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

## Antelope Hills Wind Project

### Mercer County, North Dakota

## Case #: PU-13 - 846

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Appendix A Studies and Assessments

Appendix B Agency Correspondence

# Acronyms and Abbreviations

| | |
|---|---|
| AADT | Average Annual Daily Traffic |
| Antelope | Antelope Hills Wind Project, LLC |
| APE | Area of Potential Effects |
| Basin | Basin Electric Power Cooperative |
| BMPs | Best Management Practices |
| Certificate | Certificate of Site Compatibility |
| CRP | Conservation Reserve Program |
| dBA | A-weighted decibel |
| DOD | Department of Defense |
| EMF | Electromagnetic Field |
| EPC | Engineering, procurement, and construction |
| ESA | Endangered Species Act |
| FAA | Federal Aviation Administration |
| kV | kilovolt |
| kWh | kilowatt-hour |
| MW | megawatt |
| MWh | Megawatt hours |
| MAPP | Mid-Continent Area Power Pool |
| MBTA | Migratory Bird Treaty Act |
| MCZO | Mercer County Zoning Ordinance |
| NDDOT | North Dakota Department of Transportation |
| NDAC | North Dakota Administrative Code |
| NDCC | North Dakota Century Code |
| NDGFD | North Dakota Game and Fish Department |
| NPDES | National Pollutant Discharge Elimination System |
| NRCS | National Resource Conservation Service |
| NRHP | National Register of Historic Places |

| | |
|---|---|
| NWI | National Wetlands Inventory |
| O&M | Operations and Maintenance |
| PLOTS | Private Land Open to Sportsmen |
| Project | Antelope Hills Wind Energy Project |
| PSC or Commission | North Dakota Public Service Commission |
| SCADA | Supervisory Control and Data Acquisition |
| SHPO | State Historic Preservation Office |
| SWPPP | Storm Water Pollution Prevention Plan |
| USEPA | US Environmental Protection Agency |
| USDA | US Department of Agriculture |
| USFWS | US Fish and Wildlife Service |
| WMA | Wildlife Management Area |

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# 1.0 INTRODUCTION

Antelope Hills Wind Project, LLC (Antelope) is submitting this application for a Certificate of Site Compatibility (Certificate) to construct the Antelope Hills Wind Energy Project (Project). The Project is located in Mercer County, North Dakota (Figure 1), and will have a nameplate capacity of up to 172 megawatts (MW). The Project will use up to 86 wind turbine generators depending on the turbine model used. Additional Project facilities include access roads, electrical collection systems and cabling, an operation and maintenance (O&M) building, and a substation. The Project also includes a 9.5-mile 345 kilovolt (kV) transmission tie line, which is addressed in a separate application for a Certificate of Corridor Compatibility and Route Permit.

## 1.1 Compliance with the Energy Conversion and Transmission Facility Siting Act Chapter 49-22

The siting of an energy conversion facility in North Dakota requires filing of an application for a Certificate of Site Compatibility to meet the criteria set forth in the North Dakota Energy Conversion and Transmission Facility Siting Act (North Dakota Century Code [NDCC] 49-22 and Article 69-06 of the North Dakota Administrative Code [NDAC]). Table 1 outlines the information required to fulfill the requirements for a Certificate with the North Dakota Public Service Commission (PSC) and where these requirements are addressed in this document.

NDAC 69-06-08-01 establishes exclusion and avoidance areas as well as selection and policy criteria for the siting of energy facilities. Antelope considered these areas and policy criteria in the design of the Project, as described in Section 3.

**Table 1. Certificate Completion Checklist**

| State Authority | Description | Section |
|---|---|---|
| **NDCC 49-22-08** | **Application for a certificate** | |
| 1. | An application for a certificate shall be in such form as the commission may prescribe, containing the following information: | |
| a. | A description of the size and type of facility. | 1.2, 4.1 |
| b. | A summary of any studies which have been made of the environmental impact of the facility. | Appendix A |
| c. | A statement explaining the need for the facility. | 2.0 |
| d. | An identification of the location of the preferred site for any energy conversion facility. | 1.2 |
| e. | An identification of the location of the preferred corridor for any transmission facility. | NA |
| f. | A description of the merits and detriments of any location identified and a comprehensive analysis with supporting data showing the reason why the preferred location is best suited for the facility. | 3.0 |
| g. | A description of mitigative measures that will be taken to minimize all foreseen adverse impacts resulting from the location, construction, and operation of the proposed facility. | 1.5, 5.1.3, 5.2.3, 5.3.3, 5.4.3, 5.5.3, 5.6.3, 5.7.3, 5.8.3, 5.9.3, 5.10.3, 5.11.3, 5.12.3, 5.13.3 |
| h. | An evaluation of the proposed site or corridor with regard to the applicable considerations set out in section 49-22-09 and the criteria established pursuant to section 49-22-05.1 | 3.2, 7.0 |
| i | Such other information as the applicant may consider relevant or the commission may require. | |
| **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. | 7.1 |
| 2. | The effects of new energy conversion and transmission technologies and systems designed to minimize adverse environmental effects. | 7.2 |
| 3. | The potential for beneficial uses of waste energy from a proposed energy conversion facility. | 7.3 |
| 4. | Adverse direct and indirect environmental effects which cannot be avoided should the proposed site or route be designated. | 7.4 |
| 5. | Alternatives to the proposed site, corridor or route which are developed during the hearing process and which minimize adverse effects. | 7.5 |
| 6. | Irreversible and irretrievable commitments of natural resources should the proposed site, corridor, or route be designated. | 7.6 |
| 7. | The direct and indirect economic impacts of the proposed facility. | 7.7 |
| 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. | 7.8 |
| 9. | The effect of the proposed site or route on existing scenic areas, historic sites and structures, and paleontological or archaeological sites. | 7.9 |

| State Authority | Description | Section |
|---|---|---|
| 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. | 7.10 |
| 11. | Problems raised by federal agencies, other state agencies, and local entities. | 7.11 |
| 49-22-05.1 | Energy conversion facility siting criteria | 3.2 |

## 1.2 Project Summary

### *1.2.1 Proposed Project Area*

The Project is located in northwestern Mercer County, North Dakota, northwest of the town of Beulah, and north of the towns of Zap and Golden Valley (see Figure 1). The Project Area will encompass approximately 36,600 acres of private land and five state trust parcels totaling 200 acres; the locations of these parcels are shown on Figure 2. Table 2 lists the township, range and section locations in which the Project will be located; these are shown and labeled on Figure 2, which also identifies participating landowners. Approximately 22,000 acres are under easement and participating in the Project representing one hundred percent of the land that is needed to support the Project.

**Table 2. Project Area Location**

| Township | Range | Section(s) |
|---|---|---|
| 145N | 88W | 4-9, 16-18 |
| 145N | 89W | 1-14 |
| 145N | 90W | 1,2,11,12 |
| 146N | 88W | 31-33 |
| 146N | 89W | 19, 20, 25-36, W ½ 21 |
| 146N | 90W | 14, 21-28, 33-36 |

### *1.2.2 Proposed Turbine Types*

Depending on the turbine model selected, the Project would install up to 86 turbines to meet the full generation capacity of 172 MW. The three models that are currently being considered include the Siemens 2.3-108, Vestas V-100, and the Vestas V-110. The exact turbine model that will be utilized for the Project will be decided at later time. These three turbine models are described in Table 3.

Figure 5A reflects the layout for the Siemens 2.3-108 turbine that is being considered for the Project. The Siemens 2.3-108 layout in the figure reflects a total of 92 potential locations, of which 75 represent primary turbine locations with 17 alternative locations.

Figure 5B reflects the layout for the Vestas V-100 turbine that is being considered for the Project. The Vestas V-100 layout in the figure reflects a total of 105 potential locations, of which 86 represent primary turbine locations with 19 alternative locations.

Figure 5C reflects the layout for the Vestas V-110 turbine that is being considered for the Project. The Vestas V-110 layout in the figure reflects a total of 92 potential locations, of which 86 represent primary turbine locations with 6 alternative locations.

**Table 3. Specifications for Potential Project Turbines**

| Specification | Turbine Option #1 | Turbine Option #2 | Turbine Option #3 |
|---|---|---|---|
| Manufacturer and Model | Siemens 2.3-108 | Vestas V-100 | Vestas V-110 |
| Rated Output | 2.3 MW | 2.0 MW | 2.0 MW |
| Tower Height | 80 meters (262 feet) | 80 meters (262 feet) | 80 meters (262 feet) |
| Rotor Diameter | 108 meters (354 feet) | 100 meters (328 feet) | 110 meters (361 feet) |
| Total Height | 134 meters (439 feet) | 130 meters (427 feet) | 135 meters (442 feet) |
| Clearance, Ground to Rotor | 26 meters (85 feet) | 30 meters (98 feet) | 25 meters (82 feet) |
| Rotor Swept Area | 9,144 meters$^2$ (98,425 feet$^2$) | 7,854 meters$^2$ (84,540 feet$^2$) | 9,503 meters$^2$ (102,289 feet$^2$) |
| Minimum (cut-in) Wind Speed [1/] | 3-4 m/s | 3 m/s (6.7 mph) | 3 m/s (6.7 mph) |
| Maximum (cut-out) Wind Speed [1/] | 25 m/s | 20 m/s (44 mph) | 20 m/s (44 mph) |
| Total Number of Turbines (maximum) | 75 | 86 | 86 |

## 1.3 Project Schedule

Antelope is targeting the start of construction for early 2015, provided all pre-construction permits and approvals have been obtained. The target date for operation is the end of 2015, depending on permitting, equipment deliveries, and other development activities. The Project schedule includes the following components:

a. Certificate: Antelope is hopeful that the Certificate will be approved by October of 2014.

b. Permits: Antelope will obtain all permits and licenses that are required following issuance of the Certificate. (See Section 6.0 for the list of anticipated permits.)
c. Equipment Procurement, Manufacture, and Delivery: Antelope will order the wind turbine components and other items with long lead times as soon as practical following issuance of the Certificate.
d. Construction: Construction will begin as early in 2015 as weather conditions allow.
e. Commissioning of Turbines: Testing of turbine operation will take place on a rolling basis as turbines are erected, and is anticipated to begin in mid-2015.
f. Commercial Operation: Antelope anticipates commercial operation to begin in December 2015.

## 1.4 Potential Project Impacts

The Project will create both direct and indirect impacts. Direct impacts are those caused by the Project that would occur at the same time and place as the Project. Examples of direct impacts would include the physical loss of habitat to new access roads and potential direct mortality to birds from collision with turbine blades. Indirect impacts are those caused by the Project but that would occur later in time or farther removed in distance, but are still reasonably foreseeable. Examples of indirect impacts include effects to predator species resulting from the direct loss of habitat for prey species, or impacts to bird species from the energy used to avoid the wind turbines.

Impacts may also be permanent or temporary. Permanent impacts are those which will last for the life of the Project, such as habitat loss resulting from the establishment of permanent access roads, turbine foundations, the substation and the O&M building. Temporary impacts are those which will last only for the period of construction and then would either cease or be restored. Examples include temporary increases in traffic or housing demand during construction, or temporary impacts to habitat at construction laydown areas. Table 4 summarizes the estimated permanent and temporary impact for each potential turbine type based on Project components.

All potential impacts presented are “worst-case” estimates, and actual impacts are anticipated to be smaller than presented. Access road impacts assume that all access roads will be new construction, and does not include the use of existing farm roads.

**Table 4. Estimated Project Ground Disturbing Impacts**

| Project Component | Assumptions | Layout A - Siemens 2.3-108 | | | Layout B - Vestas V-100 | | | Layout C – Vestas V110 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Impact Multiplier | Permanent Impact (acres) | Temporary Impact (acres) | Impact Multiplier | Permanent Impact (acres) | Temporary Impact (acres) | Impact Multiplier | Permanent Impact (acres) | Temporary Impact (acres) |
| Turbine foundations | Permanent: Up to 65-foot diameter turbine pad; Temporary: Up to 200-foot radius around towers for construction work area. | 75 turbines | 5.7 | 216.2 | 86 turbines | 6.5 | 248.0 | 86 turbines | 6.5 | 248.0 |
| Access roads | Permanent: 16-foot finished width; Temporary: 36-foot initial construction width | 20.8 Miles | 40.3 | 90.8 | 22.25 Miles | 43.1 | 97.1 | 24.47 Miles | 47.5 | 106.8 |
| Substations | Permanent: Area within substation fenceline; Temporary: None | 5 Acres | 5 | 0 | 5 Acres | 5 | 0 | 5 Acres | 5 | 0 |
| O&M facility | Permanent: Area within building and yard fenceline; Temporary: None | 5 Acres | 5 | 0 | 5 Acres | 5 | 0 | 5 Acres | 5 | 0 |
| Construction laydown area | Permanent: None; Temporary: Area within temporary fenceline | 15 Acres | 0 | 15 | 15 Acres | 0 | 15 | 15 Acres | 0 | 15 |

| Project Component | Assumptions | Layout A - Siemens 2.3-108 | | | Layout B - Vestas V-100 | | | Layout C – Vestas V110 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Impact Multiplier | Permanent Impact (acres) | Temporary Impact (acres) | Impact Multiplier | Permanent Impact (acres) | Temporary Impact (acres) | Impact Multiplier | Permanent Impact (acres) | Temporary Impact (acres) |
| Collection Lines [1/] | Permanent: None; Temporary: 8 feet wide along each collection line | 45.11 Miles | 0 | 43.7 | 45.43 Miles | 0 | 44.0 | 46.85 Miles | 0 | 45.4 |
| **Totals (acres)** [2/] | - | **-** | **56.0** | **365.7** | **-** | **59.6** | **404.1** | **-** | **64.0** | **415.2** |

1/ Collection lines will be co-located with access roads and county roads where possible. Estimates listed in table are worst case scenarios.
2/ Total impact areas may overestimate actual impacts, because overlapping impact areas from different project components are not discounted from the totals. These totals therefore reflect extremely conservative, worst-case scenarios.

## 1.5 Public and Agency Coordination

Antelope has been in contact with the public, landowners, and agencies throughout the planning stages of the Project. Under North Dakota's Energy Facility Siting regulations, prior notice to agencies and surrounding landowners is no longer required as of September, 2013. However, Antelope has been working with potentially impacted landowners and has contacted some agencies in preparation for this application. Pre-application public and agency coordination efforts are described below.

### *1.5.1 Public Outreach*

Antelope held a public informational meeting in Golden Valley, North Dakota on Monday, May 12, 2014. All landowners within the project boundary and within a mile of the boundary were invited to the meeting. An invitation to the meeting was also advertised in the local newspaper (Beulah Beacon).

### *1.5.2 Contacts with Affected Landowners.*

Antelope has been working with the participating landowners within the Project Area since 2010. Initial easements were signed at that time to allow the preliminary wind evaluation and other due diligence. Over time, additional landowners have joined and are participating in the Project. Antelope has kept in close communication with landowners through Project updates, landowner meetings, and mailings to keep them aware of the progress of the Project.

### *1.5.3 Contacts with Local Government and Public Officials.*

Below is a description of agencies contacted as part of the planning process; Correspondence with agencies is presented in Appendix B.

- Antelope has provided information to the Mercer County Emergency Management Services Department and the Mercer County Sheriff's Department, along with the North Dakota Aeronautics Commission.
- Antelope gave an introductory presentation to the Mercer County Commissioners at an open hearing on September 11, 2013 to provide information about the Project.
- Antelope has in held preliminary discussions with the USFWS and NDGFD about the location of the Project. Both agencies were contacted in 2011 with regard to early evaluation of potential biological constraints. Both agencies provided input into resources and sensitive biological constraints that needed to be evaluated further in the development of the Project. That feedback along with other resources aided in the development of the survey protocol that has been implemented within the Project area. Specifically, Antelope is in the process of completing Tier 3 surveys pursuant to the USFWS Wind Energy Guidelines.

# 2.0 NEED FOR THE FACILITY

## 2.1 Need Analysis

Due partly to high heating demand in winter, North Dakota's per capita energy consumption is among the highest in the nation. Nearly 30 percent of North Dakota households use electricity as their primary energy source for home heating.

A regional need exists for renewable energy produced in North Dakota. Eleven of the 17 Midwestern Independent System Operator (MISO) states currently have renewable portfolio standards. According to the MISO Transmission Expansion Plan for 2012, the MISO region needs to add between 4,484 and 11,290 MW of new capacity or 3,865 and 9,733 MW of demand reduction to meet the minimum Planning Reserve Margins in 2022. 9,912 MW of retirements are assumed to occur from 2015 onward due to EPA regulations. Depending on the projection scenario, MISO assumes anywhere from 13 to 60 gigawatts (GW) of incremental wind penetration. Seventeen multi-value transmission projects have been integrated into the MISO planning models, which will relieve a major part of MISO's internal future congestion and deliver wind energy more efficiently.

Within North Dakota, the expansion of oil and gas operations within the Bakken Formation is anticipated to significantly increase future load growth. In 2012, the North Dakota Transmission Authority commissioned a study to forecast future load growth demands due to the increased development in the Bakken Formation over a 20 year period. Based on modeled load growth projections, North Dakota alone is expected to need an additional 1,830 MW by 2017, 2,400 MW by 2022, 2,769 MW by 2027, and 3,030 MW by 2032 (KLJ 2012).

In 2013, Basin Electric Power Cooperative (Basin) issued an RFP for short- and long-term baseload of 25 MW of capacity or higher for intermediate and peaking capacity starting in 2016. Basin Electric determined that capacity and energy is needed in the Intergraded System (IS) area located in Western's east-side Balancing Authority Area (WAUE), which covers a large geographic area including North Dakota. Antelope submitted a proposal to supply power from the Project, which was selected by Basin. Antelope now has a fully executed power purchase agreement with Basin for the power produced by the Project.

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

## 2.2 Alternatives

Feasible technology alternatives to wind include electricity generation using coal, natural gas, or biomass. None of these alternatives were considered because these technologies do not meet the state's goal of adding new renewable energy.

## 2.3 Ten-Year Plan

In accordance with NDCC 49-22-04, Antelope filed its first Ten-Year Plan with the PSC and with the Auditor for Mercer County in October 2013. The second update to the Ten-Year Plan was filed in August 2014.

# 3.0 SITE SELECTION CRITERIA

NDAC 69-06-08 established criteria for siting energy facilities, including exclusion areas, avoidance areas, selection criteria, and policy criteria. Antelope's compliance with these criteria is discussed in the following sections.

## 3.1 Introduction

As a preliminary matter, a viable wind power project must have the following characteristics:

### *3.1.1 Wind resources.*

A viable wind power project must be based on a reliable wind regime, capable of producing the required amount of electric power. Antelope utilized wind data from 5 onsite meteorological towers to determine the wind characteristics of the Project Area. The first 2 towers were installed in July of 2010, two more were installed in September 2013 and the last was installed in December of 2013.

### *3.1.2 Landowner Agreements*

A viable wind power project must have a sufficient number of landowners who are willing to participate through lease agreements. Antelope has entered into agreements with landowners within the Project Area in order to secure rights to access their property for surveys, testing, construction, operation, and maintenance of the Project. Landowner agreements, appropriate easement agreements, and waivers are now secured for the Project.

### *3.1.3 Environmental Conditions*

A viable wind power project must be based on environmental conditions which allow the Project to meet environmental standards at an economically-supportable cost. Antelope has chosen a Project site with favorable environmental conditions as discussed in Section 5.

### *3.1.4 Interconnection Infrastructure.*

A viable wind power project requires interconnection infrastructure sufficiently close to the project location to keep the cost of additional transmission reasonable. In the case of the Project, a point of interconnection to Basin's transmission infrastructure is located at the Antelope Valley Substation, located approximately 2 miles east of the Project Area boundary and 7.3 miles from the proposed Project substation.

### *3.1.5 Power Purchase Agreement*

A viable wind power project must secure a purchase agreement for the power produced. Antelope and Basin Electric entered into a 25-year power purchase agreement for the full output of the Project on November 6, 2013.

## 3.2 PSC Siting Criteria

### *3.2.1 Exclusion Areas*

In accordance with NDAC 69-06-08-01, the geographical areas listed in Table 5 have been excluded in the consideration of a site for the Project. Most categories of exclusion areas are not present in the Project Area. Exclusion and avoidance areas are shown for the Project Area on Figures 6A, 6B and 6C for the Siemens 2.3-108, Vestas V100 and Vestas V110 turbine layout, respectively.

**Table 5. Exclusion Areas**

| NDAC 69-06-08-01 | Exclusion Area | Present within Project Area? | Description | Section Addressed |
|---|---|---|---|---|
| 1a. | Designated or registered national areas: parks; memorial parks; historic sites and landmarks; natural landmarks; historic districts; monuments; wilderness areas; wildlife areas; wild, scenic, or recreational rivers; wildlife refuges; and grasslands. | No | NA | 5.12 |
| 1b. | Designated or registered state areas: parks; forests; forest management lands; historic sites; monuments; historical markers; archaeological sites; grasslands; wild, scenic, or recreational rivers; game refuges; game management areas; management areas; and nature preserves. | Potentially Present | Of these exclusion areas, only previously unknown archaeological sites are potentially present. No NRHP-listed or eligible sites are known to exist in the Project Area. Any historic, culturalor archeaological sites that are discovered during Class III Pedestrian surveys or during construction will be avoided as necessary. | 5.6, 5.11, 5.12. |

| NDAC 69-06-08-01 | Exclusion Area | Present within Project Area? | Description | Section Addressed |
|---|---|---|---|---|
| 1c. | County parks and recreational areas; municipal parks; parks owned or administered by other governmental subdivisions; hardwood draws; and enrolled woodlands. | No | NA | 5.12 |
| 1d. | Prime farmland and unique farmland, as defined by the land inventory and monitoring division of the soil conservation service, United States department of agriculture, in 7 C.F.R. part 657; provided, however, that if the Commission finds that the prime farmland and unique farmland that will be removed from use for the life of the facility is of such small acreage as to be of negligible impact on agricultural productions, such exclusion shall not apply. | Yes | Prime farmland is present, and makes up approximately 6.8% of the Project Area. Prime farmland will be avoided during final design, to the extent practical. Unavoidable impacts to Prime Farmland soils would have a negligible impact to agricultural operations. | 5.1, Table 12, Figure 9. |
| 1e. | Irrigated land. | No | NA | 5.6 |
| 1f. | Areas critical to threatened or endangered animal or plant species. | No | NA | 5.4, 5.5. |
| 1g. | Areas where animal or plant species that are unique or rare to this state would be irreversibly damaged. | No | NA | 5.3, 5.4, 5.5. |
| 1h. | Areas within 1,200 feet of the geographic center of an intercontinental ballistic missile (ICBM) launch or launch control facility. | No | NA | 5.6 |
| 2a. | Areas less than: | | | |
| (1) | One and one-tenth times the height of the turbine from interstate or state roadway right of way | Yes | Required setbacks to public roads have been incorporated into the proposed layouts. | 5.6, Figure 6 |
| (2) | One and one-tenth times the height of the turbine plus seventy-five feet from the centerline of any county or maintained township roadway | Yes | Required setbacks to public roads have been incorporated into the proposed layouts. Where both state and county setbacks apply, the more restrictive setback was used. | 5.6, Figure 6 |
| (3) | One and one-tenth times the height of the turbine from any railroad right of way | No | NA | 5.6, Figure 6 |

| NDAC 69-06-08-01 | Exclusion Area | Present within Project Area? | Description | Section Addressed |
|---|---|---|---|---|
| (4) | One and one-tenth times the height of the turbine from a one hundred fifteen kilovolt or higher transmission line | Yes | Required setbacks to transmission lines have been incorporated into the proposed layouts. Where both state and county setbacks apply, the more restrictive setback was used. | 5.6, Figure 6 |
| (5) | One and one-tenth times the height of the turbine from the property line of a nonparticipating landowner, unless a variance is granted. A variance may be granted if an authorized representative or agent of the permittee and affected parties with associated wind rights file a written agreement expressing all parties' support for a variance to reduce the setback requirement in this subsection. A nonparticipating landowner is a landowner that has not signed a wind option or an easement agreement with the permittee of the wind energy conversion facility as defined in North Dakota Century Code chapter 17-04. | | Required setbacks to nonparticipating lands have been incorporated into the proposed layouts, unless the affected nonparticipating landowner has agreed to a reduced setback. | 5.6, Figure 6 |

### *3.2.2 Avoidance Areas*

In accordance with NDAC 69-06-08-01, the geographical areas listed in Table 6 have been avoided unless, under the circumstances, there is no reasonable alternative. As with exclusion areas, most categories of avoidance area are not present in the Project Area. Exclusion and avoidance areas are shown for the Project Area on Figures 6A, 6B and 6C for the Siemens 2.3-108, Vestas V100 and Vestas V110 turbine layout, respectively.

