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Leader in Community Wind Finance

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May 22, 2009

Dr. Burl A. Haar
Executive Secretary
Minnesota Public Utilities Commission
Suite 350, 121 Seventh Place East
St. Paul, MN 55101-2147

Re: Morgan Wind Project
Application for a Site Permit for a Large Wind Energy Wind Conversion System
MPUC Docket No. IP6723/WS-09-360
Org No. 7547

Dear Dr. Haar:

Morgan Wind Acquisition Group, LLC (Morgan Wind) is pleased to submit this Large Wind Energy Conversion System (LWECS) Site Permit Application for the Morgan Wind Project (Project) pursuant to Minnesota Rules 7836.0500.

Morgan Wind proposes to construct the Project in Redwood and Brown counties in south-central Minnesota. Because construction and commissioning of the Project is planned for 2009, Morgan Wind would greatly appreciate, and respectfully requests, expeditious review and issuance of the Site Permit. Morgan Wind is available to answer any questions and provide other assistance to facilitate this process.

Please note that Morgan Wind is forwarding a check made out to the Department of Commerce for the filing fee to Ms. Steinhauer, along with three hardcopies of the Site Permit Application and one CD, under separate cover.

We appreciate your timely consideration in this matter. Please contact me should you have any questions regarding the Project.

Sincerely,

Jeff Wright

Enc.
cc: Ms. Suzanne Steinhauer, Energy Facility Permitting, Minnesota Department of Commerce

APPLICATION FOR A SITE PERMIT FOR A LARGE WIND ENERGY CONVERSION SYSTEM

MPUC DOCKET NO. IP6723/WS-09-360

Morgan Wind Project

Brown and Redwood Counties, MN
May, 2009

Prepared for:

Morgan Wind Acquisition Group, LLC,
12 South Sixth Street, Suite 211,
Minneapolis, MN 55402

Prepared by:

Westwood

Application to the Minnesota Public Utilities Commission Site Permit Application for a Large Wind Energy Conversion System

Morgan Wind Project

Redwood and Brown Counties, Minnesota

MPUC Docket Number: IP6723/WS-09-360

Prepared for:

Morgan Wind Acquisition Group, LLC
12 South Sixth Street, Suite 211
Minneapolis, MN 55402

Prepared by:

Westwood

Westwood Professional Services, Inc.
7699 Anagram Drive
Eden Prairie, Minnesota 55344

Project Number: 20092502

May 22, 2009

Project Name:	Morgan Wind Project	
Project Location:	Brown County:	T111N, R33W, Sections 17-20, 30-32 (Eden Township)
	Redwood County:	T111N, R34W, Sections 11,13-14, 23-26, 35-36 (Morgan Township)

Applicant: Morgan Wind Acquisition Group, LLC

Authorized Representative: Mr. Jeff Wright, President, Midwest Wind Finance, LLC, Chief Manager of Morgan Wind Acquisition Group, LLC

Signature: _____

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Preparer of Application: Mr. Joseph G. Sedarski

Signature: _____

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DEFINITIONS

AADT	Average Annual Daily Traffic
AEP	Annual Energy Production
Aggregate Surface	Road cover used for proposed access roads
ANSI	American National Standards Institute
APE	Area of Potential Effects
ASTM	American Society for Testing and Materials
BMPs	Best Management Practices; prevents soil erosion and sedimentation
BOP	Balance of Plant
Capacity	The capability of a system, circuit, or device for storing electronic charge
C-BED	Community-Based Energy Development
Class I	Cultural Resources Inventory Existing data inventory – a large-scale review and compilation of known cultural resource data
Class III	Cultural Intensive Resources Inventory field inventory – complete surface inventory of a specific area.
COD	Commercial Operation Date
Commission or PUC	Minnesota Public Utilities Commission
CON	Certificate of Need
CRP	Conservation Reserve Program
dBA	A-weighted decibel
Distribution	Relatively low-voltage lines that deliver electricity to the retail customer's home or business
DOE	United States Department of Energy
EBH	Environmental Bore Hole
Electromechanical (or EM)	Of, relating to, or being a mechanical process or device actuated or controlled electrically; especially being a transducer for converting electrical energy to mechanical energy
EMF	Electric and Magnetic Field
EPC	Engineering, procurement, and construction
EPCRA	Emergency Planning and Community Right-to-Know Act
ESA	Environmental Site Assessment
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Maps
FPPA	Farmland Protection Policy Act
ft	foot/feet
GE	General Electric
Gearbox	An assembly of parts including the speed-changing gears and the propeller shaft by which the power is transmitted from an automobile engine to a live axle; the speed-changing gears in such an assembly
Generator	A machine by which mechanical energy is changed into electrical energy

