be temporary and as a result, will not require compensatory mitigation. Construction activities will be conducted under the requirements of the NPDES permit and SWPPP for the Project. Meadowlark will follow the <i>Construction and Environmental Disturbance Requirements</i> as provided by the NDDOH.</p>
Vegetation	<p>The permanent site layout has not been determined but Table 5.1-1 estimates the Project's impacts based on a preliminary layout. The amount of vegetation that will be permanently removed as a result of the Project will be determined once a site layout is finalized. During the construction of the Project, areas will be temporarily disturbed for contractor staging areas and underground collection lines.</p>	<p>If impacts to individual trees and shrubs cannot be avoided, these resources will be mitigated at a ratio of 2:1 and new plantings will be monitored for three years in accordance with the Commission's tree and shrub mitigation specifications. Construction activities will be conducted under the requirements of the NPDES permit and SWPPP for the Project. Meadowlark will follow the <i>Construction and Environmental Disturbance Requirements</i> as provided by the NDDOH. Temporarily disturbed areas will be reseeded per NRCS recommendations to blend with existing vegetation and prevent the spread of noxious weeds.</p>
Wildlife	<p>The Project may result in direct and indirect impacts to birds and bats. Direct impacts include strike mortality from turbine blades, power lines, and related infrastructure, electrocution from overhead collector lines, and loss of habitat. Indirect impacts may include displacement of birds and bats from their habitat, site avoidance, and behavioral modification.</p>	<p>Meadowlark is conducting biological assessments (discussed in Section 7.16) to aid in detailed placement of turbines, roads, and associated facilities to avoid or minimize impacts to wildlife and habitat. Mitigative measures include an ABPP, post-construction bird and bat mortality monitoring, revegetation, tree replacement, avoiding or minimizing disturbance to individual wetlands or drainage systems, and maintaining appropriate water and soil conservation practices.</p>
Rare and Unique Natural Resources	<p>Potential affects to rare and unique natural resources may be direct (e.g., collision mortality) or indirect (e.g., avoidance of the site resulting in species seeking alternate habitat). Refer to Section 7.16.3 for a discussion of impacts to rare and unique natural resources.</p>	<p>On behalf of Meadowlark, WEST has conducted or will conduct raptor nest location and lek surveys, acoustic bat monitoring, and avian point count surveys. Information from these surveys will be used to identify potential impacts from the Project and aid in finalizing the Project layout. Refer to Section 7.15.3 for mitigation measures Meadowlark is implementing to minimize impacts to all wildlife and habitat, including development of</p>

Resource	Potential Impacts	Mitigation Measures
		an ABPP.

8.0 PUBLIC COORDINATION

Keeping the public informed on the status of the Project is a key component to its success. Principal stakeholders in the Project are landowners that have entered into agreements with Meadowlark to provide wind rights for the Project. Meadowlark has and will continue to provide Project updates to the landowners in a consistent manner as the Project moves forward.

Meadowlark has discussed the Project with McHenry County staff to inform them of the Project, discuss local permits, and answer questions. Meadowlark met with McHenry County at two previous Conditional Use Permit (CUP) public hearings for the Project.

Meadowlark has been working with key state and federal agencies including the NDGFD and USFWS to inform them of the Project and to address areas of interest particular to each agency. Meadowlark met with the USFWS and NDGFD on February 24, 2011 in Bismarck, ND.

Letters introducing the Project and requesting feedback were sent on July 7, 2011 to the following agencies and Project stakeholders:

- North Dakota Aeronautics Commission
- North Dakota Attorney General
- North Dakota Department of Agriculture
- NDDOH
- North Dakota Department of Human Services
- North Dakota Department of Labor
- North Dakota Department of Career and Technical Education
- North Dakota Department of Commerce
- North Dakota Office of Management and Budget
- NDSL
- North Dakota Geological Survey
- Governor of North Dakota
- NDDOT
- North Dakota Indian Affairs Commission
- Job Service North Dakota

- NDPRD
- North Dakota State Soil Conservation Commission
- NDSWC
- USACE

Responses to Meadowlark’s Project notification letters are included in Appendix E. On August 11, 2011, Meadowlark notified the SHPO of the results of the literature review.