**Table 6. Avoidance Areas**

| NDAC 69-06-08-01 | Avoidance Areas | Present within Project Area? | Description and Proposed Buffer | Section Addressed |
|---|---|---|---|---|
| 3a. | Historical resources which are not designated as exclusion areas. | Present | A Class III cultural resources inventory is in the process of being completed for the Project. Sites with potential cultural resources will be avoided. | 5.11 |
| 3b. | Areas within the city limits of a city or the boundaries of a military installation. | No | NA | 5.6, Figure 1 |
| 3c. | Areas within known floodplains as defined by the geographical boundaries of the 100-year flood. | No | NA. | 5.2 |
| 3d. | Areas that are geologically unstable. | No | NA | 5.1 |
| 3e. | Wetlands | Yes | Permanent impacts to wetlands will be avoided. | 5.3, Table 13, Figure 10 |
| 3e | Woodlands | No | The Project Area will not impact deciduous trees. | 5.4, Table 14, Figure 8 |
| 3f. | Areas of recreational significance which are not designated as exclusion areas | No | NA | 5.12 |
| 4 | A wind energy conversion facility site must not include a geographic area where, due to operation of the facility, the sound levels within one hundred feet of an inhabited residence or a community building will exceed fifty dBA. The sound level avoidance area criteria may be waived in writing by the owner of the occupied residence or the community building. | No | Turbines have been sited such that noise levels within 100 feet of an occupied residence would not exceed 50 dBA. | 5.10, Figure 13 |

### *3.2.3 Selection Criteria*

NDAC 69-06-08-01.5 establishes selection criteria based on avoidance of significant adverse effects to specific resources resulting from the location, construction, and operation of the facility in that area. Table 7 describes the potential adverse effects to these resources.

**Table 7. Selection Criteria**

| NDAC 69-06-08-01 | Selection Criteria | Potential Adverse Effects | Section Addressed |
|---|---|---|---|
| 5a. | The impact upon agriculture: | | |
| (1) | Agricultural production | Between 56 and 64 acres of land will be permanently impacted and between 366 and 415 acres of land will be temporarily impacted, depending on the turbine type selected. These impacts represent a small percentage of the land area within the 36,600-acre Project Area, most of which will continue to be available for agricultural production. These impacts are adverse but minimal. | 5.1, 5.6 |
| (2) | Family farms and ranches | Although some farmland will be permanently converted to wind turbine foundations and pads, access roads, and a substation, wind lease payments to farmers will provide a compensatory source of income and no adverse impacts to family farms and ranches will result.<br>The Project will comply with setbacks for non-participating landowners. | 3.1, 5.1, 5.6. |
| (3) | 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 agricultural irrigation is currently present within the Project Area. No adverse effects are expected. | 5.2 |
| (4) | Surface drainage patterns and ground water flow patterns | No adverse effects are expected. A SWPPP and NDPES permit will be adhered to in order to avoid impacts to surface drainages and ground water flow patterns. | 5.2, 5.3, Figure 10 |
| (5) | The agricultural quality of the cropland | No impacts to the agricultural quality of cropland are anticipated other than for the area directly converted to wind energy facility use. Antelope will work with the landowners to alleviate the compaction of any soils which occurs during construction. | 5.1, 5.6 |
| 5b. | The impact upon the availability and adequacy of: | | |
| (1) | Law enforcement | No adverse impacts are expected | 5.13 |
| (2) | School systems and education programs | No adverse impacts are expected | 5.13 |
| (3) | Governmental services and facilities | No adverse impacts are expected | 5.13 |
| (4) | General and mental health care facilities | No adverse impacts are expected | 5.13 |
| (5) | Recreational programs and facilities | No adverse impacts are expected | 5,6, 5.12 |

| NDAC 69-06-08-01 | Selection Criteria | Potential Adverse Effects | Section Addressed |
|---|---|---|---|
| (6) | Transportation facilities and networks | During construction, a small increase in vehicle trips per day is anticipated for the duration of the Project construction. No impacts to existing levels of service are anticipated. During facility operation, no adverse impacts are anticipated. | 5.7, 5.8 |
| (7) | Retail service facilities | Local services such as motels, restaurants, and convenience stores are likely to experience an increase in business during Project construction. During facility operation, no discernable impacts are anticipated. | 5.13 |
| (8) | Utility services | No adverse impacts are anticipated. Antelope will coordinate with McKenzie Electric Cooperative and other affected utility providers for the installation of service lines to the O&M facility and substation, and for the construction of Project components near existing utility lines such that there would be no disruption to service. | 5.8 |
| 5c. | The impact upon: | | |
| (1) | Local institutions | No impacts are anticipated. | 5.13 |
| (2) | Noise sensitive land uses | The only noise sensitive land uses within the Project Area are residences. Based on the acoustic analysis presented in Section 5.10 Project-related noise levels will not violate any local, state or federal threshold levels. | 5.10, Table 23, Figure 13 |
| (3) | Rural residences and businesses | The Project will comply with local setbacks. No significant adverse impacts are anticipated. | 3.3, 5.6, 5.13. |
| (4) | Aquifers | No adverse effects are expected. | 5.1, 5.2 |
| (5) | Human health and safety | No impacts to human health and safety are anticipated. | 5.8 |
| (6) | Animal health and safety | No impacts to livestock are anticipated from construction or operation of the facility. Antelope will implement measures to avoid and minimize impacts to wildlife by siting facilities away from active raptor nests and wetlands to the extent practicable. | 5.5, 5.10. |
| (7) | Plant life | The Project will result in between 56 and 64 acres of permanent ground disturbance, depending on the turbine selected, including loss of the existing plant populations. As discussed above, this impact would be minimal in the context of the entire Project Area. | 5.4, 5.6, Figure 8 |
| (8) | Temporary and permanent housing | No adverse impacts to housing are anticipated. | 5.13 |
| (9) | Temporary and permanent skilled and unskilled labor | No adverse impacts are anticipated. Project impacts to skilled and unskilled labor are expected to be positive. | 4.2, 5.13 |

| NDAC 69-06-08-01 | Selection Criteria | Potential Adverse Effects | Section Addressed |
|---|---|---|---|
| 5d. | The cumulative effect of the location of the facility in relation to existing and planned facilities and other industrial development | The Project is not anticipated to contribute to cumulative effects in relation to existing and planned facilities or other industrial development. | 8.0. |

### *3.2.4 Policy Criteria*

In accordance with NDAC 69-06-08-01-6, the PSC may give preference to an applicant that will maximize benefits that result from the adoption of the policies and practices listed. Table 8 lists those policy criteria and its applicability to the Project.

**Table 8. Policy Criteria**

| NDAC 69-06-08-01 | Policy Criteria | Applicability and Applicant Response | Section Addressed |
|---|---|---|---|
| 6a. | Recycling of the conversion byproducts and effluents. | Not applicable. The Project will not create byproducts or effluent. | NA |
| 6b. | Energy conservation through location, process, and design. | Antelope is developing the site to maximize energy output and will develop a site layout that optimizes wind resources while minimizing the impact on land resources and any potentially sensitive areas. | 3.1, 4.0 |
| 6c. | Training and utilization of available labor in this state for the general and specialized skills required. | Antelope's EPC contractor will use local labor to the extent practicable. | 4.2, 5.13 |
| 6d. | Use of a primary energy source or raw material located within the state. | The energy generated at the site will utilize the wind resources of the State of North Dakota. | 2.1 |
| 6e. | Non-relocation of residents. | No residents will be relocated as a result of the Project. | 5.6, 5.13 |
| 6f. | The dedication of an area adjacent to the facility to land uses such as recreation, agriculture, or wildlife management. | The Project will not interfere with adjacent land uses. As such, it is not anticipated that areas adjacent will be dedicated to recreation, agriculture, or wildlife management issues. | 5.6, 5.12 |
| 6g. | Economies of construction and operation. | Antelope will utilize local contractors to the extent practicable. | 4.2, 5.13 |
| 6h. | Secondary uses of appropriate associated facilities for recreation and enhancement of wildlife. | None. | NA |
| 6i. | Use of citizen coordinating committees. | Antelope will continue to work with landowners of properties for the Project. | 1.6, 5.6 |
| 6j. | A commitment of a portion of the energy produced for use in this | Energy produced will be delivered into the Basin Electric switchyard at the Antelope | 1.2, 2.0, 4.0 |

| NDAC 69-06-08-01 | Policy Criteria | Applicability and Applicant Response | Section Addressed |
|---|---|---|---|
| | state. | Valley Station, from which it will be transmitted to customers of Basin Electric. Basin Electric's service area includes North Dakota, and a portion of the energy produced will be used in-state. | |
| 6k. | Labor relations. | No labor relations will be affected. | 4.2, 5.13 |
| 6l. | The coordination of facilities. | Existing facilities and facility corridors were considered in the location of the wind farm and associated facilities. | 4.0 |
| 6m. | Monitoring of impacts. | Antelope and the EPC contractor will employ environmental monitors onsite as needed during construction to ensure there will be no impacts to wetlands and documented archeological sites that require avoidance, and that necessary BMPs are implemented. Post-construction monitoring will be conducted as per USFWS WEGs. | 5.2, 5.3, 5.4, 5.5, 5.8 |

## 3.3 County Criteria

In addition to the North Dakota siting criteria discussed above, Antelope will comply with the setbacks for wind turbines and non-agricultural uses established by Mercer County (Table 9). These setbacks are the same or smaller than state setbacks.

**Table 9. Mercer County Zoning Ordinance Setback Distances for Wind Turbines from Agricultural Land Uses**

| Ordinance Section | Setback Type | Setback Distance |
|---|---|---|
| Chapter 3, Section I, Conditional Uses O.4 | Occupied dwellings, commercial buildings or publicly-used structures or facilities | 1,000 feet |
| Chapter 3, Section I, Conditional Uses O.4 | Edge of right-of-way of public roads and above-ground communication and electrical lines | 110 percent of total turbine height |
| Chapter 3, Section I, Conditional Uses O.4 | Perimeter of the facility[1/] | 110 percent of total turbine height |
| Chapter 3, Section I, Conditional Uses O.4 | Property lines, unless wind easement obtained from adjoining landowner | 110 percent of total turbine height |

1/ A Variance may be granted if an authorized representative or agent of the permittee and those affected parties of adjoining properties with associated wind rights, sign a formal and binding agreement expressing all parties' support for a variance that might reduce the setback requirement.

# 4.0 DESCRIPTION OF THE PROPOSED FACILITY

## 4.1 Project Layout and Associated Facilities

The Project will consist of up to 86 wind turbine generators, supported by required access roads, power collection lines, a Project substation, and an O&M building.

The Project will also require the construction of an approximately 9.5 mile transmission line, to convey power generated by the turbines to the interconnection point at the Basin Electric's Antelope Valley Station (AVS). The transmission line and interconnection switchyard are addressed under a separate application to the PSC for a Certificate of Corridor Compatibility and Route Permit; and are consequently not addressed further in this application.

### *4.1.1 Turbines*

Electricity will be generated by a network of wind turbine generators. Turbines will be arranged in lines or "strings" generally oriented southwest to northeast with variations from this overall pattern being mainly attributable to topography, land control, and/or avoidance of sensitive areas. The final layout of the turbines will be determined based on the turbine model chosen. After construction, turbines will be accessible via all-weather, aggregate-surfaced roads which will connect to public roads.

Antelope is currently considering three turbine models for the Project, and plans to select the most appropriate turbine technology for the Project during final design. The Project will include between 75 and 86 turbines, depending on the turbine model chosen. Turbine towers will consist of three to four tubular steel sections, with a hub height of 80 meters. Access to the turbine is through a lockable steel door at the base of the tower. The rotor assembly will have three blades mounted to a rotor hub. The hub is attached to the nacelle, which houses the gearbox, generator, brake, cooling system and other electrical and mechanical systems.

Each turbine will be equipped with a lightning protection system. The lightning protection system will be installed during foundation work, and will be designed for local soil conditions. The resistance to neutral earth will be in accordance with local utility or code requirements.

### *4.1.2 Access Roads*

Access roads will be built to each turbine and the met tower and will be used during both construction and operation. Access roads will initially be constructed at 36 feet wide and will have an aggregate surface adequate to support the size and weight of construction and maintenance vehicles. Following construction, the permanent roads will be narrowed to 16 feet wide and the wider area restored. Between 21 and 25 miles of access roads will be needed, depending on the turbine selected. Access roads will be on private land and will not be open to public use.

Large construction cranes may spend as little as one day at each turbine site before moving on to the next. Cranes are sometimes moved cross-country rather than by using the developed access roads, especially where these roads are crossed by overhead utility lines. This type of cross-country walking enables the crane to be moved without complete de-rigging and disassembly, which is time-consuming and costly. Where cranes would travel cross-country, workers would lay down some form of cribbing, bedding or mats to support the weight of the crane without impacting the ground below. The cribbing or mats would be removed immediately following passage of the crane, to be re-used elsewhere.

### *4.1.3 Electrical Collection Systems*

A step-up transformer will be used at each turbine to raise the voltage to the power collection line voltage of 34.5 kV. The power from these transformers will be run through an underground collection system consisting of direct-buried cables, generally located alongside and within the disturbance footprint of the Project access roads (Figures 5A, 5B and 5C).

The collection line cables will be laid in trenches approximately two feet wide and four feet deep; the cables will be buried a minimum of 42 inches deep. All trenches will be filled with compacted material and associated temporary impacts will be restored following burial of the electrical cables. Antelope does not anticipate the need to use any overhead collection lines. Should collection lines cross wetlands or other sensitive features, horizontal directional drilling (HDD) will be used to avoid impacts if rerouting is not possible.

### *4.1.4 Control System*

The Project will have Supervisory Control and Data Acquisition (SCADA) communication technology to allow control and monitoring of the wind farm. The SCADA communications system permits automatic, independent operation and remote supervision of the wind turbines and system provides detailed operating and performance information and history. The SCADA system will be located at the O&M building.

Each turbine will be equipped with a wind speed and direction sensor that communicates with the turbine's control system; this allows for both startup when wind is sufficient and for automatic shutdown when winds exceed operational speeds. Turbines will have variable-speed control and independent blade pitch to assure aerodynamic efficiency. The turbines will also have a yaw control, to turn the nacelle and blade to face into the prevailing wind.

### *4.1.5 Meteorological Tower*

The Project will have up to two permanent met towers, each will be approximately 80 meters (262 feet) high when installed. The towers will be un-guyed and secured to a concrete foundation. The tower locations will be selected during final design using the results of resource surveys so as to minimize impact to sensitive resources.

### *4.1.6 Project Substation*

At the Project substation, power from the turbines will be aggregated and stepped up from 34.5 kV to transmission line voltage of 345 kV. The substation will be approximately 5 acres in size.

Power from the Project substation would be conveyed via a new transmission line to a point of interconnection within the existing AVS switchyard. The transmission line and interconnection switchyard are addressed under a separate PSC application and are therefore not addressed further in this application.

### *4.1.7 Operations and Maintenance Building*

The Project will include an O&M facility, which will consist of an approximately 5,000 square foot metal building with a fenced gravel parking area. The size of the entire facility will be approximately five acres. The final location will be selected prior to construction using the results of resource surveys so as to minimize impact to sensitive resources.

### *4.1.8 Construction Laydown Area*

Construction of the Project will require the establishment of one construction laydown area, which will be used for the temporary storage of construction materials and equipment, concrete batch plant (if needed) and the construction office. The laydown area will cover approximately 15 acres. The final location will be selected prior to construction using the results of resource surveys so as to minimize impacts to sensitive resources.

## 4.2 Construction

The general sequence of pre-construction, construction, and post-construction activities for the Project is as follows:

- Grant of Certificate;
- Ordering of Project components with long lead times including towers, nacelles, blades, and transformers;
- Final biological and archaeological surveys;
- Soil borings, testing and analysis for proper foundation design and materials;
- Final siting of turbines, access roads and other Project facilities;
- Construction of access roads;
- Construction of underground power collection and communication lines;
- Design and construction of the Project substation;
- Installation of tower foundations;
- Tower placement and wind turbine setting;
- Acceptance testing of facility; and
- Commencement of commercial production.

### *4.2.1 Construction Management*

Antelope will hire an engineering, procurement, and construction (EPC) contractor which will have primary responsibility for construction management. The EPC contractor will use the services of local subcontractors where possible and appropriate and will undertake the following activities:

- Securing building, electrical, grading, road, and utility permits;
- Performing detailed civil, structural and electrical engineering;
- Scheduling execution of construction activities;
- Completing surveying and geotechnical investigations;
- Forecasting Project labor requirements and budgeting;
- Coordinating and managing the work of all Project subcontractors;
- Providing direct supervision for the installation of all Project components including roads, foundations, towers and turbines, communication and power collection lines, the O&M facility, Project substation and all related equipment.

Construction activities under the supervision of the EPC will consist of the following general tasks:

- Site development, including roads;
- Foundation excavation;
- Concrete foundation installation;
- Electrical and communications equipment installation;
- Tower assembly and machine erection; and
- System testing.

Throughout the construction phase, ongoing coordination will occur between Antelope and the EPC. The EPC's on-site Project construction manager will help to coordinate ongoing communication with local officials, citizens groups and landowners. Antelope, the EPC construction manager and the O&M staff manager will work together to ensure a smooth transition from construction through wind farm commissioning and operation.

### *4.2.2 Commissioning*

The Project will be commissioned after completion of the construction phase and detailed inspection and testing. Inspection and testing will occur for each component of the wind facility.

## 4.3 Operation and Maintenance

Project operation and maintenance will consist of continuous remote monitoring through the SCADA system and regular on-site maintenance approximately every six months. On-site maintenance includes operational checks and tests and regular preventive maintenance.

## 4.4 Decommissioning and Restoration

The Project will have an anticipated life of 30 years, based primarily on the projected life of the turbines. At the end of that period or at Antelope's option, Project components may be upgraded and the Project continued in use or the Project may be decommissioned. Prior to commencement of decommissioning, Antelope will file a decommissioning plan with the North Dakota Public Utilities Commission which meets the requirements of NDAC 69-09-09-06.

In the event that the Project is decommissioned, all towers and turbine generators, transformers and overhead cables will be dismantled and removed. Underground cables will be removed to a depth of 24 inches below ground. Foundations, buildings and ancillary equipment will be removed to a depth of 36 inches below ground. Unless a landowner requests the retention of access roads or other disturbed areas, access road surface materials will be removed and all disturbed areas will be restored and reclaimed to approximate pre-Project contours. Areas disturbed by construction and decommissioning activities will be graded, topsoiled, and reseeded according to agency recommendations and landowner specifications.

In addition to Antelope's contractual obligations for infrastructure removal related to decommissioning, Antelope's easements require the creation of a restoration fund to provide financial assurance of decommissioning. At the 11th year of operation, Antelope is required to create a restoration fund through a federally chartered bank for each turbine associated with the Project and is also required to continue to make annual contributions through the life of the Project. The restoration fund is intended to secure Antelope's obligations under its easements related to the decommissioning and removal of the project components. If Antelope were to go bankrupt, the landowner would then have access to the restoration fund in order to pay for the removal costs associated with Project infrastructure.

# 5.0 ENVIRONMENTAL ANALYSIS

This section provides a description of the environmental conditions that exist within the Project Area, along with the potential Project impacts and mitigative measures.

## 5.1 Geology and Soils

### *5.1.1 Existing Conditions*

**Elevation and Topography**

Topography within the study area ranges from flat to rolling, with the steepest topography occurring to the southwest (Figure 4). The topography ranges from 2,100 to 2,300 feet above sea level (640 to 700 meters).

**Geology and Mineral Resources**

A mantle of glacial drift deposited during the Pleistocene period overlies Tertiary rocks in the analysis area. The drift in the upland areas consists of till composed of unsorted silt, clay, sand, and gravel. Till thicknesses rarely exceeds 100 feet. The drift in stream valleys consists of a mixture of outwash sand and gravel that is cut and overlain by younger Holocene age alluvial deposits. Rarely is the alluvium more than 50 feet thick. Much of it consists of dark-gray sandy silt and clay (Croft 1973).

The bedrock geology of the study area consists of Sentinel Butte Formation from the Tertiary System. The Sentinel Butte Formation consists of gray-brown bentonitic claystone, siltstone, sandstone, and lignite. The sandstone is thin bedded and is generally fine-grained and silty. This formation can be up to 510 feet thick (Croft 1973).

Economic coal deposits are found in the eastern end of the Project Area, as shown on Figure 7. These deposits meet the minimum criteria established by coal companies operating surface mines in North Dakota. These deposits have not been mined and do not represent active mining areas; however, they may represent future mining areas. A large area of economic coal deposits has been mined as close as 0.5 miles east of the study area; the Freedom Mine, operated by Coteau Properties, and is the largest lignite mine in the United States. This mine encompasses several square miles outside the Project Area. Portions of the southwestern Project Area are also owned by Coteau Properties.

Several active or previously mined areas were identified south of the study area. Ten gravel pits were identified within 3 miles of the study area, located primarily to the south (Figure 7).

The Project Area is located near the eastern edge of the Bakken Shale Oil Field. Records from the North Dakota Geologic Survey, Oil and Gas Division indicate that four wells have been drilled within the Project Area. Three of these were exploratory wells that did not produce any oil and gas, and the fourth is an operating oil and gas well.

Investigations of public maps and local geology did not identify any fossil collection sites in the immediate vicinity of the Project Area.

**Seismic Risk**

No recorded areas of seismic activity or subsidence were identified in the Project Area. According to the North Dakota Geographic Survey, North Dakota is located in an area of very low earthquake probability. There are no known active tectonic features in south-central North Dakota and the deep basement formations underlying North Dakota are expected to be geologically stable (Bluemle 1991). This information is supported by USGS seismic hazard maps, which show that the Project Area is located in an area with very low seismic risk (USGS 2008). Related geologic hazards, such as soil liquefaction, are therefore also unlikely.

**Soil Resources**

Project Area soils are primarily well-drained loams and silt loams derived from the underlying glacial deposits and, to a lesser extent, the underlying sandstones and siltstones. Hydric soils are also present within the Project Area; hydric soils are called out specifically because of their potential to be wetlands. Approximately 752 acres of hydric soils are mapped within the Project Area; this represents approximately 2 percent of the total land within the Project Area.

According to the Soil Survey of Mercer County (USDA 1978), erosion by wind or water may be a hazard on most of the soils in Mercer County, particularly on cropland soils. Wind erosion hazard is most severe for soils that have a high percentage of lime, clay, or fine sand in the surface layer, such as the Vebar and Zahl soils. Water erosion is also a hazard on most of the cropland soils in the county, particularly on those soils having long, smooth slopes greater than 3 percent. Water erosion hazard is also greatest when the surface is bare. The soil survey report notes that loss of organic matter through erosion is also of concern, and indicates that proper management of soils to maintain good tilth is especially needed on soils that have sodic subsoil and on the Lawther and Moreau soils that have a silty clay surface layer.