Geotechnical	A science that deals with the application of geology to engineering
Hub	The central part of a circular object (as a wheel or propeller)
Interconnection	To be or become mutually connected
kV	kilovolt
kW	kilowatt
LGIA	Large Generator Interconnection Agreement
MAPP	Mid-Continent Area Power Pool
MW	megawatt
m	meter
m/s	meters-per-second
micrositing	The process in which the wind resources, potential environmentally sensitive areas, soil conditions, and other site factors, as identified by local, state and federal agencies, are evaluated to locate wind turbines and associated facilities.
MISO	Midwest Independent Transmission System Operator
mph	miles-per-hour
Nacelle	A streamlined enclosure (as for an engine), which houses the gearbox, generator, brake, cooling system and other electrical and mechanical systems
NESC	National Electric Safety Code
NHIS	Natural Heritage Inventory System
NLCD	National Land Cover Dataset
NPDES	National Pollutant Discharge Elimination System
NRCS	National Resource Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
O&M Facility	Operations and maintenance facility
PII	Potential Impact Index
Pitch	The action or a manner of pitching; especially an up-and-down movement
POI	Point of Interconnection
PPA	Power Purchase Agreement
Project, the	Morgan Wind Project
PTC	Production Tax Credit
MCBS	Minnesota County Biological Survey
MPCU, PUC or Commission	Minnesota Public Utilities Commission
RECs	Recognized Environmental Conditions
Resistance	The opposition offered by a body or substance to the passage through it of a steady electric current
Rotor	The rotor consists of three blades mounted to a rotor hub
RD	Rotor Diameter: Diameter of the rotor from the tip of a single blade to the tip of the opposite blade

ROW	Right-of-Way
rpm	revolutions-per-minute
SCADA	Supervisory Control and Data Acquisitions (communications technology)
SHPO	Minnesota State Historic Preservation Office
Step-up Transformer	A transformer that increases voltage
Substation	A subsidiary station in which electric current is transformed
SWPPP	Storm Water Pollution Prevention Plan
TI	Turbulence Intensity – a measure of the standard deviation of wind speed over an hour, divided by the mean for the same time period
Torque	A force that produces or tends to produce rotation or torsion; also a measure of the effectiveness of such a force that consists of the product of the force and the perpendicular distance from the line of action of the force to the axis of rotation : a turning or twisting force
Transformer	An electrical device by which alternating current of one voltage is changed to another voltage
Transmission	An assembly of parts including the speed-changing gears and the propeller shaft by which the power is transmitted from an automobile engine to a live axle; the speed-changing gears in such an assembly
USACE	US Army Corps of Engineers
USFWS	US Fish and Wildlife Service
WMD	Wetland Management District
WPA	Waterfowl Protection Area
WRRS	Wildlife Response Reporting System
Yaw	To deviate erratically from a course (as when struck by a heavy sea); especially to move from side to side: to turn by angular motion about the vertical axis

1.0 INTRODUCTION

Morgan Wind Acquisition Group, LLC (Applicant, or Morgan Wind) is a Minnesota limited liability company formed for the purpose of developing the Morgan Wind project (Project), a 31-31.5 megawatt (MW) wind farm in Brown and Redwood Counties, Minnesota.

Morgan Wind is submitting this Site Permit Application (Application) to the Minnesota Public Utilities Commission (MPUC) for a site permit to construct and operate the Project. Midwest Wind Finance, LLC (Midwest Wind), a Minnesota limited liability company with offices in Minneapolis, Minnesota, currently owns a majority of Morgan Wind Acquisition Group, LLC.

Morgan Wind proposes to construct the Project in Redwood and Brown Counties in south-central Minnesota, approximately 13 miles southeast of Redwood Falls (see **Appendix A, Exhibit A-1**). The Project is located southeast of the City of Morgan and it is composed of approximately 10,880 acres (17 square miles) which is mainly agricultural land (Project Area). The permit is requested to construct a 31.5 megawatt (MW) windfarm, comprised of up to 21 turbines (depending on the turbine specifications), collection transmission lines, a project substation, connection transmission lines, a permanent meteorological tower and associated roads. No Operation and Maintenance Facility (O&M Facility) is planned for the Project. Based on the net capacity factor of the Project, expected to be 38-41 percent, the Project will generate approximately 5,111,595 to 6,433,992 kilowatt-hours annually (gross), with a net annual energy production of 4,600,436 to 5,790,593 kWh.