Meadowlark is committed to keeping key stakeholders engaged in the Project as it moves forward. Meadowlark expects to participate in additional landowner, agency, or other stakeholder meetings before the Commission’s public hearing.

9.0 IDENTIFICATION OF POTENTIAL PERMITS/APPROVALS

The federal and state permits or approvals that have been identified as potentially being required for construction and operation of the Project are shown in Table 9.0-1. Permits dependent on the final site layout will be applied for after receiving Commission approval, but prior to construction.

Table 9.0-1. Project Summary of Impacts and Mitigation

Agency	Approval	Description	Status
FAA	Notice of Proposed Construction (Form 7461-1) Hazard Determination Notice of Actual Construction or Alteration (Form 7461-2)	Notifies FAA of proposed structures that might affect navigable airspace. Form requires proposed markings and lighting. FAA must review possible impacts to air safety and navigation, as well as the potential for adverse effects on radar systems.	Meadowlark has already received a Determination of No Hazard for preliminary turbine locations but will submit turbine locations again once a layout is finalized
USACE	Section 404 Permit	Required for the discharge of dredged or fill material into waters of U.S. Minimal levels of fill may be covered under existing Nationwide Permits.	Final layout will determine whether permit is needed
USFWS	Compatibility Analysis, ROW Permit, and Special Use Permit (SUP)	If constructing in a wetland within a wetland easement, compatibility analysis is required. A ROW permit may be required for permanent disturbance in wetland easements and a SUP is required for temporary disturbance in wetland easements.	Final layout will determine whether permit is needed
U.S. Environmental Protection Agency (USEPA)	Spill Prevention Control and Countermeasure (SPCC) Plan	Would be required if any facility associated with the Project (O&M or Substation) has a tank holding more than 1,320 gallons of oil on site.	Will prepare Plan prior to operation

Agency	Approval	Description	Status
North Dakota Public Service Commission (Commission)	Certificate of Site Compatibility	For facilities with greater than 0.5 MW nameplate capacity.	Subject of this Certificate application
NDDOH	Section 401 Certification	Verify that project construction would comply with state water quality standards. A 401 Water Quality Certification will be required if a Section 404 permit is required.	Final layout will determine whether permit is needed
	NPDES General Permit (Construction)	For stormwater discharges from construction activities that involve disturbing more than 1 acre.	Will prepare and submit Notice of Intent and prepare SWPPP prior to construction
	Septic Tank and Drainfield Permit	Required for installation of septic system at O&M facility.	Will prepare and submit permit application prior to construction
North Dakota Department of Transportation (NDDOT)	Road Approach/Access Permit	Required to provide driveway access to state owned ROW.	Final layout will determine whether permit is needed
	Utility Permit / Risk Management Documents	Required to install utilities within state owned ROW.	Final layout will determine whether permit is needed
North Dakota Highway Patrol	Overheight/Overweight Permit	Required to transport oversize loads on state maintained roads.	Will prepare and submit permit application prior to construction
State Historic Preservation Office (SHPO)	Review and Coordination	Field reviews for archaeological resources will be required by the SHPO.	Will conduct field reviews prior to construction
North Dakota State Water Commission (NDSWC)	Temporary Water Permit	Required for temporary use of surface water or groundwater.	Final layout will determine whether permit is needed
McHenry County	Conditional Use Permit (CUP) and Public Hearing	Required for the Project's facilities.	Will prepare and submit permit application prior to construction
	Building Permit	Required for the Project's O&M building.	Will prepare and submit permit application prior to

Agency	Approval	Description	Status
			construction

Source: HDR 2010

10.0 FACTORS CONSIDERED

The Act lists 11 factors to guide the Commission in the evaluation and designation of the Project (see NDCC Section 49-22-09). These factors are addressed below.

10.1 PUBLIC HEALTH AND WELFARE, NATURAL RESOURCES, AND THE ENVIRONMENT

Section 7 in this application discusses the research and investigations relating to the effects of the Project on public health and welfare, natural resources, and the environment. These effects and the proposed mitigation to minimize these effects are summarized in Section 7.17.