**Farmland**

Prime Farmland represents approximately 6.8 percent of the Project Area, and Farmland of Statewide Importance represents approximately 41.2 percent of the Project Area. Figures 9A, 9B and 9C show the Prime Farmland and Farmland of Statewide Importance soil classifications for the Siemens 2.3-108, Vestas V-100, and Vestas V-110 turbine layouts, respectively.

## *5.1.2 Potential Impacts*

The Project will result in direct, permanent impacts to soils through the establishment of turbine foundations, access roads, and the substation and the O&M facility. These impacts will remove soils from agricultural production for the life of the Project. The Project will result in temporary impacts at the construction laydown area, the portions of Project access roads used for construction and then reclaimed, and temporary construction areas surrounding each turbine.

The Project will create approximately 64 acres of permanent impact and 415 acres of temporary impact to soils. Because of the relatively gentle relief in the Project Area, the deliberate avoidance of steep slopes, and the use of appropriate Best Management Practices (BMPs) during and following construction, the potential for soil loss due to erosion will be low. Impacts to hydric soils such as compaction are expected to be minimal due to the siting of Project facilities to avoid wetlands and other areas with hydric soils. Table 10 provides a summary of potential impacts to hydric soils and non-hydric soil acres within the Project Area for both turbine layouts. Table 11 gives the breakdown of potential impacts to Prime Farmland, Farmland of Statewide Importance, and other farmland for the Project.

**Table 10. Potential Impacts to Soils**

| Soil Unit Name | Layout A – Siemens 2.3-108 | | Layout B - Vestas V-100 | | Layout C – Vestas V-110 | |
|---|---|---|---|---|---|---|
| | Temporary (ac) | Permanent (ac) | Temporary (ac) | Permanent (ac) | Temporary (ac) | Permanent (ac) |
| Patially or Mostly Hydric | 0.65 | 0.08 | 1.1 | 0.20 | 0.75 | 0.1 |
| Not Hydric | 389. | 50.2 | 431.9 | 53.7 | 404.80 | 57.15 |
| **TOTAL[A]** | **390.0** | **50.3** | **433.0** | **53.9** | **405.55** | **57.25** |

**Table 11. Potential Impacts to Farmland Soils**

| Farmland Status | Layout A – Siemens 2.3-108 | | Layout B – Vestas V-100 | | Layout C – Vestas V-110 | |
|---|---|---|---|---|---|---|
| | Temporary (ac) | Permanent (ac) | Temporary (ac) | Permanent (ac) | Temporary (ac) | Permanent (ac) |
| Prime Farmland | 5.17 | 1.41 | 9.53 | 1.82 | 5.92 | 1.40 |
| Farmland of Statewide Importance | 174.34 | 25.19 | 179.96 | 25.91 | 181.76 | 29.21 |
| Other farmland | 210.44 | 23.69 | 243.52 | 26.21 | 217.88 | 57.65 |
| **Total[A]** | **390.06** | **50.32** | **433.15** | **53.96** | **405.68** | **57.27** |

Prime Farmland soils are defined in the NRCS Title 430 National Soil Survey Handbook, issued November 1996, as follows: "Prime Farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is also available for these uses. It has the soil quality, growing season, and moisture supply needed to produce economically sustained high yields of crops when treated and managed according to acceptable farming methods, including water management" (USDA 1996).

Soil erosion, compaction, and other related soil disturbance will be short-term, and will be minimized by implementing environmental protection measures including appropriate access road design and stormwater management BMPs, robust hazardous materials handling and spill response procedures, regular maintenance of access roads, decompaction of temporary disturbance areas as needed, and implementing dust control measures to limit wind erosion and revegetation of disturbed areas. The loss of organic matter will be limited through implementation of stormwater management BMPs, by stripping and stockpiling topsoil in disturbance areas and using stockpiled topsoil to finish restoration of temporary disturbance areas. With the proper implementation of these environmental protection measures, no unmitigated loss of highly productive soil will result from implementation of the Project.

There will be no direct impacts to mineral resources or other regional geology. Sand and gravel are plentiful locally and the presence of the Project will not necessarily prevent either from being mined in the Project Area. The Project has been designed to avoid the areas of economic coal deposits in the eastern end of the Project Area, which would allow for mining of those resources in the future. The Project would not affect existing oil and gas wells or infrastructure, and the dispersed nature of Project infrastructure is similarly unlikely to inhibit potential future oil and gas development in the Project Area. Direct impacts to geology and soils are therefore not anticipated to be significant.

Geologic hazards such as seismicity, landslide, or subsidence will not be concerns for the Project. The region is considered to be seismically stable, and no areas of subsidence, liquefaction, mass movement or other geologic hazards have been identified in the Project Area. Project facilities will be microsited to avoid such areas if any are identified during final design,

and appropriate engineering design, primarily for turbine foundations, will be used to further reduce the impacts of geologic hazards to a non-significant level.

### *5.1.3 Mitigative Measures*

Antelope will avoid impacts to Prime Farmland, which is an exclusion area listed in NDAC 69-06-08-01-1, see Section 3.2.1. Prime Farmland will be avoided by siting wind turbines, access roads, and other Project infrastructure off of these farmlands to the extent practical. The Project will make use of existing farm access roads as much as possible, and will place wind turbines at the edges of farm fields to minimize additional disruptions to cropland. Collector lines will generally be placed within or adjacent to the access roads to minimize impacts.

Antelope will implement avoidance and minimization measures during final design and construction of the Project as appropriate, including the following:

- Avoid placement of wind energy facilities in areas with unsuitable seismic, liquefaction, slope, subsidence, settling, and flooding conditions.
- Minimize the extent of the project footprint, including improved roads and construction staging areas.
- Minimize ground-disturbing activities, especially during the rainy season.
- Use existing roads and disturbed areas to the extent possible.
- Site new roads to follow natural land contours and avoid excessive slopes.
- Site new roads to avoid stream crossings and wetlands and minimize the need to cross drainage bottoms.
- Surface new roads with aggregate materials, wherever appropriate.
- Restrict heavy vehicles and equipment to improved roads to the extent practicable.
- Control vehicle and equipment speed on unpaved surfaces.
- Stabilize disturbed areas that are not actively under construction using methods such as erosion matting or soil aggregation, as site conditions warrant.
- Salvage topsoil from all excavation and construction activities to reapply to disturbed areas once construction is completed.
- Dispose of excess excavation materials in approved areas to control erosion.
- Isolate excavation areas (and soil piles) from surface water bodies using silt fencing, bales, or other accepted appropriate methods to prevent sediment transport by surface runoff.
- Use earth dikes, swales, and lined ditches to divert local runoff around the work site as site conditions warrant.
- Reestablish the original grade and drainage pattern to the extent practicable.
- Reseed disturbed areas with a native seed mix and revegetate disturbed areas immediately following construction.
- All site characterization, construction, operation, and decommissioning activities will be conducted in compliance with applicable Federal and State laws and regulations, including the Toxic Substances Control Act of 1976, as amended (15 USC 2601, et

seq.). In addition, any release of toxic substances (leaks, spills, and the like) in excess of the reportable quantity established by 40 CFR Part 117 will be reported as required by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, Section 102b. A copy of any report required or requested by any Federal agency or State government as a result of a reportable release or spill of any toxic substances will be furnished to the authorized officer concurrent with the filing of the reports to the involved Federal agency or State government.

- Procedures will be established for fuel storage and dispensing, including shutting off vehicle (equipment) engines; using only authorized hoses, pumps, and other equipment in good working order; maintaining appropriate fire and spill response materials at equipment-fueling stations; providing emergency shutoffs for fuel pumps; ensuring that fueling stations are paved; ensuring that both aboveground fuel tanks and fueling areas have adequate secondary containment; prohibiting smoking, welding, or open flames in fuel storage and dispensing areas; equipping the area with fire suppression devices, as appropriate; conducting routine inspections of fuel storage and dispensing areas; requiring prompt recovery and remediation of all spills, and providing for the prompt removal of all fuel and fuel tanks used to support construction vehicles and equipment at the completion of facility construction and decommissioning phases.
- Refueling areas will be located away from surface water and drainages; features will be added at stationary fueling locations (i.e., in the construction yard) to direct spilled materials to sumps or safe storage areas where they can be subsequently recovered.
- Drip pans will be used under the fuel pump and valve mechanisms of any bulk fueling vehicles and during on-site refueling to contain accidental releases.
- Spills will be immediately addressed per the appropriate spill management plan, and cleanup and removal initiated, if needed. Operations and maintenance personnel will be trained in spill prevention and containment, and spill containment supplies will be located on site and be readily available.
- All vehicles and equipment will be in proper working condition to ensure that there is no potential for leaks of motor oil, antifreeze, hydraulic fluid, grease, or other hazardous materials.
- Hazardous materials and waste storage areas or facilities will be formally designated and access to them restricted to authorized personnel. Construction debris, especially treated wood, will not be disposed of or stored in areas where it could come in contact with aquatic habitats.
- Design requirements will be established for hazardous materials and waste storage areas that are consistent with accepted industry practices as well as applicable Federal, State, and local regulations and that include, at a minimum, containers constructed of compatible materials, properly labeled, and in good condition; secondary containment features for liquid hazardous materials and wastes; physical separation of incompatible chemicals; and fire-fighting capabilities when warranted.
- Written procedures will be established for inspecting hazardous materials and waste storage areas and for plant systems containing hazardous materials; identified deficiencies and their resolution should be documented.

- Schedules will be established for the regular removal of wastes (including sanitary wastewater generated in temporary, portable sanitary facilities) for delivery by licensed haulers to appropriate off-site treatment or disposal facilities.

BMPs to prevent soil erosion would be implemented during construction of the Project as required by the National Pollutant Discharge Elimination System (NPDES) Construction Stormwater Permit and the accompanying Project Erosion and Sedimentation Control Plan (ESCP).

Additional site-specific measures to further reduce impacts to soils may be identified and implemented as appropriate; however, impacts to soil resources are not expected to be significant.

## 5.2 Water Resources

### *5.2.1 Existing Conditions*

**Surface Water**

Surface water in most of the Project Area flows southward to Goodman Creek, via many unnamed tributaries. Surface water in the northern edge of the Project Area flows northward to Lake Sakakawea via Beaver Creek and its unnamed tributaries or unnamed tributaries to Malnourie Creek.

Figures 10A, 10B and 10C show the streams and wetlands present throughout the Project Area for the Siemens 2.3-108, Vestas V-100 and Vestas V-110 turbine layouts, respectively. Table 12 displays impact numbers for all three turbine layouts based on surface water features mapped by the USGS in the National Hydrography Dataset (NHD; USGS 2013). Most streams are intermittent and in many cases function as drainage ways within tilled agricultural fields. There are no known surface water withdrawals for irrigation or other uses within the Project Area. There are no major rivers or traditional navigable waters found within the Project Area. No public water sources, reservoirs or municipal water supplies, or irrigated land are present within the Project Area.

100-year floof hazard data are available from the State of North Dakota. These maps show some limited areas of flood hazard in the Project Area (Figure 10), however these areas will be avoided during development of the Project.

**Table 12. Potential Impacts to Surface Water**

| Surface Water [1/] | Layout A – Siemens 2.3-108 | | Layout B - Vestas V - 100 | | Layout C - Vestas V - 110 | |
|---|---|---|---|---|---|---|
| | Temporary | Permanent | Temporary | Permanent | Temporary | Permanent |
| Miles | 0.12 | 0.03 | 0.15 | 0.04 | 0.13 | 0.03 |
| Number of streams crossed | 31 | 7 | 32 | 9 | 38 | 9 |

1/ All streams are listed as intermittent.

**Groundwater**

Groundwater in the region supplies both public and private wells (Croft 1973). Local drinking water can be productively derived from some shallow glacial and alluvial sand and gravel aquifers associated with rivers in the area. Shallow groundwater typically follows local topography. However, most potable water supplies in the region are derived from the deeper Fox Hills, Hell Creek, and Tongue River aquifers.

Review of the North Dakota State Water Commission database of driller logs indicates that 9 wells have been drilled within the Project Area. Seven of those are observation wells drilled in 1976 and 1977 in the eastern end of the Project Area. One is a domestic well serving a farmstead in the western part of the Project Area. No information except the section location is available for the final well. The observation wells do not provide water and there is no water data available for them. The domestic well appears to utilize a shallow alluvial aquifer associated with an unnamed tributary to Goodman Creek; the well is listed as being 40 feet deep.

Regionally, both ground and surface water diversion rights allow for withdrawals to serve municipal, industrial, irrigation and other purposes. Review of the North Dakota State Water Commission water rights permit database indicates that there are no surface or groundwater diversion rights in the Project Area.

## *5.2.2 Potential Impacts*

The Project will not use surface water; therefore, there will be no direct or indirect impacts either to water quantity or water quality. The Project is highly unlikely to impact 100-year floodplain areas since the likelihood of significant flooding is very low and flood hazard areas will be avoided. With the exception of access road stream crossings and collection lines bored under streams, Project infrastructure will be set back from streams a sufficient distance to avoid impacts to floodplains that may exist. Access road crossings will be designed to provide adequate streamflow such that they will not cause or exacerbate potential flooding.

The only permanent use of groundwater will be through a well supplying water to the O&M facility for restroom and cleanup facilities. This well will require a water right permit for Industrial Use pursuant to NDCC 61-04, which will be obtained through an application to the ND State Water Commission. The small amount of groundwater withdrawn will not create a measureable impact to groundwater.

Project construction activities such as excavation and construction of foundations are unlikely to affect groundwater quality or flow patterns. If impacts were to occur, they will likely be minor and highly localized, and unlikely to adversely affect local water supply wells. As the design of the Project is finalized, facilities will be adjusted to avoid impacts to the few existing wells in the area.

Although it appears to be unlikely based on existing conditions, subsurface blasting may be required to excavate for turbine foundations. This could potentially fracture bedrock and affect groundwater flow in the immediate vicinity of the disturbance; however, potential blasting activities would not be deep enough to impact the aquifers most used in the region. In the event that subsurface blasting is required, a blasting plan would be developed and implemented to keep the impacts localized and fracture the least amount of bedrock necessary for construction. Potential disturbances due to blasting would be localized and temporary, with groundwater likely to resume its natural course of flow down-gradient of the foundation.

Operation of the Project would involve periodic changing of lubricating fluids for the turbines, and may involve small quantities of hazardous materials to be kept and used onsite (e.g., herbicides used for noxious weed management). These materials will be managed according to the mitigation measures described in below and in Section 5.1.3 for hazardous materials, which would prevent their release into surface or groundwater in the Project Area.

### *5.2.3 Mitigative Measures*

Antelope will implement measures to avoid or minimize impacts to water resources, as appropriate, including:

- Minimize the extent of land disturbance to the extent possible.
- Use existing roads and disturbed areas to the extent possible.
- Site new roads to avoid crossing streams and wetlands and minimize the number of drainage bottom crossings.
- Apply standard erosion control BMPs to all construction activities and disturbed areas (e.g., sediment traps, water barriers, erosion control matting) as applicable to minimize erosion and protect water quality.
- Apply erosion controls relative to possible soil erosion from vehicular traffic.
- Identify and avoid unstable slopes and local factors that can cause slope instability (groundwater conditions, precipitation, seismic activity, high slope angles, and certain geologic landforms).

- Identify areas of groundwater recharge and discharge and evaluate their potential relationship with surface water bodies and groundwater quality.
- Avoid creating hydrologic conduits between two aquifers (e.g., upper and lower).
- Construct drainage ditches only where necessary; use appropriate structures at culvert outlets to prevent erosion.
- Avoid altering existing drainage systems, especially in sensitive areas such as erodible soils or steep slopes.
- Clean and maintain catch basins, drainage ditches, and culverts regularly.
- Limit herbicide and pesticide use to nonpersistent, immobile compounds and apply them using a properly licensed applicator in accordance with label requirements.
- Dispose of excess excavation materials in approved areas to control erosion and minimize leaching of hazardous materials.
- Reestablish the original grade and drainage pattern to the extent practicable.
- Reseed (non-cropland) disturbed areas with a native seed mix and revegetate disturbed areas immediately following construction.
- When decommissioning sites, ensure that any wells are properly filled and capped.

Additional site-specific measures to further reduce impacts to water resources may be identified and implemented as appropriate; however, impacts to water resources are not expected to be significant.

## 5.3 Wetlands

### *5.3.1 Existing Conditions*

A preliminary assessment of the presence of wetlands was performed for Project using available desktop data including the National Wetlands Inventory (NWI) data set (USFWS 2013a). This data was evaluated using high-resolution aerial photography. The use of aerial photography is appropriate for the Project Area since the area contains low tree cover and the boundary of these wetlands is generally evident. Wetlands within the study area are scattered and relatively numerous. The majority are seasonal, freshwater, emergent wetlands surrounded by tilled fields or grassland areas. The freshwater ponds in the study area are typically excavated or impounded stock ponds used by cattle.

Figures 10A, 10B and 10C show the locations of wetlands and streams within the Project Area for the Siemens 2.3-108, Vestas V-100 and Vestas V-110 turbine layouts, respectively. Table 14 displays the temporary and permanent impact calculations for all three turbine layouts.

The preliminary assessment was used as a guide to avoidance and minimization, and to determine potential impacts for the Project. NWI data is not definitive as to classifications and existence of features, and any potentially jurisdictional wetlands that would actually be impacted by the Project will be delineated prior to construction.

### *5.3.2 Potential Impacts*

Based on the current design, impacts to wetlands would be minimal. As shown in Table 14, for the Siemens layout temporary impacts would be 0.47 acres, for the Vestas V-100 layout temporary impacts would be 0.643 acres, and for the Vestas V-110 turbine layout temporary impacts would be 0.47 acres. Permanent impacts would be up to 0.16 acres as a worst-case for any layout; however, Antelope is committed to making further design changes to avoid permanent impacts completely.

### *5.3.3 Mitigative Measures*

Antelope will implement the following measures to avoid or minimize impacts to wetlands as follows.

- Site new roads to avoid wetlands and minimize the need to cross drainage bottoms.
- A Project Storm Water Pollution Prevention Plan (SWPPP) will be obtained and complied with to ensure surface water, including wetlands, is not adversely affected by run off from construction activities.

## 5.4 Vegetation

### *5.4.1 Existing Conditions*

**Vegetation Communities**

Vegetation within the Project Area consists primarily of grassland (66%) and agriculture (22%). Some of the grassland areas may be classified as native prairie (areas of naturally occurring grasses and forbs; USGS 2013). Typical crops include wheat, barley, oats, sunflower, and hay. In steeper terrain, the primary land cover is grassland. Riparian areas are likely to contain shrubs and small trees associated with streams, and tree rows are associated with many of the farmsteads. Wetlands and open water ponds are common with in the Project Area; most are less than five acres and support seasonal surface water.

The vegetation communities within the Project Area were described by Western EcoSystems Technology, Inc. (WEST), under contract to Antelope, using available desktop information and aerial photography in spring 2014. These communities are shown in Figures 8A, 8B and 8C for the Siemens 2.3-108, Vestas V-100 and Vestas V-110 turbine layouts, respectively. Impacts to the mapped vegetation communities are provided in Table 13.

**Table 13. Potential Impacts to Mapped Vegetation Communities**

| Veg Community | Layout A – Siemens 2.3-108 | | Layout B – Vestas V-100 | | Layout C – Vestas V-110 | |
|---|---|---|---|---|---|---|
| | Temporary (ac) | Permanent (ac) | Temporary (ac) | Permanent (ac) | Temporary (ac) | Permanent (ac) |
| Agriculture | 93.75 | 15.23 | 110.42 | 15.49 | 98.29 | 17.10 |
| Grassland | 295.47 | 34.85 | 320.61 | 38.26 | 305.66 | 39.79 |
| Trees/ Shrubs | 0.21 | 0.07 | 0.75 | 0.09 | 0.63 | .021 |
| Farmstead | 0.06 | 0 | 0.58 | 0 | 0.51 | 0 |
| NWI Wetlands | 0.47 | 0.14 | 0.64 | 0.10 | 0.47 | 0.15 |
| Developed | 0 | 0 | 0.01 | 0 | 0 | 0 |
| **Total** | **389.95** | **50.30** | **433.02** | **53.95** | **405.56** | **57.25** |

## Native Prairie Habitats

Remnant native prairie may be present at scattered locations throughout the Project Area. Native prairie serves as a vital ecological resource by improving water quality, providing erosion control, and supporting a diverse population of plants and animals. However, due to the native prairie's fertile soils and predominantly flat topography, large areas of native prairie have been converted to agricultural lands. Native prairie is important habitat used by prairie grouse (e.g., sharp-tailed grouse, greater prairie chicken) for lekking, nesting, brood rearing, and wintering. Grouse leks are discussed in further detail in Section 5.5.1.3. One candidate for Endangered Species Act (ESA) listing (Sprague's pipit) and many of the state Species of Conservation Priority also rely on native prairie as their primary habitat (see Table 15 and 16).

## Hardwood draws and enrolled woodlands

Hardwood draws and enrolled woodlands are considered Exclusion Areas pursuant to NDAC 69-06-08-01.1c. The only wooded draws within the Project Area are found in the northeastern corner; none of these woodlands would be impacted by the Project. No enrolled woodlands are located within the Project Area.

## Noxious and Invasive Weeds

North Dakota has listed twelve species as noxious weeds (NDCC 63-01.1). Mercer County does not list additional noxious weed species (NDDA 2013a). The North Dakota Weed Mapper (NDDA 2013b) indicates that none of the state-listed weeds are known to be present in the Project Area.

## Rare Plant Populations

There are no federal listed, proposed, or candidate plant species known to occur in Mercer County. North Dakota's list of Species of Conservation Priority does not include any plant species.

### *5.4.2 Potential Impacts*

The Project will result in direct, permanent impacts to vegetation communities through the establishment of turbine foundations, access roads, and the substation, interconnection yard and O&M facility. The Project will result in temporary impacts at the construction laydown area, portions of Project access roads used for construction, and temporary construction areas surrounding each turbine.

The Project will have up to approximately 64 acres of permanent impact and 415 acres of temporary impact as shown in Table 1. These impacts will be distributed between cropland and grassland, with extremely small impact to developed area (existing roads), and no permanent impacts to wetlands, trees, shrubs or water.

### *5.4.3 Mitigative Measures*

Remnant native prairie may be present at scattered locations throughout the Project Area. During final design Antelope will use aerial photography and the results of further on-site investigations to locate turbines, access roads and collection lines on previously disturbed land to the maximum extent practical.

Antelope will implement measures to avoid or minimize impacts to sensitive habitats and measures to control the spread of invasive species as appropriate, including the following:

- Minimize the size of areas in which soil would be disturbed or vegetation would be removed.
- Reduce habitat disturbance by keeping vehicles on access roads and minimizing foot and vehicle traffic through undisturbed areas.
- Initiate habitat restoration of disturbed soils and vegetation as soon as possible after construction activities are completed. Restore areas of disturbed soil using weed-free native grasses, forbs, and shrubs, in consultation with land managers and the Mercer County Weed Boards.
- Develop a plan for control of noxious weeds and invasive plants that could occur as a result of new surface disturbance activities at the site. The plan should address monitoring, weed identification, the manner in which weeds spread, and methods for treating infestations, which would include at least the following:
    - Require the use of certified weed-free mulching.
    - Establish a controlled inspection and cleaning area for trucks and construction equipment arriving from locations with known invasive vegetation problems. Visually inspect construction equipment arriving at the project area and remove and contain seeds that may be adhering to tires and other equipment surfaces.
    - Regularly monitor access roads and newly established utility and transmission line corridors for the establishment of invasive species. Initiate weed control measures immediately upon evidence of the introduction or establishment of invasive species.