Morgan Wind anticipates using the Vestas V82 1.65 MW, the GE 1.5 MW sle, or equivalent wind turbines for the Project, but has not made a final selection. If the Vestas V82 is used, 19 turbines will be installed for the Project. If the GE 1.5 MW sle is used, 21 turbines will be installed for the Project. Because the turbine has not been selected, Morgan Wind proposes to permit the Project for a range in turbine sizes from 1.5 to 1.65 MW. Morgan Wind requests the right to choose turbines from a different vendor but in a similar class to the Vestas and GE, depending on turbine availability and scheduling. Morgan Wind plans to begin construction in late 2009 and commercial operation in 2010.

The Project is a Large Wind Energy Conversion System (LWECS), as defined in the Wind Siting Act, Minnesota Statutes (Minn. Stats.) § 216F.01, and a Site Permit is required for the Project under Minn. Stats. § 216F.04. A Certificate of Need is not required for the Morgan Wind Project because the Project is not a large energy facility pursuant to Minnesota Statutes § 216B.243, subd. 2 and § 216B.2421, subd. 2(1).

Morgan Wind has obtained the approval of Redwood and Brown Counties to designate the Project as a Community-Based Energy Development (C-BED) project (see **Appendix B**).

Consistent with the PUC objectives, Morgan Wind is committed to optimizing the wind resource for the Morgan Wind Project. All decisions with respect to equipment selection, site layout, and spacing are designed to make the most efficient use of land and wind resources. Morgan Wind will evaluate the site to optimize wind resources, transmission interconnection opportunities, and

economic factors, while avoiding and minimizing impacts to environmental resources. The turbine selected for the Project will be dependent on the most appropriate technology available at the time of ordering equipment prior to construction.

1.1 Project Location and Applicant Information

1.1.1 Project Location

The Project Area is located in Brown and Redwood Counties in south-central Minnesota, approximately 13 miles southeast of Redwood Falls (**Exhibit A-2**). The Project is located east of the City of Morgan and it is composed of approximately 10,880 acres (17 square miles) which is mostly agricultural land. **Table 1-1** below lists the Township, Range, and Section in which the Project is located.

Table 1-1: Project Location

County	Township Name	Township	Range	Section
Brown	Eden	111 N	33 W	17-20, 29-32
Redwood	Morgan	111 N	34 W	11,13-14, 23-26, 35-36

Morgan Wind will site the equipment and facilities within the 10,880 acre Project Area as shown in **Exhibit A-1**. This will allow some siting flexibility and will provide sufficient room for buffers that may be required for avoidance of identified infrastructure and natural resources. Morgan Wind currently has over 4,300 acres of land under easement for site control, with the possibility of gaining additional site control acreage within the Project Area, which is sufficient to support the Project.

The Project's preliminary site layout is for 31.5 MW and potential alternate turbine locations are shown in **Exhibit A-3**. Note that the preliminary site layout shows 26 turbine locations; however, at a maximum, only 21 locations will be used if Morgan Wind employs the GE 1.5 MW sle turbine for the Project. Turbine locations are subject to change during the Project preconstruction surveys and depending upon additional analysis of specific wind data and turbines' relative performance, site control, micrositing, and the turbine procurement (see discussion in Section 2.0 for additional Project site description).

Morgan Wind will prepare the final siting layout to optimize generation while minimizing the impact on land resources and potentially sensitive resources. The topography of the site and the selected turbine technology will dictate turbine spacing and layout of electric collection lines. The Project engineering and operational design is summarized in Section 3.0 and includes a description of turbine technology in Section 3.2. Section 4.0 presents a description of the environmental conditions that exist within the Project Area.

1.1.2 Applicant Information

Morgan Wind Acquisition Group, LLC (Morgan Wind), is the Applicant for this Site Permit. The majority owner of Morgan Wind is Midwest Wind Finance, LLC (Midwest Wind), which is a Minnesota limited liability company with offices in downtown Minneapolis. Midwest Wind currently has seven employees.

