# High Prairie Wind Farm II

## LWECS Site Permit Application

PUC Docket Number PT6556/WS-06-1520

Public Version; Trade Secret Data Excised

November 21, 2006

# Site Permit Application for a Large Wind Energy Conversion System

High Prairie Wind Farm II
Mower County, Minnesota

High Prairie Wind Farm II, LLC

MPUC Docket Number PT6556/WS-06-1520

Public Version; Trade Secret Data Excised

November 21, 2006

# High Prairie Wind Farm II, LLC

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Mr. Jeffrey Haase
Energy Facility Permitting
Minnesota Department of Commerce
85 7th Place East, Suite 500
St. Paul, MN 55101-2198

Mr. Burl A. Haar
Executive Secretary
Minnesota Public Utilities Commission
121 7th Place E., Suite 350
Saint Paul, MN 55101-2147

RE: PUC Docket No. PT6556/WS-06-1520

Dear Mr. Haase and Mr. Haar:

I am pleased to transmit the LWECS Site Permit Application for High Prairie Wind Farm II, LLC, in accordance with Minnesota Rule 4401.0450. I have also enclosed an application fee of $5,000 to the Minnesota Department of Commerce, pursuant to Minnesota Rule 4401.0800. Please do not hesitate to contact me with any questions regarding the application.

Sincerely,

Bob Crowell

Robert Crowell
Authorized Representative
High Prairie Wind Farm II, LLC

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# 1 Project Summary

## 1.1 Introduction

High Prairie Wind Farm II, LLC (the Applicant) submits this application for a Site Permit to construct a large wind energy conversion system (LWECS), the High Prairie Wind Farm II (the Project), as defined in the Wind Siting Act, Minnesota Statute §116C.691. The Project site is located in Mower County approximately fifteen miles east southeast of the town of Austin, Minnesota. This application is for the second 100 MW phase of the High Prairie Wind Farm, to be constructed in 2007. The first phase received a LWECS Site Permit on May 26, 2006, and is currently under construction by FPL Energy Mower County, LLC.

Consistent with the Minnesota's LWECS siting objectives (Minnesota Statute §116C.693), the Applicant is committed to optimizing the wind resource for the Project. All decisions with respect to equipment selection, site layout, and spacing have been designed to make the most efficient use of land and wind resources. The factors on which these decisions are based include unique environmental features, topographic features, available technology, and the nature of the prevailing wind resources.

## 1.2 Project Site Location

The Project site is located in Mower County approximately fifteen miles east southeast of the town of Austin, as shown in Figure 1.1 below and detailed in Map 1. The Project utilizes land within Bennington, Marshall, Grand Meadow, and Clayton Townships.

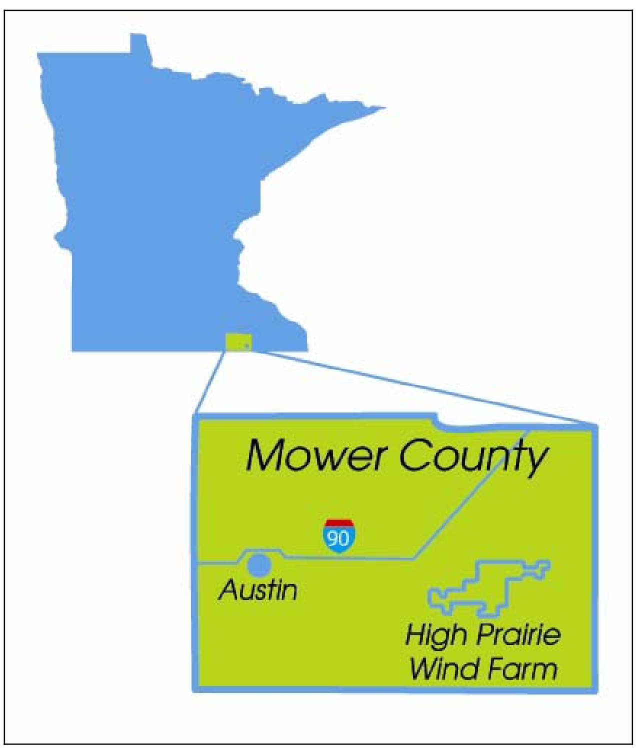


**Figure 1.1 - Project Location**

## 1.3 Site Control

In 2001, the Applicant secured privately-owned land sufficient for a 100 MW Project under long-term lease options that cover wind turbine and substation locations, access roads, transmission line alignment, ancillary facilities, and wind rights. The Applicant has received letters of intent to enter into long-term easement agreements from a significant majority of the landowners and will execute these easement agreements over the next several months.

## 1.4 Wind Resource

The Applicant has gathered over four years of on-site wind data in order to produce sound wind resource estimates. The range of expected long-term mean annual 80 meter (262 ft) wind speeds at the proposed turbine sites is 7.8 – 8.1 m/s (17.4 – 18.1 mph), and the prevailing directions are south and northwest. Winds are strongest in late winter and early spring, and during nighttime and early morning hours.

## 1.5 Projected Output

The Project will have a nameplate capacity of 100.65 MW. Assuming a net capacity factor of approximately **[TRADE SECRET BEGINS]** *** **[TRADE SECRET ENDS]**, projected annual output will be approximately **[TRADE SECRET BEGINS]** *** **[TRADE SECRET ENDS]**.

## 1.6 Siting Plan

The turbines and associated facilities will be sited on agricultural land in Mower County, Minnesota. The Applicant's proposed siting layout (included in Map 2) optimizes wind and land resources at the site while minimizing Project impacts. The turbines will have a rotor diameter (RD) of 82 meters (269 ft). A description of turbine technology is presented in Section 4.2. A final as-built siting layout will be provided once the project has reached commercial operation.

## 1.7 Interconnection and Transmission

The Applicant has signed an interconnection agreement with the Midwest Independent Transmission System Operator (MISO) and Interstate Power and Light Company (a wholly owned subsidiary of Alliant Energy Corporation) to connect the Project's 100 MW to the grid. The Applicant will utilize the seven-mile 161 kV transmission line from the Phase 1 substation to the Adams Substation (the interconnection point) constructed by FPL Energy Mower County, LLC. The Applicant will also construct a 3-mile 161 kV line from the Phase 2 project substation to the Phase 1 project substation. This line is being permitted through a local review process by Mower County under Minnesota Rules 4400.5000.

## 1.8 Environmental Analysis

The Project is located in a lightly populated rural area in southeastern Minnesota. The site is agriculturally developed with crop fields and grazing land; scattered rural residences and pig barns are also present. Wind powered electric generation is very compatible with these uses. A detailed analysis of environmental impacts is included in Section 6.

## 1.9 Permits and Licenses

The Applicant and Applicant's Contractors, as appropriate, will obtain all permits and approvals that are necessary and not covered by the LWECS Site Permit. Permits and approvals required for the Project are identified in Section 13.

## 1.10 Construction

The Applicant, the turbine supplier, and the Balance of Plant (BOP) contractor will perform or manage all development and installation activities. Specifically, the Applicant will:

- Perform site resource analysis and micrositing analysis;
- Undertake environmental review; and
- Obtain specific permits and licenses for the Project.

The turbine supplier and/or BOP contractor will:

- Assemble and install wind turbines;
- Construct foundations, transformers, and roads;
- Perform civil engineering for erection and installation of the Project;
- Install the communication system, including supervisory control and data acquisition software and hardware and telephone or fiber-optic cable; and
- Construct the electrical feeder and collection system.

A thorough Quality Assurance/Quality Control program will be implemented, and construction techniques are discussed further in Section 7.

## 1.11 Operation and Maintenance

The Project will be operational by December 2007. The Applicant will be responsible for the operation and maintenance of the wind farm for the useful life of the Project, which is anticipated to be a minimum of 20 years. The Applicant will contract with the most appropriate supplier of operations and maintenance (O&M) services, with the possibility of self-operating after the initial warranty period on the turbines has expired, and an O&M facility will be constructed as a part of the Project.

## 1.12 Decommissioning

The Applicant's lease agreements with landowners provide that the Project facilities will be removed following the end of the Project's useful life.

## 1.13 Project Ownership

The Applicant will own the Project including all equipment up to the 161 kV interconnection switch installed by FPL Energy Mower County, LLC on the Phase 1 project substation, as well as jointly own with FPL Energy Mower County, LLC the 161 kV transmission line interconnecting both phases to the Adams substation.

High Prairie Wind Farm II, LLC is a subsidiary of Horizon Wind Energy LLC (Horizon), which is a subsidiary of The Goldman Sachs Group, Inc. Horizon, formerly known as Zilkha Renewable Energy, is currently operating and developing projects in more than a dozen states.

# 2 Applicant

The Applicant is applying for a LWECS site permit to allow construction and operation of the first 100 MW phase of the Project. A site permit for the Project is mandated by Minnesota Statutes Sections 116C.691 through 116C.697, and this application has been prepared to meet the requirements of Minnesota Rules Chapter 4401.

The Applicant is owned by Horizon Wind Energy LLC, a subsidiary of The Goldman Sachs Group, Inc. The Applicant will develop, construct, operate, and own the Project.

## 2.1 Contact Information

High Prairie Wind Farm II, LLC
808 Travis St, Suite 700
Houston, TX 77002
713-265-0350 (phone)
713-265-0365 (fax)
Authorized Representative: Robert Crowell

## 2.2 Other LWECS in Minnesota

Neither the Applicant nor its parent owns any other LWECS located in Minnesota. Horizon Wind Energy LLC developed the first phase of the High Prairie Wind Farm and sold the project to FPL Energy Mower County, LLC prior to construction.

# 3 Compliance with the Wind Siting Act and Minnesota Rules 4401

The Wind Siting Act requires an application for a site permit for a LWECS to meet the substantive criteria set forth in Minnesota Statute §116C.57, subp. 4. This application provides to the Minnesota Public Utilities Commission (MPUC) information necessary to demonstrate compliance with these criteria and Minnesota Rules Chapter 4401. The siting of LWECS is to be made in an orderly manner compatible with environmental preservation, sustainable development, and the efficient use of resources (Minnesota Statute §116C.693). Sufficient Project design, wind resource, and technical information have been provided for a thorough evaluation of the reasonableness of the proposed site as a location for the Project.

### 3.1.1 Certificate of Need

Under Minnesota Rules Chapter 4401.0450, subp. 2, a Certificate of Need (CON) is required from the MPUC. The Applicant filed a Certificate of Need Application with the MPUC on October 6, 2006 (Docket No. PT-6556/CN-06-1428).

### 3.1.2 State Policy

The Applicant will further the state policy (Minnesota Statute §116C.693) by siting the Project in an orderly manner compatible with environmental preservation, sustainable development, and the efficient use of resources, as demonstrated by the information provided in this Application.

# 4 Proposed Site

## 4.1 Identification of Project Site

The High Prairie Project site is located approximately fifteen miles east southeast of Austin, Minnesota, and just east of Elkton. Historically, the area has been referred to as the "high prairie," alluding to the relatively high elevation (over 1,400 feet above sea level in places) and the open, treeless nature of the landscape. The turbines will be placed throughout an area comprising about 7,900 acres in the townships of Marshall (Sections 13, 14, 23, 24, and 25), Clayton (Sections 1-4, 8-12, 15-21, 29, 30), Grand Meadow (Sections 26, 27, 33-35) and Bennington (Sections 3-6).

The Project site was selected based on its excellent wind resources, close proximity to existing transmission infrastructure, the ability to build in multiple phases, the ability to secure the required land, current land use, and other considerations necessary to allow wind power to be generated from the site. The site boundary encompasses an area of approximately 10,000 acres. However, the land occupied by the wind farm would be less than 1% of this area. It is anticipated that the area of direct land use for the turbines and associated facilities would be approximately 81 acres and this would include approximately 14 miles of 34 foot wide gravel access roads.

## 4.2 Wind Rights

In 2001, the Applicant secured privately-owned land sufficient for a 100 MW Project under long-term lease options that cover wind turbine and substation locations, access roads, transmission line alignment, ancillary facilities, and wind rights. The Applicant has received letters of intent to enter into long-term easement agreements from a significant majority of the landowners and will execute these easement agreements over the next several months. The lease terms are for up to **[TRADE SECRET BEGINS]** *** **[TRADE SECRET ENDS]** of construction and for **[TRADE SECRET BEGINS]** *** **[TRADE SECRET ENDS]** of commercial operation.

## 4.3 Wind Characteristics in the Project Area

The United States Department of Energy (DOE) and the Minnesota Department of Commerce (MDOC) have conducted wind resource assessment studies in Minnesota since 1982. In 2006, the MDOC published updated maps that present estimates of Minnesota's wind resources throughout the state. In the vicinity of the Project area, the mean annual wind speed at an elevation of 80 m (262 ft) above ground level is mapped as 7.7 to 8.1 m/s (17.2 to 18.1 mph).

Since early 2001, the Applicant has maintained seven 50-meter (164 ft) tall meteorological test towers in the project area. Each of the freestanding towers has individual anemometers mounted at 10, 30 and 50 meters (33, 98, and 164 ft). In addition, the Applicant has a hub-height anemometer mounted on a 100 meter (328 ft) radio tower within the Project area. The on-site anemometer towers were strategically located to obtain a topographic and geographic diversity across the site.

In order to capture the long-term inter-annual variability of the wind, data from four NOAA weather stations were collected and utilized in the wind resource assessment. These long-term references included (1) Rochester International Airport (15 years), (2) Austin Municipal Airport (10 years), (3) Charles City (9 years), and (4) Mason City Municipal Airport (15 years). The hourly correlation coefficients between the Project and these references were good.

The substantial amount of on-site wind data, combined with the excellent correlation with the reference site, has allowed High Prairie's third party meteorologist to make sound predictions of the wind characteristics at the site. These characteristics are further described below.

### 4.3.1 Interannual Variation

There are five complete years of on-site data (2001-2006). The standard deviation of the annual mean wind speeds at Rochester (1997-2004) has been 3.5% of the mean value.

### 4.3.2 Seasonal Variation

Figure 4.1 below shows the composite mean 50-meter winds at one of the met tower sites during the period August 2001-March 2005. Winds are strongest in late winter and early spring, and are weakest in summer.

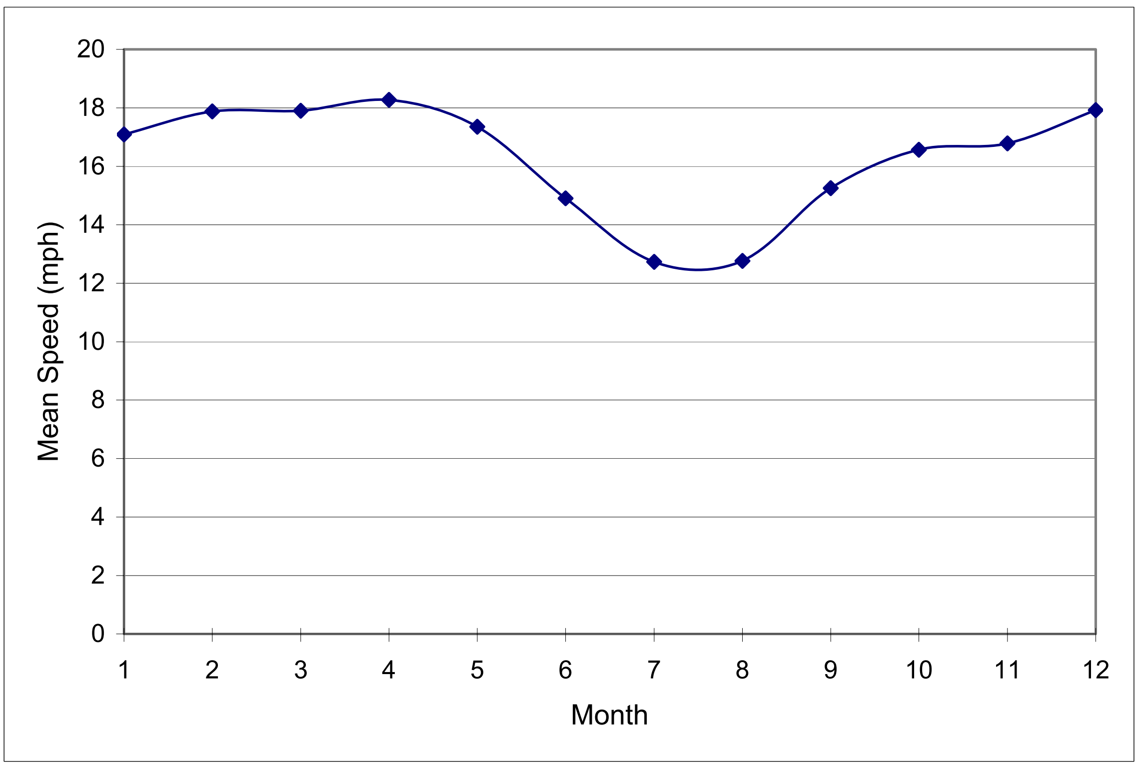


**Figure 4.1 - High Prairie Composite Mean Wind Speed**

### 4.3.3 Diurnal conditions

The winds have been converted into equivalent capacity factor and summarized by time of day in Figure 4.2. Winds are generally strongest during nighttime and early morning hours.

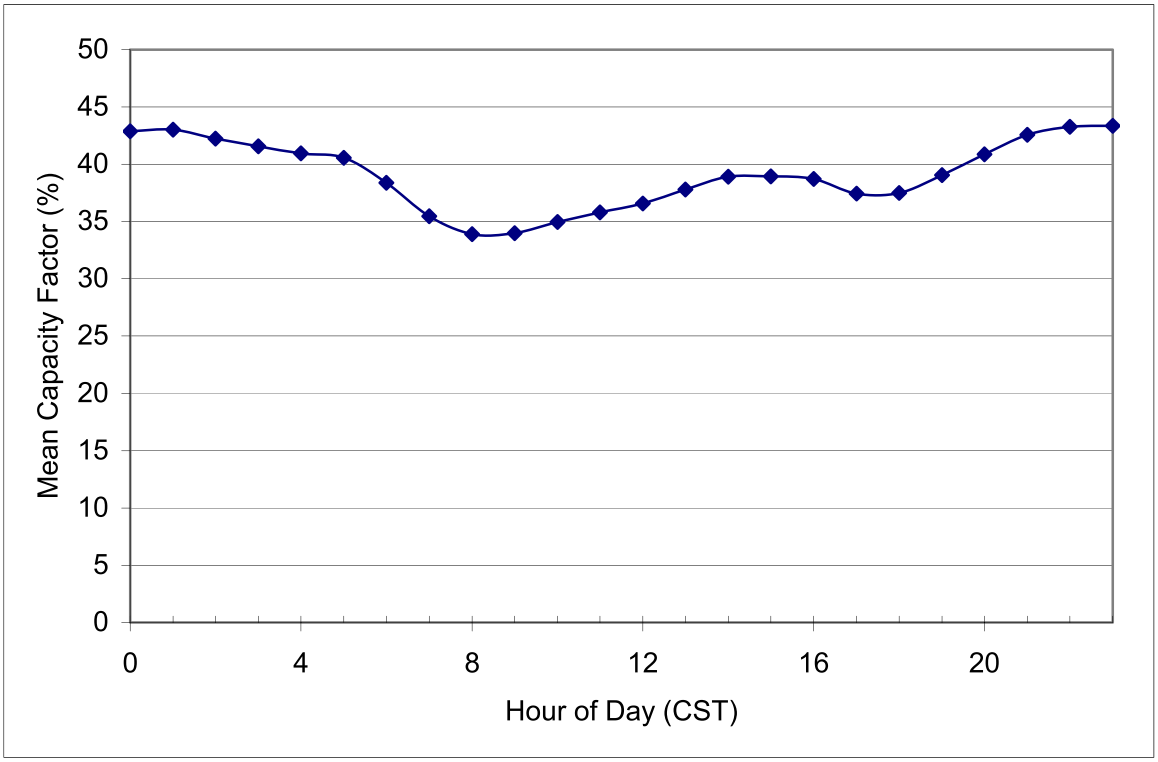


**Figure 4.2 – High Prairie Annual Diurnal Capacity Factor**

### 4.3.4 Atmospheric Stability

Such data have not been compiled, as the required inputs are normally not collected with on-site meteorological monitoring.

### 4.3.5 Hub Height Turbulence

Turbulence affects the longevity of wind turbines because greater turbulence tends to cause more wear and tear. Turbulence tends to decrease with height, making a hub height of 80 m preferable to a lower hub height from a turbulence perspective. The turbulence intensity is defined as the standard deviation of the wind divided by its concurrent mean wind speed for a given averaging period, in this case hourly. For wind speeds greater than 4 m/s (8.9 mph), the typical turbulence intensity at 80 m (262 ft) above ground is 0.08-0.11. For wind speeds greater than 15 m/s (33.6 mph) at 80 m, the mean turbulence intensity is 0.09.

### 4.3.6 Extreme Wind Conditions

The maximum hourly mean wind speed recorded at the Project was 23 m/s (51 mph), and the maximum gust was 35 m/s (79 mph).

### 4.3.7 Wind Speed Frequency Distribution

An annualized wind speed frequency distribution based on on-site data is presented in Table 4.1. It is valid for the expected long-term aggregate mean annual 80 m wind speed of 7.87 m/s (17.6).