  - Do not use fill materials that originate from areas with known invasive vegetation problems.
  - Access roads, utility and transmission line corridors, and tower site areas should be monitored regularly for the establishment of invasive species, and weed control measures should be initiated immediately upon evidence of the introduction of invasive species.
- Regularly inspect access roads, utility and transmission line corridors, and tower site areas for damage from erosion, washouts, and rutting. Initiate corrective measures immediately upon evidence of damage.
- Salvage and reapply topsoil excavated during decommissioning activities to disturbed areas during final restoration activities.
- Reclaim areas of disturbed soil using weed-free native shrubs, grasses, and forbs. Restore the vegetation cover, composition, and diversity to values commensurate with the ecological setting.

Introduction of noxious weeds will be mitigated through prompt revegetation with native species or restoration of prior land use, and through ongoing monitoring and control programs. Additional site-specific measures to further reduce impacts to plant communities may be identified and implemented as appropriate; however, impacts to plant communities are not expected to be significant.

## 5.5 Wildlife

Wildlife species of greatest concern are federally and/or state-protected species, avian species, and bats that may occur in the Project Area. Protection for wildlife species is provided under the following statutes:

- The ESA mandates protection of species federally listed as threatened or endangered and their associated habitats. The ESA makes it unlawful to “take” a listed species. Take is defined as “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect or attempt to engage in any such conduct.” Significant modification or degradation of listed species’ habitats is considered “harm” under ESA regulations. Projects that have such potential will require consultation with USFWS and may require special permitting or mitigation measures to avoid or reduce impacts to these species. Candidate species receive no statutory protection from the USFWS; however, they do receive full protection once listed.
- The Bald and Golden Eagle Protection Act prohibits the take of any bald eagle or golden eagle, alive or dead, including any part, nest, or egg. “Take” is defined as “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb”. “Disturb” means to agitate or bother an eagle to a degree that causes, or is likely to cause 1) injury to an eagle; 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior. The USFWS promulgated regulations

in 2009 that provide for a permitting framework for incidental take associated with otherwise lawful activities, including wind energy (50 Code of Federal Regulations § 22.26). The Final Eagle Conservation Plan Guidance – Version 2, that outlines the recommended steps for permit applicants, was released by USFWS in April 2013 (USFWS 2013b).

- Under the Migratory Bird Treaty Act (MBTA) it is unlawful to pursue, hunt, take, capture or kill; attempt to take, capture, or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried or received any native migratory bird, part, nest, egg or product. On March 23, 2012, the USFWS released the Land- Based Wind Energy Guidelines (USFWS 2012a). These voluntary guidelines provide recommended approaches for assessing and avoiding impacts to wildlife and their habitats, including migratory birds, associated with wind energy project development. While the MBTA provides no process for authorizing incidental take of MBTA-protected birds, USFWS has indicated that compliance with these guidelines would be considered in assessing any potential liability under the MBTA.

## *5.5.1 Existing Conditions*

**Federally Listed and Candidate Species**

The USFWS provides data regarding federally threatened and endangered, proposed and candidate species at the county level for public use. According to the USFWS, Mercer County has five endangered wildlife species, one threatened species, one candidate species, and two species proposed for listing (see Table 14). These species are discussed in the following sections.

In a letter dated October 22, 2010, the North Dakota Game and Fish Department (NDGFD) provided comments to Antelope regarding the Project (Appendix A: Critical Issues Analysis [CIA]); whooping cranes were not specifically addressed in that letter. The primary concerns expressed included limiting impacts within native prairie to the extent possible; avoiding wetlands and alternations to surface drainage patterns; and placing electrical collection lines underground where possible, and applying appropriate Avian Protection Line Interaction Committee (APLIC) design standards for any necessary above-ground segments.

The USFWS provided comments on the Project in a letter dated December 1, 2010, in response to a request for comment made for the CIA (Appendix A). The letter notes the presence of potentially suitable roosting and feeding habitat for whooping cranes in the Project Area, and recommends mapping wetlands and analyzing the potential effects to migrating whooping cranes from loss of use of habitat in the Project Area for migration stopovers. The only specific recommendations made are that any new transmission line (if included as part of the Project) be placed underground to avoid collision mortality, and the installation of visual marking devices on existing transmission lines within one mile of potentially suitable whooping crane habitat. The USFWS letter includes a general recommendation that high value habitat types, including native

prairies, woodlands, wooded draws and riparian forests, be avoided whenever possible. It also recommends minimizing impacts to wildlife and habitat by reseeding disturbed native prairie; minimizing grassland disturbance by using fewer, larger turbines and fewer access roads; using self-standing towers (no guy wires); avoiding wetland fill; replacing unavoidable wetland impacts with functionally equivalent wetlands; and utilizing appropriate erosion control measures to prevent water quality degradation.

**Table 14. Federally Listed and Candidate Species in Mercer County**

| Common Name | Latin Name | Habitat | Status |
|---|---|---|---|
| Black-footed Ferret | *Mustela nigripes* | Prairie dog complexes | Endangered |
| Gray Wolf | *Canis lupus* | Last confirmed sighting in North Dakota was in 1991. | Endangered |
| Interior Least Tern | *Sternula antillarum* | Missouri River and Yellowstone sandbars; beaches | Endangered |
| Pallid Sturgeon | *Scaphirhynchus albus* | Bottom dwelling, Missouri and Yellowstone Rivers | Endangered |
| Whooping Crane | *Grus Americana* | Palustrine wetlands and cropland ponds | Endangered |
| Piping Plover[1/] | *Charadrius melodus* | Missouri River sandbars, alkali beaches | Threatened |
| Northern Long-Eared Bat | *Myotis septentrionalis* | Caves and mines, forested areas | Candidate |
| Rufa red knot | *Calidris canutus rufa* | Coastal areas and wetlands | Candidate |
| Sprague's pipit | *Anthus spragueii* | Native prairie | Candidate |

Source: USFWS 2010
1/ Designated Critical Habitat for piping plover is located on the following water bodies: Lake Audubon, Lake Sakakawea, and the Missouri River. All of these water bodies are located north and east of the Project Area.

### Black-footed Ferret

Historically, black-footed ferrets occupied much of the Great Plains region of North America, co-locating with prairie dog (Cynomys sp.) colonies and complexes. Black-footed ferrets depend on prairie dog complexes for food and habitat. Prairie dogs and black footed ferrets prefer level topography in grasslands, steppe, and shrub steppe. Plowed lands, forests, wetlands, and water are avoided (USFWS 2013c). There are no records of recent black-footed ferret occurrences in North Dakota though there is potential for reintroduction (USFWS 2008b, as cited in HDR Critical Issues Analysis; see Appendix A).

No black-footed ferrets were observed during WEST's avian surveys of the Project Area (Appendix A: Antelope Hills Avian Use report in). No prairie dog colonies have been identified within the Project Area.

### Gray Wolf

The gray wolf was listed as an endangered species in 1978 (USFWS 1978). In 2003, the USFWS downlisted the two northern subpopulations (western and eastern distinct population segments) to threatened (USFWS 2003). The eastern population remains listed as threatened. Once common throughout North Dakota, the last confirmed sighting in the state was 1991, although there have been more recent but unconfirmed reports of sightings in the Turtle Mountains in the north-central portion of the state. The presence of wolves in most of North Dakota would likely remain sporadic and consist of occasional dispersing animals from Minnesota and Manitoba (USFWS 2008a).

There were no incidental observations of gray wolves during WEST's avian surveys (Appendix A: Antelope Hills Avian Use report).

### Interior Least Tern

The interior population of the least tern was listed as endangered in 1985 (USFWS 1985a). In North Dakota, the interior least tern is primarily found on sandbars on the Missouri River between the Garrison Dam and Lake Oahe, in the reservoirs, and on the Missouri and Yellowstone Rivers upstream of Lake Sakakawea (USFWS North Dakota Ecological Field Services Office 2008). This tern nests on barren sandbars on the Missouri River and feeds on small fish in the river (USFWS 1990a). As of 2008, approximately 100 pairs were known to breed in North Dakota (USFWS 2008b). Critical habitat for the interior least tern has not been designated.

No habitat for interior least terns is found within the Project Area, and none were observed during avian use surveys (Appendix A :Antelope Hills Avian Use report).

### Pallid Sturgeon

The pallid sturgeon historically occupied the Mississippi and Missouri rivers and their major tributaries (USFWS 1990b). The reason for decline of the sturgeon has been water control and development projects on the Mississippi and Missouri rivers. The sturgeon still occupies portions of the main stem of the Missouri River.

There is no pallid sturgeon habitat in the Project Area.

### Whooping Crane

The whooping crane is protected by federal laws in the United States. It was listed as endangered in the United States in 1970 under the Endangered Species Preservation Act of 1966 (16 USC Section 668aa(c)) and then under the ESA in 1973. Critical habitat was designated in 1978. Under the North Dakota Comprehensive Wildlife Conservation Strategy Guide (NDGFD, 2005), the whooping crane is a Level III Species of Conservation Priority, defined as "North Dakota's species having a moderate level of conservation priority but are believed to be peripheral or non-breeding in North Dakota" (NDGFD, 2005)

One self-sustaining wild population of whooping cranes currently exists in the world. Members of this population breed primarily within the boundaries of Wood Buffalo National Park in Canada and migrate through the central United States en route to the wintering grounds at Aransas National Wildlife Refuge along the Gulf Coast of Texas. This flock is referred to as the Aransas-Wood Buffalo National Park Population. Due to intensive management, this population has increased from 15 birds in 1941 to 263 as of the start of spring migration in 2010 (WCCA 2010). The migration route is well defined and 95 percent of all observations occur within a 200-mile wide corridor during spring and fall migration (CWS and USFWS 2007). The USFWS subdivides this corridor into 5 percent increments starting at 75 percent. The Project Area is within the area encompassing 75 to 80 percent of confirmed whooping crane sightings, and is approximately 50 miles west of the migration corridor centerline. Figure 11 shows the location of the Project area within the Whooping Crane Migratory Cooridor.

Antelope contracted WEST to complete an analysis of potential whooping crane habitat in the Project Area (Appendix A: Whooping Crane Habitat Review report). The habitat review and analysis evaluated whether the proposed Project Area represented high, average or low potential whooping crane habitat as compared to nearby reference areas. The potential whooping crane habitat analysis included a comparison of wetlands, wetland basins, and land cover within the proposed Project Area and four reference areas of the same dimensions located a few miles to the north, south, east and west; all four reference areas are located inside the defined whooping crane migration corridor. A recently developed potentially suitable habitat assessment (Watershed Institute 2012) was also used to quantify and compare whooping crane habitat within the study areas. This assessment first screens all wetlands within the study areas for minimum size, visual obstructions, and disturbances (roads, buildings, gas and oil development). Those wetlands left are then quantified (as a means to quantify suitability) by their size, density of wetlands around them, distance to food, whether they are natural or manmade, and their water regime.

The mean suitability score for wetlands in the Project Area was 10.4; mean suitability scores and ranges for the other four reference areas ranged from a low of 8.6 for the southern reference area to a high of 12.2 for the eastern reference area. The overall ranking for the Project Area is below what was determined to be suitable potential habitat in Kansas (a mean score of 12 or more; Watershed Institute 2012).

Although the Project Area is within the defined migration corridor, no whooping cranes have been documented within the Project Area (Appendix A: Whooping Crane Habitat Analysis). The closest confirmed sighting is approximately 1.5 miles south of the Project Area. No whooping cranes were observed during avian use surveys (See Antelope Hills Avian Use report in Appendix A). While whooping cranes likely migrate over the Project Area and there is potential for roosting or foraging habitat, the Project Area does not provide unique habitat compared to adjacent areas.

### Piping Plover

The Great Plains population of the piping plover was listed as threatened in 1985 (USFWS 1985b). The piping plover breeding range stretches from south central Canada into the Midwest United States. The majority of piping plover breeding pairs found in the United States are concentrated in Montana, the Dakotas, and Nebraska. This population of piping plover winters in the Gulf of Mexico. The plover nests in 23 counties in North Dakota, primarily in alkali wetlands in the Missouri Coteau and on barren sandbars in the Missouri River and system reservoirs. Reasons for decline of the piping plover include habitat loss and nest depredation in the wetlands, however the main reason for decline of the species along the Missouri River is habitat loss due to water development projects (e.g. Fort Peck Dam, Garrison Dam, and Oahe Dam) and loss of wetlands due to agriculture and other developments (NDSWC 2008).

Critical habitat for the piping plover was designated on September 11, 2002 (USFWS 2002). There is no USFWS-designated critical habitat for the piping plover in the Project Area (50 CFR Part 17). The entirety of Lake Sakakawea has been designated as critical habitat; the nearest portions of the lake are approximately 2.9 miles north of the closest turbine. The designated critical habitat areas are composed of shorelines, peninsulas, and islands, below the top of the maximum operating pool level and are owned by the Federal government; the USACE manages the lands bordering most of the lake. These reservoir habitats include sparsely vegetated shoreline beaches, peninsulas, islands composed of sand, gravel, or shale, and their interface with the water (USFWS 2002).

No piping plover habitat is present within the Project Area and no piping plovers were observed during avian use surveys (Appendix A: Antelope Hills Avian Use report).

### Northern Long-eared Bat

On October 2, 2013, the northern long-eared bat was proposed for federal listing as endangered under the ESA throughout its range (USFWS 2013c). The range of this species includes eastern and north central United States, including North Dakota. Habitat includes caves and mines for hibernating during the winter, called hibernacula, as well as underneath bark, in cavities or crevices of live and dead trees in the summer for roosting. This medium sized bat (approximately 3.0 – 3.7 inches) with a wing span of 9 -10 inches is distinguishable from other bats by it its long ears (USFWS 2013d).

Threats to the northern long-eared bat include white nose syndrome, impacts to hibernacula and impacts to summer habitat. No hibernacula are known from North Dakota and no known subsurface mines, caves or other cave-like structures occur in the Project Area. In addition, there is low summer habitat in the Project Area (27.30 acres of deciduous trees and shrubs, or 0.07 percent of the Project Area), therefore, habitat is limited for northern long-eared bats in the Project Area.

### Rufa Red Knot

On September 27, 2013 the rufa red knot was proposed for federal listing as threatened under ESA (USFWS 2013e). Rufa red knots fly very long distances during migration (over 9,000 miles) in the spring and autumn. This range predominately encompasses coastal areas from south of Tierra del Fuego to as far north as central Canadian Arctic. Rufa red knots have been documented in most states during migration, including North Dakota. This species depends on suitable habitat, food and weather conditions along its migration. Rufa red knots feed predominately on clams, mussels, snails and other invertebrates including their shells. However, stop over habitats, including wetlands, require the presence of easily-digestible food such as juvenile clams and mussels and horseshoe crab eggs UFWS 2013f. Threats to rufa red knot include vulnerability to climate change and affects to arctic tundra, coastal habitats and rising sea levels, depletion of food source and weather patterns.

No rufa red knots were observed during avian use surveys (Appendix A: Antelope Hills Avian Use report).

### Sprague's Pipit

The Sprague's pipit is closely tied with native prairie habitat and breeds in the north-central United States in Minnesota, Montana, North Dakota and South Dakota as well as south-central Canada (Jones 2010). The USFWS reviewed the conservation status of Sprague's pipit to determine whether the species warrants protection under the ESA. The status review found that listing Sprague's pipit as threatened or endangered is warranted, but that listing the species at this time is precluded by the need to complete other listing actions of a higher priority (Jones 2010). Currently the Sprague's pipit remains a candidate species for listing under the ESA and is also protected under the MBTA. Conversion of native prairie to agriculture and overgrazing in much of this species' range continue to cause declines on breeding and wintering grounds (Jones 2010).

No Sprague's pipits were observed during avian use surveys (Appendix A: Antelope Hills Avian Use report).

### State Species of Conservation Priority

The NDGFD has identified 100 species of conservation priority, or those in greatest need of conservation in the state (NDGFD 2008). These species are categorized into three levels as follows:

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

Table 15 shows Level I species that have been documented in the Missouri Slope Region including Mercer County.

**Table 15. Species of Conservation Priority Level I in the Missouri Slope Region**

| Common Name | Scientific Name | Habitat Type | Habitat Details |
|---|---|---|---|
| Baird's Sparrow | *Ammodramus bairdii* | Native Prairie /Grassland | Prefer native prairie; structure may be more important than plant species composition. Nesting may take place in tame grasses (found in Crested Wheat, while avoids Smooth Brome). Areas with low to no grazing activity are required. |
| Black-tailed Prairie Dog | *Cynomys ludovicianus* | Native Prairie/ Grassland | Require short-grass prairie habitats. Avoids heavy brush and tall grass areas due to the reduced visibility these habitats impose. |
| Chestnut-collared Longspur | *Calcarius ornatus* | Native Prairie/ Grassland | Located in tracts of heavily grazed or hayed mixed-grass prairie or mixed-grass/short-grass prairie. |
| Ferruginous Hawk | *Buteo regalis* | Native Prairie | Confined to very limited areas of native prairie, usually those with hilly terrain or with low-grade topsoil that has not been altered by plowing or overgrazing. |
| Grasshopper Sparrow | *Ammodramus savannarum* | Native Prairie | Inhabit open prairie with intermittent brush, avoids heavy brush cover. |
| Lark Bunting | *Calamospiza melanocorys* | Native Prairie/ Grassland | Inhabit short-grass & mixed-grass communities as well as fallow fields, roadsides, and hayfields. |
| Long-billed Curlew | *Numerius americanus* | Native Prairie/ Grassland | Inhabit dry native grasslands. |
| Plains Spadefoot | *Spea bombifrons* | Native Prairie/ Grassland/Cropland | Found in the dry prairies, sagebrush communities, and farm fields. |
| Sprague's Pipit | *Anthus spragueii* | Native Prairie | Inhabit native medium to intermediate height prairie. In short grass prairie landscape, can often be found in areas with taller grasses. More abundant in native prairie than in exotic vegetation. Requires relatively large areas of appropriate habitat. |
| Swainson's Hawk | *Buteo swainsoni* | Native Prairie/ Grassland/Forests | Require native prairie or cropland that includes thickets of natural tree growth, brush margins of native forested tracts, or shelterbelts. |

| Common Name | Scientific Name | Habitat Type | Habitat Details |
|---|---|---|---|
| Upland Sandpiper | *Bartramia longicauda* | Native Prairie/ Grassland | Inhabit mixed-grass prairie, extensive tracts of wet meadow, grazed tall-grass prairie, tame haylands, CRP fields, and mowed or burned railroad or highway rights-of-way. |
| Western Hognose Snake | *Heterodon nasicus* | Native Prairie | Prefers sandy or gravelly habitats like sand prairies, very open portions of prairies, or sand dunes with very low cover. |
| Wilson's Phalarope | *Phalaropus tricolor* | Wetland | Inhabit swales along ephemeral streams and various types of ponds and lakes that contain expanses of shallow water that are interspersed with, or adjacent to, wet-meadow vegetation. |

Source: Hagen et al. 2005

North Dakota's list of Species of Conservation Priority includes five species that are also listed as federally threatened or endangered: the interior least crane, piping plover, pallid sturgeon, whooping crane and gray wolf. These species are discussed above.

Sixteen North Dakota Species of Conservation Priority were observed in or near the Project Area during surveys (Appendix A: Antelope Hills Avian Use report). These included five Level I species and eleven Level II species (Table 16).

**Table 16. Species of Conservation Priority Observed During Wildlife Surveys**

| Common Name | Scientific Name | Conservation Priority Level |
|---|---|---|
| Ferruginous hawk | *Buteo regalis* | 1 |
| Franklin's gull | *Larus pipixcan* | 1 |
| Grasshopper sparrow | *Ammodramus savannarum* | 1 |
| Marbled godwit | *Limosa fedoa* | 1 |
| Swainson's Hawk | *Buteo swainsoni* | 1 |
| American kestrel | *Falco sparverius* | 2 |
| Bald Eagle | *Haliaeetus leucocephalus* | 2 |
| Bobolink | *Dolichonyx oryzivorus* | 2 |
| Golden eagle | *Aquila chrysaetos* | 2 |
| Loggerhead shrike | *Lanius ludovicianus* | 2 |
| Northern Harrier | *Circus cyaneus* | 2 |
| Northern pintail | *Anas acuta* | 2 |
| Sharp-tailed grouse | *Tympanuchus phasianellus* | 2 |
| Upland sandpiper | *Bartramia longicauda* | 2 |
| Western meadowlark | *Sturnella neglecta* | 2 |
| Willet | *Catoptrophorus semipalmatus* | 2 |

## Avian Species

### Avian Point Count Surveys

Antelope contracted WEST to conduct fixed-point avian surveys to estimate seasonal and spatial use of the study area by birds. The surveyors also recorded incidental observations of all diurnal raptors, unusual or unique birds, sensitive species, mammals, reptiles and amphibians detected outside of the standardized survey periods. Birds observed incidentally were recorded but were excluded from avian use calculations. Surveys commenced in September of 2013 and have continued through the summer of 2014. Surveys are still ongoing as of the submittal of this application and are expected to be completed in August 2014.

Seventy-eight bird species were identified during point count surveys and incidental observations through June of 2014. o federally endangered, threatened or candidate species were recorded. Sixteen North Dakota Species of Conservation Priority were recorded, including both bald and golden eagles. Canada goose was the most abundant species, representing 22% of the total number of observations, followed by horned larks, representing 17% of the total number of observations. Ten species of raptors including bald and golden eagles, five hawk species (ferruginous, rough-legged, red-tailed, Swainson's hawk, and northern harrier), one owl species (great horned owl), one falcon (American kestrel) and one vulture species (turkey vulture) were observed. The most common raptor species observed was northern harrier, representing 44% of the total raptor observations.

Six bald eagles and one golden eagle were observed during point counts (Appendix A: Antelope Hills Avian Use report).

### Sharp-tailed Grouse Lek Surveys

Antelope contracted WEST to conduct sharp-tailed grouse lek aerial surveys in April and May 2014, in order to determine the approximate location of leks and provide general information on sharp-tailed grouse use within and immediately adjacent to the Project Area. Surveys were conducted during peak lekking season (early April through mid-May). Eighteen confirmed leks (birds observed in courtship behavior at the same location during more than one survey) and 3 probable leks (birds observed in courtship behavior during only one survey) were recorded in the study area, which extended approximately 0.5 miles beyond the boundaries of the project area as defined at that time. The current Project Area is somewhat smaller than the project boundary used for lek surveys, so is completely covered by the lek survey study area. A copy of WEST's lek survey report is provided in Appendix A.

Eleven of the confirmed leks and 2 of the probable leks are located within the Project Area[1]. The remaining 7 confirmed lek sites were identified within one mile of the Project Area boundary,

[1] The lek report in Appendix X indicates different numbers of leks within the project boundary: 12 confirmed and two probable leks. The difference is due to a change in the project boundary used for the lek survey compared to the Project Area as described in this application; the current Project Area is smaller and contains fewer documented lek sites.

and the remaining one probable lek site is located approximately 1.5 miles outside the Project Area. The maximum number of sharp-tailed grouse recorded on leks ranged from 2 to 24 birds (Table 17). With the exception of lek site #1, all identified leks were located in grassland/hayland habitat. Based on the relatively large number of birds recorded at some leks there is potential for a healthy sharp-tailed grouse population in the area.