Midwest Wind is primarily involved in financing wind energy projects in the Midwest and nationwide, including Idaho, Hawaii and other locations. The Morgan Wind Project is the first wind energy project that Midwest Wind will develop, own and operate.

As shown on the Preliminary Site Layout Map (**Exhibit A-3**), the proposed Project Area and additional property under option for potential future development is currently under agricultural use. Morgan Wind will own, operate and maintain the Project throughout its life, which is anticipated to be at least 20-30 years. Morgan Wind plans to begin construction of the Project in late 2009 and begin commercial operation in 2010.

Midwest Wind may elect to create the Project as a Community-Based Energy Development (C-BED) project. To that end, Redwood and Brown Counties have designated the Project as C-BED (see **Appendix B**).

Morgan Wind has assembled an experienced, high-quality team to assist with development of the Project. With assistance of the team and related service providers, Midwest Wind will provide the Project financing, land control, wind rights, design, engineering, permitting, interconnection, operational control and maintenance for the Project.

The Project is in the Midwest Independent Transmission System Operator (MISO) Group 5 interconnect queue position G626. All interconnection studies have been completed, including feasibility, system impact and facility studies. A Large Generator Interconnection Agreement (LGIA) was executed on September 30, 2008 for the Project. Midwest Wind is currently negotiating a Power Purchase Agreement (PPA) with a utility off-taker for the electricity generated from the Project and expects to execute the PPA in May 2009. In the event that the Project is ultimately a C-BED project, it will add community-owned wind resources that have near-term interconnection possibilities to Redwood and Brown Counties.

1.2 Compliance with the Wind Siting Act and Minnesota Rules 7836

The Wind Siting Act (Minnesota Statutes § 216F) requires an application for a site permit for a LWECS to meet the substantive criteria set forth in Minnesota Statutes § 216E.03, subd. 7. This Application provides information necessary to comply with these criteria and Minnesota Rules Chapter 7836. The siting of an LWECS is to be made in an orderly manner compatible with environmental preservation, sustainable development, and the efficient use of resources (Minnesota Statutes § 216F.03).

The Wind Siting Rules (Minnesota Rules Chapter 7836) govern the content and treatment of application for a LWECS site permit under the Wind Siting Act. To the extent available, Morgan Wind has presented information required by the Wind Siting Rules. In addition, 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.

The Morgan Wind Project is a Large Wind Energy Conversion System (LWECS), as defined in the Wind Siting Act, Minnesota Statutes § 216F.01, and a Site Permit is required for the Morgan Wind Project under Minnesota Statutes § 216F.04.

1.2.1 Certificate of Need

A Certificate of Need (CON) is required for a large energy facility. However, a Certificate of Need is not required for the Morgan Wind Project because the Project is a 31-31.5 MW wind farm, and it is not a "large energy facility", as defined by Minnesota Statute § 216B.2421, subd. 2(1).[1]

1.2.2 State Policy

Pursuant to Minnesota Statutes § 216F.03, Morgan Wind will further state policy by siting the Project in an orderly manner compatible with environmental preservation, sustainable development, and the efficient use of resources. Morgan Wind is designing the Project to include the closest feasible spacing of turbines to maximize wind development while minimizing the impact on area land resources.

2.0 PROJECT AREA AND WIND RESOURCES

2.1 General Wind Characteristics

The wind resource across Southwestern Minnesota has been documented for more than 20 years by US. Department of Energy, Minnesota Department of Commerce, and public utility companies. Extensive wind measurements have been taken and synthesized by various parties. These data suggest that the long-term mean annual 80-m wind speeds across Brown and Redwood Counties in the area of interest for the Morgan Wind Farm range from 7 to 8 meter per second (mps) (16 to 18 mph).

[1] Under Minn. Stat. § 216B.2421, subd. 2(1), a "large energy facility" is defined as any electric power generating plant or combination of plants at a single site with a combined capacity of 50,000 kilowatts or more and transmission lines directly associated with the plant that are necessary to interconnect the plant to the transmission system.

2.2 Specific Wind Characteristics in Project Area

In October 2008, Morgan Wind engaged V-Bar, LLC (V-Bar) to conduct a wind resource assessment for the Project. V-Bar analyzed wind data collected from a 50-m meteorological tower called Sundown (or Site 0797) to better understand Project Area wind characteristics. The Sundown tower is located 7 miles (12 km) southwest of the Project Area.