**Table 4.1 - High Prairie Annual Wind Speed Frequency Distribution**

| Speed (m/s) | Hours/ Year |
|---|---|
| 0 | 53.9 |
| 1 | 116.1 |
| 2 | 189.7 |
| 3 | 379.5 |
| 4 | 625.4 |
| 5 | 819.2 |
| 6 | 999.8 |
| 7 | 1,114.2 |
| 8 | 1,043.9 |
| 9 | 884.2 |
| 10 | 719.4 |
| 11 | 539.7 |
| 12 | 430.4 |
| 13 | 318.8 |
| 14 | 205.6 |
| 15 | 121.9 |
| 16 | 82.0 |
| 17 | 47.2 |
| 18 | 29.6 |
| 19 | 19.9 |
| 20 | 10.0 |
| 21 | 6.4 |
| 22 | 2.3 |
| 23 | 0.0 |
| 24 | 0.4 |
| 25 | 0.4 |
| 26 | 0.0 |
| 27 | 0 |
| 28 | 0 |
| 29 | 0 |
| 30+ | 0 |

### 4.3.8 Wind Variation with Height

Wind shear is the relative change in wind speed as a function of height. Wind shear is calculated using a power function based upon the relative distance from the ground. The general equation used for calculating wind shear is $S/S_0 = (H/H_0)^{\alpha}$, where $S_0$ and $H_0$ are the speed and height of the lower level and $\alpha$ is the power coefficient. The power coefficient can vary greatly due to the terrain roughness and atmospheric stability, and will also change slightly with variation in height. The meteorological towers measure winds at a minimum of three levels, 10, 30 and 50 m (33, 98, and 165 ft). The 10-50 m wind shears typically range from 0.17 – 0.21. The shear at the 101 m (331 ft) tower above the 50 m level is 0.24.

### 4.3.9 Spatial Wind Variation

The range of expected long-term mean annual 80 m (262 ft) wind speeds at the proposed turbine sites is 7.8 – 8.1 m/s (17.4 mph – 18.1 mph), reflecting the fairly flat conditions of the Project site.

### 4.3.10 Wind Rose

A wind rose for the Project area is presented in Figure 4.3 below. Prevailing direction sectors are south and northwest.

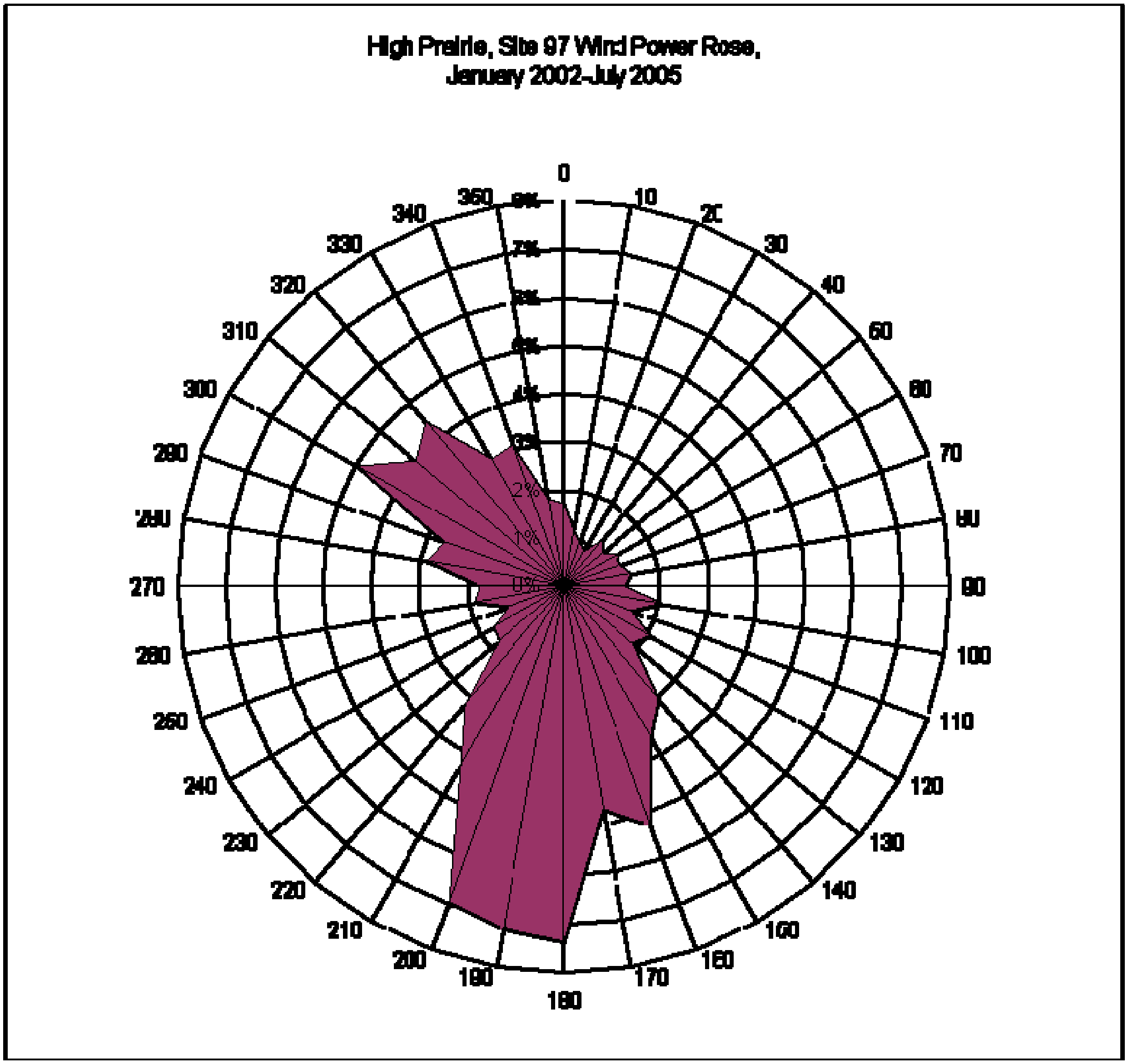


**Figure 4.3 - High Prairie Wind Rose**

## 4.4 Other Meteorological Conditions

### 4.4.1 Average and Extreme Weather Conditions

The Project area has a sub-humid, continental climate characterized by cold winters and warm summers. Southerly winds (and moist air flow from the Gulf of Mexico) predominate in summer. In winter, northerly-component winds predominate, bringing cold dry air from Canada.

Meteorological summaries from the National Weather Service station at the Rochester, Minnesota airport have been used as a surrogate for the Project area. Temperature and precipitation statistics are summarized in Table 4.2.

On average there are 87 clear days per year, 98 partly cloudy days per year, and 180 cloudy days per year. Precipitation (0.01” or more) occurs on average 118 days per year, with snow (1.0” or more) on 15 days per year. There are 40 days with thunderstorms per year. On average, there are 15-20 tornadoes across the entire state of Minnesota each year.

**Table 4.2 - Climate Summary, Rochester, Minnesota**
(temperatures in degrees F, precipitation in inches), 1960-1991

| Month | Mean T | Daily Max T | Daily Min T | Extreme Max T | Extreme Min T | Mean Precip | Max Monthly Snow | Max 1-Day Precip |
|---|---|---|---|---|---|---|---|---|
| Jan | 10.8 | 19.7 | 1.9 | 55 | -32 | 0.74 | 27.3 | 1.42 |
| Feb | 17.0 | 26.2 | 7.7 | 63 | -29 | 0.69 | 19.1 | 1.05 |
| Mar | 28.0 | 36.7 | 19.2 | 79 | -31 | 1.73 | 25.2 | 2.04 |
| Apr | 44.6 | 54.9 | 34.3 | 91 | 5 | 2.50 | 16.4 | 3.97 |
| May | 56.9 | 68.2 | 45.6 | 92 | 21 | 3.42 | 0.3 | 2.61 |
| Jun | 66.6 | 77.6 | 55.5 | 101 | 35 | 4.12 | Trace | 3.01 |
| Jul | 70.7 | 81.4 | 59.9 | 102 | 42 | 3.82 | 0 | 7.47 |
| Aug | 68.4 | 79.1 | 57.6 | 99 | 37 | 3.85 | Trace | 3.89 |
| Sep | 59.2 | 70.3 | 48.1 | 95 | 23 | 3.07 | 0.8 | 6.01 |
| Oct | 48.7 | 59.2 | 38.1 | 88 | 11 | 2.08 | 5.4 | 2.81 |
| Nov | 32.6 | 41.1 | 24.1 | 73 | -20 | 1.39 | 22.5 | 2.64 |
| Dec | 18.5 | 26.3 | 10.7 | 62 | -33 | 0.84 | 30.6 | 1.35 |
| Year | 43.5 | 53.4 | 33.6 | 102 | -33 | 28.25 | 30.6 | 7.47 |

## 4.5 Other Wind Turbines in the Area

This Site Permit application is being submitted for the second phase of the High Prairie Wind Farm. The first phase is currently under construction by FPL Energy Mower County, LLC, and is located to the south and east of the Project. The two projects are approximately one to two miles apart. A map showing the approximate locations of both Project phases is included in Figure 4.4 below.

The Garwin McNeilus project in Adams Township is approximately seven miles from the High Prairie Wind Farm, a sufficient distance to avoid any wind wake interference.

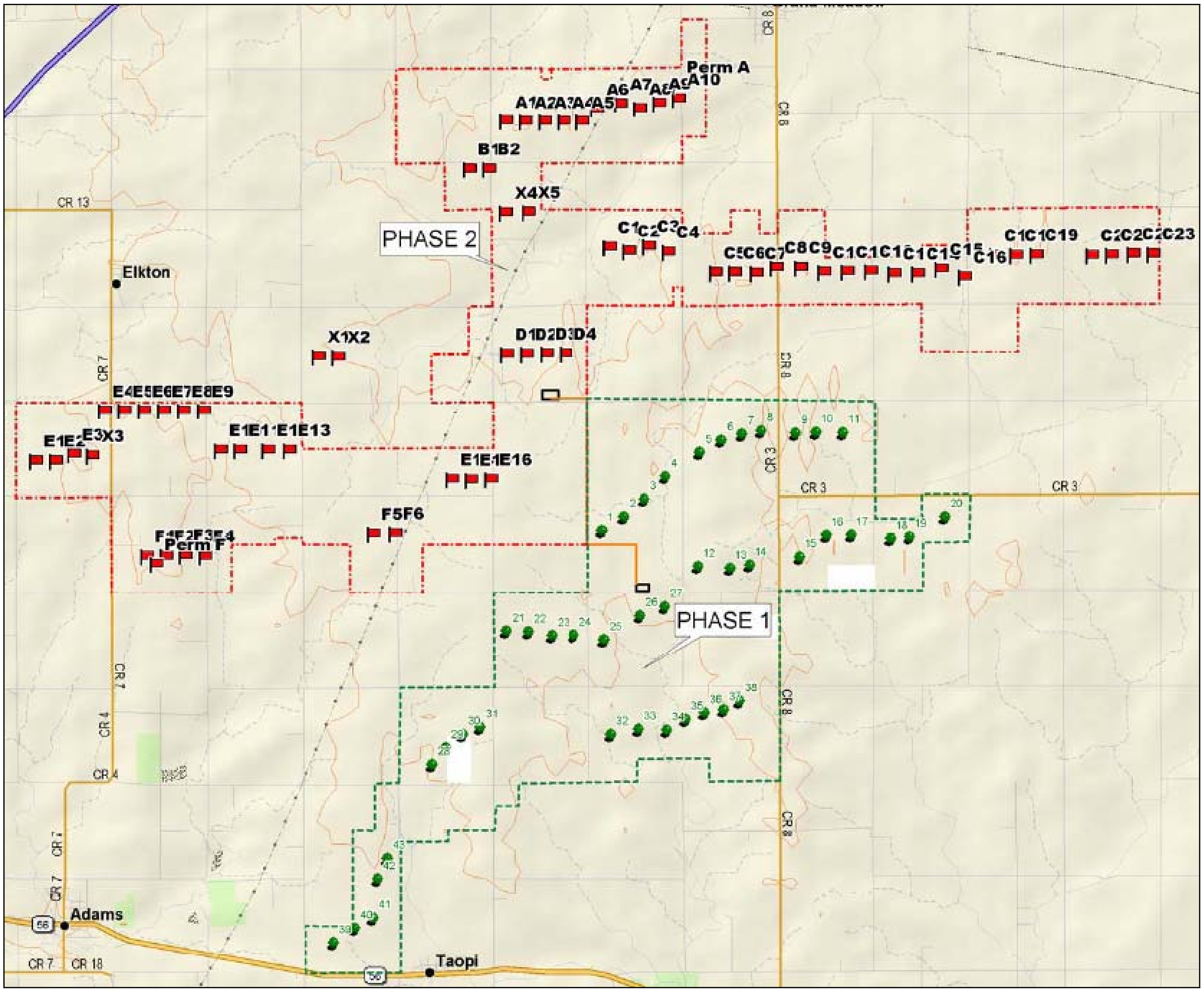


**Figure 4.4 - Approximate Locations of High Prairie Wind Farm Phases 1 & 2**

# 5 Design of Project

## 5.1 Project Layout

The Project will consist of wind turbines, transformers, meteorological towers, access roads, underground and overhead electrical lines, a substation and switchyard, and an operations and maintenance center. A Project layout is included in Map 2 and in Figure 5.1 below.

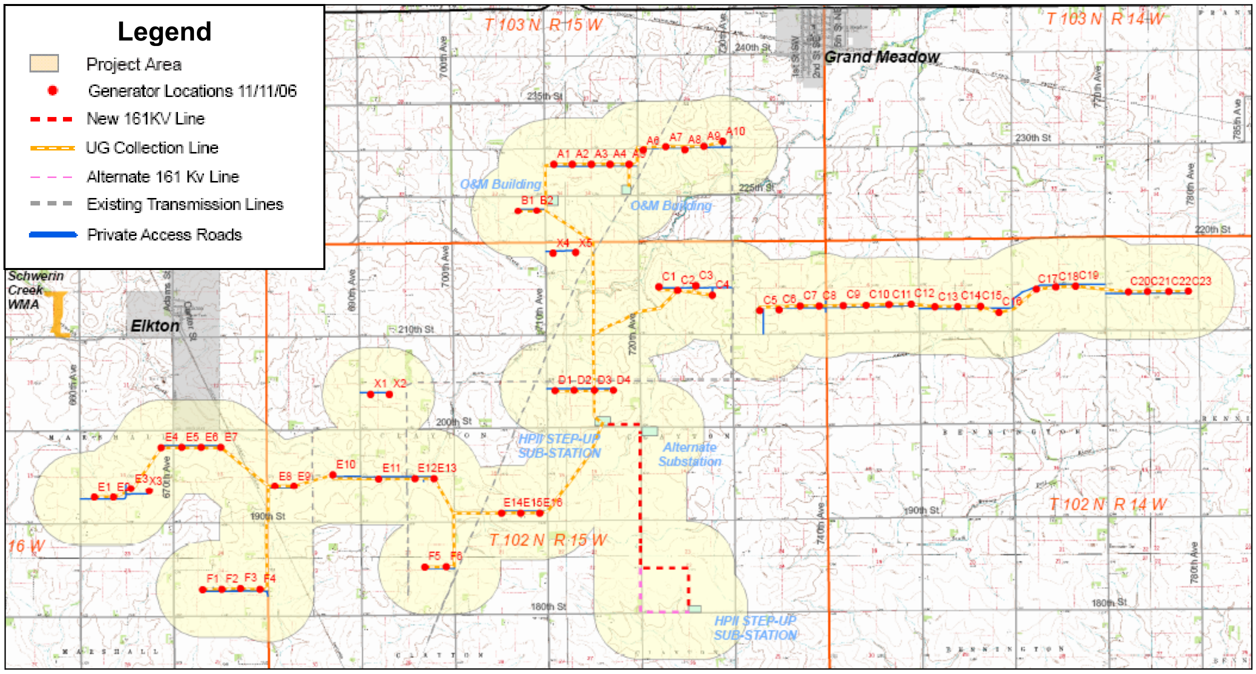


**Figure 5.1 - Project Layout**

### 5.1.1 General Layout and Setback Considerations

The proposed layout generally employs setbacks of 5 rotor diameters (RD) from north and south project boundaries, and 2 RD from east and west project boundaries. Exceptions are discussed below.

For the purposes of preparing this layout, a road setback of approximately 500 feet from the road centerline was used. In final field siting, strings may be nudged closer to the roads to reduce construction costs, but in no case would a turbine be placed closer than laydown distance from the edge of the road right-of-way. The laydown distance is equal to the hub height (80 m) plus ½ RD (41 m), or 121 m (397 feet). This would exceed the 250 foot setback required in previous permits, and would meet the Mower County requirements for small wind projects.

In most cases, turbines have been setback at least 1500 feet from homes. If a participating landowner were to consent, the applicant would consider moving turbines closer to such landowner's home if it were possible to compact the layout by doing so, but in any case not closer than 305 meters (1000 feet).

### 5.1.2 Exceptions

Turbines E4, E5, E6, and E7 are less than 5 RD south of the Project boundary, and turbine X1 is less than 2 RD west of the Project boundary. A Mower County ordinance prohibits wind turbine installations on the land on the other side of these boundaries because the area has been designated as a microwave beam path for emergency communication systems. The Mower County ordinance is included as Appendix 1.

## 5.2 Wind Turbines

The Project will consist of 61 Vestas 1.65 MW wind turbines for an installed nameplate capacity of 100.65 MW. Horizon Wind Energy has entered into an agreement with Vestas to provide turbines for several 2007 wind energy projects. Under this agreement, 61 of these turbines have been designated for the Project and will be built with upgrades for cold weather climates. The turbine has a hub height of 80 meters (262 ft) and a rotor diameter of 82 meters (269 ft). Turbine specifications are included in Appendix 2.

### 5.2.1 Rotor

The rotor consists of three blades mounted to a rotor hub. The hub is attached to the nacelle, which houses the gearbox, generator, brake, cooling system, and other electrical and mechanical systems. The rotor diameter will be 82 m, corresponding to a swept area of 5281 $m^2$ (56,844 $ft^2$). The rotor speed will be 14.4 rpm.

### 5.2.2 Tower

The tower is a conical tubular steel tower with a hub height of 80 m. The tower consists of three to four sections manufactured from certified steel plates. All welds are made in automatically controlled power welding machines and are ultrasonically inspected during manufacturing per American National Standards Institute (ANSI) specifications. All surfaces are sandblasted and multi-layer coated for protection against corrosion. Access to the turbine is through a lockable steel door at the base of the tower. A service platform at the top of each section allows for access to the tower's connecting bolts for routine inspection. An internal ladder runs to the top platform of the tower just below the nacelle. A nacelle ladder extends from the machine bed to the tower top platform allowing nacelle access independent of its orientation. The tower is equipped with interior lighting and a safety guide cable alongside the ladder.

### 5.2.3 Foundations

**Figure 5.2 - Spread Footing Foundation**

The foundation design will be tailored to suit the soil and subsurface conditions at the various turbine sites. A formal geotechnical investigation will be performed at each tower location with a drill to analyze soil conditions and test for voids and homogeneous ground conditions. Two foundation designs are under consideration depending on the results of the geotechnical study. Both are standard for wind turbine generator foundations and have been used extensively throughout the industry. The first, a spread footing type foundation (as shown in Figure 5.2), is a typical octagon spread footing with a 3-4 foot pedestal, rebar and anchor bolts. When completed, a spread footing foundation would contain approximately 400-500 cubic yards of structural concrete. The second type, a pier foundation, would consist of a 30-35 foot corrugated metal cylinder (16-18 foot in diameter) placed vertically in the ground. A bolt cage consisting of two concentric rows of anchor bolts extending the entire length of the cylinder would be installed in a pattern matching the tower base flange bolting pattern. Once the bolt cage is placed, concrete would be installed to complete the foundation. When completed, each pier foundation would be filled with approximately 250-300 cubic yards of structural concrete. The chosen foundation design will be certified by an experienced and qualified registered structural engineer who has designed several generations of wind turbine towers and foundation systems that have proven themselves well in some of the most aggressive wind regions of the world.

### 5.2.4 Turbine Safety Systems

All turbines are designed with several levels of built-in safety, and comply with the codes set forth by international standards as well as those of the Occupational Safety and Health Administration (OSHA) and of the ANSI.

***Braking Systems***

The turbines are equipped with two fully independent braking systems that can stop the rotor either acting together or independently. The braking system is designed to be fail-safe, allowing the rotor to be brought to a halt under all foreseeable conditions. The system consists of aerodynamic braking by the rotor blades and by a separate hydraulic-disc brake system. Both braking systems operate independently, such that if there is a fault with one, the other can still bring the turbine to a halt. Brake pads on the disc brake system are spring-loaded against the disc, and power is required to keep the pads away from the disc. If power is lost, the brakes will be mechanically activated immediately. The aerodynamic braking system is also configured such that if power is lost, the system will be activated immediately using back-up battery power or the nitrogen accumulators on the hydraulic system, depending on the turbine's design.

The turbines are also equipped with a parking brake that is generally used to "park" the rotor during routine maintenance or while inspections are performed that require a stationary rotor.

***Climbing Safety***

Normal access to the nacelle is accomplished with a ladder inside the tower, which is kept locked. Standard tower safety hardware includes equipment for safe ladder climbing such as lanyards and safety belts for service personnel. All internal ladders and maintenance areas inside the tower and nacelle are equipped with safety provisions for securing lifelines and safety belts, and conform to or exceed current national and state regulations regarding safety requirements for ladders.

***Lightning Protection System***

The turbines are equipped with a lightning protection system that connects the blades, nacelle, and tower to the grounding system at the base of the tower. The grounding system consists of a copper ring conductor connected to grounding rods driven down into the ground at diametrically opposed points outside of the foundation.

As the rotor blades are nonmetallic, they normally do not act well as a discharge path for lightning; however, as the highest point of the turbine, the blades sometimes provide the path of least resistance for a lightning strike. In order to protect the blades, they are constructed with an internal copper conductor extending from the blade tip down to the rotor hub, which is connected to the main shaft and establishes a path through the nacelle down to the tower base grounding system embedded underground. An additional lightning rod extends above the wind vane and anemometer at the rear of the nacelle. Both the rear lightning rod and blades have conductive paths to the nacelle bed frame that in turn connects to the tower. The tower base is connected to the grounding system at diametrically opposed points.

## 5.3 Description of Electrical system

Each turbine will have a step-up transformer to raise the voltage to distribution line voltage of 34.5 kV. Power will be run through an underground collection system to the Project substation. In locations where two or more sets of underground lines converge, pad-mounted junction panels will be utilized to tie the lines together into one or more sets of larger feeder conductors. At the Project substation, the electrical power from the entire wind plant is converted to 161 kV and is delivered to the interconnection switch at the FPL Energy Mower County Wind Farm via a three-mile transmission line.