**Table 17. Sharp-tailed Grouse Lek Status and Distance to Project Area**

| Lek ID | Lek Status | Maximum number of individuals | Distance to Project Area (miles) |
|---|---|---|---|
| 1 | Confirmed | 18 | 0.9 |
| 2 | Confirmed | 10 | Within |
| 3 | Probable | 12 | 1.5 |
| 4 | Confirmed | 7 | 0.2 |
| 5 | Confirmed | 12 | Within |
| 6 | Confirmed | 12 | Within |
| 7 | Confirmed | 19 | Within |
| 8 | Confirmed | 15 | Within |
| 9 | Confirmed | 8 | Within |
| 10 | Probable | 5 | Within |
| 11 | Confirmed | 8 | Within |
| 12 | Confirmed | 20 | Within |
| 13 | Confirmed | 13 | Within |
| 14 | Confirmed | 12 | 0.6 |
| 15 | Confirmed | 12 | Within |
| 16 | Confirmed | 13 | Within |
| 17 | Probable | 10 | Within |
| 18 | Confirmed | 8 | 0.3 |
| 19 | Confirmed | 15 | 0.7 |
| 20 | Confirmed | 2 | 0.3 |
| 21 | Confirmed | 24 | 1.0 |

### Raptor Nest Surveys

For the purposes of the Project, raptors are defined as kites, accipiters, buteos, harriers, eagles, falcons, and owls. Aerial surveys for raptor nests included the Study Area plus a 1-mile buffer in accordance with guidance provided in the USFWS Inventory and Monitoring Protocols (Pagel et al. 2010). In addition, surveys for eagle nests included the Study Area plus a 10-mile buffer, because the USFWS defines the area nesting population for golden eagle to be the “number of pairs of golden eagles known to have a nesting attempt during the preceding 12 months within a 10-mile radius of a golden eagle nest” (USFWS 2013b).

Aerial raptor nest surveys were conducted in April 2014. Surveyors documented 31 raptor nests representing three identified species: bald eagle, great-horned owl, and red-tailed hawk. Of these nests, 3 were active bald eagle nests, 3 were active great horned owl nests, 9 were active

red-tailed hawk nests, and 16 were inactive unknown raptor nests. Table 18 indicates the nest activity status, associated species and location relative to the Project Area for all raptor nests documented during the survey. No potential or occupied eagle nests are located within the Project Area or the one mile buffer; all eagle nests are at least 5 miles outside the Project Area. Active bald eagle nest density within the 10 mile buffer was 0.004 nests per square mile. Non-eagle raptor nest density, including both active and inactive nests, was 0.307 nests per square mile.

**Table 18. Raptor Nests Documented Within 10 miles of the Project Area**

| Nest ID[1/] | Species | Nest Status | Distance to Project Area (mi) [2/] |
|---|---|---|---|
| 1 | Bald Eagle | Active | 8.2 |
| 2 | Unknown | Inactive | Within |
| 3 | Unknown | Inactive | Within |
| 4 | Red-Tailed Hawk | Active | Within |
| 5 | Unknown | Inactive | 1.0 |
| 6 | Unknown | Inactive | 1.0 |
| 7 | Unknown | Inactive | Within |
| 8 | Red-Tailed Hawk | Active | Within |
| 9 | Red-Tailed Hawk | Active | Within |
| 10 | Unknown | Inactive | Within |
| 11 | Unknown | Inactive | Within |
| 12 | Great Horned Owl | Active | Within |
| 13 | Unknown | Inactive | Within |
| 14 | Unknown | Inactive | Within |
| 15 | Red-Tailed Hawk | Active | Within |
| 16 | Unknown | Inactive | Within |
| 17 | Unknown | Inactive | 0.5 |
| 18 | Unknown | Inactive | 0.5 |
| 19 | Great Horned Owl | Active | 0.5 |
| 20 | Red-Tailed Hawk | Active | 1.0 |
| 21 | Red-Tailed Hawk | Active | Within |
| 22 | Red-Tailed Hawk | Active | Within |
| 23 | Unknown | Inactive | 0.8 |
| 24 | Unknown | Inactive | Within |
| 25 | Red-Tailed Hawk | Active | Within |
| 26 | Red-Tailed Hawk | Active | Within |
| 27 | Unknown | Inactive | 0.4 |
| 28 | Unknown | Inactive | Within |
| 29 | Great Horned Owl | Active | 0.5 |
| BE212 | Bald Eagle | Active | 5.4 |
| BE253 | Bald Eagle | Active | 7.0 |

1/ Nest IDs as assigned by WEST in Raptor Nest Survey Report (Appendix A)
2/ distances are approximate.

### Bat Study

Of the 47 bat species in the United States, 10 occur in North Dakota and may potentially occur within the Project Area based on current known distribution ranges including the little brown bat (Myotis lucifugus), silver-haired bat (Lasionycteris noctivagans), big brown bat (Eptesicus fuscus), eastern red bat (Lasiurus borealis), hoary bat (Lasiurus cinereus), western long-eared myotis (M. evotis), western small-footed myotis (M. ciliolabrum), Keen's myotis (M. keenii), northern long-eared myotis (M. septentrionalis) and long-legged myotis (M. volans) (ASM 2007, NatureServe 2008, BCI 2009). None of the species that potentially occur within the Project Area are federally listed as threatened or endangered. The northern long-eared bat is a state sensitive species and was proposed for listing as endangered by the USFWS in 2013 (USFWS 2013d). Three of the species that could potentially occur within the Project Area – hoary bat, silver-haired bat, and eastern red bat – are highly migratory and are found in the greatest abundance in North Dakota during late May through early September (Cryan 2003).

Antelope contracted WEST to complete a study of bat activity in the Project Area during summer and fall 2014. Acoustic monitoring surveys were conducted at four meteorological tower stations within the Project Area. Surveys were conducted from mid-June through mid-October to capture the fall migratory period. One of the detectors was placed at approximately 45 meters (148 feet) above ground level to record bats flying near rotor heights; the others were placed at ground level. The detectors were programmed to start recording approximately 30 minutes before sunset and turn off approximately 30 minutes after sunset each night.

The standard metric used for measuring bat activity was the number of bat passes per detector-night, and this metric was used as an index of bat activity in the Project Area. To assess potential for bat fatalities, bat activity in the Project Area was compared to existing data at other wind energy facilities in the Midwest.

Acoustic studies for bats are ongoing; however, the Project Area is mostly agriculture and grassland and provides limited habitat for bats. Bat species that may potentially occur in the vicinity of the Project Area, include migratory tree-roosting species (eastern red, hoary, and silver-haired). These species will most likely use the Project Area during migration because trees found along riparian corridors and established windbreaks may provide suitable roosting habitat. The silver-haired bat, hoary bat, and eastern red bat have been found in the highest numbers as mortalities at wind farms throughout North America (Kunz et al. 2007). Big brown bat is considered a generalist and will use trees, caves, and fabricated structures for roosting. Given that big brown bats are widespread and common in North Dakota (USGS 2013a), and the presence of suitable artificial structures and foraging habitat within the Project Area, the species has a high likelihood of occurrence within the Project Area.

WEST is conducting a northern long-eared bat desktop habitat analysis to determine suitable habitat in the Project Area. Suitable habitat was defined as: forests and woodlands containing potential roosts and forested linear features such as fencerows, riparian forests and other

wooded corridors, as well as, human-made structures. Suitable habitat estimated in the Project Area totals 27.30 acres or 0.07 percent of the Project Area.

### *5.5.2 Potential Impacts*

Impacts to wildlife can be short-term (one or two reproductive seasons, generally during the construction period), or long-term (affecting several generations during the life of the Project). Impacts can also be direct (an immediate effect to an individual, population, or its habitat), or indirect (an effect that may occur over time or result from other actions). Direct permanent effects include mortality or injury due to collisions with turbines, guy wires, or transmission lines and mortality of ground and shrub nesting birds and possibly nests by construction vehicles and ground clearing activities.

The presence of wind turbines may alter the landscape so that wildlife use patterns are affected, displacing wildlife away from the Project facilities and suitable habitat. In addition to direct effects through collision mortality, wind energy development results in indirect effects such as direct loss of habitat where infrastructure is placed and indirect loss of habitat through behavioral avoidance and perhaps habitat fragmentation.

Indirect permanent effects including displacement may occur as a result of alterations to the landscape or food availability. Construction also reduces habitat effectiveness because of the presence of access roads and gravel pads surrounding turbines (WEST 2010b, 2011). The greatest concern with displacement effects for wind energy facilities in the United States has been where these facilities have been constructed in grassland or other native habitats (Leddy et al. 1999; Mabey and Paul 2007). Three studies on grassland bird species have shown reduced use of habitat near wind turbines (WEST 2010b). A study of a wind energy facility in Minnesota showed the area of reduced use extended about 100 meters from the turbines, while studies of wind energy facilities in Oregon and Washington showed the area of reduced-use extended approximately 50 meters from the turbines. Based on these studies, there could be a reduction in habitat use by grassland species at the Project site, and this area could extend from approximately 50 to 100 meters from the turbines. Effects to feeding, resting, migrating birds, and breeding birds have been documented at wind energy facilities around the United States (WEST 2010b, 2011; Erickson et al. 2004). It is not known whether birds habituate to wind energy facilities over time, but research on this topic is ongoing.

Direct temporary effects to birds may include temporary displacement from the construction area due to construction noise and activity. Construction noise and activity may result in a reduction in nesting activity in the immediate vicinity, and construction could result in the temporary loss of nests of ground-nesting species.

Indirect impacts to non-avian wildlife would include displacement and loss of habitat for mobile species such as deer or antelope. These effects would not be significant given that displacement in response to construction would be short-term, and the habitat to be lost is common throughout the area.

## Federally Listed and Candidate Species

### Black-footed Ferret

The Project is unlikely to affect black-footed ferret as there have not been any prairie dog colonies found in the Project Area and it is unlikely that black-footed ferrets are present.

### Gray Wolf

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

### Interior Least Tern

The Project is unlikely to impact interior least tern, as there have been no documented occurrences of the species in or near the Project Area.

### Pallid Sturgeon

The Project will have no impact on pallid sturgeon, as there is no habitat for this fish within the Project Area, and the Project will not impact water quality in the Missouri River or its major tributaries where the pallid sturgeon is known to occur.

### Whooping Crane

No whooping cranes were observed during fall or spring wildlife surveys for the Project, and there are no historical records of whooping cranes occurring within the Project Area. The overall suitability rating for wetland habitat in the Project Area is below what is considered to be suitable potential habitat for whooping cranes. In addition, a study was presented at the 2012 National Wind Coordinating Collaborative meeting describing avoidance behavior of whooping and sandhill cranes at a wind farm in South Dakota (Nagy et al. 2012). Sandhill cranes altered flight trajectory away from turbines when flying within the height of the rotor-swept area more often than when flying above the rotor-swept area. It is likely that whooping cranes will respond similarly and move around wind turbines.

### Piping Plover

The Project is unlikely to impact piping plover, as there have been no documented occurrences of the species in or near the Project Area.

### Northern Long-eared Bat

The Project is unlikely to impact Northern long-eared bat because there is low potential for suitable habit in the Project Area.

### Rufa red knot

The Project is unlikely to impact Rufa red knot, as there have been no documented occurrences of the species in or near the Project Area.

### Sprague's Pipit

The Project may impact individual Sprague's pipits during the spring and fall migration through collision with the turbines. However, any impacts are expected to be minimal as the species was not detected during surveys.

## State Species of Conservation Priority

Sixteen North Dakota Species of Conservation Priority were observed during wildlife surveys, and an additional 13 Level 1 species are known to occur in Mercer County (see Table 16 and 17, respectively). The impacts discussion below related to passerines, grouse, and raptors covers impacts to State Species of Conservation Priority.

## Avian Species

### Passerines

Passerines (songbirds) were the most abundant bird type observed during surveys. Migrant passerines are found more often in post-construction mortality monitoring compared to other groups of birds (Arnett et al. 2007, Strickland and Morrison 2008, Strickland et al. 2011). Although nocturnal migrants comprise the majority of songbird fatalities, the proportion of migrating songbirds killed at any given wind project during migration is reported to be low (Strickland et al. 2011). Locally breeding songbirds may experience lower mortality rates than migrants because many of these species tend not to fly at turbine heights during the breeding season, except some species with aerial flight displays in the rotor swept area (Pickwell 1931, Johnson and Erickson 2011).

During the avian surveys, 41 species of songbirds were observed, totaling 2,940 observations. Horned larks had the highest number of observations (795), followed by western meadowlark (266), and red-winged blackbird (328). Although these species have been documented at other wind energy facilities, if fatalities occur at the Project, they are unlikely to have population-level impacts.

### Grouse

Prairie grouse have been identified as a group that exhibits avoidance behavior. Particular concern over avoidance issues has been raised by agencies and non-governmental groups with respect to grouse species (USFWS 2012b). The only published research on operational wind facilities and grouse show that sage-grouse continue to use habitats near wind energy facilities; however, the researchers state that in long-lived species, long-term data sets are needed to adequately assess impacts (Johnson et al. 2012). Given the lack of wind-specific studies, wildlife agencies have relied on research from other types of development to evaluate potential impacts to grouse. To date, this research is limited to observational studies, with results varying by grouse species and source of disturbance (i.e., roads, oil and gas wells, vertical structures, and transmission lines).

Studies of grouse have documented that some species of grouse avoid transmission lines, improved roads, buildings, oil and gas wells, and communication towers (Pitman et al. 2005, Pruett et al. 2009, Johnson et al. 2012). However, other studies have found no evidence of avoidance of transmission lines or of wind facilities (Johnson et al. 2012). Although some studies have concluded that avoidance of other development is based on height, which could drive avoidance of wind turbines, Walters et al. (2014) found that, in most published studies, the effect of the height of a structure could not be conclusively isolated from the other effects of energy development.

**Raptors**

Thirty-one raptor nests representing three species were documented during 2014 surveys, of which 3 were active bald eagle nests. Nineteen raptor nests were located in the Project Area, although none were eagle nests. Six observations of bald eagles and one observation of a golden eagle flying through the area confirm the potential utilization of the area by eagles, however, the probability of mortality with Project facilities is low. Northern harrier had the highest number of observations (49), followed by red-tailed hawk (27). Surveys are still ongoing as of the submittal of this application and are expected to be completed in August 2014.

**Bats**

Overall, there is a low likelihood of occurrence for bat species for the entire Project Area, because lands are mostly agriculture and grassland which provide limited habitat for bats. Acoustic surveys are ongoing; however, should bats occur in the Project Area, the potential for direct impacts (e.g., mortality resulting from turbine collisions or barotraumas) will be minimized by turbine siting away from areas of potential bat activity such as wetlands.

## *5.5.3 Mitigative Measures*

**Federally Listed and Candidate Species**

Antelope will implement avoidance and minimization measures and BMPs for wildlife species that have a potential to be in the Project Area as appropriate:

**Whooping Crane**

*Survey Requirements and Avoidance Measures:*

- Conduct preconstruction evaluations and/or surveys to identify wetlands that provide potentially suitable stopover habitat.
- Do not site turbines, transmission lines, access roads, or other project facilities within or adjacent to wetlands that provide suitable stopover habitat.

*Conservation Measures:*

- Place state-of-the-art bird flight diverters on any new or upgraded overhead collector, distribution, and transmission lines located within 1 miles (1.6 kilometers) of suitable stopover habitat.
- Although use of the project area by whooping cranes is unlikely, on-site monitoring for whooping cranes will be conducted during spring and fall migration periods throughout the operational life of the project (or as long as determined to be necessary) and shutting down turbines and/or construction activities within 2 mi (3.2 km) of whooping crane sightings. This monitoring will be conducted by trained on-site operations personnel. Training will be completed by biologists familiar with identification of whooping cranes. In addition to training, job aids such as posters, identification guides, and laminated placards will be included.
- Instruct workers to avoid disturbance of cranes present near project areas.

**State Species of Conservation Priority and Avian Species**

Antelope will prepare a Bird and Bat Conservation Strategy based on the USFWS Wind Energy Guidelines. The overall goal of such a plan is to reduce or eliminate avian and bat mortality. Antelope will work with the USFWS and the NDGFD to identify protective measures to include in the plan.

## 5.6 Land Use/Farmland

### *5.6.1 Existing Conditions*

The land within the Project Area is primarily in private ownership, and is largely in agricultural use including crops and livestock grazing, with scattered farmstead residences. The Project Area is not located within any city limits or any military installation. There are several industrial developments in the Project Area, including Basin Electric's 345 kV transmission line, that runs along a portion of the southern Project Area boundary, one functioning oil and gas well, a small collection of oil and gas storage tanks, and one communication tower. State Highway 1806 runs east-west through the Project Area. Other roads within the Project Area include two paved county major collector roads (2905 and 2913), gravel surfaced county roads and two-track farm access roads and trails.

No part of the Project Area is located within 1,200 feet of the geographic center of an intercontinental ballistic missile (ICBM) launch or launch control facility.

**County Land Use Regulation**

The Project is subject to land use regulation by Mercer County. Zoning has been adopted; the entire Project Area is zoned for Agricultural use.

Under the Mercer County Zoning Ordinance (MCZO), the construction of a wind energy facility in the Agricultural District requires a Conditional Use Permit (MCZO Chapter 3, Section I,

Conditional Uses list letter O). The entire Project Area is zoned for Agricultural use. An application for a Conditional Use Permit will be filed with Mercer County in August, 2014. The MCZO include specific provisions for wind turbines, including defined setbacks as follows:

- Each wind turbine is to be set back a distance of at least 1,000 feet from occupied residences, commercial buildings or publicly used structures or facilities.
- Each wind turbine is to be set back from the edge of right-of-way of public roads and above-ground communication or electrical lines a distance of not less than 110 percent of the total turbine height.
- Each wind turbine is to be set back from the perimeter of the facility by a distance not less than 110 percent of the total turbine height; a variance may be granted if an authorized representative or agent of the permittee and those affected parties of adjoining properties with associated wind rights, sign a formal and binding agreement expressing all parties' support for a variance that might reduce the setback requirement.
- Each wind turbine is to be set back from any property line by a distance not less than 110 percent of the total turbine height, unless a wind easement has been obtained from the adjoining property owner.

In addition, non-agricultural structures are to be set back a minimum of 150 feet from the centerline of county, state, and federal highways and roads. Non-agricultural structures are to be set back a minimum of 50 feet from side and rear lot lines (MCZO Chapter 3, Section 1, District Regulations). These provisions would apply to the O&M Building and substation; the location of these structures will be adjusted as needed during final design to comply with these provisions.

Additional administrative permits would be needed for construction of the Project in Mercer County. Building permits would be needed, and structures must comply with the North Dakota State Building Code and any future amendments or revisions to that code. County road access permits, utility crossing permits, and permits to work with county rights-of-way would also be needed. An erosion and sediment control plan may also be required. These would be obtained by Antelope's construction contractor.

### USFWS Wetland and Grassland Easements

The USFWS has been purchasing wetland easements in the Prairie Pothole Region since 1989. Easement wetlands are part of the National Wildlife Refuge System. There are no USFWS wetland easements in the Project Area or in Mercer County (NCED 2013).

### Conservation Reserve Program (CRP) Easements

The Natural Resource Conservation Service (NRCS) and Farm Services Agency administer a number of conservation-based programs for private landowners. The CRP conserves soil and water resources and provides wildlife habitat by removing enrolled tracts from agricultural production, generally for a period of 10 years. The NRCS administers a number of conservation-based programs for private landowners. These tracts cannot be hayed, tilled, seeded, or

otherwise disturbed without the authorization of the NRCS. The 2002 Farm Bill amended Section 3832 of the Farm Security and Rural Investment Act to allow the use of CRP land for wind energy generation.

According to the Farm Services Agency, there are a total of 3,229.3 acres of land in Mercer County enrolled in CRP as of March, 2014); the Project Area may include some lands that are enrolled in CRP. Antelope will work with landowners within the Project Area to determine if any lands are enrolled in CRP. Should any CRP lands be identified, Antelope will avoid those areas to the extent practicable during micrositing. If avoidance is not practical, Antelope will work with the landowner and USDA to determine an appropriate course of action.

### USDA Loan Coordination

The USDA offers a variety of loans through its Rural Development program. Land under loans from the USDA requires special coordination with the USDA if non-agricultural project activities are proposed within those parcels. The Project Area may include some lands that have used USDA loads and are therefore subject to USDA review. Antelope will work with landowners within the Project Area to determine if any lands are under USDA jurisdiction due to loans. Should any loan coordination lands be identified, Antelope will work with the landowner and USDA to determine appropriate avoidance or mitigation measures, if necessary.

### Private Land Open to Sportsman (PLOTS)

NDGFD runs the PLOTS program, under which private lands may be opened to public hunting use. These lands are enrolled in one of three NDGFD programs to enhance fish and wildlife populations for sustained public use, and may also be jointly enrolled in other federal programs such as the CRP described below.

As of April 2014 there is one parcel enrolled in the PLOTS program within the Project Area: T145N, R89W, West ½ Section 12 (see Figure 14). There are no other PLOTS parcels located near the Project Area; the nearest is located 2.5 miles west of the Project Area, in Dunn County (NDGFD 2014).

### Wildlife Management Areas

Wildlife Management Areas (WMAs) are state-owned lands managed by the NDGFD for wildlife habitat. There is one WMA, the Golden Valley WMA, within the Project Area (Figure 14). The 160-acre Golden Valley WMA is located in Section 32, T146N R 89W, and offers sharp-tailed grouse and deer hunting opportunities. The Project is designed to avoid impacts to the Golden Valley WMA.

There are two WMAs located near the Project Area. The Beaver Creek WMA is one mile to the north of the Project Area at the southern end of Beaver Creek Bay, and the Hille WMA is approximately 2.6 miles to the northeast of the Project Area (Figure 14). Both of these WMAs are adjacent to Lake Sakakawea on lands managed by the USACE, and offer hunting and fishing opportunities.

## State Trust Lands

There are five State Trust lands parcels within the Project Area. Each parcel is a quarter-section of land, for a total of 200 acres of state lands in the Project Area. The State lands parcels are in the following locations (see Figure 2):

- Township 145N, Range 88W, SW ¼ Section 5
- Township 145N, Range 88W, NW ¼ Section 16
- Township 146N, Range 89W, SE ¼ Section 36
- Township 146N, Range 90W, NE ¼ Section 36
- Township 146N, Range 90W, NW ¼ Section 36

## Federal Lands

There are no federally-owned or –managed lands within the Project Area.

Lake Sakakawea is located 2.9 miles from the closest turbine location (Figures 5A, 5C and 13). Lake Sakakawea was formed in 1954 with construction of the Garrison Dam. The lake and adjacent lands are maintained by the USACE for recreation (camping, picnicking, boating, fishing), fish and wildlife enhancement, flood control, hydropower production, navigation, and irrigation. USACE has multiple public use areas (PUAs) and grasslands along the lake, including the Beaver Bay PUA, Beaver Bay Grassland, and Lake Sakakawea Grassland.

## Tribal Lands

There are no tribally-owned or managed lands within the Project Area.

The Project Area is located less than one mile south of the Fort Berthold Reservation boundary. This reservation is home to the Mandan, Hidatsa, and Arikara Nation, also known as the Three Affiliated Tribes (MHANation.com, 2006). The 1851 Fort Laramie treaty defined the Reservation boundary as a very large area along the Missouri River. Because the Fort Laramie treaty was never ratified by Congress, the Reservation was determined in 1870 to have no legal standing, and was redefined with the smaller boundary it has today (Three Affiliated Tribes, 2010). The Reservation currently covers approximately 988,000 acres in Mercer, McClean, Ward, Dunn, McKenzie, and Mountrail counties and has a population of approximately 3,776. Much of the land within the current Reservation boundaries is privately owned by non-tribal members, with the rest being tribally-owned, government-owned, or allotment land. There is a Tribal Energy Department that is responsible for development of energy resources within the Reservation boundaries; to date, most of this development has been in oil and gas. However, the Department's website indicates it is also responsible for development of alternative and renewable resources (MHAEnergy.com, 2010).

## Other Exclusion and Avoidance Areas

NDAC 69-06-08-01.1a lists ten categories of nationally-designated land uses to be avoided; these include designated or registered national: parks, memorial parks, historic sites and

landmarks, natural landmarks, historic districts; monuments, wilderness areas, wildlife areas; wild, scenic, or recreational rivers; wildlife refuges; and grasslands. None of these occur within or near the Project Corridor.