The Sundown tower has nearly identical elevation, terrain characteristics and surface conditions as the Project Area, which consists mostly of rolling pasture land. V-Bar analyzed nearly 4½ years of wind data (April 2003 to August 2007) from this tower. Wind speeds are measured at 30, 40 and 50 m above ground. The composite annual mean wind speeds from this tower are summarized below in **Table 2-1**, along with extrapolations to 80-m hub height.

Table 2-1: Sundown Tower Wind Speeds

Height (m)	Site 0797 (m/s)	Shears Levels (m)	Exponent	Extrapolated to 80 m w/shear 40-50 m	Extrapolated to 80 m w/shear 30-50 m
30	6.18	30-40	0.243	-	-
40	6.63	40-50	0.125	-	-
50	6.81	30-50	0.191	7.23 m/s	7.46 m/s

Due to the similarities of the Sundown meteorological tower and the Morgan Wind Project, V-Bar has concluded that the Sundown wind characteristics are a suitable first approximation for the Morgan Project.

Ground elevations in the Project Area vary only slightly from 1,056 feet above sea level in the western portion of the Project Area to 1,001 feet in the eastern portion. An elevation map of the Project Area is shown in **Exhibit A-9**. This part of Minnesota is characterized by gently rolling to level ground moraine topography, with the exception of steep topography along the banks of the Minnesota River Valley. The Project Area lies within a geographic region that has been historically proven viable for the deployment of wind turbine generators. Based on available data from the Sundown tower site, the Project Area can be judged as having similar wind climates.

To refine knowledge about the site-specific wind regime, Morgan Wind installed one on-site 60-m meteorological tower in December 2008 and a second on-site 60-m meteorological tower in April 2009. Thus, the description of the Morgan Wind wind regime presented below is adapted from the Sundown tower data.

2.2.1 Interannual Variation

V-Bar has examined interannual variation of mean annual wind speeds at various long-term airport stations in and near southwestern Minnesota. The standard deviations of annual mean wind speeds these stations have ranged from 3-4%. V-Bar believes this is an appropriate range for the Morgan Wind farm as well.

The composite annual mean wind speed at the 50-m level of the Sundown tower for its 4+ year period of record was 6.81 mps (15 mph). This translates to 90% confidence limits of roughly 6.6-7.0 mps (15-16 mph) in evaluating the true long-term wind speed at this station.

2.2.2 Seasonal Variation

The composite monthly mean 50-m wind speeds at the Sundown tower are summarized below in **Table 2-2**. Early spring is the windiest time of year, which is consistent with the rest of southwestern Minnesota.

Table 2-2: Composite Monthly Mean Wind Speeds (mps)(Sundown Tower April 2003-August 2007)

Month	Mean Speed		Month	Mean Speed
Jan	7.2		Jul	5.4
Feb	6.9		Aug	5.1
Mar	7.3		Sep	6.6
Apr	7.6		Oct	7.0
May	8.0		Nov	7.2
Jun	6.2		Dec	7.1

Thus the windiest months (April-May) average about 15% above the annual mean, and the least windy months (July-August) average about 20% below the annual mean.

2.2.3 Diurnal Conditions

Average winds for this region of the continent are generally stronger during nighttime hours and early morning hours declining during midday during most seasons (and years). The highest average wind speed is generally greatest during the late night. The lowest wind speeds are in mid-morning.

2.2.4 Atmospheric Stability

The air in Minnesota tends to be stable at night during all seasons in lieu of active frontal passages, and is often stable during day time in the winter due to the influence of high pressure and snow cover.

2.2.5 Hub Height Turbulence

The Turbulence Intensity (TI) is defined as the measured standard deviation of wind speed over an hour, divided by the mean for the same time period. Measured values of TI for the 50-m level at the Sundown tower site are low to moderate, roughly 0.10 in the power-producing range of speeds. The 90-percentile (mean plus 1.5 standard deviation) is typically 0.12 to 0.16.