### 5.3.1 Transformers

Power from the turbines is fed through a breaker panel at the turbine base inside the tower and is interconnected to a pad-mounted step-up transformer (shown during construction in Figure 5.3) which steps the voltage up from 600 Volts to 34.5 kilovolts (kV). The transformer impedance will be optimized based on the facility power output requirements and feeder circuit-breaker interrupting ratings and internal fuses. Protection to the transformer and wind turbine is provided by a switch breaker at the turbine bus cabinet electrical panel inside the tower. The pad transformers are interconnected on the high voltage side to underground cables to form an electrical collection system described in the following section.

**Figure 5.3 - Typical Pad Mount Transformer**

### 5.3.2 Electrical Collection System

**Figure 5.4 - Typical Cable Trench**

The Project will utilize approximately 24 miles of underground 34.5 kV electrical power lines to collect all of the power from the turbines and transmit it to the Project substation. The underground cables are installed in a trench that is approximately 3-4 feet deep and runs beside the Project's roadways as shown in Figure 5.4. A clean fill material such as sand or fine gravel will cover the cable before the native soil and rock are backfilled over the top. In locations where two or more sets of underground lines converge, underground vaults and/or pad-mounted switch panels will be utilized to tie the lines together into one or more sets of larger feeder conductors. The underground collection cables feed larger underground and overhead feeder lines that run to the Project substation.

### 5.3.3 Substation

The Project substation will step-up the voltage from 34.5 kV to 161 kV so that the electricity can be reliably interconnected to the surrounding power grid. The basic elements of the substation are a control house, transformer, outdoor breaker, relaying equipment, high-voltage bus work, steel support structures, and overhead lightning suppression conductors. The substation equipment will be installed on concrete foundations and will consist of a graveled footprint area of approximately two to four acres, a chain link perimeter fence, and an outdoor lighting system. Figure 5.5 shows a typical substation. The substation is being permitted under Minnesota Rules 4400.5000, which allow local review for a conditional use permit by Mower County.

**Figure 5.5 - Typical Substation**

### 5.3.4 Transmission Line

Electricity will be transmitted from the Project substation to the Mower County substation (the substation for phase 1) via a three-mile 161 kV transmission line. The transmission line is being permitted under Minnesota Rules 4400.5000, which allow local review for a conditional use permit by Mower County. From the Mower County substation, electricity will be transmitted to the Adams substation via a seven-mile 161 kV line that is currently under construction and is jointly owned by High Prairie Wind Farm II, LLC and FPL Energy Mower County, LLC.

### 5.3.5 Interconnection

The interconnection study for the Project has been completed with MISO in coordination with Xcel Energy and Alliant Energy, and High Prairie Wind Farm II, LLC has executed an interconnection agreement with these parties for 100 MW. The facilities study confirmed that no major upgrades are required to interconnect the Project to the grid.

All utility protection and metering equipment will meet Xcel's and Alliant's standards for parallel operations. The construction manager will work closely with Xcel's and Alliant's engineers to ensure that proper interconnection protection is established. Detailed interconnection information will be supplied to the MPUC as it becomes available.

## 5.4 Associated Facilities

### 5.4.1 Access Roads

Graveled access roads branching from existing graveled section line roads that cross the Project area will provide access to the various rows of turbines. In some areas new roads will be designed to allow for the transportation of heavy equipment to the Project area, and will be used throughout the life of the wind farm to allow access to and from the wind turbines, substation, meteorological towers, and operations and maintenance (O&M) facility. The turbine access roads typically may be constructed two different ways. On arid sites where there is substantial subgrade bearing capacity and little danger of precipitation challenging the soil properties, a narrow (approximately 16 foot wide) road would be constructed, with an additional 18' to 20' width graded and compacted to support the other crawler crane track. However, due to the expected soil conditions and the potential for precipitation at this site, it is anticipated that the graveled access roads must cover the full width of the crane track. The crane track is approximately 31 feet wide requiring road widths of 32 to 34 feet. In either case, the vegetative subgrade will be removed for the depth of the rock to be replaced, approximately 8 to 12 inches deep. Typically, a geotextile fabric will be installed and then the gravel will be placed, graded, and compacted. The final road surface will be flush with the original grade, allowing unhindered passage of farm machinery.

### 5.4.2 Meteorological Towers

Two permanent meteorological towers will be installed at the Project site to monitor the wind during the operation of the wind farm. These towers will be between 50 – 80 meters (164 – 262 ft) tall. Each met tower will have a grounding system similar to that of the wind turbines with a buried copper ring and grounding rods or rods installed at the top of the towers to provide an umbrella of protection for the upper sensors. The met towers will be connected to the wind farm's central SCADA system (described below). In addition, some of the previously permitted temporary meteorological test towers described in Section 4.3 may be kept in place for some period of time during and after construction.

### 5.4.3 Operations and Maintenance Center

An O&M facility will be constructed to serve as a center for the Project's O&M efforts, house the Supervisory Control and Data Acquisition (SCADA) system, and will potentially also serve as a visitor center/viewing area. The O&M facility is the base of operations for the wind generating facility maintenance and operation. It provides office space for the crews, as well as a shop/storage area for spare parts and vehicles. It will also house all of the central monitoring equipment for the generating facility where the turbines can be monitored and controlled. The building may either be built on the Project site by a local contractor, or, if the location is convenient, an existing facility may be purchased and modified to function as the O&M facility.

### 5.4.4 SCADA System

Each turbine is connected to a central SCADA system, as shown schematically in Figure 5.6, through a network of underground fiber optic cable or copper signal wire. In order to prevent stray surges if copper signal wire is used, the interfaces to the wind turbine and other signal processors are all optically isolated. The SCADA system allows for remote control monitoring of individual turbines and the wind plant as a whole from both the central host computer and from a remote computer. In the event of faults, the SCADA system can also send signals to a fax, pager, or cell phone to alert operations staff.

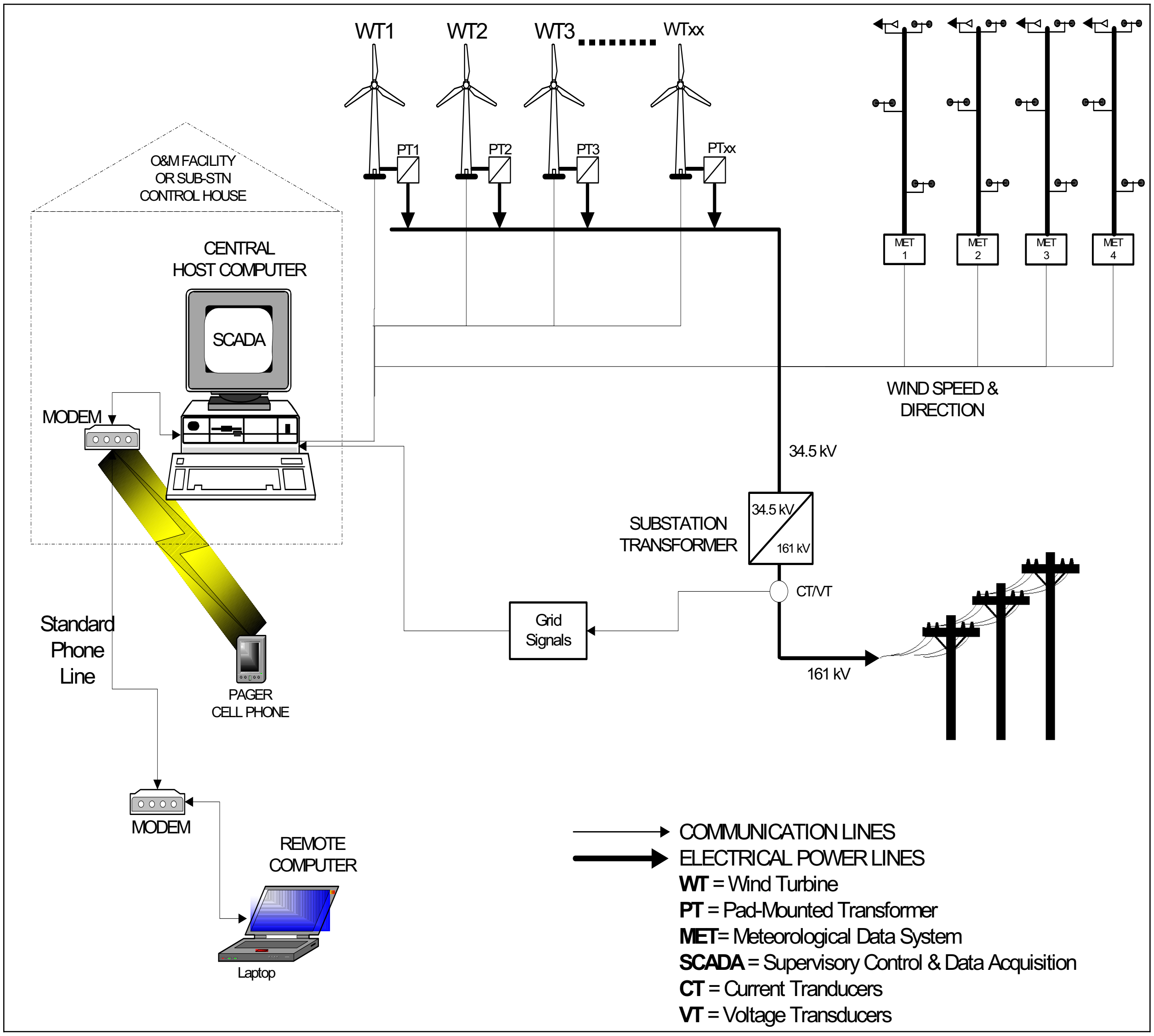


**Figure 5.6 - Electrical and Communication Collection System**

# 6 Environmental Analysis

**Table 6.1 - Summary of Disturbances**

| Component | Typical Construction Requirements (temporary) | Typical Maintenance/Operations Requirements (long-term) |
|---|---|---|
| Turbines | 250 feet by 250 feet each, with 60 feet by 100 feet crane pad, including associated laydown areas | 50 feet by 50 feet each, with a 60 feet by 100 feet crane pad each |
| Turbine Transformers | Within turbine construction area | Within 50 feet by 50 feet turbine area |
| Access Roads to Turbines | 14 miles<br>34 feet wide disturbance within 200 feet wide construction ROW[1] | 14 miles<br>34 feet wide, gravel surface road |
| Underground Lines (trenches) | Approximately 23.7 miles of underground line.<br><br>Disturb area no more than 75 feet wide. | Trenches filled, re-graded, and vegetated. No permanent surface disturbance |
| Collection Substation, Operations and Maintenance Buildings | 10 acres total | 10 acres total |
| Laydown Area | 15 acres total | Will be reclaimed in accordance with lease agreement. |
| Transmission Line Poles | 50 feet by 50 feet plus temporary access road 16 feet wide along route | 7 feet by 7 feet for pole bases plus an access road along route |
| Temporary Met. Towers | 100 feet by 100 feet laydown area for each | No permanent disturbance |
| Permanent Met. Towers | 100 feet by 100 feet laydown area plus 25 feet wide alignment from nearest turbine for each tower | 30 feet by 30 feet disturbance for tower base |

[1] Rights of Way (ROW) have not yet been secured. Lease agreements will determine the final width of the ROW and allowable disturbance.

This section provides a description of the environmental conditions that exist within the Project. Consistent with MPUC procedures on siting LWECS and applicable portions of the Power Plant Siting Act, various exclusion and avoidance criteria were considered in the selection of the Project Area shown on Maps 1 and 2, which totals approximately 19,427 acres. To support this siting process, maps of the Project Area were generated from existing data to show the following features:

- Parks and wildlife management areas available from Minnesota GIS sources;
- Monuments, historic sites, and trails shown on USGS 7.5 Minute Quadrangle Maps;
- Soils and geology;
- Roads and railways;
- Topography;
- Surface water hydrology including wetlands; and
- Land use and land cover.

Initial investigations also included agency queries consisting of requests for relevant information to assess potential impacts of Project development. These query letters were sent to the U.S. Army Corps of Engineers (USACE), U.S. Fish and Wildlife Service (USFWS), Minnesota Department of Natural Resources (MNDNR), Minnesota Natural Heritage Program (MNNHP), Mower County Coordinator, and Mower County Planning and Zoning. Query letters and responses are presented in Appendix 3. In addition to these written queries, phone calls were made to staff in these agencies and others. This information was used to prepare the following environmental analysis.

## 6.1 Description of Environmental Setting

The Project Area is located approximately 70 miles west of the Mississippi River on a low ridge serving as a drainage divide between several local watersheds. Elevations in the Project Area range from 1,350 to 1,420 feet above mean sea level (amsl). The Project Area is agriculturally developed with crop fields, grazing land, scattered rural residences, and other agricultural operations dominating the landscape.

The Project Area is primarily located in the Western Corn Belt Plains Ecoregion as described below:

> *"Once covered with tallgrass prairie, over 75 percent of the Western Corn Belt Plains is now used for cropland agriculture and much of the remainder is in forage for livestock. A combination of nearly level to gently rolling glaciated till plains and hilly loess plains, an average annual precipitation of 63-89 cm, which occurs mainly in the growing season, and fertile, warm, moist soils make this one of the most productive areas of corn and soybeans in the world. Major environmental concerns in the region include surface and groundwater contamination from fertilizer and pesticide applications, as well as impacts from concentrated livestock production (USEPA 2006)".*

## 6.2 Socioeconomics

### 6.2.1 Description of Resource

The Project is located in Mower County, a rural area in southeastern Minnesota. Baseline data for the county include population and demographic data, as well as current business and economic statistics information. Information in this section was obtained from the U.S. Census Bureau based on the 2000 census data, as reviewed, updated, and reported each year, and on the 2002 Economic Census.

Mower County comprises 712 square miles with 54.3 people per square mile and a total population of 38,603 people in 2000. Mower County grew by 3.3 percent between 1990 and 2000 and an estimated 1.0 percent between 2000 and 2004. The median age in Mower County was 38.9 years, with 31.2 percent of the population under the age of 18 and more than 19 percent 65 years or older in 2000. The population of minority and low-income populations in the county and state are shown in Table 6.2.

**Table 6.2 - Minority Populations and Low-Income Populations, Mower County, 2000**

| Location | Total Population | Percent Minority* | Percent below Poverty (1999)** |
|---|---|---|---|
| Mower County | 38,603 | 7.0 | 9.2 |
| State of Minnesota | 4,919,479 | 11.8 | 7.9 |

*Source: U. S. Census Bureau 2005*
**Minority populations are persons of Hispanic or Latino origin of any race, Blacks or African Americans, American Indians or Alaska Natives, Asians, and Native Hawaiian and other Pacific Islanders.*
***Low-income populations are persons living below the poverty level. In 2000, the poverty weighted average threshold for a family of four in the United States was $17,603 and $8,794 for an unrelated individual.*

Austin is the largest city and county seat of Mower County. The Project is located in Marshall, Grand Meadow, Bennington, and Clayton townships. There are several small rural communities in the vicinity of the Project Area including Taopi, Adams, Grand Meadow, Dexter and Elkton. According to the City of Adams web page, the Southland Consolidated School District provides educational services to K-12 pupils in the area (City of Adams 2005).

The 2000 U.S. Census reports that there were 15,582 housing units in Mower County with 2.42 persons per household. Mower County had a home ownership rate of 78.2 percent in 2000. The median housing value was $71,400, which is significantly less than the state average of $122,400. Median household income was $37,859 in 2002, just 75 percent of the state median household income of $50,157. (U.S. Census Bureau 2005).

The 2002 Mower County Comprehensive Plan estimates that the county population will increase by 1,290 people by 2010, resulting in an estimated census population of approximately 40,000 people, with most of the new growth concentrated adjacent to the I-90 corridor.

Mower County has a long record of economic stability due in part to Hormel Meat Company, which produces "Spam" and other meat products at its facility in Austin. Over 85 percent of all manufacturing employment (4,347) is classified as food manufacturing (3,745) and over 90 percent of the manufacturing annual payroll ($176,193,000) is from the food manufacturing sector ($159,190,000). Other major employers include: the Austin Medical Center; Mayo Health Systems; various other manufacturing businesses; commercial businesses, including accommodation and food services; all levels of government and education; and agricultural operations. Approximately 1,818 people worked in government jobs (federal, state, local, schools) in 2000. A summary of the non-farm jobs and payroll for Mower County is shown in Table 6.3.

**Table 6.3 - Non-farm Private Employment by Industry, 2002, Mower County**

| Industry | 2002 | Annual Payroll ($1,000) |
|---|---|---|
| Total Non-farm Private Employment | 14,498 | **No figures available** |
| Manufacturing | 4,347 | 176,193 |
| Wholesale Trade | 343 | 10,747 |
| Transportation & warehousing | 332 | 8,151 |
| Construction | 555 | 19,355 |
| Retail Trade | 1,918 | 32,732 |
| Information | 167 | 4,458 |
| Finance & insurance | 507 | 18,740 |
| Professional, scientific and technical services | 242 | 11,418 |
| Administrative & support & waste management & remediation service | 397 | 13,511 |
| Educational services | 94 | 1,553 |
| Health care & social assistance | 2,468 | 61,043 |
| Arts, entertainment, & recreation | 80 | 1,599 |
| Accommodation & food services | 1,249 | 10,366 |
| Other services (except public administration) | 970 | 1,724 |
| Other non-farm private employment, not included in county data | 829 | **No figures available** |

*Source: U. S. Census Bureau 2002*

Agriculture is an important activity in the county, including businesses that support agriculture and provide basic commercial services to local residents. Direct agricultural employment in Mower County was estimated at 926 in 2000, approximately six percent of the total workforce. Total market value of agricultural products produced from farms in Mower County was $178,681,000, including $105,467,000 in crops and $73,214,000 in livestock and poultry. There were 1,088 farms in Mower County in 2002, with a median size of 186 acres (just over a quarter section) (USDA 2002).

Unemployment in Mower County has consistently remained slightly lower than that of the entire state of Minnesota, with 4.6 percent of the state work force being unemployed in 2002, and 4.0 percent of the Mower County being unemployed in 2002 (USDA 2005).

### 6.2.2 Impacts

Economic impacts are described as the amount of money and/or employment that the Project may deliver in terms of:

- Employment;
- Income;
- Government costs and tax revenues.

Construction of the Project is anticipated to cost several million dollars for labor and equipment and be complete within nine months following commencement of construction. During construction and operation, the Project will function as a "basic industry" in Mower County, the Southeastern Region, and the State of Minnesota. Basic industries are those business and government activities which bring outside income into an area economy. Income from sources outside the area that is received as paychecks and spent generates additional income and employment in the area, which is called the multiplier effect. Construction employment accounts for less than four percent of the Mower County workforce. If local contractors are employed for portions of the construction, total wages and salaries paid to contractors and workers in Mower and adjacent counties will contribute to the total personal income of the region. Additional personal income will be generated in the local, regional, and state economies due to the multiplier effect of each dollar paid in salaries and wages. Multipliers used for basic industries are estimated to be between one and three times the original salary and wages. This multiplier effect occurs as earners buy goods and services locally with the money earned and contribute to local, state and national taxes. Purchase of goods such as energy, fuel, operating supplies, and equipment also generate sales tax revenues.

Long-term impacts to the Mower County tax base resulting from the construction and operation of the Project will contribute to the local economy in southeastern Minnesota. Development of energy projects in this region is important in diversifying and strengthening the economic base and encouraging economic growth of the region and the local counties where energy projects are located. County government expenses are not expected to increase because of the Project. Leading industries in Mower County, including Hormel, are not expected to be impacted during construction or operation of the Project.

There is no indication that an environmental justice population (minority, including Native Americans, or low income) exists in the county or that the Project will be placed in an area occupied primarily by any minority group.

### 6.2.3 Mitigation Measures

Socioeconomic impacts associated with the Project will be primarily positive. These positive impacts result from the influx of wages and purchases made at local businesses during Project construction, an increase in the county's tax bases from the construction and operation of the Project and payment to landowners for easements. Since impacts resulting from the Project are expected to be beneficial to the local community rather than detrimental, specific mitigation is not required.

## 6.3 Noise

### 6.3.1 Description of Resource

The Project is located in a rural, predominantly agricultural area. Sources of background noise audible to rural residents and visitors to the area include wind, agricultural activity, recreation (primarily hunting), and vehicles. General noise level data from the USEPA and National Transit Institute were used to provide a typical sound level range for rural residential and agricultural cropland uses. Typical baseline average day-night sound levels measured in A-weighted decibels [dB(A)] near the Project likely range from approximately 38 dB(A) to 48 dB(A) (USEPA 1978). These are relatively low background levels and are generally representative of the site. Higher levels exist near roads and other areas of human activity. The windy conditions in this region may elevate ambient noise levels relative to rural areas with less wind. Typical levels of sounds in various settings and from various sources are presented in Table 6.4.

**Table 6.4 - Noise Levels from Common Sources Expressed in A-weighted decibels (dB[A])**

| dB(A) | Typical Source |
|---|---|
| 130 | Pneumatic drill |
| 120 | Loud car horn one meter away<br>Air raid siren at 50ft |
| 110 | Airport<br>Rock Concert |
| 100 | Along mainline railway |
| 90 | Inside bus<br>Motorcycle at 25ft |
| 80 | Busy residential road |
| 70 | Conversational speech |
| 60 | Living room with music or television playing quietly<br>Air conditioning unit at 100ft |
| 50 | Quiet office |
| 40 | Bedroom<br>Low limit of urban ambient sound |
| 30 | Recording Studio |
| 20 | Broadcasting Studio<br>Leaves rustling |
| 10 | Threshold of hearing |
| 0 | No sound |

USEPA, 1978

### 6.3.2 Impacts

Noise is defined as any unwanted sound. Noise can have such subjective effects as annoyance, nuisance, and dissatisfaction, and can also interfere with activities such as speech, sleep, and learning. Physiological effects such as anxiety, tinnitus, or hearing loss can also occur as a result of noise exposure. Contribution to hearing loss can begin at levels as low as 70 dB(A)

The State of Minnesota noise standards require an L50 level of 50 dBA or less at night for residential receptors (Minn. Rule 7030.0040).