NDAC 69-06-08-01.1b also lists seven categories of state-designated land uses to be avoided; these include designated or registered state: 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. With the potential exception of previously unknown archaeological sites that may be discovered during construction and the wildlife management areas noted above, none of these occur within or in close proximity to the Project Corridor.

NDAC 69-06-08-01 also requires avoidance of Areas within 1,200 feet of the geographic center of an intercontinental ballistic missile (ICBM) launch or launch control facility. There are no missile launch sites or control facilities in Mercer County; the nearest missile sites are located over 20 miles to the northeast.

NDAC 69-06-08-1.3 establishes avoidance areas, which include areas within the city limits of a city or the boundaries of a military installation. The Project Area does not contain any lands within existing city limits or military installations.

### *5.6.2 Potential Impacts*

The development of the Project will not displace any residents or existing or planned industrial facilities. Wind turbines will be sited a minimum of 1,320 feet from occupied residences in, in accordance with the recommended setbacks from the North Dakota PSC. Setbacks to roads and nonparticipating lands as established by county and state regulations would also be observed.

The Project would not impact any wetland easements, wetlands management districts, PLOTS lands, or wildlife management areas. If Project facilities are proposed for parcel enrolled in CRP and it is not practical to move such facilities, Antelope will work with landowners to determine whether the parcel should be removed from the program and if reimbursement is necessary.

### *5.6.3 Mitigative Measures*

Operation of the wind farm will not change the land use in the majority of the Project Area. The proposed land use will not involve any ongoing industrial use of non-renewable resources or emissions into the environment. Consequently, no further mitigative measures are proposed.

# 5.7 Transportation

## *5.7.1 Existing Conditions*

**Ground Transportation**

Most construction equipment and materials would arrive at the Project Area via truck, along Interstate Highway 94 (I-94). From I-94, the most direct route to the Project Area is via State Highway 49 (ND-49), which runs from an interchange at I-94 north into Beulah. From Beulah, a number of routes into the Project Area are possible, which would utilize a combination of state highways and major county collector roads. For example, one route would continue northward on 58th Avenue (County Route CR 21 [CR-21]) to ND-1608, which passes east-west through the Project Area. Depending on the specific location to which equipment or materials would be delivered other routes may be used. Major county collector roads that may be used include County Routes 5 and 13 within the Project Area, and County Routes 15, 16, 17, and 21 outside the Project Area. ND-200, which runs east-west a few miles south of the Project Area, may also be used depending on the specific delivery location.

It is possible that Project some materials or equipment may be delivered by rail. A Burlington Northern Santa Fe (BNSF) rail line runs near ND200 to the south of the Project Area, with a spur to the Antelope Valley Generating Station.

Local roads within the Project Area would also be used for Project construction and operation. Local county roads are spaced throughout the Project Area; these are generally section line roads. However, while section lines in North Dakota are all designated as public right-of-way, not all such right-of-way is owned or maintained by the local counties. Local county roads within the Project Area include paved, gravel, dirt and unimproved roadways. Mercer County roads within the Project Area are shown on Figures 6A, 6B and 6C.

Traffic volume data in the vicinity of the Project are limited. No vehicle count data are available for the county and township roadways in the Project Area. Traffic counts are available for some roads in the vicinity. Available existing traffic volumes on the area's roadways are documented in Table 19.

Additional county and township roads run through the Project Area in addition to those listed in Table 19, but no vehicle count data are available for them. In general, the NDDOT indicated that roads with vehicle counts under 100 vehicles per day, or Average Annual Daily Traffic (AADT), are rarely counted. According to NDDOT, vehicle counts on routes with no count data are likely lower than those with count data. For purposes of comparison, the functional capacity of a two-lane paved rural road is approximately 5,000 AADT. Paved four-lane highways such as I-94 have a functional capacity of approximately 80,000 vehicles per day. Based on these data, traffic volumes on the roads in and near the Project Area are low and levels of service are high.

**Table 19. Existing Daily Traffic Levels**

| Roadway Segment | Existing AADT/Commercial Truck Traffic |
|---|---|
| I-94 at ND-49 Interchange | 8635/ 2405 |
| I-94 at ND-49, eastbound off-ramp | 835/ 105 |
| I-94 at ND-49, westbound off-ramp | 275/ 60 |
| ND-49 north of I-94 | 1665/ 315 |
| ND-49 at south end of Beulah | 2640/ 675 |
| ND-49 0.25 mile south of ND-200 | 4170/ 485 |
| ND-49 0.25 mile north of ND-200 | 2900/ 260 |
| ND-200 west of ND-49 | 1585/ na |
| ND-1806 west of CR-21 | 240/ 55 |
| CR-5 north of ND-1806 | 95/ 10 |
| ND-200 northeast of Zap | 1615/ 395 |
| ND-200 north of Zap | 1295/ 350 |
| CR-13 north of ND-200 | 240/ 35 |
| Source: North Dakota DOT Transportation Information Map (NDDOT 2013). | |

## Air Transportation

There are 2 public airports and 8 private airports within 25 miles of the Project Area (Table 20). Setbacks from public and private airports follow North Dakota Aeronautics Commission and Federal Aviation Administration (FAA) requirements. The North Dakota Aeronautics Commission has provided guidance on other wind projects related to safety for crop dusting aircraft to decrease their risk of colliding with met towers and turbines.

**Table 20. Public/Private Airports within 25 Miles of the Project Area**

| Airport Name | Type | Distance from the Project Area (miles) | Direction from the Project Area |
|---|---|---|---|
| Beulah | Public | 9.0 | South-Southeast |
| Mercer County Regional Airport | Public | 15.4 | East-Southeast |
| Frei Private | Private | 3.7 | West |
| Brecht Strip | Private | 4.3 | South |
| Fredericks Ranch | Private | 6.0 | Northwest |
| Indian Hill Resort | Private | 9.2 | North |
| Sakakawea Medical Center | Private | 13.8 | East-Southeast |
| Smith Strip | Private | 17.8 | Southwest |
| Sunset Strip | Private | 21.1 | Southwest |
| Fischer Private Airport | Private | 23.3 | Northeast |

Notice to the FAA allows the agency to evaluate the effect of the proposed construction on air safety and navigable airspace, which begins with a determination of whether the proposed

structure represents an obstruction. Obstructions are defined in 14 CFR 77, Subpart C (Sections 77.13 through 77.23), which defines obstructions based on both absolute height of the proposed object and height in relation to protected airspace, in effect establishing five distinct thresholds. The first threshold is defined in Section 77.17(a)(1) as an object that is greater than a height of 499 feet above ground level at the site of the object. The second threshold is defined in Section 77.17(a)(2) as an object with "a height that is 200 feet AGL, or above the established airport elevation, whichever is higher, within 3 nautical miles [3.45 statute miles] of the established reference point of an airport, excluding heliports, with its longest runway more than 3,200 feet in actual length." As with the notification requirement, "airport" is defined as a public use airport, a military airport, an airport operated by a federal agency or the Department of Defense (DOD), or an airport with an FAA-approved Instrument Approach Procedure (IAP).

Antelope will be required to file a Notice of Proposed Construction with FAA due to the height of the proposed turbines. The second threshold for notice is not triggered, because there are no airports within 3 nautical miles of the Project Area. Antelope has received Determinations of No Hazard based on preliminary locations that have been filed with the FAA.

The FAA's online Department of Defense (DoD) Preliminary Screening Tool indicates that the Project Area lies within the confines of two Military Training Routes (MTR): IR644 and IR649. IR-designated routes are flight corridors in which military aircraft may exceed the standard flight speed limit of 250 knots, up to 420 knots, and in which military aircraft may fly below the standard floor of 1,500 feet above ground level (AGL). The minimum flight elevation on both routes is 200 feet AGL; however, these two routes are used only for B-52 training flights, which are not permitted to fly below 1000 feet AGL. The Air Force has indicated that the Project would therefore not pose a problem for these routes, and that the Project would not be opposed (personal communication, Denny Hough, Chief of Airspace Management, Minot Air Force Base, 4/3/2014). Formal notice was be given to the Air Force through the filing of the Notice of Proposed Construction with the FAA that were submitted based on preliminary turbine locations. As noted above, Determinations of No Hazard have been issued for the Project.

## *5.7.2 Potential Impacts*

**Ground Transportation**

Construction will increase traffic on local roads to the Project Area, possibly causing temporary impacts to local traffic flow while equipment is hauled to the site. There are several roads near the Project Area on which construction-related traffic will be concentrated. It is anticipated that construction-related vehicles will primarily use I-94 and ND-49 to Beulah, and major county collector roads into the Project Area. While the number of vehicle trips for workers and equipment has not been modeled, construction traffic is highly unlikely to materially impact local traffic patterns or lower the existing levels of service, given the low volume of existing traffic.

Construction of the Project will require the movement of oversize/overweight loads on public roads. The EPC contractor will obtain any necessary permits for transporting equipment and

materials, and will implement traffic control measures as appropriate to limit the impacts of those loads on other road users.

Operation of the Project is not expected to result in any significant traffic issues on the area highways or state roads because there will be only a minor increase in traffic (only a few vehicles per day). In the event that major maintenance of a turbine is required that necessitates the use of large equipment or involves large turbine components, the necessary trip permits will be obtained and traffic controls will be implemented as needed to limit the impacts to other road users.

Impacts to existing road infrastructure will mostly be positive. Construction activities will use the existing section line roads whenever possible. Where needed, existing local roads will be improved to allow heavy construction cranes and extra-long trucks used to transport turbine blades. These improvements will remain in place following the completion of construction to assist with access and maintenance of the proposed facilities. Roads damaged during construction will be returned to pre-construction condition or better.

**Air Traffic**

The installation of wind turbines creates a potential for impacts to air traffic. However, the wind turbines and meteorological towers will have lighting and markings that comply with FAA requirements. Due to minimal air traffic, distance of the Project Area from airports in the region, generally good visibility, and the inclusion of turbine lighting, no impact to air traffic is anticipated.

In July, 2013 the Project received Determinations of No Hazard to Air Navigation based on the preliminary Project layout; additional Notices of Proposed Construction will be filed with FAA once the layout is finalized, with the expectation that any modifications to the layout would also result in determinations of no hazard. The Project would not affect protected airspace for any airport, because there are none within close proximity to the Project Area. The Project is not anticipated to pose a conflict for military aircraft training (personal communication, Denny Hough, Chief of Airspace Management, Minot Air Force Base, 4/3/2014). Filing of the Notice of Construction with FAA will enable FAA to mark the Project location on aeronautical charts, thus providing notice to pilots flying in the area.

## *5.7.3 Mitigative Measures*

Antelope will observe the setbacks to roadways as established by the State in NDAC 69-06-08 during final micrositing of Project infrastructure. The observance of these setbacks would prevent damage to area roadways or disruptions to local travel in the unlikely event of a catastrophic failure of a wind turbine.

Antelope will implement the following avoidance and mitigation measures to minimize impacts to transportation infrastructure:

- Existing roads will be used to the extent possible.

- Project personnel and contractors will be instructed and required to adhere to speed limits commensurate with road types, traffic volumes, vehicle types, and site-specific conditions to ensure safe and efficient traffic flow.
- During construction, operations and maintenance, and decommissioning phases, traffic will be restricted to designated project roads. Use of other unimproved roads will be restricted to emergency situations.

## 5.8 Human Health and Safety

This section considers potential Project impacts to human health and safety.

### *5.8.1 Existing Conditions*

**Telecommunication and Radar**

Wind turbines can cause loss of detection, false alarms, and corrupt data for primary and weather surveillance radar. This is a concern for air traffic control, DOD, Department of Homeland Security, FAA, and for weather radar. The potential impacts to NEXRAD (next generation weather radar) area are greatest within 10 nautical miles of a radar unit. Non-federal beam paths (such as for commercial radio stations) can also be impacted.

A microwave beam path study was conducted to identify all non-federal microwave telecommunication systems, as well as AM, FM, cellular, and television tower locations (see report in Appendix A). There are no microwave beam pathways crossing the Project Area. One private land mobile communication tower is located within the eastern end of the Project Area (T145N, R88W, Section 7). A large cluster of FCC-registered towers, including microwave towers, are located at the Antelope Valley Power Plant, about two miles east of the Project Area.

The FAA's online DOD Preliminary Screening Tool allows developers to gain preliminary insights regarding potential impacts that structures may have on long range radars, military training routes, and special use airspace prior to official filing of an Obstruction Evaluation/Airport Airspace Analysis request with the FAA. This tool does not replace any official processes or procedures that may be required by the FAA. The FAA will need to review and authorize the proposed turbine locations prior to construction.

The Preliminary Screening Tool results indicate that the Project would have no impact to Air Defense and Homeland Security radars or to Weather Surveillance Radar operations.

**Electromagnetic Fields**

The term electromagnetic fields (EMF) refers to electric and magnetic fields that are present around any electrical device. Electric fields arise from voltage, or electrical charge, and magnetic fields arise from current, or the flow of electricity that travels along transmission lines, power collection lines, substation transformers, house wiring, and electrical appliances. The

intensity of the electric field is related to the voltage of the line, and the intensity of the magnetic field is related to the current flow through the conductors.

**Shadow flicker**

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

**Hazardous Materials / Hazardous Waste**

The Project Area is located in a relatively rural area of North Dakota. Potential hazards may exist in rural areas from old gasoline facilities, landfill sites, and private activities. Hazardous wastes from large industrial or commercial activities are not likely.

The U.S. Environmental Protection Agency (USEPA) Superfund National Priorities List database was reviewed to determine the potential for major hazardous material issues within the Project Area. The database also lists sites registered under other EPA programs including Conditionally Exempt Small Quantity Generators (CESQG) and Toxic Release Inventory Sites (TRIs). No National Priorities List sites are present within the Project Area (USEPA CERCLIS 2013). No CESQG, TRI, or any other EPA-listed sites occur within or near the Project Area. NDDOT maps were also consulted as they often identify known dumps in the area; there are no known dumps in the Project Area. Basin Electric's Antelope Valley Generating Station and the adjacent Beulah Great Plains Gasification Plant are both registered as hazardous waste generators and handlers and have air emissions permits. There are no other hazardous waste handlers or toxic release inventory sites located within the Project Area or within 5 miles of the Project Area (National Atlas 2003).

Potentially hazardous materials associated with the Project include gear box oil, hydraulic fluid, and gear grease for the turbines, and mineral oil used for the transformers.

## *5.8.2 Potential Impacts*

**Telecommunication Interference**

A beam path study was conducted to identify all non-federal microwave telecommunication systems, as well as AM, FM, cellular, and television tower locations. There are no microwave beam pathways within the Project Area, therefore the Project would not interfere with microwave communications.

With the switch to digital television in 2009 throughout the United States, the concern of ghost images and flickering that may be caused by wind turbine interference with analogue signals are no longer an issue.

The Long Range Radar Screening Tool indicates that there would be no impacts to Air Defense and Homeland Security radars or to Weather Surveillance Radar or Doppler Radar. When the notice of proposed construction to the FAA is filed (see Section 4.16), the FAA will conduct an aeronautical study that will include an assessment of potential impacts to radar systems.

### Electromagnetic Fields

While the general consensus is that electric fields pose no risk to humans, the question of whether exposure to magnetic fields can cause biological responses or health effects continues to be the subject of research and debate. Low-level power frequency EMF will occur around the wind turbine generators (in the nacelles), around the GSU transformers, along the collector lines and at the Project substation. All Project facilities would be set back from residences as required by state and county regulation. At these distances EMF levels would not be above background levels. The only exposure will be brief exposure to maintenance workers, primarily at the substation. Because the Project will be constructed to meet NESC standards, electromagnetic fields will be limited to acceptable industry standards; with this and the limited exposure times of workers, no adverse impacts to public or worker health and safety will be created.

### Shadow Flicker

Shadow flicker impacts are not regulated in applicable state or federal law, and there is no permitting trigger or established threshold of significance with regard to hours per year of anticipated shadow flicker impacts to a receptor from a wind energy project.

The British Epilepsy Foundation states that there is no evidence that wind turbines can cause seizures (Epilepsy Action 2008). However, they recommend that wind turbine flicker frequency be limited to 3 Hz. Since the Project's wind turbine blade pass frequency is approximately 0.9 Hz (less than 1 alternation per second), no negative health effects to individuals with photosensitive epilepsy are anticipated.

A shadow flicker study was conducted for the wind turbine models being considered for the Project using WindPro (Appendix A). The analysis included both the primary and alternative turbine locations for the turbine layouts analyzed. [RESULTS OF THE SHADOW FLICKER ANALYSIS ARE STILL PENDING AND WILL BE SUBMITTED WHEN COMPLETE]

Antelope will maintain a minimum setback of 1,320 feet from occupied residences as recommended by the PSC, exceeding Mercer County's residential setback standard of 1,000 feet. The observance of this setback will minimize potential impacts from shadow flicker.

The analysis of potential shadow flicker impacts from the Project on nearby receptors shows that shadow flicker impacts within the area of study are expected to be minor and well within acceptable ranges for avoiding nuisance and/or health hazards. Effective mitigative measures

for shadow flicker include vegetation planting and curtains; if any landowners in or near the Project Area have an issue with shadow flicker, Antelope will work with them to the extent practical.

**Hazardous Materials / Hazardous Waste**

All hazardous materials will be handled and disposed of in accordance with state and federal regulation. The potential for spills of hazardous materials will be mitigated by the implementation of a Spill Prevention, Control and Countermeasures (SPCC) Plan during construction of the Project. An SPCC Plan would not be necessary during the operational phase of the Project, because the only significant quantities of hazardous materials would be contained within wind turbines and the substation transformers, switches and circuit breakers. These are considered qualified oil-filled operational equipment, and require the establishment of an inspection and monitoring program, as well as a spill contingency plan and the commitment of resources to expeditiously control and remove any discharged oil. These measures will reduce the level of risk for human health impacts to a level of non-significance.

## *5.8.3 Mitigative Measures*

All facilities will be constructed in accordance with the National Electrical Safety Code, U.S. Department of Labor Occupational Safety and Health Standards, and other applicable State safety standards.

**Telecommunication Interference**

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

**Electromagnetic Fields**

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

**Shadow Flicker**

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

**Hazardous Materials / Hazardous Waste**

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

# 5.9 Air Resources

## *5.9.1 Existing Conditions*

USEPA and the North Dakota Department of Health (NDDoH) regulate air quality in North Dakota through implementation of the Federal Clean Air Act (CAA) (42 U.S.C. §§ 7401-7671q). The CAA requires the adoption of National Ambient Air Quality Standards (NAAQS) to protect the public health and welfare from the effects of air pollution. The CAA defines NAAQS as levels of pollutant above which detrimental effects on human health and welfare could occur. A state or region is given the status of "attainment" if the NAAQS thresholds have not been exceeded for any criteria pollutant, or "nonattainment" for a specific pollutant if the NAAQS thresholds have been exceeded for that pollutant. Standards are provided for sulfur dioxide ($SO_2$), carbon monoxide (CO), nitrogen dioxide ($NO_2$), ozone ($O_3$) particulate matter less than 10 microns (PM10), particulate matter less than 2.5 microns (PM2.5), and lead (Pb), which are known as the criteria pollutants.

The entire state of North Dakota is in attainment of all state and federal air quality standards, and no exceedences have been reported for at least the past ten years[2]. Relatively high concentrations of total suspended particulates (dust) may occur in springtime from farming operations and strong winds; however these have not and are not likely to exceed NAAQS.

## *5.9.2 Potential Impacts*

Direct impacts to air quality would include temporary increases in vehicle emissions and dust during construction. All such impacts would be limited to the period of construction, and are not expected to cause an exceedence of any NAAQS or federal guidance related to greenhouse gas (GHG) emissions.

GHG emissions from construction equipment and construction vehicle use are expected to be well below the 25,000 metric tons $CO_2e$ per year threshold of potential significance. GHG emissions from decommissioning would be similar. The Project itself will not generate GHG emissions, so GHG emissions during the operational phase would be limited to emissions from occasional maintenance operations. These are expected to be negligible.

GHG emissions from a wind farm can be estimated using several techniques. The first technique requires a detailed analysis of the types and usage of construction equipment, the number of trips made to deliver materials and equipment to the site, the number of construction worker trips, the amount of concrete made, the construction processes used for wind farm

[2] Annual reports of the North Dakota Department of Health Air Quality Monitoring program were reviewed for the years 2000 to 2011; these and additional annual reports are available online at: http://www.ndhealth.gov/AQ/AmbientMonitoring.htm

construction, and other factors. The West Butte Wind Power Project[3] provides an example of such an analysis. West Butte Wind proposed a 104 MW project with up to 52 turbines; their analysis arrived at a total of 4,066.7 metric tons $CO_2e$ over the entire lifespan of the facility. Of that, 1,321.7 metric tons $CO_2e$ emissions (32 percent) would occur during construction (see West Butte Wind Final EIS section 3.11.2; BLM 2009). Most of those emissions would occur during construction and decommissioning of the project, and the total amount of GHG emissions is highly dependent on the number of turbines constructed. Assuming that this analysis can be scaled up in direct proportion to the total number of turbines, this would indicate that the Antelope Project, with up to 86 turbines, would result in approximately 6,710 metric tons $CO_2e$ over its entire lifespan. Less than half of that would occur during the year of construction and again in the year of decommissioning, and a small portion would occur during the projected 30 years of project operation. Even allowing for a generous margin of error, the estimated emissions attributable to the Project would be far below the 25,000 metric tons per year $CO_2e$ threshold of potential significance established in the 2010 CEQ guidance.

Emissions related to operation of the Project would primarily be extremely minor exhaust emissions from maintenance vehicles. Additional emissions would be generated by major maintenance actions, such as replacement of a gearbox or other major turbine component, should such actions be necessary. These emissions would not cause any detectable impacts to regional air quality.

### *5.9.3 Mitigative Measures*

Antelope will implement measures applicable to reducing air quality impacts, including the following:

- Use surface access roads, on-site roads, and parking lots with aggregates or that maintain compacted soil conditions to reduce dust generation.
- Post and enforce lower speed limits on dirt and gravel access roads to minimize airborne fugitive dust.
- Minimize potential environmental impacts from the use of dust palliatives by taking the necessary measures to keep the chemicals out of sensitive terrestrial habitats and streams. The application of dust palliatives must comply with Federal, State, and local laws and regulations.
- Ensure that all pieces of heavy equipment meet emission standards specified in the State Code of Regulations, and conduct routine preventive maintenance, including tune-ups to manufacturer specification to ensure efficient combustion and minimum emissions. If possible, equipment with more stringent emission controls should be utilized.

[3] http://www.blm.gov/or/districts/prineville/plans/wbw_power_row/

- Limit idling of diesel equipment to no more than 10 minutes unless necessary for proper operation.

Mitigation measures applicable during construction activities include the following:

- Stage construction activities to limit the area of disturbed soils exposed at any particular time.
- Water unpaved roads, disturbed areas (e.g., areas impacted by scraping, excavation, backfilling, grading, and compacting), and loose materials generated during project activities as necessary to minimize fugitive dust generation.
- Install wind fences around disturbed areas if windborne dust is likely to impact sensitive areas beyond the site boundaries (e.g., nearby residences).
- Spray stockpiles of soils with water, cover with tarpaulins, and/or treat with appropriate dust suppressants, especially when high wind or storm conditions are likely. Vegetative plantings may also be used to limit dust generation for stockpiles that will be inactive for relatively long periods.
- Train workers to comply with speed limits, use good engineering practices, minimize the drop height of excavated materials, and minimize disturbed areas.
- Cover vehicles transporting loose materials when traveling on public roads, and keep loads sufficiently wet and below the freeboard of the truck in order to minimize wind dispersal.
- Inspect and clean tires of construction-related vehicles, as necessary, so they are free of dirt prior to entering paved public roadways.
- Clean (e.g., through street vacuum sweeping) visible trackout or runoff dirt from the construction site off public roadways.