2.2.6 Extreme Wind Conditions

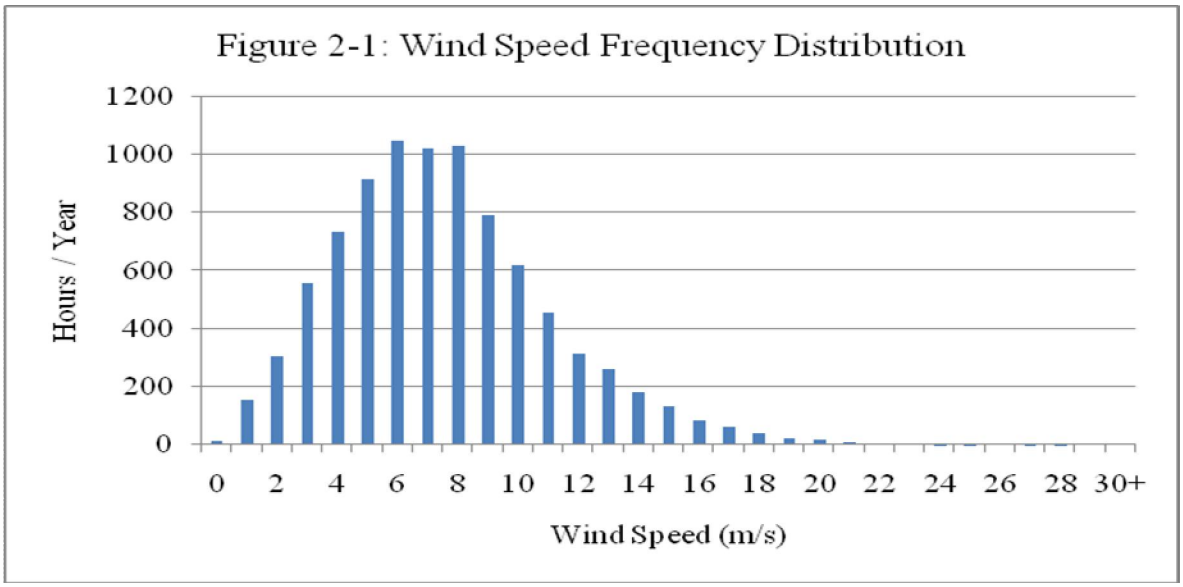
The maximum wind speed (survival speed) above which the wind turbine models being considered for the Morgan Wind Project will not operate is 59.5 mps, or 133 mph.

V-Bar has worked with more than 20 years of data across southwestern Minnesota and from many dozens of locations and V-Bar has never seen a recorded gust greater than 50 mps (112 mph). There was a tornado that stuck Buffalo Ridge in roughly 1996, which destroyed some Kenetech wind turbines, but V-Bar does not have any specific knowledge of the associated winds.

The highest gust recorded at the Sundown tower for its 4+ year period of record is 39 mps (87 mph). It is quite reasonable to conclude that extreme winds at the Morgan Wind site will be substantially below the survival speed of the wind turbines.

2.2.7 Wind Speed Frequency Distribution

The following **Figure 2-1** provides the anticipated long-term annualized wind speed frequency distribution for the Morgan Wind Project, assuming a mean annual hub-height wind speed of 7.5 mps (17 mph).



2.2.8 Wind Variation with Height

Wind speeds tend to increase with height due to reduced influence of surface frictional effects. The formula to describe this variation is as follows:

$$V_2/V_1 = (z_2/z_1)^{\alpha}$$

where V is the wind speed at height 1 or 2, z is the height above ground, and alpha is the so-called power law exponent.

The observed annual mean wind shear from 30-50 m at the Sundown tower is 0.19, which is typical for southwestern Minnesota.

2.2.9 Spatial Wind Variation

The Project site power variation is expected to be minimal due to the gradual elevation changes and consistency in ground cover (farm land, homes and some trees). V-Bar believes that there will be minimal spatial variation of long-term mean annual wind speeds across the Project site. Under the current assumption of a long-term 7.5-mps (17 mph) wind speed, it is anticipated that all turbine sites in the array plan will average within 2% of this representative value.

2.2.10 Wind Rose

A wind rose is a graphical presentation that shows the various compass points, and specifies the frequency that the wind is observed to blow from a given compass point. Small-scale variations are expected at the proposed site depending on individual turbine height and exposure. The

prevailing energy/wind direction is generally from the northwest and south-southeast, with significant wind energy from the WNW-NNW sectors. A wind rose for the Sundown tower is presented in **Exhibit A-4**.