The National Safety Council (NSC) recommends no more than 85 dB(A) for eight hours per day of exposure as the safe limit for farm operations. Industrial standards of the Occupational Safety and Health Administration (OSHA) regulations would apply during construction, operation and maintenance of the Project. Short-term noise issues would be related to construction of the Project; long-term issues would be related to operation of the facility. Noise generated by construction activities would occur intermittently over the construction period during daytime hours and would be generated by an increase in traffic on local roads, as well as heavy equipment operation. Available estimates from other wind farm construction projects indicate that the maximum noise levels from heavy equipment would be 85 to 88 dB(A) at a distance of 50 feet (Western 2003).

During operation of the wind farm, noise will be emitted from turbines. The level of noise generated by turbines will vary with the wind speed, speed of the turbine, and distance of the listener from the turbine. Noise levels produced by operation of the turbines were modeled to determine at what distance turbine noise would not exceed Minnesota Pollution Control Agency (MPCA) noise standards.

Using the formulas shown below, the noise impacts at various distances were calculated for the Vestas Americas 1650/V82 wind turbine.

$$\mathbf{L_p = L_w - 10 \log (2\pi R_2) - L_a}$$

Where:
$L_p$ = The free field sound pressure level at the receiver (residence).
$L_w$ = The sound power level of the source (wind turbine).
R = The distance between the source (wind turbine) and the receiver (residence) in meters.
$L_a$ = Attenuation of sound due to air absorption (varies with frequency and is measured per meter).

$$\mathbf{Distance = 10^{[L_w - L_p - 10 \log 2 - 10 \log \pi - (R)(L_a)]/20}}$$

Where:
$L_w$ = The sound power level of the source (wind turbine).
$L_p$ = The free field sound pressure level at the receiver (residence).
R = The distance between the source (wind turbine) and the receiver (residence) in meters.
$L_a$ = Attenuation of sound due to air absorption (varies with frequency and is measured per meter).

In the above equation, the air absorption value, "a", has been computed for each of the octave bands used (see Table 6.5 below).

**Table 6.5 - Air Absorption of Sound**

| Octave Band (Hz) | 250 | 500 | 1000 | 2000 | 4000 | 8000 |
|---|---|---|---|---|---|---|
| Air Absorption (dB/m) | 0.0011 | 0.0024 | 0.0041 | 0.0089 | 0.0272 | 0.0972 |

The sound power level for the Vestas V82 wind turbines is 101.7 dB(A), measured at a wind speed of eight meters per second (18 mph) at 33 feet (10m) above ground level. The V82 wind turbine produces 50 dB(A) at a distance of 466 feet (142m). Based on these findings, the minimum distance where an exceedance of a state noise standard would no longer occur for a single isolated wind turbine is 466 feet for the State of Minnesota Nighttime L50 standard of 50 dB(A). The typical proposed setback of 1,500 feet (460 m) from occupied residences will ensure that cumulative noise levels resulting from multiple turbines and noise drift resulting from wind will not exceed the regulatory limit at any residence. The location of turbines and residences with a buffer of 500 feet is illustrated in Map 3.

### 6.3.3 Mitigative Measures

Noise impacts to nearby residents and other potentially affected parties have been taken into consideration as part of the actual siting of the turbines. Turbines will be sited more than 1,500 feet from occupied residences in most cases.

## 6.4 Visual Resources

### 6.4.1 Description of Resource

The Project lies in a rural location with farming, livestock grazing, and related agricultural operations dominating land use. Agricultural fields, farmsteads, fallow fields, and large open vistas visually dominate the area surrounding the Project and the topography is relatively flat with gently rolling hills. The landscape can be classified as rural open space where the visual resources of the area are neither unique to the region nor entirely natural.

Structure and color features in the visual region of influence include those associated with wetlands, cultivated cropland, pasture, forested shelterbelt, and additional anthropogenic features such as farmsteads and other structures. Colors are seasonally variable and include green crop and pasture land during spring and early summer, green to brown crops and pasture during late summer and fall, brown and black associated with fallow farm fields year round, and white and brown associated with late fall and winter periods. The settlements in the vicinity of the Project are primarily residences and farm buildings (inhabited and uninhabited) surrounded by forested shelterbelts located along the rural county roads. These structures are focal points in the dominant open space character of the vicinity.

Key observation points (KOPs) are viewing locations that represent the location of the anticipated concentration of sensitive viewers (or the highest incidence of sensitive viewers) near the Project. KOPs for the Project include roadways and occupied residences within the vicinity of the Project and could include receptors in the nearby towns of Grand Meadow, Elkton, Adams and Taopi (Map 3). There are approximately 66 residences (inhabited and uninhabited) within the Project Area which includes an area one half mile from all of the facilities including transmission lines, turbines and buried collection lines. Fifty-three residences were identified within one half mile from the proposed turbine locations. Currently, there are no distinctive landscape features in the Project Area that would require specific protection from visual impairment.

### 6.4.2 Impacts

The placement of turbines will have an effect on the visual quality within the site vicinity. Discussion of the aesthetic effect of the proposed wind farm is based on subjective human response. The wind farm will have a combination of perceived effects on the visual quality/rural character of the area. From one measure of standards, the Project could be perceived as a visual intrusion. On the other hand, wind farms have their own aesthetic quality, distinguishing them from other non-agricultural land uses.

Wind turbines, transmission lines and structures, and construction of access roads would result in changes to public views. The uppermost portion of the turbine blades would reach approximately 400 feet (121 meters) above ground surface and would be visible for up to several miles, changing the visual character of the area from agricultural to quasi-industrial. These structures would be visible from all of the identified KOPs. In addition, some of the turbines would require strobe lights for aircraft safety, potentially further altering the view from KOPs. Visual effects would decrease as the distance from these facilities increases.

Impacts on visual resources within the Project Area were determined by considering the post-construction views from the KOPs, as discussed above. Implementation of setbacks during facility siting and the process of negotiating agreements with the landowners in the Project Area lessen the perceived impacts in the area. The Project Area does not contain any highly distinctive or important landscape features, registered cultural resources, or unique viewsheds.

### 6.4.3 Mitigative Measures

The following are proposed measures to mitigate visual impacts:

- Collector lines will be buried to minimize aboveground structures within the turbine array;
- Turbines will not be located in biologically sensitive areas such as wetlands or relict prairies;
- Turbines will be illuminated to meet FAA regulations;
- Existing roads will be used for construction and maintenance where possible, minimizing the need for new roads;
- Access roads created for the wind farm will be constructed either at-grade or minimally above-grade to minimize changes to the landscape texture;
- Temporarily disturbed areas will be converted back to cropland or otherwise reseeded to blend in with existing vegetation; and
- Turbines will typically maintain minimum setbacks of 500 feet from public roads and 1,500 feet from occupied residences.

To attain maximum efficiency, wind power technology requires as much exposure to the wind as possible. Mitigation measures that would result in shorter towers or placement of the turbines at alternate locations off the ridgelines have not been considered as they would result in less efficiency per unit.

## 6.5 Public Services, Infrastructure, and Traffic

### 6.5.1 Description of Resource

The Project is located in a lightly populated, rural area in southeastern Minnesota. There is an established transportation and utility network that provides access and necessary services to the light industry, small cities, homesteads, and farms existing near the Project Area. The communities of Taopi, Adams, Dexter, Elkton and Grand Meadow are adjacent to the Project Area as shown on Map 1.

County and township roads that run coincident with section lines characterize the existing roadway infrastructure adjacent to much of the Project Area. These local roads have an Average Daily Traffic (ADT) of between 55 and 85 vehicles per day. For purposes of comparison, the functional capacity, or ADT, of a two-lane paved rural highway is in excess of 5,000 vehicles per day. The 2004 MNDOT average traffic count on Highway 56, west of Taopi near the Adams Substation, is 1,600 vehicles per day (MNDOT 2004). The average traffic count on Highway 7, approximately midway between Elkton and Adams along the western edge of the Project Area, is 1,150 vehicles per day while the average traffic count north of the Project Area on Highway 8, west and east of Grand Meadows, is 1,750 vehicles per day (MNDOT 2004). The 2004 MNDOT average traffic count on Highway 16 south of Grand Meadow near the east section of the Project Area ranges from 550 to 850 vehicles per day (MNDOT 2004).

### 6.5.2 Impacts

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

- *Electrical Service.* Construction of the Project will add up to 65 wind turbine generators and transformers, 24.5-miles of underground electrical collection lines, and a project substation. At the project substation, the electric voltage will be stepped up to 161 kV and then power will be transmitted over a 2.5 to three mile transmission line to the Mower County substation. From here it will be transmitted over a seven mile transmission line to the Adams substation, where it will enter the grid. During these activities, local electrical service will not be disrupted.

- *Roads.* Access easement agreements will be obtained prior to construction and will be maintained to allow for access to transmission facilities during the operation of the Project. Motor vehicle traffic in the vicinity of the Project Area would temporarily increase during the construction phase. The maximum construction workforce is expected to generate approximately 100 additional vehicle trips per day. Since many of the roadways have minimal ADT, the addition of 100 vehicle trips may be perceptible, but would still be less than seasonal variations such as autumn harvest.

- *Water Supply.* Construction and operation of the Project will not impact the water supply, nor require appropriation of surface water or dewatering of underground aquifers. The installation or abandonment of wells is not required. It is likely the Project will require a single domestic-sized well for the operations and maintenance facility.

- *Telephone and Fiber Optic.* Construction and operation of the Project will not impact telephone and/or fiber optic service to the Project Area. These service providers will be contacted prior to construction to locate and avoid underground facilities. To the extent project facilities cross or otherwise affect existing telephone or fiber optic lines or equipment, the Applicant will enter into agreements with service providers so as to avoid interference with service.

- *Radar.* Wind turbines are required to be constructed at a certain minimum distance from a radar facility, determined by the height of the wind turbine and tower, so that construction and operation of the Project does not affect radar operation. Specific information on longitude, latitude, and elevation of the turbines will be submitted to the FAA to ensure compliance with these requirements.

Potential impacts of proposed construction and operation of the Project on existing telecommunications infrastructure within Mower County were assessed (Comsearch 2006). Assessments included potential impacts to non-Federal Government microwave paths, off-air TV station infrastructure, and NTIA telecommunications systems. The Mower County microwave tower in Section 7 of Clayton Township is within approximately one half mile from the Project. Additionally, setback standards are currently being permitted for the beam paths. Based on a supplemental investigation by Comsearch (2006), none of the turbines will be within the beam paths.

To date, the proposed Project is not anticipated to have an impact on existing non-Federal Government microwave transmissions within the Project Area of Mower County. There is potential for some interference with off-air television reception in surrounding communities. However, initial studies did not detect any problems. Consultation with the NTIA is ongoing.

- *Non-Federal Government Microwave Paths*[2]. Ten non-Federal Governmental microwave paths were identified to have a potential conflict with the (82-meter rotor diameter) turbine locations proposed for the Project. For each microwave path, a Worst Case Fresnel Zone (WCFZ)[3] was calculated and assessed. Results indicated that none of the ten identified paths will be in conflict with the locations of the proposed turbines. Therefore, no impacts to non-Federal Government microwave paths are likely to result from construction of the Project as proposed. Mower County has also established a microwave beam path from a transmitter tower in Section 7 of Clayton Township. This installation of wind turbines in this path is prohibited.

- *Off-Air TV Stations.*[4] Cable television has penetrated the majority of the area. Where it is available, very few homes appear to be hooked up. One reason for this may be that the television programming provided on the cable is considered marginal, at best (Comsearch 2006). The majority of the Off-air television transmitters are located in the Rochester, Minnesota area with the rest of the transmitters located in the Austin,

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[2] Non-federal government microwave paths are those microwave paths owned and operated by private and commercial entities. All non-federal government microwave paths are regulated by the FCC.
[3] A Fresnel Zone is a region surrounding the line-of-sight path between transmitting and receiving antennas. In order for a microwave radio link to work properly the Fresnel Zone must be free from obstruction. The WCFZ analysis assesses the mid-point of a full microwave path where the widest (or worst case) Fresnel Zone occurs.
[4] Off-air television stations are stations that broadcast television signals "over the air" to a terrestrial-based receiving antenna. These are typically stations that can be viewed on television without the aid of a cable or other signal connection.

Minnesota and Mason City, Iowa areas. Over ninety percent of these transmitters are less than 50 miles away with an average distance of 30 miles. It is expected because of the location of the Off-air television transmitters some of the communities in the Mower County area may have some problems with reception of some, but not all of the available TV channels. Thirty percent of the homes in the area have Off-air TV antennas and another thirty percent have direct broadcast satellite (DBS) antennas. Most of the Off-air TV antennas in use are aligned toward Rochester, Minnesota. Also, the Off-air antennas appear to be mounted at a height below tree level and most seem weather-worn and in need of repair (Comsearch 2006). The four major networks (ABC, CBS, NBC, and FOX) are available from the Off-air television transmitters. The measurement sites, on average, received six to 10 analog stations and three to five digital stations. This is considered a good number of Off-air television stations when compared to other locations where wind energy facilities are proposed. A test point is located inside the wind farm Area of Interest (AOI) and is equidistant from Austin, Minnesota, Rochester, Minnesota and Mason City, Iowa. If Off-air television reception issues arise in the High Prairie Wind Farm II area, this test point can be used for comparative purposes since it is located in the existing FPL Energy Mower County Wind Farm (Comsearch 2006).

- *Federal Government Systems.* The Project is currently coordinating with the Federal Government National Telecommunications and Information Administration (NTIA) to determine if the proposed Project will impact Federal Government Communication links. Results of the NTIA inquiry will be provided in a supplemental filing to this Site Permit Application.

### 6.5.3 Mitigation Measures

Construction and operation of the proposed Project will be in accordance with all associated federal, state, and local laws, as well as industry construction and operation standards. No infrastructure impacts are expected during project construction and operation, therefore mitigation measures are not anticipated.

Damage to public roads will be repaired in accordance with applicable laws and permits and damage to private roads will be promptly repaired unless otherwise negotiated with the affected landowner. While baseline measurements showed some potential for impacts to off-air TV stations, the Applicant will construct and operate the Project in a manner that minimizes these impacts. In the event residents experience such disruption or interference after the turbines are placed in operation, these measurements will provide data that can be used to determine whether the Project is the cause of disruption or interference of television reception.

The Applicant will not operate the Project in a manner that will cause communication interference contrary to FCC regulations or other laws. However, in the event of a material problem after construction, the Applicant will take the measures necessary to correct the problem. In the event of a material problem with television reception after construction, the Applicant will work with affected residents to determine the cause of interference and where necessary reestablish acceptable reception quality in a timely fashion.

Prior to commencement of construction, the results of consultation with the NTIA (letter submitted September, 2006) will be submitted to MPUC. A response from the NTIA will only be received if any issues are discovered. It is not anticipated that any issues will arise with the Project.

## 6.6 Cultural and Archaeological Impacts

### 6.6.1 Description of Resources

The study area (Cultural Study Area) for this discipline included a literature review of areas within five miles of all proposed facilities (Table 6.6).

**Table 6.6 - Cultural Study Area**

| Township | Range | Section |
|---|---|---|
| 102N | 15W | 1-3, 8-11, 15-20 |
| 102N | 16W | 13, 14, 24 |
| 103N | 15W | 26, 33, 34 |
| 102N | 14W | 3, 4, 5, 6 |

***Background Research***

Background research and evaluation of existing datasets was conducted to identify and explicate known areas of archaeological concern, and to identify and provide a framework for investigating areas that warrant Phase I level field investigation. This standard background research consisted of many tasks including: investigation of known archaeological records and previous archaeological research as documented at the Minnesota Historic Society State Historical Preservation Office (SHPO); investigation of known archaeological sites and previous archaeological research as documented in published sources; location and analysis of available historic maps; and location and analysis of current and historical environmental information.

Factors such as the climate, vegetation, wildlife, geographic and geological characteristics of a landscape influence patterns of human activity. Understanding a region's natural history greatly enhances an archaeological study by providing indications of the availability of local resources, such as animal and vegetable food sources, water, shelter, or lithic raw materials throughout time.

Mower County lies within the Minnesota and northeast Iowa morainal section of the state. This area is marked by glacial end moraines and outwash plains, and corresponds to a transitional zone from the prairie (to the southwest) and the woods (to the northeast). The Cultural Study Area is predominately situated on glacial till of unknown origin, with southeast and south central areas that include some fluvial sediment. The Cultural Study Area is till-dominated and the Grand Meadows area is bedrock-dominated. This may represent differently available lithic resources for prehistoric usage, and is worthy of further investigation. The original Public Land Survey mapped this area in 1853. The survey noted few lakes and some small streams. Prairie was noted as the predominant vegetation type. The Trygg Map (1850), derived from the public land survey, noted the Cultural Study Area as an area "Good for Grass," and the area just south of the Cultural Study Area as "Good" to "Excellent Farming Land". The area of the Cultural Study Area has probably been prairie since A.D. 300. The environmental setting of Mower

County for past peoples has been defined not just by geology, but also by climate. Relatively minor shifts in temperature and wetness can cause habitats to shift, and the vegetation types of the Project Area may have changed significantly in the past.

***Previous Archaeological Work***

No known archaeological research has been conducted within the project boundary. Archaeological research in Mower County has been limited. The earliest professional investigations date to the late nineteenth century, when Theodore H. Lewis and Alfred Hill of the Northwestern Archaeological Survey conducted an exhaustive survey of American Indian burial mounds and earthworks throughout the upper Midwest. In 1911, Newton H. Winchell synthesized his own research, as well as the work of Hill, Lewis and others, in The Aborigines of Minnesota (Winchell 1911). In the late 1930s and early 1950s, L. A. Wilford of the University of Minnesota published a number of field investigations in Mower County (Wilford, 1939, 1951, 1952). In 1977, the Minnesota Legislature created the Minnesota Statewide Archaeological Survey. The program systematically sampled portions of Mower County between 1977 and 1980, locating a substantial number of previously unknown archaeological sites including the Grand Meadow Quarry Site (21 MW 8). In the spring of 2006, an archaeological survey for the High Prairie Wind Farm I was conducted southeast of the Project Area (McFarlane and Rothaus, 2006). The survey included a Phase 1a overview and localized Phase 1 level investigations throughout 26 sections of land. The investigation identified six new archaeological sites.

***Recorded Archaeological Sites***

Thirty cultural sites were identified within five miles of the cultural study area (Table 5-6), including prehistoric and historic archaeological sites and historic structures. Maps illustrating the known sites within one and five miles of the Project Area are shown on Map 4. None of these sites fall within the project boundaries.

The Cultural Study Area is in close proximity to the Grand Meadows chert quarry (21MW8). This site, although heavily disturbed by agricultural usage, includes several hundred acres of quarry pits, of which 80 remain. These pits are, on average, one to two meters (3.2-6.5 feet) deep and five meters (16.4 feet) wide. The chert material is typically located in a layer one meter (3.2 feet) below the surface at the contact between surficial material and bedrock. Grand Meadow chert is arguably the highest quality chert material to be found in Minnesota, and its use is well documented across a wide region. While a variety of lithic materials from southeastern Minnesota are known, only Grand Meadow chert has been associated with a quarry site. The discovery of this one quarry site is quite unusual, but there is no reason to think that the discovered quarry was the only source for the material. Secondary deposits of this material have been noted along the Root River in Fillmore County. The natural distribution of this raw material remains unknown. Grand Meadow chert is similar to Hampton chert from Northern Iowa, and the two may be geologically related (Bakken 1995; Gonsior 1992; Romano 1993; Trow 1981).

Analysis of the Andreas 1874 Atlas indicates several potential historic archaeological sites in or adjoining the Cultural Study Area. Comparison of the Andreas Atlas to more heavily occupied areas of Mower County shows a strong correlation to current structures and structures indicated in the atlas, and we believe that this Atlas was quite accurate. Structures and sites that are potential archaeological features within five miles of the project boundary are identified in Table 6.7.

**Table 6.7 - Cultural Sites Within Five Miles of the Project Boundary**

| Cultural Site | Location | Description |
|---|---|---|
| 21MW001 | T103N, R14W, Section 3, NW-SE. | The Sleeper Site. Prehistoric artifact scatter with potential burial mounds |
| 21MW003 | T103N, R14W, Section 3, center | Prehistoric habitation site |
| 21MW004 | T103N, R14W, Section 5, SW-SE | Prehistoric habitation site |
| 21MW008 | T103N, R15W, Section 13 & 14 | The Grand Meadow Quarry Archaeological District. A prehistoric chert quarry used from 8000 B.C. – A.D. 1600. |
| 21MW009 | T103N, R15W, Section 13 SW-NE and SE-NE | Merle J. Site. Prehistoric lithic workshop |
| 21MW010 | T103N, R15W, Section 13: NW-NE-SE-NW | Finbar's Workshop. Lithic scatter |
| 21MW012 | T103N, R14, NE-NW-SW & NE-SW & SE-SW, Section 16; NE-NE-NE & SE-NE-NE, Section 21; NW-NW-NW, Section 22 | Jahns. Archaic, undetermined Woodland |
| 21MW014 | T103N, R14W, SW-NW Section 7 | Wahl. Habitation, quarry site |
| 21MW016 | T103N, R15W, NW-NW-NW-NW Section 12 | North Fork Bear Creek. Prehistoric artifact scatter. |
| 21MW017 | T102N, R14W, SW-SW-SE, Section 12 | Sample. Prehistoric artifact scatter. |
| 21MW019 | T103N, R14W, SW-SW-NW-NW Section 18 | Bear Creek Findspot. Prehistoric lithic scatter |
| 21MW021 | T103N, R14W, NW-NE Section 30 | Prehistoric lithic scatter. |
| 21MW043 | T102N, R15W, SW-NW-SW Section 13 | Carpenter Site. Historic Farmstead. Artifact scatter |
| 21MW044 | T102N, R15W, SE-NE-SW-NE Section 35 | Bustad Site. Prehistoric artifact scatter |
| 21MW045 | T101N, R15W, SE-NW-NW-SE Section 8 | Oxley Site. Prehistoric artifact scatter |
| 21MW046 | T101N, R15W, NE-SW-SE Section 7 | Wood Site. Prehistoric artifact scatter |
| 21MW047 | T101N, R15W, , NE-NE-NE Section 8 | Hanson Site. Historic foundations related to early railroad |
| 21MW048 | T101N, R15W, NW-SW Section 4 | Kiefer Site. Historic Farmstead. Artifact scatter |
| 21MWg | T103N, R14W, Section 9, N1/2 | Lithic quarry. Unevaluated |
| 21MWh | T103N, R14W, Section 9, N1/2 of NE-NE. | Lithic scatter (numerous points). Unevaluated |
| 21MWi | T103N, R14W, Section 3, S1/2 of SE & Section 2, SW-SW & Section 11, N1/2-NW | Artifact scatter/habitation. Unevaluated |
| 21MWk | T103N, R14W, Section 21, W ½ of NW ¼ | Artifact scatter/habitation. Unevaluated |
| 21MWl | T103N, R15W, Section 2, NE ¼ and NE-NW and NE-NW-NW | Artifact scatter/habitation. Unevaluated |
| MW-BEN-1 | T102N, R14, Sec. 8, NE-NE-NE | Historic School House |
| MW-BEN-2 | T102N, R14, Sec. 14, NE-NE-NE | Bennington Town Hall |
| MW-BEN-3 | T102N, R14, Sec. 36, SE-NE-SE | Historic School House |
| MW-CLA-1 | T102N, R15, Sec. 28, SE-SE | Clayton Town Hall |
| MW-CLA-2 | T102N, R15, Sec. 31, NW-NW-SW | Historic Church |
| MW-MAR-1 | T102N, R16, Sec. 34, NW-NE-NW | Historic Farmstead |
| MW-MAR-2 | T102N, R16, Sec. 8, SW-SW-SW | Historic Church and Cemetery |

### *Prehistoric Period*

Archaeological sites in the plains tend to be small and randomly dispersed, with a high number of temporary locations, making probability mapping difficult and less than reliable. Moreover, unlike the lake-filled areas of northern Minnesota, sites in southeastern Minnesota do not cluster around water sources (Gibbon, et al. 1995).