No additional mitigation measures are considered necessary during normal operations of the Project, but some dust control measures discussed above may be applicable to minimize fugitive dust emissions from bare surfaces and unpaved access roads.

Decommissioning activities generally mirror construction activities; thus, the same mitigation measures should be applied during decommissioning as would be applied during construction.

## 5.10 Noise

### *5.10.1 Existing Conditions*

Noise is generally defined as unwanted or excessive sound. Noise from wind energy facilities includes primarily mechanical and aerodynamic noise from the wind turbines, and noise emanating from substation equipment. Mechanical noise is primarily generated by the gearbox, generator, cooling fans and other moving parts within the wind turbine. Mechanical noise tends to be tonal but also has a broadband component. Aerodynamic noise originates primarily from the flow of air over and past the blades, so it generally relates to the ratio of blade tip speed to wind speed. Aerodynamic noise is characterized by a broadband “swish” sound, and is the

dominant noise component for modern wind turbines. Some noise would also be generated from substation and interconnection equipment. The primary noise from substations is a tonal noise emanating from the transformers; this occurs at harmonic frequencies of the transmission frequency (e.g., 120, 240 and 360 Hz tones on a 60-Hz transmission system).

Mercer County would generally be characterized as a rural agricultural land use area, and existing ambient sound levels are expected to be relatively low, although sound levels may be sporadically elevated in localized areas due to roadway noise or periods of human activity. Sound levels near the eastern end of the Project Area may be elevated due to the large industrial facilities located nearby: the Antelope Valley Generating Station and the Great Plains Synfuels Plant, in addition to the coal mining activities that take place at the Freedom Mine just east of these two industrial uses. Background sound levels will vary both spatially and temporally depending on proximity to area sound sources, roadways and natural sounds. Principal contributors to the existing acoustic environment likely include motor vehicle traffic, farming equipment, farming activities such as plowing and irrigation, all-terrain vehicles, local roadways, rail movements, periodic aircraft flyovers, and natural sounds such as birds, insects, and leaf or vegetation rustle during elevated wind conditions in areas with established trees or crops. Diurnal effects result in sound levels that are typically quieter during the night than during the daytime, except during periods when evening and nighttime insect noise dominates in warmer seasons.

In areas with elevated background sound levels, sound may be obscured through a mechanism referred to as acoustic masking. Seasonal effects such as cricket chirping, certain farming activities, as well as wind-generated ambient noise as airflow interacts with foliage and cropland, contribute to this masking effect. The latter is most prevalent in rural and suburban areas with established tree stands. Wintertime defoliate conditions typically have lower background sound levels due to lower wind masking effects and reduced outdoor activities in colder climates. During colder seasons, people typically exhibit lower sensitivities to outdoor sound levels, particularly in this geographical region of the United States, as windows and doors are typically closed, and limited time is spent outdoors as compared to more temperate climates.

Some land uses are considered more sensitive to intrusive noise than others due to the type of activities typically involved at the receptor location. Sensitive noise receptors normally include residences, schools, libraries, religious institutions, hospitals and nursing homes, daycare centers, and some types of businesses; North Dakota also specifies community buildings as noise sensitive receptors. Noise sensitive receptors in the Project Area are identified on Figures 13A, 13B and 13C for the Siemens 2.3-108, Vestas V-100 and Vestas V-110 turbine layout, respectively.

At the state level, NDAC requires that the potential for adverse impacts at noise sensitive receptors be assessed during the site selection process. NDAC 69-06-08-01.4 establishes avoidance areas for wind energy facilities, stating:

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

The North Dakota standard is the strictest noise limitation applicable to Project operation. Mercer County does not currently have noise standards or ordinances that are applicable to the Project.

The recommended USEPA (1978) noise guideline is an Ldn of 55 dBA (Ldn(24-hours), applicable to outdoor locations at noise sensitive receptors where extended periods of time are spent, (e.g., yards). This noise level corresponds to a maximum instantaneous equivalent sound level (Leq) of 48.6 dBA. The USEPA guideline is essentially echoed by the North Dakota standard.

The National Safety Council (NSC) recommends no more than 85 dBA for 8 hours of exposure as the safe limit for farm operations. Industrial standards of the Occupational Safety and Health Administration (OSHA) regulations would apply to those involved in the construction, operation, and maintenance of the facilities. OSHA permissible noise exposures are shown in Table 21.

**Table 21. OSHA Permissible Noise Standards**

| Duration (number of hours per day) | Sound Level (dBA) |
|---|---|
| 8.0 | 90 |
| 6.0 | 92 |
| 4.0 | 95 |
| 3.0 | 97 |
| 2.0 | 100 |
| 1.5 | 102 |
| 1.0 | 105 |
| 0.75 | 110 |
| 0.5 | 115 |

Potential noise receptors within the Project Area and a one mile buffer are limited to scattered rural residences; there are no schools, libraries, places of worship, community buildings, places of business or other types of noise sensitive receptors within or within one mile of the Project Area. Figures 12A, 12B and 12C show the locations of all known occupied residences and residences of unknown occupancy for the Siemens 2.3-108, Vestas V-100 and Vestas V-110 turbine layouts, respectively. Unoccupied residences are not considered potential noise-sensitive receptors.

## *5.10.2 Potential Impacts*

Project construction may cause short-term but unavoidable noise impacts due types of construction and equipment. Construction activity would also generate traffic that would have potential noise effects, such as trucks travelling to and from the site on public roads. Sound generated by construction activities is generally exempt from state and local noise regulation. Once the Project has been built, no significant noise impacts are anticipated from regular maintenance.

A screening level acoustic assessment was conducted to determine the feasibility of the Project to operate within applicable noise criteria (Appendix A). The assessment is representative of worse-case scenario because the Project layout includes more than the target number of turbine locations needed to meet the Project's nameplate capacity to account for alternate locations. Noise was modeled at a distance of 100 feet from each residential structure in consideration of the North Dakota noise standard. The acoustic modeling results were compared to the State's numerical limits of 50 dBA. Table 22 summarizes the number of noise sensitive receptors within selected sound pressure level ranges (in dBA) under each of the modeled operational conditions. [RESULTS OF THE NOISE ANALYSIS ARE STILL PENDING AND WILL BE SUBMITTED WHEN COMPLETE]

**Table 22. Number of Noise Sensitive Receptors by Sound Level Range and Exceedance Condition for each Wind Turbine Layout**

| Sound Level Range (dBA) | Siemens 2.3-108 | | Vestas V-100 | | Vestas V-110 | |
|---|---|---|---|---|---|---|
| | Typical Downwind | Anomalous Meteorological | Typical Downwind | Anomalous Meteorological | Typical Downwind | Anomalous Meteorological |
| Less than 35 | | | | | | |
| 35 – 40 | | | | | | |
| 40 - 45 | | | | | | |
| 45-50 | | | | | | |
| 50-55+ | | | | | | |
| >50 (North Dakota Limit) | | | | | | |

The results of the acoustic assessment demonstrate that the Project would comply with regulatory limits and/or guidelines at all noise sensitive receptors.

**Potential Noise Impacts to Wildlife**

Although it is likely that construction of the Project will result in short-term disturbance of wildlife, it will be difficult to assess whether the disturbance comes from the noise of construction activities or the activities themselves (e.g., construction vehicles moving along roads). All such activities will be short-term and limited to the period of construction. Available research

regarding the noise impacts of wind farm operations suggests that animals in the area would either habituate to consistent low-frequency noise from the turbines or would alter their behaviors to adapt to the new acoustic environment (e.g., Rabin et al. 2003, Brumm and Slabbekoorn 2005, Wood and Yezerinac 2006)

### *5.10.3Mitigative Measures*

Antelope will implement BMPs and mitigation measures applicable to noise as follows:

- Take advantage of topography and the distance to nearby sensitive receptors when positioning potential sources of noise.
- Select equipment with the lowest noise levels available and no prominent discrete tones, when possible.
- Maintain all equipment in good working order in accordance with manufacturer specifications. Suitable mufflers and/or air-inlet silencers should be installed on all internal combustion engines and certain compressor components.
- All vehicles traveling within and around the project area should operate in accordance with posted speed limits.
- Establish a process for documenting, investigating, evaluating, and resolving project-related noise complaints.

BMPs and mitigation measures applicable during construction include the following:

- Limit noisy construction activities to the least noise-sensitive times of day (daytime only, between 7 a.m. and 7 p.m.) and weekdays.
- Schedule noisy activities to occur at the same time whenever feasible, since additional sources of noise generally do not greatly increase noise levels at the site boundary. Less-frequent but noisy activities would generally be less annoying than lower-level noises occurring more frequently.
- Locate stationary construction equipment (e.g., compressors or generators) as far as practical from nearby sensitive receptors.
- In the unlikely event that blasting or pile driving would be needed during the construction period, notify nearby residents in advance.

The same BMPs and mitigation measures applicable to construction activities are applicable to decommissioning activities.

## 5.11 Cultural, Historical, and Architectural Resources

Cultural resources include archeological sites, historic standing structures, objects, districts, traditional cultural properties and other properties that illustrate important aspects of prehistory or history or have important and long-standing cultural associations with established communities or social groups. Significant archeological and architectural properties are usually defined by eligibility criteria for listing in the National Register of Historic Places (NRHP), and in consultation with the State Historic Preservation Office (SHPO).

## *5.11.1 Existing Conditions*

There are no designated or registered historic sites, monuments, historical markers or archaeological sites within the Project Area.

The online NRHP database was searched for registered properties in Mercer County located within the Project Area and a surrounding one mile buffer. No NRHP registered archaeological or historic resources are located within or near the Project Area.

A search of the State Historical Society of North Dakota's web site and manuscript files was conducted for the Area of Potential Effect (APE), defined as the area in and within 1 mile of the Project Area. The file search revealed 198 previously recorded sites, site leads and isolated finds. Of these, 116 have not been evaluated for potential NRHP listing, 74 have been evaluated and found to be ineligible for listing, and 8 have been found to be eligible for listing. Most of the sites consist of or include a stone circle, chipped stone, charcoal and ceramics, bone or faunal remains, or other rock features such as cairns, indicating Native American use of the area. A small number are historic-era sites, often dumps, with masonry, metals, glass and wood; a few contain old farm machinery, and a few others are remnants of abandoned homesteads. One gravesite is identified.

The scarcity of listed archaeological and/or historic facility resources does not mean the Project Area is clear of significant resources. It is possible there are both recorded and unrecorded resources in the Project Area that may be significant, but which have been neither evaluated nor had their status determined. In order to assess whether there are previously undocumented cultural resources that may be affected, a Class III archeological pedestrian survey is being conducted to assess areas of disturbance associated with the Project. An architectural inventory of structures and buildings around the Project Area will also be conducted, though no existing structures will be directly impacted by the Project.

## *5.11.2 Potential Impacts*

A significant impact to cultural resources would occur if a site or archaeological, tribal, or historical value that is listed, or is eligible for listing, in the NRHP could not be avoided or mitigated during siting or construction. Effects can be either direct, which involves physical harm to a listed or eligible resource, or indirect, which involves a change in the setting, feeling or associations related to a listed or eligible resource.

Possible concerns that should be considered for this project include:

- Unrecorded cultural resources located within the study area
- Any ground disturbing activity within the study area that has potential to impact known or unknown cultural resources
- Visual impacts to recorded or unrecorded cultural resource properties

No significant impacts to cultural resources are anticipated from the Project. As the layout of the Project is finalized and the Class III archaeological survey is completed, the location of Project facilities will be adjusted as needed to avoid impacts to cultural resources. All resources identified in the Class III survey will be avoided until such time as SHPO makes a determination of eligibility for NRHP listing.

If historic or prehistoric materials are discovered during monitoring of earth-disturbance construction activities, construction would be halted and SHPO would be notified in order to evaluate the find for eligibility and determine appropriate treatment. Discovered sites would also be avoided to the extent practicable.

### *5.11.3 Mitigative Measures*

Antelope will implement avoidance and mitigation measures and BMPs applicable to historic and cultural resources, as follows:

The following mitigation measures will be implemented to address potential impacts on cultural resources:

- Impacts to cultural, historic and archaeological resources determined to be eligible for NRHP listing will be avoided through modifications to the Project layout.
- A Class III archaeological pedestrian survey will be conducted prior to beginning construction on the Project, and the results provided to the SHPO. All cultural and archaeological resources identified in the Class III survey will be avoided until such time as the SHPO makes a determination of eligibility for NRHP listing.
- Cultural resources discovered during construction will immediately be brought to the attention of the SHPO. Work would be immediately halted in the vicinity of the find to avoid further disturbance to the resources while they are being evaluated and appropriate mitigation plans are being developed.
- If human remains are found on a development site, work will cease immediately in the vicinity of the find. The appropriate law enforcement officials and the SHPO will be contacted. No material will be removed from the find location. If it is determined that the remains belong to an archaeological site, the SHPO will be consulted to determine how the remains should be addressed.

## 5.12 Recreational Resources

### *5.12.1 Existing Conditions*

There are no designated recreation areas, public or private parks and no designated trails within the Project Area. The Project Area also does not include any of the following:

- Designated or registered national areas including parks; memorial parks; historic sites and landmarks; natural landmarks; historic districts; monuments; wilderness areas; wildlife areas; wild, scenic, or recreational rivers; wildlife refuges; or grassland,

- Designated or registered state areas: parks; forests; forest management lands; historic sites; monuments; historical markers; known archaeological sites; grasslands; wild, scenic, or recreational rivers; game refuges; game management areas; management areas; and nature preserves
- County parks and recreational areas; municipal parks; parks owned or administered by other governmental subdivisions; hardwood draws; or enrolled woodlands.

Nearby recreation resources include Lake Sakakawea and associated public use areas and parks. Lake Sakakawea is located approxmately 2.9 miles from the closest turbine location (Figure 14). The lake and adjacent lands are maintained by the USACE for recreation (camping, picnicking, boating, fishing), fish and wildlife enhancement, flood control, hydropower production, navigation, and irrigation. USACE has multiple public use areas (PUAs) along the lake. The nearest public use areas are Twin Buttes and Red Butte Bay, located about 3 miles and 4.8 miles north of the Project Area, respectively, and Beulah Bay, located about 7 miles northeast of the Project Area.

A major recreational activity in North Dakota is hunting. The NDFGD runs the PLOTS program, under which private lands enrolled in the program may be opened to the public for hunting. No PLOTS are located within the Project Area. As of July 2014 there is one parcel enrolled in the PLOTS program within the Project Area: T145N, R89W, West ½ Section 12 (see Figure 14). There are no other PLOTS parcels located near the Project Area; the nearest is located 2.5 miles west of the Project Area, in Dunn County (NDGFD 2014).

Wildlife Management Areas also serve as recreation resources. The Golden Valley WMA, located within the Project Area, offers sharp-tailed grouse and deer hunting opportunities. The Beaver Creek WMA and Hille WMA, located approximately 3.7 miles north and 6.1 miles northeast of the Project Area respectively, both offer hunting and fishing opportunities.

There are no state parks near the Project Area; the nearest state park (Lake Sakakawea S.P.) is approximately 20 miles to the east. There are no state recreation areas near the Project Area; the nearest, Indian Hills State Recreation Area and Resort, is approximately 10 miles to the north, on the north shore of Lake Sakakawea. There are no state nature preserves or natural areas within 40 miles of the Project Area. There are no designated multi-use or snowmobile trails in Mercer County (State of North Dakota 2010).

## *5.12.2 Potential Impacts*

The Project would have no direct impacts to existing recreation areas in the vicinity. Potential impacts would be limited to indirect, primarily visual effects. Construction and operation of the Project would introduce new visual elements, primarily the wind turbines, that may be visible from the nearby recreation areas. During construction and decommissioning, construction equipment, especially cranes, could introduce temporary visual impacts. The Project wind turbines would have nighttime lighting in conformance with FAA guidelines and would be white or off-white colored for daytime visibility.

While views of the Project turbines may be partially blocked by terrain, it is likely that some of the Project turbines would be visible from portions of the Twin Buttes, Red Butte Bay, and Beulah Bay PUAs, as well as the Beaver Creek WMA and Hille WMA. Views of the turbines would occur at a middleground to background distance, where the turbines may be noticeable but are unlikely to be a dominant feature in the viewshed. Views of the turbines, however, are unlikely to substantially alter the recreational experience at any of these areas. These recreation areas are all oriented toward Lake Sakakawea so the focus of visitors' attention would primarily be away from the Project Area. Views of the turbines would not interfere with the primary activities offered at any of these locations: boating, fishing, camping and hunting.

It is possible that some of the Project turbines would also be visible from the Indian Hills State Recreation Area. Based on topography, it appears that views of the Project turbines would be largely blocked by terrain for most of the cabins, campsites and RV spaces and other developed portions of the recreation area; the Project would be most visible from the trails in the south end of the recreation area, which climb a rise to overlook Lake Sakakawea. At a distance of over 10 miles, views of the Project turbines would be at a background distance and would not create strong visual contrast. As with the PUAs, the recreation area is largely oriented toward the water, a small bay of Lake Sakakawea, so the focus of visitors' attention would primarily be away from potential views of the Project.

The Project would be visible at close range from the Golden Valley WMA and the one PLOTS parcel within the Project Area. Views of the turbines, however, are unlikely to adversely impact the ability to participate in hunting, which is the primary recreational activity offered at these sites.

Viewer reactions to the Project from recreation areas would be both subjective and site- and time-specific because of the subjective and experiential nature of human visual perception and cognition in the assessment of the magnitude and importance of perceived visual impacts (Hankinson 1999, University of Newcastle 2002;). The perception of visual impacts is highly dependent not only on physical factors that affect what and how the impacts are seen, but also on the number and type of viewers, their sensitivity to the visual environment, their personal preferences and attitudes, and other cultural factors that concern both the viewer and the affected landscape (Benson 2005, BLM 1984, DTI 2005, University of Newcastle 2002, USFS 1995;).

In one of the few studies addressing public acceptance of wind power and perceptions of visual impact in the Upper Great Plans Region, Sowers (2006,) noted that a large number of project sites in the region had no significant opposition, which was attributed in part to the region's inhabitants regarding wind turbines as a source of income and as being compatible with their perceptions of wind energy facilities providing a "working" agricultural landscape. Most residents he interviewed indicated that they did not view the visual impacts negatively, viewing wind turbines in some cases as "another piece of farm machinery."

Overall, the introduction of the Project is not anticipated to be perceived as a negative visual impact by users of recreation areas in and near the Project Area. Although likely to be visible from many of the recreation areas in the vicinity, the Project is unlikely to introduce sufficient visual contrast to create significant impacts given the presence of existing wind farms and other energy infrastructure in the area and the general acceptance of wind projects in the surrounding communities.

Other indirect effects could include noise and traffic impacts. With the exception of the Golden Valley WMA, all of the recreation areas in the vicinity are sufficiently far away that Project noise would be inaudible. Construction of either of the action alternatives would increase traffic on local roads to the Project Area, possibly causing temporary impacts to local traffic flow to nearby recreation areas while equipment is hauled to the site. However, based on the relatively low volume of traffic on surrounding roads it is unlikely that construction traffic would materially impact local traffic patterns sufficient to cause disruptions for access to nearby recreation areas. Should any disruptions occur, they would be temporary and intermittent, and traffic patterns would return to pre-Project levels following construction. Operational traffic generation and traffic impacts would be negligible.

The nearest state parks, state recreation areas, nature preserves and natural areas are sufficiently far from the Project Area that any effects would be negligible.

### *5.12.3 Mitigative Measures*

The Project would not result in significant adverse impacts to any recreation area; therefore, no mitigative measures are proposed.

## 5.13 Socioeconomics

### *5.13.1 Existing Conditions*

The Project is located in Mercer County, North Dakota, a primarily rural agricultural area located approximately 65 miles northwest of Bismarck, ND and 45 miles northeast of Dickinson, ND.

There are several small cities near the Project Area. The city of Beulah. located about 8 miles southeast of the Project Area, is the largest city in the area (2010 population 3,142). The city of Hazen (2010 population 2,420) is located about 6 miles east of Beulah. The cities of Zap (2010 population 244) and Golden Valley (population 182) are both located approximately 6 miles to the south. The cities of Dodge (2010 population 99) and Halliday (2010 population 209) are located to the southwest in Dunn County. A small number of scattered farmsteads are located within the Project Area, and there is no indication of any new residential construction.

Mercer County contains 1,043 square miles of land, with a density of just over 8 persons per square mile; the population density of the census block group in which the Project Area is located (Mercer County Tract 9618, Block Group 1) is approximately 1.6 persons per square mile. Approximately 95 percent of the population is composed of white persons who are not of

Hispanic or Latino origin. The median age of Mercer County residents is 46.3 years. Approximately 17 percent of the county population is 65 years or older and 6 percent of the population is under five years of age (US Census Bureau 2010). The 2010 census reported a total of 4,450 housing units in Mercer County, of which approximately 18.5 percent were vacant; of the vacant housing units, nearly 60 percent are classified as being for seasonal, recreational or occasional use.

According to the 2010 Census, mining, quarrying and oil and gas extraction industry employs the largest share of the county's workforce, followed by utilities; specific employment numbers (and thus percentages) are not made available due to the small number of businesses in each category. Health care and social services and retail trade represent the next two largest employment industries, each representing approximately 10.5 percent of the county workforce. Per capita income in 2010 was $31,331; median household income was $63,244. Approximately 7.2 percent of the population lived below the poverty level, compared to 14.3 percent nationwide.

Agriculture plays a significant role in the County's land use and economy. In 2007, there were 455 farms in Mercer County, comprising approximately 76 percent (509,522 acres) of the total county land area. According to the 2007 Census of Agriculture (USDA 2007), the total market value of agricultural products produced in Mercer County was over $40 million, 62 percent of which was from crops and 38 percent from livestock sales.

Tax revenues in Mercer County fund a number of vital community services, including fire protection and law enforcement, emergency management, health and welfare services, and public schools. Tax revenues also fund agricultural extension services, weed management programs, and a roads maintenance department, along with other typical county government services.

## *5.13.2 Potential Impacts*

### Economic Impacts

The Project would have positive economic impacts for the local population, including lease and royalty payments for participating landowners, employment, and property and sales tax revenue. Landowner compensation will be established by individual lease agreements, but are anticipated to total over $200,000 annually. Annual property tax payments to local entities are estimated at over $800,000. In general, agricultural areas surrounding each turbine can still be farmed. In addition, in an environment of uncertain and often declining agricultural prices and yields, the supplemental income provided to farmers from wind energy leases will provide stability to farm incomes and thus will help assure the continued viability of farming in the Project Area.

The Project would create 8 to 12 full-time permanent jobs and 250-300 peak construction jobs. To the extent that local contractors are used for portions of the construction, total wages and salaries paid to contractors and workers in Mercer County will contribute to the total personal

income of the region. Additional personal income will be generated for residents in the county as well as the state by circulation and recirculation of dollars paid out by Antelope as business expenditures and state and local taxes. Expenditures made for equipment, energy, fuel, operating supplies and other products and services will benefit businesses in the county.

These anticipated impacts are consistent with the limited amount of published information on other projects. A 2009 case study evaluated the socioeconomic impacts of a wind energy facility constructed in 2007 and 2008 in Cavalier County, northeastern North Dakota (Leistritz and Coon 2009). The study authors felt that the Project Area was typical of Great Plains communities where many similar wind energy projects are being constructed. This study found that the 159-MW project resulted in a peak workforce of 269 workers during construction, 10 permanent jobs, and $1.4 million in ongoing annual expenditures to local businesses and households. This includes payments to landowners totaling $413,000 the first year, annual local property taxes to the County and school district, and direct payments for wages and materials in Cavalier County and adjacent counties. On a per-megawatt basis, the project's economic impacts were $8,900 in local expenditures per year; $2,600 per year in landowner payments; and $2,900 per year in property taxes.