10.2 TECHNOLOGIES TO MINIMIZE ADVERSE ENVIRONMENTAL EFFECTS

Meadowlark will utilize the most recent technologies that minimize impacts to the environment. Current wind turbine technologies, including the equipment and siting tools, optimize the wind and land resources. Meadowlark will use tubular turbine towers rather than lattice towers to minimize bird perching and nesting opportunities. Meadowlark will avoid placing external ladders and platforms on tubular towers to minimize perching and nesting. The use of guy wires for turbine or permanent meteorological tower supports will not occur. Turbine blades will be feathered in high wind speeds to prevent excessive rotation.

10.3 POTENTIAL FOR BENEFICIAL USES OF WASTE ENERGY

This factor is not applicable to the Project.

10.4 UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS

Unavoidable adverse environmental effects include the visual impacts associated with the Project as well as those impacts related to the placement and use of the land within the site. The visual character of the site will be changed due to the construction of the Project. These impacts will be based on subjective human responses.

Unavoidable adverse environmental effects for the Project include the permanent placement of Project facilities. The final layout has not been determined but Table 5.1-1 estimates the Project's temporary and permanent impacts based on a preliminary layout.

10.5 ALTERNATIVES TO THE PROPOSED SITE

Meadowlark believes that the proposed site is the most viable alternative. Meadowlark is committed to being flexible on the layout and will work closely with landowners and regulatory agencies to examine all reasonable alternatives to the 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. 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 those resources are primarily related to construction. Construction resources that will be used include aggregate resources, concrete, steel, and hydrocarbon fuel. The Project's access roads will consist of aggregate (i.e., gravel), while concrete will be used for the foundations of multiple Project facilities, most notably turbines. Each turbine will be constructed primarily of steel. Lastly, hydrocarbon fuels will be used during construction by construction and delivery vehicles, as well as construction machinery.

10.7 DIRECT AND INDIRECT ECONOMIC IMPACTS

Direct economic impacts include impacts associated with land being removed from production for the life of the Project due to conversion to turbine sites, access roads, and other Project facilities. The final layout has not been determined but Table 5.1-1 estimates the Project's temporary and permanent impacts based on a preliminary layout. In general, agricultural areas surrounding each turbine can still be farmed or grazed, and landowners will be compensated for the land occupied by the wind turbines and associated facilities.

Short-term economic benefits may include wages and salaries paid to local hires, which 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 Meadowlark as business expenditures and state and local taxes. Expenditures will be made for equipment, energy, fuel, operating supplies, and other products and services, which will benefit businesses in the county and the state.

The Project will provide long-term benefits to McHenry County's tax base, which 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 north-central North Dakota. Additional revenues are expected from property and income taxes. Continuing to establish North Dakota as an important producer of energy sources may spur the development of wind-related businesses in the area, which will contribute to the 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. Meadowlark met with McHenry County at two previous CUP public hearings for the Project. No issues related to existing development plans were raised at either meeting.

10.9 EFFECT OF SITE ON CULTURAL RESOURCES

Meadowlark completed a literature search of known cultural resources and archaeological properties within the Project Area. Additionally, Project-specific field surveys for cultural resources will also be

conducted during fall 2011. Sensitive cultural resources found within the Project Area will be avoided during development of the final Project layout. Furthermore, Meadowlark or its consultant will engage the SHPO to obtain its feedback regarding concerns related to sensitive cultural and historic properties.

10.10 EFFECT OF SITE ON BIOLOGICAL RESOURCES

Meadowlark has implemented measures to avoid and minimize effects to biological resources at the Project. 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 these species.

Biological resources that may be impacted by the Project include wetlands, native plant communities and wildlife. Meadowlark will seek to avoid or minimize impacts on these resources through additional studies, including wetland delineations and pre-construction biological surveys, as well as the mitigation measures detailed in Sections 7.14.3, 7.15.3, and 7.16.3.

10.11 AGENCY COMMENTS

Agencies were contacted to comment on the Project. The summary of comments received is below. Agency response letters are included in Appendix E.

10.11.1 North Dakota Game and Fish Department

NDGFD's primary concern for the Project is the disturbance of native prairie. This agency asks that native prairie disturbance be avoided to the extent possible. NDGFD also recommends that any unavoidable wetland impacts be replaced in kind, above-ground appurtenances not be placed in wetland areas, and no alternations be made to existing drainage patterns. Routine monitoring for avian and bat mortality is also recommended by NDGFD to be included as part of the facility maintenance plan for the life of the Project. NDGFD requests GPS coordinates for each turbine location after the Project is operational.