In the Cultural Study Area, the only areas that can be singled-out for high probability are the headwaters of Schwerin Creek, Deer Creek, Spring Valley Creek and the South Branch of the Root River. These areas are the most obvious sources of water in the area, and likewise provide the highest potential for exposures of lithic raw materials.

The area holds moderate to high potential for lithic procurement and reduction sites associated with some of the widely-traded lithic raw materials of the area. While there is currently no evidence of quarrying or lithic activity in the Cultural Study Area, this may largely be due to the Cultural Study Area never having been subjected to survey. The Cultural Study Area does not contain exposed or near-surface bedrock as does the nearby Grand Meadows site (21MW8), and this reduces the probability of major lithic procurement sites in the area. However, the Project Area of potential effects (location of facilities) is located on glacial till, which also provided lithic raw materials. Of equal or perhaps greater concern is the location of the Grand Meadows site in proximity to the Cultural Study Area. This proximity suggests that the area of the Cultural Study Area was heavily trafficked in prehistoric times, and creates a very high probability for small temporary campsites, as well as a variety of lithic reduction sites and scatters.

***Historic Period***

Historic structures eligible to the National Register of Historic Places were identified within 5 miles of the project boundary. No historic structures have been evaluated within the project boundary. Considering the few cultural studies that have been conducted in the area, it is likely that unevaluated historic structures are located in the study area and possibly within the Project Area. Historic structures potentially impacted by the project should be evaluated for historic significance.

### 6.6.2 Impacts

No known archaeological sites are documented in the project Cultural Study Area. While the Project Area does not seem to have the same high prehistoric archaeological potential as the nearby Grand Meadow Quarry Archaeological District, there is certainly enough potential to necessitate a Phase I Field Survey of the Cultural Study Area. Historically, the Cultural Study Area has been only lightly occupied. Some areas of particular interest have been noted, and it is anticipated that the Phase I Field Survey will serve to identify any additional areas of historic interest. Avoidance of impacts to cultural sites will be obtained through pre-construction survey, consultation, and educational programs for construction crew.

### 6.6.3 Mitigation Measures

A Phase I Archaeological Survey (pedestrian survey, shovel testing, soil probes) will be conducted within the areas that will be permanently or temporarily impacted during construction or operation of the Project. The footprint of the wind turbine towers plus a reasonable buffer will receive a Phase I investigation. The remaining Cultural Study Area between towers can be subjected to a less intensive Phase I investigation.

Phase I investigations typically begin with the high probability areas. Investigators then develop a context for additional finds through review of local topography as early in the research as possible. Because prehistoric archaeological sites, especially sites represented only by lithic debris, tend to be small and diffuse in this area, a pedestrian survey will be conducted at a spacing of no greater than 25 meters. The Phase I survey will include observation of eroded ravines, streambeds and exposures for signs of lithic activity.

Pedestrian survey, with proper surface visibility and conducted by experienced personnel, is preferable to shovel testing for an area this large, especially because there is only moderate anticipation of intact buried soils, and because the area may contain small, diffuse lithic sites. Adequate soil probes must be taken throughout any area investigated by pedestrian survey to detect any possible buried soil horizons. Shovel testing may be necessary in areas with limited ground surface visibility and areas with intact prehistoric soil horizons identified during probing.

Historic structures within the project's area of potential effect (APE) will be evaluated for historic significance and potential impacts. Historic structures potentially eligible to the National or State Registers of Historic Places should be avoided during construction. Visual impacts may need to be assessed for properties listed or eligible to the National or State Register of Historic Places

Following the survey, results will be provided to the SHPO and the Office of State Archaeologists. Any resources found which will be impacted by project activities shall be evaluated for integrity and potential listing on the National Register of Historic Places (NRHP). Previously undocumented resources that are eligible for listing on the NRHP will be avoided.

Prior to construction, workers will be trained about the need to avoid cultural properties, about how to identify cultural properties, and about the procedures to follow if undocumented cultural properties, including gravesites, are found during construction. If any archaeological sites are found during construction, work will be stopped immediately and the MPUC and Minnesota Historic Society (MHS) will be notified.

## 6.7 Recreational Resources

### 6.7.1 Description of Resource

Recreational opportunities in Mower County include hunting, fishing, snowmobiling, wildlife viewing, camping, and hiking. Hunting is permitted in designated Minnesota Department of Natural Resources (MNDNR) wildlife management areas (WMAs), unless posted otherwise. Recreational information was obtained from MNDNR Public Recreation Information Maps of the Austin area.

Hunting in Mower County focuses mainly on whitetail deer, upland gamebirds and waterfowl. Deer densities within Mower County range from one to five deer per square mile and historical harvest data indicate that hunting efforts and game populations are stable (MNDNR 2004). WMAs are managed to provide wildlife habitat, improve wildlife production, and provide public hunting and trapping opportunities. These MNDNR lands were acquired and developed primarily with funds from hunting license fees. WMAs are closed to all-terrain vehicles and horses because of potential detrimental effects on wildlife habitat. There are three WMAs located within five miles of the Project (Map 2):

- Rustic Refuge WMA located four miles south of the Project substation.
- Cartney WMA located approximately three miles east-southeast of the substation and five miles from the nearest proposed turbine.
- Schwerin Creek WMA located approximately two miles northwest of the Project.

One State Park is located outside the vicinity of the Project Area. Lake Louise, a 1,170 acre state park, is located approximately eight miles southeast of the Project Area. The park is valued for its open landscape and lush hardwood forest.

### 6.7.2 Impacts

Recreational activities would not be significantly impacted by the Project. Game populations within Mower County would not decline as a result of the Project. Likewise, the Project would not reduce the camping or hiking opportunities. Visual impacts would be the most evident impact to people who use the WMAs and SNAs for recreation.

Recreationists in the towns of Austin, LeRoy, Dexter, Taopi, and Adams would not be visually affected by the Project because they are not within close proximity. However, the towns of Grand Meadow and Elkton are located within one mile of the Project Area and recreationists in those towns may experience visual impacts, resulting in an overall effect on the quality of recreational activities.

### 6.7.3 Mitigation Measures

Wind turbines will not be located in WMAs, SNAs, state parks or other areas with exceptional value for recreation; therefore, no mitigation measures will be required.

## 6.8 Public Health and Safety

### 6.8.1 Description of Resource

***Air Traffic***

The nearest airport is located in Austin, Minnesota, which is over 10 miles from the Project Area. However, due to the fact that the vast majority of current land use is agriculture, aerial spraying or crop dusting is employed periodically. Crop dusting is typically carried out during the day by highly maneuverable airplanes or helicopters. The proposed turbines and overhead high voltage transmission lines (HVTL) are expected to be similar to those already present throughout the region (i.e., similar heights and HVTLs located along the edges of fields and roadways). The wind turbines and meteorological towers would be visible from a distance.

***Electromagnetic Fields***

Extremely low-frequency electric and electromagnetic fields (ELF-EMF) may currently exist near the Project where electric conductors exist with an electrical current flow. EMFs result from electrically charged particles which may cause effects some distance from the line. The electrical effects relating to a HVTL would be characterized as “corona effect” or “field effect”. Examples of conductors to be used in the Project include an HVTL, distribution (feeder) lines, substation transformers, house wiring, and electrical appliances. HVTLs are not fundamentally different from other electrical conductors and also exhibit ELF-EMFs.

Since 1979, there has been considerable attention focused on understanding the effects of electric and magnetic fields (EMF) on humans. The question of whether exposure to power-frequency (60 Hz) magnetic fields can cause biological responses or even health effects has been the subject of considerable research for the past three decades. There is presently no Minnesota statute or rule that pertains to magnetic field exposure. The most recent and exhaustive reviews of the health effects from power-frequency fields conclude that the evidence of health risk is minimal. The National Institute of Environmental Health Sciences (NIEHS) issued its final report, "NIEHS Report on Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields" on June 15, 1999, following six years of intensive research. NIEHS concluded that there is little scientific evidence correlating ELF-EMF exposures with health risk.

The Minnesota State Interagency Working Group on EMF Issues, consisting of members from the Minnesota Department of Health (MDH), Department of Commerce, Public Utilities Commission, Pollution Control Agency, and Environmental Quality Board conducted research related to EMF, which resulted in similar findings to the NIEHS report. The group issued "A White Paper on Electric and Magnetic Field (EMF) Policy and Mitigation Options" in September of 2002 wherein it concluded:

- Research on the health effects of EMF has been carried out since the 1970s. Epidemiological studies have mixed results – some have shown no statistically significant association between exposure to EMF and health effects, and some have shown a weak association. More recently, laboratory studies have failed to show such an association, or to establish a biological mechanism for how magnetic fields may cause cancer.

- The MDH concludes that the current body of evidence is insufficient to establish a cause and effect relationship between EMF and adverse health effects. However, as with many other environmental health issues, the possibility of health risk from EMF cannot be dismissed.

The conclusions of the Minnesota State Interagency Working Group are also consistent with those reached by the MDH in 2000 and the 1999 Final Report by the NIEHS.

***Security and Safety***

The Project is located in a rural area with relatively low population. Construction and operation of the Project would have minimal impacts on the security and safety of the local populace.

***Traffic***

Discussions regarding existing roads and traffic are discussed in Section 6.5.

### 6.8.2 Impacts

***Air Traffic***

The Project will have no significant impacts on air traffic in the region because there are no airports in the Project Area and the wind and meteorological towers will have lighting to comply with FAA requirements.

***Electromagnetic Fields***

While the general consensus is that electric fields pose no risk to humans, the question of whether exposure to magnetic fields potentially can cause biological responses or even health effects continues to be the subject of research and debate. Based on the most current research on electromagnetic fields, the facilities such as those comprising the Project are not expected to have significant impact to public health and safety due to ELF-EMF. The addition of these transmission facilities is not expected to add significantly to the presence of ELF-EMF exposure in the Project Area.

***Security and Safety***

Project construction and operation will have no significant impact on the security and safety of the local community. Some additional risk for worker or public injury will exist during the construction phase, as it would for any large construction project. Work plans and specifications will be prepared to address worker safety during Project construction and all work completed on the Project will be OSHA compliant.

***Traffic***

Motor vehicle traffic near the Project Area would temporarily increase during the construction phase. The maximum construction workforce is expected to generate approximately 100 additional vehicle trips per day. Since many of the area roadways have minimal ADT, the addition of 100 vehicle trips may be perceptible, but would still be less than seasonal variations such as autumn harvest. Traffic management and control of the local roadways would be considered in the planning and implementation of the Project construction. With these measures, the potential for a traffic fatality is low; consequently, an increase in risk to local residents or increase in injuries and fatalities related to traffic is not anticipated.

### 6.8.3 Mitigation Measures

***Air Traffic***

The Project will have no significant impacts on air traffic in the region because there are no airports in the Project Area. The wind turbines and meteorological towers will have lighting that complies with FAA requirements.

***Electromagnetic Fields***

While the general consensus is that electric fields pose no risk to humans, the question of whether exposure to magnetic fields potentially can cause biological responses or even health effects continues to be the subject of research and debate. Based on the most current research on electromagnetic fields, the facilities such as those comprising the Project are not expected to have significant impact to public health and safety due to ELF-EMF. The addition of the turbines, substation, and underground collectors is not expected to add significantly to the presence of ELF-EMF exposure in the vicinity.

***Security***

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

- In most cases, the towers will be placed 500 feet from roads and 1,500 feet from occupied homesteads. These distances are considered to be safe based on developer experience, and are consistent with prior site permits for LWECS and Mower County Planning and Zoning regulations. They also serve to minimize the danger of ice shedding and reduce noise and shadow flicker.
- Security measures will be taken during the construction and operation of the Project, including temporary (safety) and permanent fencing, warning signs, and locks on equipment and wind power facilities.
- Turbines will sit on solid steel enclosed tubular towers in which all electrical equipment will be located (except for the pad-mounted transformer in certain turbine models). Access to the tower is only through a solid steel door that will be locked when not in use.
- Where necessary or requested by landowners, the Applicant will construct additional gates or fences to minimize potential for personal injury or property damage.

***Traffic***

The traffic projections for construction will not significantly impact public health and safety because the local roads are designed to carry many more than 100 additional trips per day. No mitigation is necessary.

## 6.9 Hazardous Materials

### 6.9.1 Description of Resource

A thorough regulatory database search for hazardous waste sites did not identify any hazardous waste sites in the vicinity of the Project Area. Potential hazardous materials within the vicinity of the Project Area would be associated with agricultural activities, and include petroleum products (fuel and lubricants), pesticides and herbicides. Older farmsteads may also have lead-based paint, asbestos shingles, and polychlorinated biphenyls (PCB) in transformers. Trash and farm equipment dumps are common in rural settings.

Potentially hazardous materials associated with the Project include fluids found in association with turbines. There will be three types of fluids used in the operation of the wind turbines that are petroleum products including gear box oil, hydraulic fluid, and gear grease.

### 6.9.2 Impacts

The Applicant does not anticipate encountering any hazardous waste sites.

### 6.9.3 Mitigation Measures

Because there are no proposed impacts to hazardous waste sites, no mitigative measures are necessary. If any wastes are generated during any phase of the Project, they will be handled and disposed of in accordance with applicable local, state and Federal regulations.

## 6.10 Effects on Land-Based Economies

### 6.10.1 Description of Resource

The majority of the site is cultivated farmland, with corn and soybeans being the predominant crops. Further emphasizing this land use, nearly all of the soil near the Project Area is designated prime farmland due to the high suitability of the soils for agricultural production. Drain tiles have been installed to improve drainage and enhance productivity of soils where drainage was the limiting factor. Land cover, farmland, vegetation, and artificial drainage are further discussed in the soils and vegetation sections. An illustration of the local land uses and land cover is shown on Map 5.

Economically important forestry is not found in the vicinity of the Project Area, with the only existing trees occurring in association with homes in the form of woodlots and along drainages. With the exception of scattered gravel pits, the region does not have a significant amount of minable resources.

### 6.10.2 Impacts

The loss of agricultural land to the construction of the Project will reduce the amount of land that can be cultivated. Only a very small percent of the total acreage within the Project is directly impacted by transmission poles, substation, associated laydown areas, and temporary disturbances by equipment traffic. The estimated acreage of permanent facilities for the Project is shown in Table 6.8. An additional 15 acres will be temporarily disturbed as a construction laydown area for both the HVTL and turbine construction.

**Table 6.8 - Summary of Total Permanent Surface Disturbance**

| Facility | Acres |
|---|---|
| Turbines | 12.7 |
| New Permanent Access Roads | 57.7 |
| Substations & Operations and Maintenance Buildings | 10 |
| Transmission Lines (assumes 20 structures per mile) | 0.6 |
| Permanent Meteorological Towers | 0.4 |
| Total acres | 81.4 |
| Percent of Project Area (19,427) | <0.1% |

During lease negotiations and facility micrositing, discussions with property owners will identify features on their property, including drain tile, which should be avoided. Impacts to drain tile are anticipated during Project construction. Damage to drain tile or other property resulting from construction activities or operation of the Project will be repaired according to the agreement between the Project owner and the property owner.

### 6.10.3 Mitigation Measures

Only land required for permanent facilities will be taken out of crop production. Once the turbines are constructed, prompt reclamation will allow the surrounding land to be farmed. In the event that there is damage to drain tile as a result of construction activities the Applicant will work with affected property owners to repair the damaged drain tile in accordance with the agreement with the owner of any damaged tile. Non-recoverable impacts to land-based economics will be mitigated through landowner compensation determined through negotiation.

## 6.11 Tourism and Community Benefits

### 6.11.1 Description of Resource

At present, there is no significant tourism in Mower County. Wildlife management areas, hunting opportunities, public parks, and local events create some tourism in the region.

### 6.11.2 Impacts

No impacts are anticipated to tourism resources.

### 6.11.3 Mitigation Measures

No impacts on tourism are anticipated, and as such, no mitigation is necessary.

## 6.12 Topography

### 6.12.1 Description of Resource

As a result of periodic glaciations, the topography of the site is relatively flat with minimal relief and somewhat poor drainage as shown on Map 6. Gently rolling hills with gentle side slopes ending in drainage ways characterize the area surrounding the Project Area. Elevations in Mower County range between 1,150 feet MSL along the Cedar River in the southwest part of the county to 1,440 feet MSL along drainage divides in the central part of the county. The Project crosses a landscape with relatively high elevations for Minnesota, being located along the central divide at 1,350 to 1,420 feet MSL.

### 6.12.2 Impacts

No impacts to topography are anticipated. Transmission towers and temporary access will not require significant excavation or fill.

### 6.12.3 Mitigation Measures

No impacts are anticipated, and as such, no mitigative measures are necessary.

## 6.13 Soils

### 6.13.1 Description of Resource

Due to the dominance of farming as a land use in Mower County, soil is an important resource to landowners. A soil association map is useful in comparing the suitability of large areas, such as the Project Area, for general land uses. A soil association is a mapping unit used to delineate a landscape that has a distinctive pattern of soils. It is composed of one or more major soils and some minor soils, and is named for the major soils. According to the Soil Survey of Mower County (SCS 1989), one major association is located within the proposed Project Area: the Tripoli-Oran-Readlyn association covers most of the Project Area. A description of this soil association follows.

The Tripoli-Oran-Readlyn Association consists of nearly level and gently sloping, poorly drained and somewhat poorly drained, silty soils on glacial till plains. This association consists of low ridges separated by broad drainage ways. Relief ranges from 20 to 50 feet. A well-formed, dendritic drainage system dissects this association. This association makes up about 55 percent of the county. The association comprises the vast majority of the Project Area and consists of about 35 percent Tripoli soils, 25 percent Oran soils, 15 percent Readlyn soils and 25 percent soils of minor extent.

The Tripoli soils are nearly level and poorly drained, typically found in drainage ways and shallow depressions. The surface layer is black silty clay loam about 10 inches thick. The subsurface layer is dark grayish-brown silt loam about six inches thick. The underlying material is yellowish brown mottled loam to a depth of 60 inches. The Oran soils are level to gently sloping, poorly drained areas found on low ridges. The surface layer is dark gray silt loam that is eight inches thick. The subsurface is dark grayish-brown silt loam that is six inches thick. The underlying material is yellowish brown mottled loam to a depth of 60 inches. The Readlyn soils are level and somewhat poorly drained on low ridges. The surface layer is black silt loam that is eight inches thick. The subsurface layer is black and very dark grayish-brown silt loam that is about nine inches thick. The underlying material is yellowish-brown, mottled, firm, calcareous loam to a depth of 60 inches.

Minor soils in the association are the Clyde, Hayfield, Ostrander and Skyberg series. The Clyde soils are poorly drained and are on broad drainage ways. The Hayfield soils are somewhat poorly drained and are on foot slopes along major drainage ways. The somewhat poorly drained Skyberg soils and the well-drained Ostrander soils are on low rises. Soils of these series are moderately permeable and surface runoff is medium to rapid. Runoff is rapid where soil composition is primarily clay or in soils that have a high permanent water table.

### *Management Concerns*

The primary management concerns for soils in the Project Area include drainage management and erosion control. In most areas, artificial drainage such as tiling and excavated channels is needed. Some soils are so wet that crop production is impractical unless they are artificially drained. Water erosion and blowing soil are concerns for most soils in the Project Area. Erosion control practices and conservation tillage provide a protective surface cover, reduce runoff and increase infiltration of water.

### *Prime Farmland Soils*

Prime farmland is land that has the best combination of physical and chemical characteristics for use as cropland, pastureland, rangeland, or forestland, but not urban built-up land or water. It has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when managed according to acceptable farming methods. Specifically, prime farmlands have an adequate water supply, favorable temperature and growing season, acceptable pH and salt content, and few rocks. Prime farmlands are not excessively erodible or saturated with water for long periods of time. Based on the County Soil Survey, all soils in the Project Area, with the exception of a few very wet areas along drainages, are Prime Farmland or could be converted to Prime Farmland with adequate drainage.

### 6.13.2 Impacts

Construction activities including road construction and turbine pad excavations will result in surface disturbances in the Project Area. Topsoil could become contaminated or lost if protective measures are not taken as an initial step in project construction. Excavations can leave soil exposed and susceptible to wind and water erosion if mitigation measures are not implemented. Increased surface traffic can lead to compaction if soils are moist and mitigation measures are not implemented.