Direct spending by Antelope will have a multiplier effect as directly spent funds get distributed and re-distributed throughout the economy. The Leistritz and Coon study indicated that for every dollar of direct expenditures, nearly 3 dollars of indirect spending would occur.

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

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

More recently, the Lawrence Berkeley National Laboratory conducted two multi-year studies on the impact of wind power projects on residential property values in the U.S. (Hoen et al 2009, 2013). Both studies included literature review, data collection for residential sales transactions at multiple study areas, visit to each home to measure turbine visibility and quality of scenic vista, use of multiple statistical models. The studies also examined repeat sales of homes in order to capture the before and after effects of the announcement or construction of a nearby wind energy facility. The studies concluded that:

- There was no statistical evidence that the proximity of wind energy facilities affects the sales price or rate of sale of homes sold prior to versus after announcement or construction of wind facilities; and
- There was no statistical difference in sales price between homes with a view of wind turbines and homes without such views.

**Other Potential Impacts**

It is likely that sufficient skilled labor is available in Mercer County and the surrounding vicinity to serve the basic infrastructure and site development needs of the Project. Specialized labor from outside the local area will be required for certain components of wind farm construction.

No effects on permanent housing are anticipated. During construction, out-of-town laborers will likely use lodging facilities in Beulah, Hazen, or the other small cities in the area; some workers may commute from as far away as Bismarck or Dickinson. Operation and maintenance of the facility will employ from 8-12 maintenance staff; these are expected to largely be existing residents of the area

Local businesses such as motels, restaurants, bars, gas stations, and grocery stores would likely experience some increase in revenue resulting from new employment of the non-resident portion of Project construction crews. In particular, the consumption of goods, services, and temporary lodging in and near Beulah, Hazen and other cities in the region could be expected to minimally increase due to the presence of these non-native workers. Other local area businesses that may benefit through increased sales would likely include ready-mix concrete and gravel suppliers, hardware and general merchandise stores, welding and machine shops, packaging and postal services, and heavy equipment repair and maintenance services.

This increase in demand for local goods and services would be minimal due to the small size of the non-local workforce and the short-term nature of the construction phase of the Project. For the same reasons, the effects to infrastructure such as law enforcement, schools, governmental services and facilities, hospitals and mental health care facilities, recreational programs and facilities, housing, and utilities would also be minimal.

## *5.13.3 Mitigative Measures*

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

# 6.0 POTENTIAL PERMITS AND APPROVALS

The federal and state permits or approvals that have been identified as potentially required for the construction and operation of the Project are shown in Table 23. Permits dependent on the final site layout will be applied for after receiving PSC approval and prior to construction.

**Table 23. Potential Permits and Approvals Required for Construction and Operation of the Proposed Facility**

| Regulatory Authority | Legal Authority | Permit/Approval | Description | Trigger | Application Time | Website |
|---|---|---|---|---|---|---|
| **Federal** | | | | | | |
| FERC | 18 CFR 366.7 | Exempt Wholesale Generator Status | Request for a determination that the utility is a wholesale generator of electric power and thus exempt from most FERC regulations that pertain to a public utility | Request by entity generating electric power for wholesale customers | | |
| FERC | 18 CFR Part 35 | Market Based Rate Authorization | An entity seeking to make market-based rate sales of energy, capacity and ancillary services in the wholesale markets must first seek authorization from FERC | Request by entity generating wholesale electricity | | |
| FAA | 14 CFR Part 77 | Notice of Proposed Construction or Alteration (Form 7460-1) | Notifies FAA of proposed structures that might affect navigable airspace. FAA reviews possible impacts to air safety and navigation, as well as the potential for adverse effects on radar systems. | • Construction or alteration of structures standing higher than 200 feet above ground level<br>• Construction or alteration of structures near airports; 14 CFR 77.13 provides details<br>• Siting within radar line-of-sight of an air defense facility | 45 days | |

| Regulatory Authority | Legal Authority | Permit/Approval | Description | Trigger | Application Time | Website |
|---|---|---|---|---|---|---|
| FAA | 14 CFR Part 77 | Supplemental Notice (Form 7460-2) | Supplemental Notice provided to FAA in advance of beginning construction | Planned start of construction on project for which a Notice of Proposed Construction was required | 5 days | |
| USACE | Clean Water Act (33 USC 1251 et seq) Section 404 (33 USC 1344) | CWA Section 404 Permit; individual, general or nationwide permit | Regulates discharge of dredged or fill materials into waters of the United States | Activities that may impact federal waters, including wetlands | 45 days | |
| USEPA | Clean Water Act Section 311, 40 CFR 112 | Spill Prevention Control and Countermeasures (SPCC) Plan. | Required if any facility associated with the project (O&M or substation) has a tank holding more than 1,320 gallons. | Oil storage of more than 1,320 gallons of oil. | A copy of the plan will need to be maintained on file with the owner/operator and reviewed by the certifying engineer every five years. | |
| North Dakota Public Service Commission | Pursuant to North Dakota Century Code 49-22 | Certificate of Site Compatibility. | For facilities with greater than 0.5 MW nameplate capacity. | Generation of power described in previous column. | 180 days prior to construction (minimum). | http://www.psc.state.nd.us/ jurisdiction/electricity-laws.html |
| North Dakota Public Service Commission | NDCC 49-22 and NDAC 69-06 | Certificate of Corridor Compatibility and Route Permit | Required for Transmission Lines over 115 kV | Construction of Transmission Line | Prior to Construction | http://www.psc.state.nd.us/ jurisdiction/electricity-laws.html |
| North Dakota Public Service Commission | NDCC 49-22 and NDAC 69-06 | Certificate of Site Compatibility | Required for facilities with greater than 0.5 MW nameplate capacity. | Generation of power described in previous column. | 180 days prior to construction (minimum). | http://www.psc.state.nd.us/ jurisdiction/electricity-laws.html` |

| Regulatory Authority | Legal Authority | Permit/Approval | Description | Trigger | Application Time | Website |
|---|---|---|---|---|---|---|
| North Dakota Department of Health | Clean Water Act 33 USC 1342 NDAC 33-16-01 | NPDES General Permit (Construction). | For stormwater discharges from construction activities. | Grading of more than 1 acre. | Permit to be filed prior to construction with a Stormwater Pollution Prevention Plan (SWPPP). | http://www.ndhealth.gov/WQ/Storm/Construction/C onstructionHome.htm |
| | NDAC 33-16-01 | Septic Tank and Drainfield Permit. | Required for installation of septic system at O&M facility. | Installation of a septic system. | Prior to construction. | |
| North Dakota Highway Patrol | | Overheight/ Overweight Permit. | Required to transport oversize loads on state maintained roads. | Project construction requires oversize/ overweight truck loads. | Prior to construction. | http://www.nd.gov/ndhp/permits/permits.html |
| State Historic Preservation Office (SHPO) and the Office of the State Archaeologist (OSA) | North Dakota Century Code 55-10; 49-22 And NHPA Section 106, 16 USC 470 | Review and Coordination. | Section 106 Compliance is required if there is a federal permit or approval. | Federal Permit Authorizations | Prior to construction. | |
| North Dakota Department of Game and Fish | | Wildlife conservation recommendations. | Consultation will be required as part of by North Dakota PSC review of the Certificate of Site Compatibility. | Certificate of Site Compatibility Review by ND PSC. | | |

| Regulatory Authority | Legal Authority | Permit/Approval | Description | Trigger | Application Time | Website |
|---|---|---|---|---|---|---|
| North Dakota State Water Commission | NDAC 889-03-01-10 | Temporary Water Permit. | Required for temporary use of surface or groundwater. | Construction water used onsite. | Prior to construction; permit is valid for up to one year | http://www.swc.state.nd.us/4dlink9/4dcgi/GetSubCategoryRecord/Permits/Water%20Permits |
| Mercer County | MCZO Chapter 3, Section I, Conditional Uses O | Conditional Use Permit. | All proposed wind energy facilities in an agricultural zone must apply for a conditional use permit with County Planning Commission. | Wind energy facility in agricultural zone. | Prior to construction. Process takes about 3 months. | |
| Mercer County | MCZO Chapter 4.I | Road Crossing/ Encroachment Permit. | Required for installation of service connections or extensions of existing underground utilities including crossing of county highways or for placing temporary obstructions on the right-of-way. | Working in or utility crossing of county road right-of-way. | Prior to construction. | |
| | County Regulations | Building Permit. | Required if O&M building is constructed. | O&M Building. | Prior to construction. | |
| | MCZO Chapter 4.I | Permit to Construct a Sewage Disposal System. | Required for sanitation at O&M building. | Restroom, shower or kitchen in O&M building. | Prior to construction. | |

# 7.0 FACTORS CONSIDERED BY PSC

The North Dakota Energy Conversion and Transmission Facility Siting Act lists 11 factors to guide the Commission in the evaluation and designation of the site of the facility (49-22-09).

## 7.1 Public Health and Welfare, Natural Resources, and the Environment

The preceding sections discuss the research and investigations relating to the effects of the proposed facility on public health and welfare, natural resources, and the environment. These effects and the proposed mitigative to minimize these effects are summarized in Section 5.0.

## 7.2 Technologies to Minimize Adverse Environmental Effects

Antelope will utilize the most current technologies that minimize impacts to the environment. As discussed in Section 4, these will include use of the most current and efficient wind turbine models to minimize noise impacts, and the use of horizontal directional drilling to avoid impacts to wetlands and streams.

## 7.3 Potential for Beneficial Uses of Waste Energy

This factor is not applicable to this Project since wind energy does not produce waste energy

## 7.4 Unavoidable Adverse Environmental Effects

Unavoidable adverse environmental effects are described for each resource area in Section 5. Unavoidable permanent ground disturbance will include the permanent loss of up to approximately 64 acres of habitat through the construction of access roads, turbine foundations, and the Project substation, and O&M facility. Unavoidable permanent effects will also include noise effects from the turbines. Unavoidable temporary effects will include ground disturbance, noise and air emissions related to construction. Temporary ground disturbing impacts will total up to approximately 415 acres.

## 7.5 Alternatives to the Proposed Site

During its siting process Antelope investigated a variety of sites in the central North Dakota area, and alternative designs for the Project within the Project Area. The proposed Project site was selected based on the following initial factors which will both meet the requirements for a viable wind project and minimize environmental impacts:

- The Project Area has a reliable wind regime, capable of producing the required amount of electric power. Within the Project Area, the turbine corridors have been placed to maximize the available wind, and during final micro-siting turbine locations will be further adjusted.

- The Project Area has sufficient number of landowners who are willing to participate in the Project through lease agreements.
- Environmental conditions in the Project Area will allow the Project to meet applicable environmental standards at an economically-supportable cost.
- Antelope has secured a power purchase agreement with a Basin Electric and can interconnect to Basin's transmission system a short distance from the Project Area.

Antelope then used the data from site-specific resource investigations to avoid sensitive resource as represented by the exclusion areas, avoidance areas, selection criteria and policy criteria discussed in Section 3.

Antelope believes that the proposed Project layout represents the alternative which is both the most economically viable and has the least environmental impacts.

## 7.6 Irreversible and Irretrievable Commitment of Natural Resources

Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the use of these resources have on future generations. Irreversible effects primarily result from use or destruction of a specific resource that cannot be replaced within a reasonable timeframe. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action. There are few commitments of resources associated with this Project that are irreversible and irretrievable, but these include those resources primarily related to construction. Construction of the Project will necessitate a one-time expenditure of funds, which is not retrievable.

Labor and natural resources will be used in the fabrication and preparation of construction materials. These materials are usually not retrievable. Construction resources that will be used include aggregate, concrete, steel, and hydrocarbon fuel. Access roads will require aggregate for their construction and maintenance. During construction, vehicles will travel to and from the site utilizing hydrocarbon fuels. These resources are not in short supply, and their use will not have an adverse effect on the availability of these resources. In addition, the anticipated economic benefits of the Project will balance the irretrievable commitment of resources resulting from the construction of the Project.

## 7.7 Direct and Indirect Economic Impacts

Direct and indirect economic impacts are primarily positive, as discussed in Section 5.14. Antelope's annual payments to local landowners are anticipated to be approximately $200,000. This will be new revenue which will help to diversify and strengthen the local farming economy. Antelope's annual property tax payments to Mercer County are anticipated to total around $800,000, this new revenue will support important local government functions. The majority of both revenue sources will be spent in the local and state economies, thus supporting local employment. The Project will support 8 -12 permanent jobs for maintenance and operation of the facility.

A one-time economic benefit will be realized during construction of the Project, which will support a maximum of approximately 250-300 direct construction jobs. Continuing to establish the central region of North Dakota as an important producer of alternative energy sources may spur the development of wind-related businesses in the area, in turn contributing to economic growth in the region.

## 7.8 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.

## 7.9 Effect of Site on Cultural Resources

Antelope is committed to minimizing impacts to cultural resources and will avoid known resources and any additional resources identified throughout the life of the Project. If avoidance is not possible, Antelope will work with the North Dakota SHPO to mitigate potential impacts.

## 7.10 Effect of Site on Biological Resources

Antelope will implement measures to avoid and minimize effects to biological resources at the proposed site. The impact of the Project on wildlife is expected to be minimal. There is potential for avian and bat collisions with facility turbines or meteorological towers. The site will be designed to minimize those impacts. Detailed discussion of potential impacts and proposed mitigative measures on biological resources is provided in Section 5.4 (Vegetation) and Section 5.5 (Wildlife).

## 7.11 Concerns Raised by Federal, State or Local Agencies

The only concerns raised to date by federal, state or local agencies have been those related to wetland and wildlife protection, in letters from the NDGFD and the USFWS; these letters are summarized in Section 5.5.1 and the complete letters are contained in the Critical Issues Analysis in Appendix A. Antelope intends to avoid all wetland impacts through micrositing of turbine locations, access roads and other facilities during final engineering design, and will implement BMPs to protect water quality. As requested by USFWS, high value habitat types including native prairie, wooded draws and riparian areas will be avoided to the extent practicable. Areas temporarily disturbed by construction activities will be restored and reseeded with native vegetation types. Section 5.5 provides additional discussion related to wildlife protection and measures to be implemented to minimize impacts to wildlife and habitat.

# 8.0 CUMULATIVE EFFECTS

Cumulative effects refers to the sum of impacts from the Project in conjunction with prior or existing actions in the vicinity as well as reasonably forseeable actions. Prior actions considered are limited to existing wind energy development in the area; these are listed in Table 24. There are three existing wind farms located within 45 miles of the Project Area (not counting individual phases of a single wind farm), totaling 504 MW of generating capacity and 237 wind turbines.

**Table 24. Prior Wind Energy Development in the Vicinity of the Project**

| Project Name | Operator | Description | County | Approximate Distance from Antelope Hills Project Area |
|---|---|---|---|---|
| Prairie Winds ND1 | Basin Electric Power Cooperative | Operating 115 MW, 80 turbine wind energy facility | Ward | 41 miles |
| Bison Wind Project I, II and III | ALLETE Clean Energy | Operating 291 MW, 103 turbine wind energy facility | Oliver and Morton | 28 miles |
| Oliver Wind I and II | FPL Energy | Operating 98 MW, 54 turbine wind energy facility | Oliver | 31 miles |

A list of reasonably foreseeable actions in the region of the Project was developed based on a search of projects listed on the PSC online case information, and other publicly available information (Table 25). Reasonably foreseeable actions include proposed wind energy facilities, oil and gas pipelines, and continued development of existing coal mines. The Project Area is near the eastern edge of the Bakken oil field, and additional oil exploration and/or production is likely to occur in or near the Project Area in the future. There is little residential, commercial, or industrial development existing or expected in the area, which is expected to remain largely agricultural.

**Table 25. Reasonably Foreseeable Future Actions in the Vicinity of the Project**

| Project Name | Operator | Description | County | Approximate Distance from Antelope Hills Project Area |
|---|---|---|---|---|
| Sunflower Wind Energy Facility | Sunflower Wind Project, LLC | 110 MW wind energy facility | Morton and Stark | 37 miles |
| Bison IV | Minnesota Power | 210 MW wind energy facility | Oliver and Mercer | 28 Miles |
| Oliver III | Next Era Energy Resources, LLC | 48 MW wind energy facility | Morton | 44 Miles |
| Wilton IV | Next Era Energy Resources, LLC | 96 MW wind energy facility | Burleigh | 56 miles |

| Project Name | Operator | Description | County | Approximate Distance from Antelope Hills Project Area |
|---|---|---|---|---|
| New Frontier Wind Energy Project | Meadowlark Wind I LLC | 102 MW wind energy facility | McHenry | 52 miles |
| Basin Transload Pipeline) | Basin Transload, LLC and Tesoro High Plains Pipeline Company LLC | 4 mile-long 10-inch crude oil pipeline | Mercer | 40 miles |
| Continued operations of the Freedom Mine | Coteau Properties | Continued coal mining operations, primarily east/northeast of AVS but some mining within eastern end of Project Area possible | Mercer | 0 to 10 miles |
| Continued oil and gas development in Bakken fields | Various | Potential additional exploratory and/or production wells in western end of Project Area and farther west | Mercer, Dunn and others | 0 to 50+ miles |

For cumulative impacts to occur, impacts from the Project would need to overlap in time and space with impacts from one or more of the reasonably foreseeable future actions that were identified. No cumulative impact would occur for resources where the Project would not have an impact, this would include the following resource areas:

- Environmental Justice
- Recreation

There would also be no cumulative impact where the Project would have an impact to a resource but this impact would not occur in the same time and space as the impact of a reasonably foreseeable action. This would include the following resource areas:

- Geology and Soils
- Air Quality
- Water Resources
- Surface Waters and Wetlands
- Vegetation
- Land Use
- Noise
- Transportation

- Health and Safety
- Cultural, Historical and Archaeological Resources

Wind energy development is anticipated to have a positive cumulative impact on socioeconomics as discussed in Section 5.13.

The principle resource of concern for cumulative impacts is anticipated to be wildlife, particularly bats and avian species including eagles and other raptorsAs discussed in Section 5.5, construction and operation of wind facilities may result in direct and indirect impacts to bats, raptors, and other avian species. Impacts to these resources caused by the Project, combined with impacts from the reasonably foreseeable actions described in Table 25, could potentially result in cumulative impacts.

Cumulative impacts to bats would most likely be caused by incremental mortality caused by collisions with the Project and the other wind facilities proposed for the region. Collision risk to bats posed by the Project is expected to be low (Section 5.5.2), and other wind facilities within the Great Plains have low bat fatality rates (Hein et al. 2013). However, bat population sizes in the region of the Project are largely unknown, leaving some uncertainty as to whether the Project and other reasonably foreseeable actions would create cumulative impacts to bat populations.

Project-related collision mortality of the majority of avian species that use the Project Area is unlikely to have cumulative impacts because local and regional populations of these species are large and widely distributed. A recent meta-analysis of studies at wind facilities in the U.K. revealed little evidence of avian population declines caused by collision mortality (Pearce-Higgins et al. 2012). Additionally, a study by Arnold and Zink (2011) found that collision mortality caused by anthropogenic structures such as tall buildings and communication towers have little effect on population trends of North American songbirds.

Whooping cranes are an endangered non-songbird species, but are unlikely to suffer collision mortality from the Project because they are unlikely to occur in the Project Area and a closely related species, sandhill cranes, demonstrates flight avoidance of turbines. As no Project impact to whooping cranes is expected, cumulative impacts to this species due to collison are unlikely. Project impacts in the form of habitat fragmentation, displacement, and disturbance to bird populations, if they occur, are likely to be temporary in nature (Pearce-Higgins et al. 2012) and not result in cumulative impacts.

Raptor species are generally more susceptible to cumulative impacts given their relatively longer life-spans, delayed sexual maturity, lower reproductive rate, and greater susceptibility to turbine collisions than songbirds and other bird groups. However, non-eagle raptor species in the Project Area and vicinity have large and widespread local and regional populations, reducing the likelihood that any Project-related fatalities at the Project would result in cumulative impacts. Collision mortality to eagles at the Project is expected to be low due to the combination of few individuals of either species observed during surveys, documented avoidance behavior (Sharp et al. 2010, Johnston et al. 2014), and few records of bald eagle fatalities at wind

facilities (Pagel et al. 2013). Although golden and bald eagle populations in some regions may be susceptible to cumulative impacts from even low rates of fatalities, the USFWS estimates that take of between 1 and 5% of annual production is sustainable (USFWS 2009).Breeding golden eagle population in the region of the Project appears to be stable (Nielson et al. 2012), and the breeding bald eagle population is steadily increasing (North Dakota Game and Fish Department 2014). Therefore, cumulative impacts as a result of mortality are unlikely.

The Project is unlikely to cause cumulative impacts as a result of disturbance to eagle nests. There were no nests of golden eagles within 10 miles of the Project Area. Although three bald eagle nests were identified within 10 miles of the Project Area, none were closer than 5 miles to the Project which is substantially greater than recommended distance setbacks in the USFWS National Bald Eagle Management Guidelines (2007).

Considering the regulations on wildlife and habitat protection enforced by the PSC, recommendations provided within the USFWS' Wind Energy Guidelines, and various USFWS, NDGFD and other agency programs for habitat protection, it is expected that measures similar to those proposed for the Project in the BBCS would be implemented for most future wind energy development in the region. The avoidance and minimization measures developed at the Project are designed to reduce the level of impacts to the maximum extent practicable. In combination with an adaptive management strategy, the measures in the BBCS should account for remaining unavoidable impacts. Consequently, it is anticipated that the total cumulative impacts to avian and bat species as well as other wildlife from the Project and other reasonably foreseeable actions will be minimal.

# 9.0 QUALIFICATIONS OF CONTRIBUTORS

| Name<br>Project Role | Education and Professional Experience |
|---|---|
| Tracey Dubuque<br>Principal in Charge, Senior Peer Review | Ms Dubuque is a senior project manager and professional civil engineer. She serves as the Director of Onshore Wind Energy Development for Tetra Tech. Ms. Dubuque has experience preparing environmental documentation for energy facilities throughout the United States, including applications under North Dakota energy siting regulations.<br><br>Ms. Dubuque has a BS in Civil Engineering. |
| Dale Bennett<br>Project Manager, Lead Author | Mr. Bennett is a senior project manager with over 20 years of experience managing large and small planning, land use and regulatory projects. For the last four years his practice has focused on renewable energy development including wind and transmission projects.<br><br>Mr. Bennett has a BA in biology and a JD. |
| Thomas Kruger<br>Land Use Planner, Contributing Author | Mr. Kruger is a land use planner and regulatory specialist with over 12 years of experience. He regularly performs detailed regulatory research, authors environmental and permitting documents, and performs peer review of complex data sets.<br><br>Mr. Kruger has a BA in Biology and a Master's degree in Urban and Regional Planning. |
| Jennifer D'Avanzo<br>Senior Biologist, Contributing Author | Ms D'Avanzo is a biologist with over 11 years of experience, including coordination of field surveys, environmental monitoring and authoring reports and sections of environmental documents. She has worked a senior biologist on large-scale power transmission and pipeline projects throughout the western United States.<br><br>Ms D'Avanzo has a BS in Forest Biology and a Master's Degree in Landscape Architecture. |
| Laura Nagy<br>Biology Peer Review | Ms. Nagy is Tetra Tech's Natural Resources Discipline Lead, and is that role is responsible for training and quality control standards, and works to ensure that appropriate resources company-wide are available to meet our clients' needs.<br><br>Ms. Nagy has a BA in Biology, Master's Degree in Zoology and PhD in Evolution and Ecology |

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# Figures

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# Appendix A
# Studies and Assessments

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# Appendix B Agency Correspondence