Meadowlark will avoid native prairie, wetland, and surface water disturbance to the extent possible. Meadowlark will conduct post-construction avian and bat mortality monitoring and will provide NDGFD with GPS coordinates of the Project's turbine locations.

10.11.2 U.S. Fish and Wildlife Service

USFWS recommends the use of the 2003 Interim Wind Turbine Siting Guidelines and that Meadowlark develop an ABPP. USFWS indicates construction should be scheduled for late summer or fall/early winter so as to not disrupt waterfowl or other wildlife during the breeding season (February 1 to July 15). If biological surveys indicate a significant impact to migratory birds is possible, the USFWS requests further consultation with Meadowlark. USFWS also suggests that if Meadowlark believes the incidental take of any federally listed species will occur, then the Project should be covered under the HCP discussed in Section 7.16.3. USFWS also provided information regarding its easement acquisition program and suggested contacting its Realty office if the Project has the potential to impact easements. Avoidance of native prairie, wetlands, wooded draws, and riparian forests is also recommended. A minimum of two years of pre-construction wildlife surveys and at least three years of post-construction collision monitoring are recommended.

Meadowlark will follow the 2003 Interim Wind Turbine Siting Guidelines and will develop an ABPP. Meadowlark will contact USFWS's Realty office if impacts to wetland easements are likely. Meadowlark will avoid native prairie, wetlands, wooded draws and riparian forests to the extent possible. Meadowlark will also conduct post-construction avian and bat mortality monitoring.

10.11.3 North Dakota Aeronautics Commission

In their response letter, this agency did not identify aviation concerns but noted that the closest public airport is the Garrison Airport, approximately 25 mi to the southwest. The Aeronautics Commission included North Dakota Senate Bill No. 2206 (enacted as NDCC Section 2-05-21) regarding anemometer towers and marking requirements. This agency asked that if Meadowlark has any current or future meteorological towers in North Dakota, to submit the coordinates to the Aeronautics Commission via email.

Per NDCC Section 2-05-21, Meadowlark will follow the marking requirements for anemometer towers and will provide the coordinates of existing and future meteorological towers to the North Dakota Aeronautics Commission.

10.11.4 U.S. Army Corps of Engineers

If the Project will impact waters under USACE jurisdiction, USACE asked for a location map and completed permit application describing all proposed work and construction methodology.

Meadowlark will avoid wetlands and waters of the U.S. to the extent possible. If impacts are unavoidable, Meadowlark will submit an application, per USACE's direction.

10.11.5 North Dakota Department of Health

NDDOH commented that all necessary measures must be taken to minimize fugitive dust and that if complaints arise, they must be dealt with. Minimal disturbance of stream beds and banks should occur in order to prevent excess siltation. Revegetation should occur in disturbed areas as soon as possible following completion of work. Caution must be taken to prevent spills of oil and grease. NDDOH noted their *Construction and Environmental Disturbance Requirements* for soils, surface waters and fill material. Projects disturbing 1 acre or more must have a permit to discharge storm water runoff. Noise levels should be minimized by ensuring construction equipment is equipped with a recommended muffler in good working order. Construction activities should not be conducted during early morning or late evening hours.

Meadowlark will follow NDDOH's recommendations including their *Construction and Environmental Disturbance Requirements*.

10.11.6 North Dakota Department of Transportation

NDDOT indicated ND 51 and ND 53 are both narrow and low volume roadways. Any temporary or permanent modifications for requested new driveway locations must be approved by the District Engineer. No storage of materials can occur within the highway ROW. If work must be done in highway ROW, appropriate permits and risk management documents will need to be obtained from the District Engineer.

Meadowlark will follow NDDOT's instructions and apply for appropriate permits, if necessary.

10.11.7 North Dakota Parks and Recreation Department

NDPRD recommended that all efforts be made to avoid impacts to wildlife species and their habitats. This agency suggests pre and post construction avian and bat monitoring studies be conducted. NDPRD recommends that the Project be accomplished with minimal impacts and that all efforts be made to ensure critical habitats are not disturbed and that rare species conservation remains secure in North Dakota.

Meadowlark will conduct pre and post construction avian and bat monitoring studies.