### 6.13.3 Mitigation Measures

Initial project development will include soil removal from areas of permanent disturbance including new access roads and turbine pads. Soil will be salvaged to a depth of as much as 12 inches in order to preserve the desirable physical and chemical properties of the topsoil. The topsoil will be bladed to the side and placed on top of adjacent soils in a manner that will make it available for future reclamation should these facilities ever be removed.

A National Pollutant Discharge Elimination System (NPDES) permit application to discharge storm water from construction activities will be acquired prior to construction. As part of this application, a stormwater pollution protection plan (SWPPP) will be developed to minimize soil erosion. This plan will identify best management practices (BMPs) to be employed during construction of the Project to protect topsoil and adjacent resources and to minimize soil erosion. Practices may include containing excavated material, protecting exposed soil, and stabilizing restored material.

Compaction will be minimized by salvaging topsoil prior to construction and tilling soil as part of the final reclamation treatment measures. In addition, minimizing the total area required by all facilities will limit the area exposed to compaction due to surface activity.

Through implementation of these environmental protection measures, soil erosion, compaction, and other related disturbance will be short-term. With the proper implementation of environmental protection measures intended to prevent, minimize, and/or reclaim soil erosion, compaction, and spill effects, no unmitigated loss of highly productive soil will result from construction and operation of the Project.

## 6.14 Geologic and Groundwater Resources

### 6.14.1 Description of Resource

The baseline geology of the general area surrounding the Project was determined through review of documents describing the local geology of Mower County (MNDNR 2002; Mossler 2000 and 1998). The surficial geology consists of glacial till, which is chiefly composed of unsorted silt and clay sediments containing pebbles, scattered cobbles, and boulders. Till thickness ranges from 50 to 200 feet.

Underlying the glacial till are bedrock formations of Middle Devonian age. The uppermost bedrock unit is the Coralville Formation, underlain by the Hinkle, Eagle Center, Chickasaw and Bassett Members of the Little Cedar Formation. The Pinicon Ridge Formation underlies the Little Cedar Formation.

The Coralville Formation is primarily a light brown to gray-orange to yellowish-gray, very fossiliferous, thick-bedded dolostone with some gray-green shale interbeds as thick as several feet. The Hinkle and Eagle Center Members consist of yellow-gray dolostone that is thin-bedded and contains interclasts, dessication cracks, and some thin pale green shale beds. The Chickasaw Member consists of silty, light-gray shale and is approximately 40 feet thick. The Bassett Member consists of light- to medium-gray, argillaceous, thick-bedded dolostone. The Pinicon Ridge Formation also consists of light- to medium-gray, argillaceous, thick-bedded dolostone.

The synclinal folding of these sedimentary bedrock layers along the axis of the Hollandale embayment results in gentle slope to the south to southwest. It is unlikely that bedrock would outcrop in the Project Area.

The principal aquifers in the vicinity of the Project Area are the Upper Cedar Valley Aquifer and the Lower Cedar Valley Aquifer. The Chickasaw Member, a silty shale, lies stratigraphically between the aquifers and acts as an aquitard, or vertical barrier to water flow. The Upper Cedar Valley Aquifer is comprised of the Coralville Formation, Hinkle Member, and Eagle Center Member, which are dolostone rocks. Although the primary permeability of the dolostone is not very high, the secondary permeability of the dolostone is much greater due to joints, fractures, and bedding planes in the rock, and numerous voids due to dissolution. In the area surrounding the Project Area, this aquifer is 50 to 100 feet thick and generally occurs at depths greater than 75 feet below ground surface. Groundwater in these bedrock formations is confined and generally flows toward the southwest.

The Lower Cedar Valley Aquifer is comprised of the Bassett Member and Pinicon Ridge Formation, which are also dolostone rocks. The permeability of this aquifer is similar to the Upper Cedar Valley Aquifer. This aquifer is 60 to 70 feet thick in the vicinity of the Project Area and generally occurs at depths greater than 100 feet below ground surface. Groundwater in this aquifer is also confined and generally flows toward the west.

The MDH County Well Index was reviewed for the vicinity of the Project Area and a total of 59 domestic wells were identified. Groundwater resources for these wells are derived from the Upper Cedar Valley Aquifer in the central and southern portion of the Project Area and the Lower Cedar Valley Aquifer in the northeastern portion of the Project Area. The average depth of these wells is 162 feet below ground surface. No wells were completed in the glacial till sediments as water yields in these sediments are very low.

### 6.14.2 Impacts

Impacts for geologic and groundwater resources are not anticipated. It is probable that Project operations and maintenance requirements will be limited and easily satisfied with a single domestic-size water well. Local groundwater supplies are adequate for the Project.

### 6.14.3 Mitigation Measures

Construction of the Project is not expected to impact existing domestic water wells because the turbines typically will be located over 1,500 feet from occupied residences where wells most commonly occur. Also, the turbine tower footings are generally not deeper than 35 to 60 feet below ground surface, which is in the glacial till sediments and stratigraphically higher than the top of the Upper Cedar Valley Aquifer. This aquifer is 50 to 100 feet thick in the Project Area and generally occurs at depths greater than 75 feet below ground surface.

## 6.15 Surface Water and Floodplain Resources

### 6.15.1 Description of Resource

Surface water and floodplain resources adjacent to the Project Area were identified by reviewing U.S. Geological Survey topographic maps and Flood Insurance Rate Maps produced by the Federal Emergency Management Agency (FEMA). An illustration of the hydrologic resources in the vicinity of the Project Area is shown on Map 7. The predominant surface waters in the vicinity of the site are portions of the South Branch Root River, Little Iowa River, Upper Iowa River, and North Branch Upper Iowa River. Wetlands adjoin most of the drainages as described in Section 5.16 of this document. The shallow hydrogeologic gradient is not known for all areas, but may be inferred to be parallel to the topographic gradient. There are no natural lakes in the vicinity of the Project Area. The FEMA Floodplain maps identify all portions of the Project Area as Zone C – minimal flooding and outside of the 100 year flood plain.

### 6.15.2 Impacts

On-site or off-site flooding would not likely result from the construction of the Project. Implementation of environmental protection measures such as installation of adequately-sized and appropriately placed culverts, and avoidance of channels and other areas of concentrated flow, would ensure that such on-site or off-site flooding does not occur. The wind turbines will generally be built on uplands, and this will avoid streams located in topographically lower positions in the landscape.

Risk for contamination of surface waters will be reviewed after determining all final facility locations. Where discharge of hazardous waste or sediment is a risk, mitigation measures will be employed.

### 6.15.3 Mitigation Measures

If it is determined that the Project will impact U.S. or Minnesota Public Waters, the Applicant will apply for the necessary permits prior to construction. Access roads constructed adjacent to streams and drainage ways will be designed in such a manner that runoff from the upper portions of the watershed can flow unrestricted to the lower portions. A NPDES permit application and SWPPP will be prepared by the Applicant and submitted to the MPCA prior to the construction of the Project. Compliance with this permit and the associated SWPPP will ensure that surface water is not adversely affected by runoff from disturbances and construction areas. If required to protect navigable waters (e.g. surface waters), a Spill Prevention, Control, and Countermeasure (SPCC) plan will be developed. The SPCC plan will address any secondary containment or other required measures needed to protect navigable waters from petroleum spills or leaks.

## 6.16 Wetlands

### 6.16.1 Description of Resources

Literature review, queries of state and federal natural resource-related databases, and interviews of state and federal management personnel were conducted prior to a site investigation. On September 5 through September 8, 2006 a site reconnaissance was completed to characterize habitats, wildlife, and identify wetlands and other aquatic sites which could potentially be impacted by the proposed development. Wetland delineations, preliminarily identified as falling under the jurisdiction of state or federal agencies, were identified during this site reconnaissance. Ongoing consultation and results of these delineations will determine if state or federal wetland development permits will be required.

Wetland resources within the Project Area have been highly modified by agricultural practices. Wetlands have been converted to agricultural fields by implementing systems or practices (e.g., channelizing, deepening and/or tiling) designed to facilitate water removal, leaving the land more suitable for agricultural row-crop production. The small amount of woody habitat present within the Project Area is generally restricted to small riparian corridors bordering highly modified drainages and/or planted shelterbelts around residential and livestock/feedlot areas. Wetland resources within the Project Area are depicted on Map 8.

### 6.16.2 Impacts

Most construction activities associated with the Project will be sited outside of wetland resource areas. However, some of the proposed service roads, and buried and overhead power lines bisect ditches, drainages modified to grass waterways and natural ephemeral drainages. Construction of these facilities would result in some temporary and permanent disturbances.

Temporary impacts to wetlands or waters may occur where access for construction requires installation of temporary crossing structures at drainage ditches; drainages converted to grass waterways, creek channels and associated wetland areas. If required at these sites, one of the following types of temporary crossings would be constructed:

- At-grade crossings without dredge or fill of wetlands, possibly including wetland crossings using wooden mats;
- Culverted crossings using geotextile, coarse rock fill and culverts.

Temporary equipment crossings in grass waterways or wetland areas which do not have defined channels will be restricted to crossing on wooden mats to prevent compression of soils and or disturbance of vegetation. Areas with water in defined channels would be crossed at temporary, at-grade crossings, low water crossings or temporary culverted crossings to prevent permanent impacts to these areas. Crossing of areas which have a combination of a defined channel and adjacent wetland areas may require the use of wooden mats and installation of a temporary at-grade or culverted crossings.

Permanent impacts to wetlands will occur where new access roads or underground collector lines are installed within a wetland or across a channel. Based on site observations made during the site visit, as many as 26 permanent crossings may be required for project development, including nine consisting of roads and collector lines, 14 with only underground collector lines, and two found in association with the overhead transmission line. The proposed permanent disturbance area of wetlands would not exceed 0.41 acres (18,000 square feet).

### 6.16.3 Mitigation Measures

Wetlands will be avoided to the extent practicable during the construction phase of the Project. If wetland impacts cannot be avoided, the Applicant will submit Section 404 and Minnesota Wetland Conservation Act permit applications to the U.S. Army Corps of Engineers (USACE) and the Minnesota Department of Environmental Conservation (MNDEC) prior to construction. Wetlands in Minnesota are regulated under a variety of local, state, and federal programs. Many times, two or more of these programs have jurisdiction over a particular wetland or waterway.

Where crossings are required, construction activities will include implementation of Best Management Practices (BMPs) to control erosion and minimize impacts to wetland resources. Fill material placed below the high water mark will be free of topsoil, decomposable materials, and toxic concentrations of persistent synthetic organic compounds. Temporary crossings will be inspected after runoff-producing rains to check for blockage of channels, erosion of abutments, channel scour, and riprap or piping displacement. All repairs will be made immediately to prevent further damage to the installation. Permanent crossings will be similarly inspected and regularly maintained as necessary to minimize impacts.

Temporary crossings will be removed immediately when they are no longer needed. All construction materials (e.g., rock, geotextile fabric, culvert, etc.) will be removed and the site will be restored to its original grade. The disturbed area will be smoothed and appropriately stabilized with silt fence or erosion control blankets as necessary to control erosion. The site will be seeded with local native species adapted to site conditions as necessary to promote revegetation. Due to the temporary nature of impacts, it is likely that onsite propagules (e.g., living plants and seeds) will regenerate vegetative cover similar to that found prior to the disturbance without additional seeding. Silt fences will remain in place to continue capturing sediment until the crossing site is fully stabilized and revegetated as determined in consultation with USACE. Soils at risk of erosion will be identified prior to disturbance and the need for placement of additional silt fence or erosion control matting will be evaluated and implemented as needed.

If required by agencies governing wetland resources, off-site mitigation of wetland losses will be employed to reduce the overall effect of the Project. The Applicant will work with local, state, and federal agencies to minimize or avoid disturbances which would require mitigation through creation of new wetlands.

## 6.17 Vegetation

### 6.17.1 Description of Resource

The site vicinity is in an area predominantly used for agriculture with scattered rural residences. The dominant land cover is row-crop agriculture, with minor amounts of pasture/hayland. There are limited native grasslands within the Project Area. Some grasslands exist in association with modified drainages, as filter strips located between drainages and row-crop production areas; however, most of these areas appear to be hayed or mowed on an annual basis. Areas of Conservation Reserve Program (CRP) grasslands likely provides important habitat for a variety of grassland animal species. A summary of the various land uses and cover types in the Project Area is provided in **Table 5-8**.

**Table 6.9 - Summary of Land Uses and Cover Types in the Project Area**

| Land Use / Land Cover Class | Percent of Project Area |
|---|---|
| Open Water | <0.1% |
| Low Intensity Residential | <0.1% |
| Commercial/Industrial/Transportation | 1.4% |
| Deciduous Forest | 1.0% |
| Pasture/Hay | 4.0% |
| Row Crops | 92.8% |
| Woody Wetlands | 0.3% |
| Emergent Herbaceous Wetlands | 0.6% |

*Source: (USGS 1992)*

Minimal, highly-fragmented areas of the Project Area contain deciduous/coniferous forest, woody wetlands and emergent herbaceous wetlands. Woody habitat is generally restricted to small riparian corridors bordering highly modified drainages, and/or planted shelterbelts around residential and agricultural buildings or livestock/feedlot areas.

### 6.17.2 Impacts

Wind turbine sites are optimally located in areas of higher elevations within the Project Area, effectively placing the majority of the turbine sites in agricultural production areas. Access roads and supporting facility features will be designed to minimize impacts to existing grassland and woody vegetation. However, some impacts to woody vegetation in drainages will be unavoidable at road crossing sites.

### 6.17.3 Mitigation Measures

Grassland and forested areas will be avoided during the construction phase of the Project. If impacts to these habitats cannot be avoided, the Applicant will mitigate impacts by replanting woody and grassland species in areas of disturbance as practicable. Landowner approval will be negotiated prior to any removal of trees during construction.

## 6.18 Wildlife

### 6.18.1 Description of Resources

Due to the migratory and transient behavior of many of the wildlife species within the region, the information presented includes a discussion of wildlife resources within the Project Area, as well as at a regional level. The status and distribution of wildlife species was determined based on the completion of a background investigation and a site reconnaissance. A site reconnaissance visit was completed during the period of September 5 through 8, 2006 with the objective of characterizing habitat and surveying for wildlife. Wetlands, aquatic sites, and other areas of valued wildlife habitat which could potentially be impacted by the proposed development were identified. Literature review, and queries of state and federal natural resource related databases, and interviews of state and federal management personnel were the primary sources used for the background investigation related to species potentially found in the Project Area. The following section does not include a discussion on wildlife species listed as threatened, endangered or of special concern by state or federal management agencies. Refer to Section 5.19, Rare and Unique Natural Resources, for information on these resources.

Wildlife use of the Project Area is largely affected by the types of habitat.. The dominant landcover is row-crop agriculture, with minor amounts of pasture/hayland. Native grasslands are virtually non-existent within the Project Area. Minimal, highly-fragmented portions of the Project Area contain deciduous/coniferous forest, woody wetlands and emergent herbaceous wetlands. Woody habitat is generally restricted to small riparian corridors bordering highly modified drainages and planted shelterbelts around residential and livestock/feedlot areas. Woody cover-types provide food, hiding and thermal cover, and nesting habitats for a variety of species, especially migratory birds. Resident and migratory birds, mammals, reptiles and amphibians, and insects occupy the region both continually and intermittently throughout the year.

***Resident and Migratory Birds***

Resident birds are those that occupy the proposed Project Area throughout the year. Appendix 4 lists the resident birds that can be expected to occur in the Project Area (Henderson 1979; Jansen 2004). Migratory birds are those birds that utilize the Project Area during the breeding and nesting season. The principal migratory route for many of these species is the Mississippi Flyway. The primary route of this flyway is located west of the Project Area with only secondary routes overlying the Project Area. The list identifies the migratory birds most likely to use the Project Area. The list in Appendix 4 should not be considered a comprehensive list of the migratory birds that could potentially occur in the proposed Project Area. However, based on the available information, the migratory birds listed represent the majority of species regularly present in the vicinity of the Project.

Breeding bird surveys and roadside surveys are conducted annually throughout various locations in the state. However, the majority of available trend information on birds focuses on game species. A review of the MNDNR annual game bird reports for southeastern Minnesota indicates that game bird populations are healthy and stable in this region. Based on the lack of suitable waterfowl habitat present in the Project Area relative to other portions of the state, limited use of the Project Area by migrating waterfowl species would be expected.

During a site visit in September 6 through September 8, 2006, several species of birds were observed in the Project Area. These included: ring-necked pheasant (*Phasianus colchicus*), Gray (Hungarian) partridge (*Perdix perdix*), snow bunting (*Plectrophenax nivalis*), Northern cardinal (*Cardinalis cardinalis*), European starling (*Sturnus vulgaris*), and yellow-shafted flicker (*Colaptes auratus*).

***Mammals***

The agricultural fields, grasslands, woodlands, and wetland areas provide habitat for a variety of large and small mammals that inhabit the Project Area. Agricultural crops and native flora provide year round food sources and thermal/hiding cover for species. Smaller mammals occupying the grassland and woody vegetation areas provide a food source for larger carnivorous and omnivorous mammals and birds.

White-tailed deer, the dominant big game species in the area, favor the open wooded areas in the region for cover. Deer consume agricultural crops during warmer months and acorns during the winter. A review of the MNDNR Deer Population Model for spring pre-fawning (2005) indicates that deer density within Mower County is approximately one to five deer per square mile. In addition, the Historical Harvest Statistics (1995-2004) have been healthy and stable within Mower County. Appendix 4 identifies mammals that can be expected to occupy the Project Area throughout the year.

Mammals observed within the Project Area during the site visit included: white-tailed deer (*Odocoileus virginianus)*, red fox (*Vulpes vulpes*), eastern fox squirrel (*Sciurus niger)*, raccoon (*Procyon lotor),* coyote (*Canis latrans*), and eastern cottontail (*Sylvilagus floridanus*). Various unidentified rodent tracks were observed throughout the Project Area. Evidence of beavers (*Castor canadensis*) within Project Area drainages included lodges, beaver cut trees and food piles.

***Reptiles and Amphibians***

Several reptile and amphibian species may use the grassland, wetland, and deciduous forested areas within the region. However, the majority of the amphibian species would be concentrated in wetland or aquatic habitats and these habitats are limited within the Project Area. Appendix 4 identifies the reptile and amphibian species that may occupy the Project Area throughout the year.

### 6.18.2 Impacts

***General Wildlife Impacts***

Construction activities that remove vegetation and disturb soil may cause direct impacts to individuals of less mobile species (e.g., small mammals, amphibians, reptiles) through direct mortality or displacement and exposure to predators. The cultivated croplands where most disturbances would occur are not considered to be particularly productive habitats for those species because of low habitat diversity. Permanent habitat loss from construction of access roads and tower foundations would be minimal and restricted to localized areas, while other construction disturbances would be temporary. Revegetation of disturbed areas would mitigate these short-term effects. More mobile species (medium to large mammals and birds) would be expected to disperse from the area of disturbance and re-enter the area following the completion of construction.

Disturbance to wildlife due to noise, vehicles, and human presence would be localized and of short duration. Vehicles traveling on access roads could kill small mammals, reptiles, or birds, though more mobile species would be able to avoid impacts from vehicles. Nests of ground-nesting birds could be destroyed by vehicle traffic if construction activities occur during spring and early summer months when birds are nesting. However, these losses are not expected to cause a significant decline in overall wildlife populations. Therefore, no significant impacts are expected to occur. Additional discussion regarding specific wildlife/turbine interactions is presented in the following sections.

***Avian/Bat Impacts***

*Summary of National Wind Turbine/ Avian and Bat Mortality Data*

Nationwide, the potential for avian mortality has been addressed by selecting project locations outside of known concentrations of birds and by adjusting turbine sites within the project location to avoid sensitive avian habitats. Despite these efforts, mortality to birds resulting from collision with wind turbines has been documented (Nelson and Curry 1995; Osborn et al. 2000). Studies conducted prior to 2004 indicate an average of 2.3 avian fatalities per turbine per year in the U.S. outside of California and 2.7 per turbine per year in the Upper Midwest for all species combined. These studies have shown that raptor fatalities average 0.03 per turbine per year across the U.S. outside of California (NWCC 2004). Avian collisions with turbines may be influenced by such factors as annual migration and local movement patterns, turbine size, and weather.

Reports describing avian mortality at wind energy facilities were reviewed during the analysis of the Project. The Buffalo Ridge Study (WEST 2000) and Top of Iowa Study (TOI; Koford et al. 1985) were the primary avian mortality studies reviewed. Summaries of these studies and their findings are presented in Appendix 5. These studies identified several site-specific factors that warrant consideration in the context of the Project. The following section presents details of both studies and the implications of those findings regarding the potential effects of the proposed project on birds and bats.

*Buffalo Ridge Study*

Buffalo Ridge is currently the largest wind energy center outside of California with a total of 354 wind turbines in operation. Buffalo Ridge is a segment of the 62-mile-long Bemis Moraine, which is located in Lincoln and Pipestone Counties in southwest Minnesota and Brookings County, South Dakota. Buffalo Ridge is located in the Coteau des Prairies, a major physiographic landform consisting of terminal moraines and stream-dissected lands. Habitats in the study area were characterized as being primarily agricultural crops including corn, soybeans, small grains, hay and pasture, and CRP set-asides planted to a mixture of smooth brome and alfalfa or to monocultures of switchgrass. During the four-year study period, much of the land previously enrolled in the CRP program was put back into crop production. Relatively minor vegetation types in the study area include deciduous woodlots associated with farmsteads, wooded ravines, and wetlands.