10.11.8 North Dakota State Water Commission

NDSWC indicated the Project is not located in an identified floodplain and it is believed the Project will not affect an identified floodplain. NDSWC commented all waste material associated with the Project must be disposed of properly and not placed in identified floodway areas.

Meadowlark will not place waste material in identified floodway areas. Meadowlark will also properly dispose of all waste material associated with the Project.

10.11.9 State Historical Society of North Dakota

SHPO indicated a Class II (reconnaissance) survey is warranted for standing structures in the visual Area of Potential Effect (APE). SHPO also requests a map of the actual placement areas of wind turbines to determine the visual APE because they do not use a set distance for visual effects. Class III (pedestrian) surveys will be warranted for all areas directly impacted by the Project, including crane paths, access roads, transmission lines, and turbine pads.

Meadowlark will conduct Class III surveys and will provide SHPO with a map of the actual placement areas of Project facilities.

11.0 QUALIFICATIONS OF CONTRIBUTORS

Table 11.0-1. Qualifications of Contributors

Contributor	Qualifications
Michael Arndt Vice President, Central and Mountain West Development Element Power US, LLC	Mr. Arndt has eight years of experience in renewable energy development throughout the central United States. Mr. Arndt comes to Element Power most recently from Invenergy, LLC, where he held the position of Director of Business Development in the Central Region. Prior to Invenergy, he was a Project Developer at Navitas Energy, a subsidiary of Gamesa Energy. University of Wisconsin-Madison, Natural Resources, B.S.
Scott Koziar Senior Project Manager Element Power US, LLC	Mr. Koziar has six years of experience in renewable energy development throughout the central United States. Scott comes to Element Power most recently from RES Americas, where he held the position of Development Manager in the Central Region. While at RES Americas, Scott played a lead role in the creation of a 1,000 megawatt development pipeline of wind energy projects, including managing a 400 MW joint venture project with a community owned wind farm. Prior to RES Americas, Scott worked for NextEra Energy and Enbridge Energy. University of Colorado – Boulder, Business, B.A.
Evelyn Lim Senior Vice President, Legal Element Power US, LLC	Ms. Lim has over ten years of experience in the energy industry. Ms. Lim was most recently Senior Vice President and Deputy General Counsel for First Wind where she helped grow the company from a small start-up to an operating company with over 200 employees and over 500 MW of operating projects, while playing a significant role in

Contributor	Qualifications
	<p>raising over \$2 billion of capital for the company. Prior to joining First Wind, she was a partner in the finance group at McDermott, Will & Emery LLP and an associate with Milbank, Tweed, Hadley & McCloy LLP.</p> <p>Cornell University, Applied Economics and Business Management Fordham University, J.D.</p>
<p>Todd Mattson Director of Environmental Affairs Element Power US, LLC</p>	<p>Mr. Mattson is an environmental and regulatory compliance specialist with over 16 years of experience in the energy sector. Having worked on energy development projects throughout the United States, he has been responsible for directing project feasibility and planning analyses, field studies, federal and state environmental reviews, endangered species compliance, permitting, and agency consultations. This includes supporting the development of over 1,000 MW of wind energy projects since 1997. Prior to joining Element Power, Mr. Mattson was a Vice President and wind energy program manager at HDR Engineering, Inc., one of the leading engineering and environmental consulting firms serving the renewable energy industry.</p> <p>University of Wyoming – Laramie, Wildlife Ecology, M.S., 1994 Minnesota State University – Moorhead, Biology, B.A., 1992</p>
<p>Mollie M. Smith Attorney Fredrikson & Byron, P.A.</p>	<p>Ms. Smith is a senior associate in Fredrikson & Byron’s Litigation, Oil & Gas, Transmission, Renewable Energy and Condemnation & Eminent Domain Groups. Ms. Smith assists clients with oil and gas litigation matters; wind farm, transmission line and pipeline permitting matters; and condemnation/eminent domain matters.</p> <p>University of Minnesota Law School, J.D., 2004 Colorado State University, M.A., 2000 Northern State University, B.A., 1997</p>
<p>Ingrid Schwingler Development Coordinator Element Power US, LLC</p>	<p>Ms. Schwingler has five years of experience in renewable energy, including advocacy, consulting, data collection, preparation of permit applications, fieldwork, and data analysis. Ms. Schwingler comes to Element Power most recently from HDR Engineering, Inc., where she held the position of Environmental Scientist.</p> <p>B.A., Environmental Studies, Political Science, Gustavus Adolphus College, St. Peter, MN, 2007</p>
<p>Scott Zeimetz Senior GIS Specialist Element Power US, LLC</p>	<p>Mr. Zeimetz has nine years of experience in GIS and 3 years of experience in renewable energy development. Mr. Zeimetz comes to Element Power most recently from Westwood Professional Services, where he held the position of GIS Manager.</p> <p>B.A. Environmental Biology, Saint Mary’s University of Minnesota,</p>

Contributor	Qualifications
	2003 M.A. GIS, Saint Mary's University of Minnesota, 2005

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FIGURES

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APPENDIX A

Policies and Commitments to the Environment

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ELEMENT POWER'S CORPORATE POLICY

Element Power US, LLC (Element Power) is dedicated to being a responsible steward of the environment. It is Element Power's corporate policy to conduct its business in an environmentally sustainable and responsible manner while providing clean, reliable, economical energy to utilities and their customers. Element Power is committed to siting, designing, constructing, and operating its project facilities in a way that minimizes adverse environmental impacts consistent with state and federal regulations. Further, Element Power is committed to working cooperatively with the U.S. Fish and Wildlife Service (USFWS) and state wildlife agencies towards the protection of wildlife resources. Element Power's projects that comply with this principle will minimize potential impacts on birds, bats and other wildlife and their habitats. Despite these efforts, it is recognized that wind turbines and their associated facilities may directly and indirectly affect wildlife. Element Power has developed and implements a corporate Avian and Bat Protection Plan (ABPP) to support its commitment to comply with key wildlife laws by undertaking consistent procedures and practices to minimize impacts on birds and bats and their habitats.

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APPENDIX B

Design Data Report

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New Frontier Wind Project – Design Data Report

- Up to 102 MW (Gross Capacity) Project
- Final layout to be completed after micrositing and prior to construction

Wind Turbines

Turbine Type and MW Rating	Generator Type	Generator Rated Voltage	Rotor Diameter	Rotor Swept Area	Cut-In Wind Speed	Cut-Out Wind Speed	Hub Height	Lighting	Foundation Type
Siemens SWT-2.3-113	Synchronous, PMG	2,300 kW	113 m (371 ft)	10,000 m ² (107,639 ft ²)	3 m/s (7 mph)	25 m/s (56 mph)	80 m or site specific	Accordance with FAA	Likely spread footing
Siemens SWT-2.3-101	Asynchronous	2,300 kW	101 m (331 ft)	8,000 m ² (86,111 ft ²)	3-4 m/s (7-9 mph)	25 m/s (56 mph)	80 m or site specific	Accordance with FAA	Likely spread footing
Vestas V90-1.8	4-pole (50 Hz)/6-pole(60 Hz) doubly fed generator, slip rings	1,800 kW (50 Hz) or 1,815 kW (60 Hz)	90 m (295 ft)	6,362 m ² (68,480 ft ²)	4 m/s (9 mph)	25 m/s (56 mph)	80 m or site specific	Accordance with FAA	Likely spread footing
GE 1.6-82.5	Asynchronous, Partial Power Converter	1,600 kW	82.5 m (271 ft)	5,345 m ² (57,533 ft ²)	3.5 m/s (8 mph)	25 m/s (56 mph)	80 m or site specific (262 ft)	Accordance with FAA	Likely spread footing

Project Collector System

System Voltage	Approximate Buried Depth	Approximate Cable Length	Cable Sizes
34.5 kV	4 ft	114,400 to 163,800 ft (44 to 63 turbines)	1/O AWG, 4/O AWG, 500 kcmil, 750 kcmil, 1000 kcmil, 1250 kcmil

Project Substation

Approximate Area	Main Transformer	Interconnection Station Standards
5 acres	34.5 kV/115 kV	FERC, NERC, and MISO

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APPENDIX C

Studies and Assessments

- Critical Issues Analysis
- Whooping Crane Habitat Review

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APPENDIX D

Project Notification Letters

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APPENDIX E

Agency Letter Responses

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