- Buffalo Ridge is not located in a major waterfowl staging area or along significant waterfowl migration routes.
- Bird detections during point-count surveys at the Buffalo Ridge sites were lower than eight other sites monitored during 1996.
- Data indicated that the Buffalo Ridge site received comparably less use by nocturnal migrants than other areas sampled in west-central and southwestern Minnesota.
- The intensive agriculture within Buffalo Ridge provides habitat similar to habitat present at the Project site. Both sites are located in an area where intensive modifications have been made to the natural environment to facilitate agricultural production.
- During the four-year Buffalo Ridge study, thirty-one avian fatalities of 15 species were found on reference plots and fifty-five windfarm-related avian fatalities comprised of at least 31 species were found (Johnson, et.al., 2002).
- Avian fatalities associated with wind turbines were found to be 76.4 percent passerines, 9.1 percent waterfowl, 5.5 percent waterbirds, 5.5 percent upland gamebirds, 1.8 percent raptors and 1.8 percent shorebirds.
- A total of 184 bat fatalities were found in 1998 and 1999 within the three wind development areas. Bat mortalities were all found associated with turbines and appeared turbine-related. Hoary bats were the most common fatality.

*Top of Iowa Study*
The Top of Iowa (TOI) Wind Farm is located near Joice in Worth County, Iowa and was completed in December 2001. The facility is composed of 89 turbines mounted on 71.6 m (235-foot) high tubular towers. Each turbine is equipped with three 25.9 m (85-foot) blades. Blade speed at the tips is approximately 337 km/h (130 mph).

The TOI site is centrally located near three large, state-owned WMAs which provided a wide variety of habitat under state management (wetland, grassland and forest habitat). The proximity of these WMAs provides attractive habitat for migrating birds in an otherwise intensively farmed region of northern Iowa. In addition, the complex of the three WMAs provides important avian breeding habitat, particularly for wetland and grassland bird species. The Project Area has exhibited historically high bird use with migrant and resident shorebirds, rails, raptors, sparrows and icterids historically moving between the WMAs. These movements routinely take them through the area that is now occupied by the windfarm. The quality of the habitat, coupled with the location of a portion of the windfarm in an area that has been closed to Canada goose hunting for 30 years, results in high Canada goose usage at the TOI site.

Important site-specific factors at the TOI site include:

- The habitat present around the TOI is vastly superior in both quality and quantity to both the Buffalo Ridge and the Project sites.
- The proximity of the TOI site to three Iowa WMAs has been demonstrated to increase avian and bat usage within and near the Project Area.

- The TOI study demonstrated that the location of a wind energy facility near and within habitat that experiences high avian usage does not seem to adversely affect avian use at turbine sites.
- High avian use of the TOI site is an important consideration when making comparisons and extrapolating potential avian and bat interactions to the Project site.
- Windfarm-related mortality during 2003 and 2004 was a total of seven birds. In 2003, two bird deaths, a yellow-throated vireo and a tree swallow, were attributed to interactions with windfarm infrastructure. In 2004, five bird deaths (yellow-headed blackbird, red-tailed hawk, golden-crowned kinglet and two carcasses of unidentifiable bird species) were attributed to interactions with windfarm infrastructure.
- Windfarm-related bat mortality during 2003 and 2004 was 74 bats. In 2003, 30 bat deaths (hoary, red, little brown, big brown and silver-haired bats) were attributed to interactions with windfarm infrastructure. In 2004, 44 bat deaths (hoary, red, little brown, big brown, silver-haired and eastern pipistrelle bats) were attributed to interactions with windfarm infrastructure.
- Avian interactions and mortality were low, given the high avian use of the Project Area. However, investigators found that bat mortality numbers at the TOI site may be cause for concern.

*Expected Impacts to Avian and Bat Species at the Project*

The differences in the scale of impacts expected at the proposed Project and those observed at the two sites described above is largely based on differences in habitat, expected bird usage, turbine numbers and turbine heights.

Avian and bat impacts resulting from the construction and operation of the proposed Project are expected to be low. Mortality rates are expected to be similar to those found at the Buffalo Ridge site due to similarities in habitat type at the two sites. Avian species composition in the proposed Project Area is also expected to be similar to the Buffalo Ridge site as both areas have been subjected to intensive agricultural practices, which have modified historic wetland and prairie habitats to facilitate row-crop production. As such, passerine species are expected to exhibit the highest wind turbine-related mortality of any avian group in the proposed Project Area. Also, similar to the Buffalo Ridge site the proposed Project Area is not located in a major waterfowl staging area or along significant waterfowl migration routes. Therefore, impacts to waterfowl are expected to be low.

Based on the lack of woody habitat and the current condition of riparian corridors in the proposed Project Area, bat use is expected to be similar to use at the Buffalo Ridge site. As such, bat mortality rates on a per turbine basis would also be expected to be similar. However, cumulative impacts to bat populations should be less for the proposed Project, which will have significantly fewer turbines.

In contrast to the Buffalo Ridge site, the TOI site is very different from the proposed Project Area in terms of habitat and expected bird usage. Habitats that exist near the TOI site are described as being attractive, high quality habitats located in an area with historically high bird use. Compared to the proposed Project Area, avian habitat is of higher quality and found in greater quantity. Because habitat quality and composition are important indicators for avian use, the proposed Project Area would likely have lower avian/bat use and mortality than the TOI site. Avian species composition in the proposed Project Area is not expected to be similar to that of the TOI site, given differences in habitat between the two sites.

***Overall Impacts to Wildlife***

Development of the Project, including the construction and operation of the Project, is expected to result in minimal impacts to wildlife and would not reduce the viability of wildlife populations. Some small-scale displacement of wildlife is expected during construction; however, wildlife will likely reoccupy impacted areas shortly after completion of construction activities. Available habitat in the Project Area will be reduced slightly, but the reduction will be a small percentage of the entire site area. Operation and maintenance will not significantly change the existing land use or have an effect on species within the Project Area. While it is likely that there will be impacts to individual birds because of collisions with wind turbines and/or transmission lines, there is no evidence available that indicates that the proposed location or project facilities present a high risk for impacts to wildlife populations at the site. It is expected that avian and bat interactions with the proposed Project would be similar in nature, but of a much smaller scale, to those found at the Buffalo Ridge site, which is located in an area with similar habitat. The low impact of the Project relative to the Buffalo Ridge project results from fewer and taller turbines proposed for this Project. Based on the findings of the studies fewer larger towers are expected to result in fewer bird and bat strikes.

### 6.18.3 Mitigation Measures

During consultations with the USFWS during the High Prairie Phase I project, the primary environmental concerns expressed were potential for impacts to wetlands, streams, and forested areas. In addition to minimizing disturbances to these resources, the USFWS recommended implementing the Interim Guidelines to Avoid and Minimize Impacts to Wildlife from Wind Turbines (USFWS 2003). Many of the recommendations made in these guidelines are proposed as part of the High Prairie Wind Farm II Project. Such proposed mitigation measures include:

- The Project Area has been selected, in part, due to the low use of the area by migratory birds and relatively low value of the area for wildlife habitat relative to sites in other portions of the state.
- Facilities have been sited in locations where impacts to locally important habitats (e.g., wetlands and grasslands) are minimized.
- Surface disturbances and above-ground facilities have been minimized to the extent practicable and all temporary disturbances will be promptly reclaimed.

Based on implementation of these and other mitigation measures noted elsewhere in this document, no significant impacts to wildlife would be expected to occur due to the construction and operation of the proposed Project.

## 6.19 Rare and Unique Natural Resources

### 6.19.1 Description of Resource

For the purpose of this discussion, Rare and Unique Natural Resources are considered to be those species identified as threatened, endangered, candidate or sensitive by state and federal management agencies, or other natural resource features identified by state or federal management agencies to be unique within the region of the Project Area.

***Federally Listed Species***

The Endangered Species Act of 1973, as amended, requires protection of those species federally listed as threatened or endangered, as well as protection of habitat designated as critical to the recovery of those listed species. Projects that could potentially have an adverse effect on listed species or critical habitat require consultation with the USFWS.

The MNDNR maintains a Natural Heritage Database (NHD) through their Natural Heritage Program and Non-game Game Wildlife Program, which is the most complete source of data on Minnesota's rare, endangered, or otherwise significant plant and animal species, plant communities, and other natural features. The results of a NHD query for the Project Area and a one mile buffer search radius found that there are no documented sightings of federally threatened or endangered species within the Project Area or search radius (MNDNR 2006).

Appendix 4 contains a table that lists the federally listed threatened and endangered species found within Minnesota. Of those species, only two species have been documented as occurring in Mower County (Delphey 2005): the Western Prairie Fringed Orchid (*Platanthera praeclara*) and the Prairie Bush-Clover (*Lespedeza leptostachya*).

The threatened plant species that have been documented in Mower County and could potentially occur within the Project Area are protected by the Endangered Species Act, the state's Endangered Species Statute (84.0895) and by Minnesota's 1930 Wildflower law (17.23). As such, a person may not take, import, transport, or sell any portion of these species. Following is a description of the habitat that these plants are typically found in:

- *Prairie Bush-clover:* Prairie bush-clover is a prairie legume that is found only in the tallgrass prairie region of four Midwestern states. The plant is considered to be endemic as it is only found in the tall grass prairie region of the upper Mississippi River Valley (USFWS 2000). Tallgrass prairie habitat does not occur within the Project Area; therefore, it is unlikely that this species would be found within the Project Area.

- *Western Prairie Fringed Orchid:* Western prairie fringed orchid grows in moist tallgrass prairies and sedge meadows. Documented sightings indicate that this species is tolerant of some disturbance as it has been found in pastures, ditches and cultivated fields (CCM 2004). The plant is unlikely to occur within the Project Area as there are no tallgrass prairies, and large wetland areas and meadows will be avoided to the extent practicable.

Upon further consideration and consultation, the USFWS determined that there are currently no federally endangered or threatened species known to occur within the Project Area. Therefore, they concluded that that there was no need for further action on this project as required under Section 7 of the Endangered Species Act of 1973 (USFWS 2006).

***State Listed Species***

Minnesota's Endangered Species Statute (Minnesota Statutes, Section 84.0895) requires the MNDNR to adopt rules designating species meeting the statutory definitions of endangered, threatened, or species of concern, and authorizes the MNDNR to adopt rules that regulate treatment of designated species. Appendix 4 contains a list of state-listed threatened and endangered mammals and birds. (A comprehensive list of all state-listed threatened species, endangered species, and species of concern can be found on the MNDNR website at: [www.dnr.state.mn.us/est/index.html].)

The MNDNR's NHD also maintains records of documented occurrences of state-listed species or other rare and unique species. The results of a NHD query for the Project Area and a one-mile buffer search radius found that there are two occurrences of rare species within the search radius (MNDNR 2005 and 2006). The species were the Blanding's turtle (*Emydoidea blandingii*) and several species of rare mussels such as Ellipse (*Venustaconcha ellipsiformis)* and Creek Heelsplitter (*Lasmigona compressa).* These species are wetland/aquatic species and, due to the limited amount of wetland habitat within the Project Area, the MNDNR did not have any concerns about the impacts from the Project on these species (MNDNR 2005 and 2006).

***Unique Natural Resources***

State owned lands that are managed or preserved for their unique qualities include SNAs, WMAs and State parks. The objectives of these areas include: preservation of the ecological diversity of Minnesota's natural heritage, including landforms, fossil remains, plant and animal communities, and rare and endangered species; or other biotic features and geological formations for scientific study and public edification as components of a healthy environment. The Project Area is privately owned and does not contain these management areas. However, several of these state properties are within the region of the Project Area.

The SNA Program's goal is to ensure that no single rare feature is lost from any region of the state. This requires protection and management of each feature in sufficient quantity and distribution across the landscape. The Shooting Star SNA is located within the vicinity of the Project Area as previously noted in this document.

Three Wildlife Management Areas (WMAs) are within two to four miles of the Project Area as shown on Map 2. WMAs are areas managed to provide recreation and wildlife habitat for a variety of game and non-game species. These areas are predominantly used for hunting; however, they are increasingly being used for wildlife viewing. For more information on these areas, see the Recreational Resources section of this document.

There is one State Park located within the vicinity of the Project Area. Lake Louise is a 1,170 acre state park located six miles southeast of the Project Area. The park is valued for its open landscape and lush hardwood forest.

### 6.19.2 Impacts

The Project would not impact any federal- or state-listed threatened or endangered species. As previously discussed, the site reconnaissance, consultation with the USFWS (USFWS 2005), and the query of the NHD indicate that there are no federal threatened or endangered species documented to occur within the Project Area. Likewise, these sources indicate that the state-listed or rare species that could potentially occur within the Project Area are species associated with and dependent on wetlands and aquatic areas. Impacts to these areas will be minimal and avoided where practicable. In addition, a variety of mitigation measures will be implemented to avoid and minimize impacts to all wildlife species. For more discussion on mitigation measures, see the Wildlife section of this document.

Unique resources, such as state management areas and recreation areas, will not be directly impacted by the Project. However, some of the areas may experience indirect impacts, most notably, visual impacts to recreation areas.

### 6.19.3 Mitigation Measures

There are a variety of mitigation measures associated with various resource areas that will assist in minimizing impacts to rare and unique natural resources. The mitigation measures associated with the Wildlife, Recreation Resources and Visual Resources sections are all measures that will protect Rare and Unique Natural Resources. Some specific proposed mitigative measures are:

- Turbines will not be located in biologically sensitive areas such as wetlands, relict prairies, or in close proximity to wildlife management areas and impacts to important habitats will be avoided where practicable;
- Existing roads will be used for construction and maintenance where possible, and new road construction will be minimized;
- Access roads created for the wind farm will be located on gentle grades to minimize visible cuts and fills; and
- Temporarily disturbed areas will be reseeded to blend in with existing cover and land uses.

# 7 Construction

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

- Ordering of all necessary components including towers, nacelles, blades, foundations, and transformers
- Final turbine micrositing
- Complete survey to establish locations of structures and roadways
- Soil borings, testing and analysis for proper foundation design and materials
- Complete construction of access roads, to be used for construction and maintenance
- Construction of overhead feeder lines
- Design and construction of Project substation
- Installation of tower foundations
- Installation of underground cables
- Tower erection and wind turbine setting
- Acceptance testing of facility
- Commencement of commercial operation

Access roads will be built adjacent to the towers, allowing access both during and after construction. The roads will be approximately 32 to 34 feet wide with gravel surfacing, adequate to support the size and weight of construction and maintenance vehicles. The specific turbine placement will determine the amount of roadway that will be constructed for the Project.

During the construction phase, several types of light, medium, and heavy-duty construction vehicles will travel to and from the site, as well as private vehicles used by the construction personnel. The Applicant estimates that there will be 100 trips per day in the area during peak construction periods. That volume will occur during the peak time when the majority of the foundation and tower erection is taking place.

## 7.1 Construction Management

### 7.1.1 Construction Management Organization

The Applicant will enter into two primary agreements for the construction of the Project: 1) an agreement for the supply, erection and commissioning of the wind turbines; and 2) a Balance-of-Plant ("BOP") contract for the construction all other Project facilities and infrastructure such as the roads, electrical collection system, substation, O&M facility, etc. The turbine erection may be performed by either the turbine supplier or the BOP contractor.

***Project Construction Management***

The Project Management organizational structure will include two support groups: an engineering-and-design specifications team, and a field site management team. Figure 7.1 below illustrates the construction management organizational structure for the Project. The Project

Manager will handle contractual aspects of the agreements with the project managers of the wind turbine vendor and the BOP Contractor. The organizational chart below represents a typical structure for wind power projects. The exact organization may change after award of the BOP contract and other subcontracts.

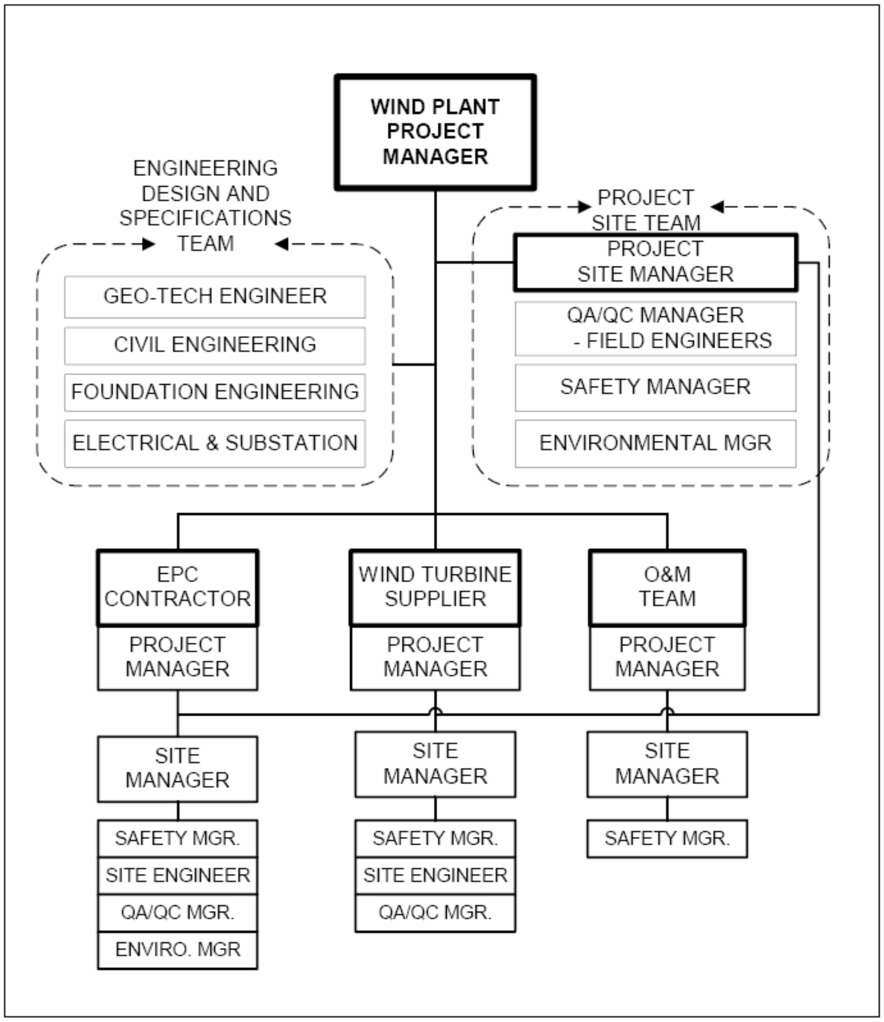


**Figure 7.1 - Project Construction Management Organization**

### ***Field Site Management Team***

The field site management team will oversee construction on-site and will ensure that construction on-site is done in accordance with the engineering plans and specifications, regulatory requirements and good industry practice. The field site team will generally be involved in day-to-day issues as they arise throughout the construction phase.

### ***BOP Contractor's Construction Management Team***

The BOP Contractor will be responsible for managing several construction subcontractors, including those involved in all of the BOP items such as the roads, electrical and communications system infrastructure, substation and O&M Facility. The BOP Contractor will be required to implement a safety plan, a Quality-Assurance/Quality-Control (QA/QC) plan and an environmental protection plan, including the storm water pollution prevention plan (SWPPP).

***Wind Turbine Supplier's Construction Management Team***

The wind turbine supplier will be responsible for the supply, delivery, erection and commissioning of the wind turbines. The turbine supplier's construction team will include a lead Project Manager, a Site Manager, transportation specialists and several lead technicians. The turbine supplier's site team will be supported by their own quality-assurance and quality-control specialists and site safety officers.

### 7.1.2 Quality-Assurance/Control, Environmental, Health and Safety Compliance

***QA/QC Program Characteristics***

A Quality-Assurance and Quality-Control Program will be implemented during all phases of the Project to ensure that the engineering, procurement, construction, and startup of the facility are completed as specified.

In the QA/QC Program, the contractor will describe the activities and responsibilities within its organization, and the measures to be taken to assure quality work in the Project. Some of the topics that will be covered are design control, configuration management and drawing control. Independent QA/QC personnel will review all documentation (design, engineering, procurement, etc.) and will witness field activities as a parallel organization to that of the construction contractors to assure compliance with the specifications. In the installation, alignment and commissioning of all major equipment, field inspectors' acceptance will be required.

***Environmental Protection***

Copies of all applicable construction permits will be kept on-site. The lead Project construction personnel and construction Project Managers will be responsible for all required compliance activities.

***Health-and-Safety Program***

The BOP Contractor, and each subcontractor, will be responsible for construction health-and-safety issues. The BOP Contractor, and each subcontractor, will provide a Health and Safety Coordinator who will ensure that all laws, ordinances, regulations and standards concerning health and safety issues are complied with and that any identified deficiencies are corrected as quickly as possible. The BOP Contractor's Health and Safety Coordinator will report back to the BOP Contractor's corporate management, and will have the authority to "stop work" when health and safety issues are violated and the health and safety of construction personnel are in danger. The "stop work" authority is also given to the Project's Construction Manager for commercial actions and environmental health and safety issues.

***QA/QC, Safety and Environmental Inspections—Checks and Reviews***

Safety, Environmental Protection and QA/QC inspections of the major facilities and equipment listed below will typically include, but not be limited to, the following operations, checks and reviews:

**Safety:**
- Review of safety procedures;
- Observation and attendance of safety training for supervisors and field staff (tail-gate meetings);
- Review of construction safety techniques and implementation;
- Verification of safety incident reports and statistical data.

**Environmental Protection:**
- Review of erosion control and storm water pollution prevention plans;
- Witness of construction implementation;
- Witness of erosion control performance;
- Ensuring sensitive areas are flagged and avoided;
- Inspection of spill sites and cleanup and review of spill reports;
- Continuous inspection for trash and debris removal from the Project site.

**Wind Turbine Generators and Towers:**
- Inspection of turbines at manufacturer's facilities;
- Review and inspection of manufacturer's QA/QC procedures;
- Manufacturing drawing review and verification;
- Verification of welding procedure specifications (WPS) compliance;
- Material mill certificates tracking system and verification;
- Overall visual inspection (including assembly, fastening systems and welding);
- Inspection of flange interface flatness measurements, finishing and protection;
- Witness or review of turbine run-in load testing;
- Inspection of paint finishing and protection;
- Inspection of painting/marking/preparation for shipment;
- Verification of field wiring and tagging;
- Pre-Commissioning field testing and verification.

**Road Construction and Site Preparation:**
- Field verification of road locations to site plan and survey markings;
- Review of clearing and grubbing process;
- Verification of road grade to plans.

**Concrete/Structural:**
- Inspection of batch plant facilities, engineer's review of mix design and break test verification;
- Inspection of forms, structural steel and rebar prior to backfilling and prior to casting;
- Field engineer's witness of concrete pouring;
- Inspection of concrete testing during pour (slump) and verification of break tests results.

**Electrical Collection System:**
- Inspection of cables and trenches prior to burial and backfilling;
- Witness of proper backfilling procedures;
- Witness and/or review of polarity, cable marking and phase rotation tests;
- Witness and/or review of grounding system resistance measurements;
- Inspection of all lock-out tag-out locations and energization sequences and plan.

**Pad-Mount Transformers and Main Substation Transformers:**

- Inspection of transformers at manufacturer's facilities;
- Witness and/or review of winding resistance, polarity and phase displacement tests;
- Witness and/or review of no load losses and excitation current at rated voltage and frequency;
- Witness and/or review of impedance voltage and load losses at rated current and rated frequency;
- Witness and/or review of high potential and induced potential tests;
- Witness and/or review of impulse tests, reduced full wave, chopped wave and full wave tests;
- Witness and/or review of regulation and efficiency calculations;
- Verification of compliance to engineering specifications;
- Inspection of painting/tagging/preparation for shipment;
- Verification of field wiring and tagging.

**Substation Breakers:**

- Witness and/or review of rated continuous current and short circuit tests;
- Witness and/or review of dielectric withstand tests;
- Witness and/or review of switching tests;
- Witness and/or review of insulator tests;
- Witness and/or review of mechanical life tests;
- Witness and/or review of terminal loading tests;
- Witness and/or review of partial discharge tests;
- Verification of compliance to engineering specifications;
- Inspection of painting/tagging/wiring/preparation for shipment;
- Verification of field wiring and tagging.

**Substation Relaying and Instrumentation:**

- Inspection of manufacturer's facilities;
- Verification of instrument and relay compliance to specifications;
- Verification of installation in accordance with drawings;
- Witness and/or review of instrument and relaying calibration;
- Verification of field wiring and tagging.

**Substation Structural Steel Work:**

- Inspection of manufacturer's facilities as required;
- Review and inspection of manufacturer's QA/QC procedures;
- Manufacturing drawing review and verification;
- Verification of welding procedure specifications (WPS) compliance;
- Material mill certificates tracking system and verification;
- Overall visual inspection (including assembly, fastening systems and welding);
- Inspection of flange interface flatness measurements, finishing and protection;
- Inspection of paint finishing and protection.

## 7.2 Construction Methodology

### 7.2.1 Geotechnical Investigations

A detailed geotechnical investigation will be performed to identify subsurface conditions which will dictate much of the design work of the roads, foundations, underground trenching and electrical grounding systems. Typically, the geotechnical investigation involves a drill rig which bores to the engineer's required depths (typically drilling 45-50 feet deep) to identify the subsurface soil and rock types and strength properties by sampling and lab testing. Testing is also done to measure the soil's electrical properties to ensure proper grounding system design and cable ampacities for the subject soil thermal and electrical characteristics.

### 7.2.2 Site Preparation and Road Construction

Construction activities will begin with site preparation, including the construction of Project site access entryways from public roads, rough grading of the roads, leveling of the field construction site office parking area and the installation of about six to eight temporary site office trailers.

The Project roads will be gravel-surfaced. Road construction will be performed in multiple passes starting with the rough grading and leveling of the roadway areas. The vegetative subgrade will be removed for the depth of the rock to be replaced, approximately 8 to 12 inches deep. Typically, a geotextile fabric will be installed, and then the gravel will be placed, graded, and compacted. The final road surface will be flush with the original grade, allowing unhindered passage of farm machinery.

Project road construction will involve the use of several pieces of heavy machinery including bulldozers, track-hoe excavators, front-end loaders, dump trucks, motor graders, water trucks and rollers for compaction. Storm water controls, such as hay bales, silt fences and diversion ditches in some areas will control storm water runoff during construction in accordance with local, state and federal regulations.

### 7.2.3 Foundation Construction

The Project will require several foundations, including bases for each turbine and pad mounted transformer, the substation equipment, and the O&M facility.

Once the roads are complete for a particular row of turbines, turbine foundation construction will commence on that completed road section. Foundation construction occurs in several stages including excavation, outer form setting, rebar and bolt cage assembly, casting and finishing of the concrete, removal of the forms, backfilling and compacting, construction of the pad transformer foundation, and foundation site area restoration.

Excavation and foundation construction will be conducted in a manner that will minimize the size and duration of excavated areas required to install foundations. Foundation work for a given excavation will commence after excavation of the area is complete. Backfill for the foundations will be installed immediately after approval by the engineer's field inspectors. The Applicant plans on using on-site excavated materials for backfill to the extent possible.

The foundation work requires the use of several pieces of heavy machinery including track-hoe excavators, drill rigs, front-end loaders, dump trucks, transportation trucks for materials, cranes and boom trucks for off-loading and assembly, compactors, concrete trucks, concrete pump trucks, backhoes and small Bobcat-type loaders.

### 7.2.4 Electrical Collection System Construction

Once the roads, turbine foundations and transformer pads are complete for a particular row of turbines, underground cables will be installed on that completed road section. The underground cables are installed in a trough that is typically up to 54 inches deep and generally runs beside the Project's roadways in order to minimize ground disturbances.

As previously described, the high-voltage underground cables are fed through the trenches and into conduits at the pad transformers at each turbine. The cables run to the pad transformers' high-voltage (34.5 kV) compartment and are connected to the terminals. Low-voltage cables are fed through another set of underground conduits from the pad transformer to the bus cabinet inside the base of the wind turbine tower. The low-voltage cable will be terminated at each end and the whole system will be inspected and tested prior to energization. A clean fill material, if needed, such as sand or fine gravel will be used to cover and protect the cable before the native soil and rock are backfilled over top.

The overhead pole lines will require detailed field surveys to determine the exact pole locations. Once the survey and design work is done, the installation of poles and cross-arms to support the conductors can commence. The poles are first assembled and fitted with all of their cross-arms, cable supports and insulator hardware on the ground at each pole location. Holes for each pole will then be excavated or drilled and the poles will be erected and set in place using a small crane or boom truck. Once it is set in place, concrete will be poured in place around the base of the pole, or a clean fill will be compacted around the pole base according to the engineer's specifications. The overhead lines will connect to underground cables at each end through a switchable, visible, lockable riser disconnect with fuses.

The electrical construction work will require the use of several pieces of heavy machinery including a track-hoe, front-end loaders, trenchers, cable plows, drill rigs for the pole-line, transportation trucks for the materials, small cranes and boom trucks for off-loading and setting of the poles and pad transformers, concrete trucks, cable spool trucks used to un-spool the cable, man-lift bucket trucks for the pole-line work and a winch truck to pull the cable from the spools onto the poles.

### 7.2.5 Project Substation

The construction schedule for the Project substation is largely dictated by the delivery schedule of major equipment such as the main transformers, breakers, capacitors, outdoor relaying equipment, control house, etc. The construction involves several stages of work including, but not limited to: grading of the area; the construction of several foundations for the transformers, steel work, breakers, control houses, and other outdoor equipment; the erection and placement of the steel work and all outdoor equipment; and electrical work for all of the required terminations. All excavation, trenching and electrical system construction work will be done in accordance with the formal SWPPP for the Project. Once physical completion is achieved, a rigorous inspection and commissioning test plan is executed prior to energization of the substation.

### 7.2.6 Wind Turbine Assembly and Erection

The wind turbines consist of three main components: the towers, the nacelles (machine housing) and the rotor blades. Other smaller components include hubs, nose cones, cabling, control panels and tower internal facilities such as lighting and ladders. All turbine components will be delivered to the Project site on flatbed transport trucks, and main components will be off-loaded at the individual turbine sites.

Turbine erection is performed in multiple stages including: setting of the bus cabinet and ground control panels on the foundation, erection of the tower (usually in three to four sections), erection of the nacelle, assembly and erection of the rotor, connection and termination of the internal cables, and inspection and testing of the electrical system prior to energization.

### 7.2.7 Plant Energization and Commissioning (Start-Up)

After the interconnection is energized, turbines will be commissioned as they are completed. The Project will be commissioned after completion of the construction phase, and it does not require the use of heavy construction machinery. The Project will undergo detailed inspection and testing procedures. Inspection and testing occurs for each component of the wind turbines, as well as the communication system, meteorological system, high voltage collection and feeder system, and the SCADA system.

### 7.2.8 Project Construction Clean-Up

Since Project clean-up generally consists of landscaping and earthwork, it is very weather- and season-sensitive. Landscaping clean-up is generally completed during the first allowable and suitable weather conditions after all of the heavy construction activities have been completed. Disturbed areas outside of the graveled areas will be reseeded to control erosion by water and wind. All construction clean-up work and permanent erosion control measures will be done in accordance with the formal SWPPP for the Project.

Other Project clean-up activities might include interior finishing of the O&M building, landscaping around the substation area, washing of towers, painting of scratches on towers and exposed bolts as well as other miscellaneous tasks that are part of normal construction clean-up.

Construction clean-up will require the use of a motor grader, dump trucks, front-end loaders, and light trucks for transportation of any waste materials, packaging, etc.

# 8 Operations and Maintenance

## 8.1 Project Control, Management, and Service

The Applicant will enter into contractual agreements with appropriate parties to provide on-site service and maintenance for the Project. For an initial period, Vestas, the turbine equipment manufacturer, will be responsible for operations and maintenance for the turbines. The Applicant will have technicians seconded in the Vestas operating and maintenance staff. Balance of plant equipment operation and maintenance is the responsibility of the Applicant. Routine maintenance of the electrical substation will typically be handled by a high voltage contractor. All service and maintenance activities will be performed by qualified technicians who will report to the site operations leader.

Each wind turbine in the Project will communicate directly with the SCADA system for the purposes of performance monitoring, energy reporting, and trouble-shooting. Under normal conditions each wind turbine operates autonomously, making its own control decisions.

The SCADA system provides the O&M team with access to wind turbine generation or production data, availability, meteorological, and communications data, as well as alarms and communication error information. Performance data and parameters for each machine (generator speed, wind speed, power output, etc.) can also be viewed, and machine status can be changed. There is also a "snapshot" facility that collects frames of operating data to aid in diagnostics and troubleshooting of problems.

Typical functions of the SCADA system are to:

- Monitor wind farm status
- Allow for autonomous turbine operation
- Alert operations personnel to wind farm conditions requiring resolution
- Provide a user/operator interface for controlling and monitoring wind turbines
- Collect meteorological performance data from turbines
- Monitor field communications
- Provide diagnostic capabilities of wind turbine performance for operators and maintenance personnel
- Collect wind turbine and wind farm material and labor resource information
- Provide information archive capabilities
- Provide inventory control capabilities
- Provide information reporting on a regular basis

## 8.2 Maintenance Schedule

The Applicant will monitor the Project on a daily basis. This will be accompanied appropriate inspections, various daily checks and other means consistent with industry practice and manufacturer recommendations, as required to ensure that the Project is operating within expected parameters.

Once installed, the Project service and maintenance is carefully planned and divided into the following intervals:

A) First service inspection
B) Annual service
C) Multi-year service inspections

A) First Service Inspection. The first service inspection will take place one to three months after the turbines have been commissioned. At this inspection, typical activities include tightening of all bolts, a full greasing, and filtering of gear oil.

B) Annual Service. The yearly service inspection consists of a semi-annual inspection plus a full annual component check. Bolts are appropriately checked with a torque wrench.

C) Multi-Year Service. Inspections and preventative maintenance are performed consistent with industry practice and manufacturer recommendations. These activities typically include such items as checking and tightening of terminal connectors, inspection of the wind braking system, checking and testing of oil and grease, balance check, etc.

## 8.3 General Maintenance Duties

The O&M field duties involve performing all scheduled and unscheduled maintenance including periodic operational checks and tests, regular preventive maintenance on all turbines, related plant facilities, equipment, safety systems, controls, instruments and machinery. Typical tasks include:

- Maintain the wind turbines and the mechanical, electrical power, and communications system
- Perform all routine inspections
- Maintain all oil levels and change oil filters
- Maintain the control systems, all Project structures, access roads, drainage systems and other facilities necessary for the operation
- Maintain all O&M field maintenance manuals, service bulletins, revisions, and documentation for the Project
- Maintain all parts, price lists, and computer software
- Maintain and operate interconnection facilities
- Provide all labor, services, consumables, and parts required to perform scheduled and unscheduled maintenance on the wind farm, including repairs and replacement of parts and removal of failed parts
- Manage lubricants, solvents, and other hazardous materials as required by local and/or state regulations
- Maintain appropriate levels of spare parts in order to maintain equipment
- Provide all necessary equipment including industrial cranes for removal and reinstallation of turbines
- Hire, train, and supervise a work force necessary to meet the general maintenance requirements

- Implement appropriate security methods

## 8.4 Operations and Maintenance Facility

The Applicant will construct a facility to house the O&M staff for the Project. The facility will be appropriately sized to provide office space for the crews, a shop/storage area for spare parts and vehicles, and will house all of the central monitoring equipment for the generating facility where the turbines can be monitored and controlled. The building may either be built on the Project site, or, subject to availability and convenient location, an existing facility may be purchased and modified to function as the O&M facility.

# 9 Cost Analysis

The Applicant has estimated costs using typical wind farm design, construction and operation data to be approximately **[TRADE SECRET BEGINS]** *** **[TRADE SECRET ENDS]**. For purposes of comparison, a service life of 20 years has been assumed in order to estimate annualized capital costs. The actual price that the Project will obtain from the sale of its energy and environmental attributes is proprietary and confidential.

# 10 Project Schedule

## 10.1 Land Acquisition

The Applicant has entered into options to lease land and wind rights for all of the property required to support the Project, and anticipates exercising these options by March 2007.

## 10.2 Permits

The Applicant will be responsible for undertaking all required environmental review, and aspires to obtain a LWECS Site Permit by April 2007. A Conditional Use Permit for the transmission line and substations is expected to be granted by the Mower County Board of Commissioners by April 2007 as well. Additional permits as required in Section 13 will be obtained prior to construction.

## 10.3 Equipment Procurement, Manufacture and Delivery

For wind power projects, the longest lead-time items are typically the substation transformers, which require eight to twelve months from time of order to delivery, and the wind turbines, which require six to nine months for delivery. Horizon Wind Energy has entered into an agreement with Vestas to provide turbines for several 2007 wind energy projects. Under this agreement, 61 of these turbines have been designated for the Project. Due to extended lead times, the Applicant has already ordered the main transformer for the Project.

## 10.4 Construction

The construction and commissioning phase will take approximately seven months to complete. Construction will likely commence in May 2007 and be completed by December 2007.

## 10.5 Financing

The Applicant will be responsible for financing all pre-development, development, and construction activities, as well as permanent financing for the Project. Prior to obtaining permanent financing, the Applicant anticipates financing these activities through internal funds of its parent company.

## 10.6 Expected Commercial Operation Date

The Applicant anticipates that the Project will begin operation in December 2007.

# 11 Energy Projections

When built, the Project will have a nameplate capacity of 100.65 MW. Assuming net capacity factors of approximately **[TRADE SECRET BEGINS]** *** **[TRADE SECRET ENDS]**, projected average annual output will be approximately **[TRADE SECRET BEGINS]** *** **[TRADE SECRET ENDS]**. Net calculations take into account, among other factors, energy losses in the gathering system, mechanical availability, array losses, and system losses.

# 12 Decommissioning and Restoration

The Project will be designed to meet utility-grade standards as well as a number of other stringent codes and requirements. As a result, the design life of all of the major equipment such as the turbines, transformers, substation and supporting plant infrastructure is at least 20 years. Based on the site conditions, it is expected that the proposed turbine technology will continue to perform well into its third decade of operation.

The current trend in the wind energy industry has been to replace or "repower" older wind energy projects by upgrading older equipment with more efficient turbines. A good portion of the value in the Project is in its proven wind resource, land agreements and in-place infrastructure. It is likely that after mechanical wear takes its toll the Project would be upgraded with more efficient equipment and therefore will be capable of sustaining a design life far beyond 20 years.

Except for the underground collection system (which is provided for under a perpetual easement), the Applicant's lease agreements with the landowners provide that all wind Project facilities will be removed following the end of the Project's useful life. In particular, all foundations would be removed to a depth of 36 inches below grade and unsalvageable material would be disposed at authorized sites. The soil surface would be restored as close as reasonably possible to its original condition. The Project substation is generally valuable, and often times in older power projects the substation would revert to the ownership of the utility. If the overhead power lines could not be used by the utility, all structures, conductors, and cables would be removed.

Reclamation procedures would be based on site-specific requirements and techniques commonly employed at the time that the area is to be reclaimed, and would include re-grading, adding topsoil, and re-vegetation of all disturbed areas. Re-vegetation would be done with appropriate seed mixes, based on vegetative cover in the Project area. Decommissioned roads would be reclaimed or left in place based on landowner preferences, and rights-of-way would be vacated and surrendered to the landowners. Demolition or removal of equipment and facilities, to the extent necessary, will occur to meet environmental and health regulations, to salvage economically recoverable materials or to recycle the Project site for future uses.

## 12.1 Decommissioning Economics and Financial Surety

As the scrap value of the materials and equipment contained in the project infrastructure (steel towers, electric generators, copper wires/cables, etc.) fluctuates dramatically over time with variations in commodity prices, it is not possible to accurately estimate decommissioning costs twenty years in advance.

The Applicant's lease agreements with the landowners provide that all Project facilities will be removed following the end of the Project's useful life. The Applicant also reserves the right to explore alternatives regarding Project decommissioning at the end of the Project Site Permit term. One such option may be to reapply for a Site Permit and continue operation of the Project, providing energy is sold under a new long-term contract or on a merchant basis. Retrofitting the turbines and power system with upgrades based on new technology may allow the wind farm to produce energy efficiently and successfully for many more years.

To assure that the Project will meet its obligation to dismantle the wind Project, the Applicant will either establish a decommissioning fund in the amount of **[TRADE SECRET BEGINS] *** [TRADE SECRET ENDS]** per wind turbine generator to be held in escrow for the benefit of landowners, provide the landowners a corporate guaranty of the Project's decommissioning obligations from a company with an investment grade credit rating, or provide similar security acceptable to the landowners. The Applicant will establish the decommissioning security during the seventh year of the Project.

# 13 Identification of Required Permits and Approvals

The federal and state permits or approvals that have been identified as being required for the construction and operation of the Project are shown in Table 13.1:

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

**Table 13.1 - Required Permits and Approvals**

| Permit | Permitting Agency | Trigger | Permit Required |
|---|---|---|---|
| **FEDERAL** | | | |
| Notice of Proposed Construction or Alteration | Federal Aviation Administration | Facility safety lighting | Yes |
| Determination of No Hazard | Federal Aviation Administration | Turbines and facility safety lighting | Yes |
| Clean Water Act Section 404 Permit | U.S. Army Corps of Engineers; St. Paul District Office | Discharges of dredged or fill material into waters of the United States, including their adjacent wetlands | Yes |
| Exempt Wholesale Generator Status | Federal Energy Regulatory Commission | Seeking status as an exempt wholesale generator must file with the Commission | Yes |
| Market-based Rate Authorization (Petitions for Rate Approval pursuant to Section 284.123(b)(2) 18 C.F.R. Section 381.403) | Federal Energy Regulatory Commission | Commissioning of the wind facility | Yes |
| **STATE OF MINNESOTA** | | | |
| Certificate of Need | Minnesota Public Utilities Commission (PUC) | Construction of a Large Wind Energy Conversion System (LWECS) | Yes |
| Site Permit | Minnesota Public Utilities Commission (PUC) | Construction of a Large Wind Energy Conversion System (LWECS) | Yes |
| General NPDES Permit for Stormwater Discharges Associated with Construction Activities | Minnesota Pollution Control Agency (MPCA) | Disturbance of greater than 1 acre of ground. | Yes |
| Section 401 Water Quality Certification | MPCA | Impacts to waters of the US (Corps Section 404 permit) | Yes |
| Small Quantity Hazardous Waste Generator License | MPCA | Generation more than 100 pounds of hazardous waste each year | TBD |
| Above-ground Storage tank (AST) Notification Form | MPCA | Any above-ground petroleum storage tank 500 gallons or greater | TBD |
| License for Crossing Public Lands and Waters | Minnesota DNR | Any wind farm facilities that require crossing of or location on State administered Public Lands or Waters | Yes |

| Permit | Permitting Agency | Trigger | Permit Required |
|---|---|---|---|
| Public Waters Work Permit | Minnesota DNR | Any construction activities that impact waterways, including wetlands Applies to public waters that are identified on DNR public waters inventory maps | Yes |
| Wetland Conservation Act Compliance | Mower County Soil & Water Conservation District – MN Board of Soil and Water Resources (rules) | Construction activities that impact non-state wetlands | Yes |
| Well Construction Notification | Minnesota Dept. of Health (MDH) | Installation of private well(s) for O&M building | Yes |
| Plumbing Plan Review | Minnesota Dept. of Labor and Industry | Plumbing system for O&M building | Yes |
| Highway Access Permit | Minnesota Dept. of Transportation | Access to State roads from wind farm facilities. | Yes if off Highway 56 or 16 |
| Utility Access Permit | Minnesota Dept. of Transportation | Utility construction impacts to state roads | Yes |
| Oversize & Overweight Permit | Minnesota Dept. of Transportation | Use of oversize and overweight vehicles | Yes |
| **MOWER COUNTY** | | | |
| Highway Access Permit (County and Local Roads) | Mower County Engineer and Township Chairs | Access to county and local roads from wind farm facilities. | Yes |
| Zoning Permit | Mower County Office of Planning and Environmental Services | Construction of wind farm facilities | Yes |
| Conditional Use Permit (Requires an Environmental Assessment) | Mower County Office of Planning and Environmental Services | Construction of transmission line | Yes |
| Individual Sewage Treatment System Permit (ISTS) | Mower County Office of Planning and Environmental Assistance | Connection to existing or approval of on-site sewage and water (O&M building). | TBD |