2.3 Other Meteorological Conditions

Minnesota has a continental-type climate characterized by frequent occurrences of continental polar air throughout the year, with occasional Arctic outbreaks during winter and occasional periods of prolonged heat during the summer, especially in southern Minnesota when warm air moves in from the Gulf of Mexico and southwestern United States. Pacific Ocean air masses moving across the western United States allow for mild and dry weather conditions during all seasons. While the climate within the Project Area is fairly uniform due to relatively little topographic relief and lack of large water bodies, extreme weather events, such as tornados, high thunderstorm winds, high winds and blizzard conditions, do occur and are discussed further in this section.

Specific climatological data does not exist for the Project Area. However, data from a climate station located near Springfield, Minnesota approximately 11 miles south of the Project Area should be representative of the Project Area. A summary of temperature and precipitation from the Springfield 1 NW Minnesota climate station No. 217907 climate station is provided in **Table 2-3**.

Table 2-3: Temperature and Precipitation

Month	Temperature (^{o}F)					Precipitation (Inches)	
	Avg. Daily Max	Avg. Extreme Max	Avg. Daily Min.	Avg. Extreme Min	Avg.	Rainfall Average	Snowfall Average
Jan	22.4	26.7	3.1	-1.5	12.8	0.62	7.8
Feb	28.0	31.8	8.7	3.1	18.3	0.70	7.3
Mar	38.8	40.7	20.5	18.8	29.7	1.70	9.4
Apr	56.7	54.9	34.2	37.2	45.5	2.67	2.4
May	70.	67.8	46.4	52.7	58.7	3.42	0.0
Jun	80.3	75.0	56.8	62.5	69.6	3.81	0.0
Jul	83.7	77.5	60.4	63.6	72.1	3.71	0.0
Aug	81.1	74.8	57.7	63.1	69.4	3.37	0.0
Sept	73.2	67.9	48.0	52.9	60.6	2.69	0.0
Oct	61.1	59.7	36.8	41.1	48.9	1.82	0.5
Nov	40.2	45.7	23.3	21.6	32.6	1.36	5.6
Dec	27.6	30.1	9.9	-0.6	18.8	0.67	7.8
Annual	55.5	48.9	33.8	40.8	44.7	26.53	41.0

Sources: National Climatic Data Center website accessed February 2009 and Midwest Regional Climate Center accessed February 2009. Historical Climate Data, normals, means, and extremes from Springfield 1 NW Minnesota climate station No. 217907 (1948-2007), State Climatology Office.

Extreme weather events in the Project Area have been recorded by the National Climatic Data Center (NCDC) for the period of time from January 1950 through June 2008. Extreme weather events include tornadoes/funnel clouds, hail, thunderstorm wind, high wind, blizzards, extreme cold/low wind chill, glaze, heavy ice and snow, blowing snow, excessive heat, fog, floods, and flash floods.

NCDC records indicate the occurrence 21 tornados, 4 funnel clouds and 91 thunderstorm/high wind events were reported in Brown County, Minnesota between January 1, 1950 and October 31, 2008. The records indicate 23 tornados, 10 funnel clouds and 128 thunderstorm/high wind events were reported in Redwood County, Minnesota between January 1, 1950 and October 31, 2008. Typically, such storms are local in extent, of short duration and result in damage to relatively small geographic areas.

2.4 Wind Rights

Morgan Wind has obtained the wind rights and easements necessary to support the Project. Within the approximate 10,880 acre Project Area, Morgan Wind has land rights for approximately 4,343 acres at this time. The secured lease and easement agreements will ensure access to the Project Area for construction and operation of the Project, and prohibit landowners from any activities that might interfere with the implementation of the Project. The term of these leases is 30+ years.

Land right leases and wind easements will encompass the proposed wind farm Project and all associated facilities, including but not limited to wind and buffer easements, wind turbines, access, transmission lines located on public roads when necessary, and possibly land to mitigate environmental impacts incurred due to development.

This Project Area was chosen based upon the close proximity to available transmission infrastructure, wind resources, access roads, location of substation, and landowners' interest in supporting the Project. Land-use patterns and environmentally sensitive features were also factored into site selection. Although the Project Area encompasses approximately 10,880 acres, land area occupied by the wind farm after construction is expected to be approximately 0.23 acres per turbine site.

It is conservatively estimated that the area of direct land use for 19 of the Vestas 1.65 MW turbines and gravel access roads after construction would be approximately 8.13 acres. If the GE 1.5 MW sle turbine is selected, up to 21 turbines will be installed which will involve approximately 9 acres of direct land use. An additional 2-4 acres is anticipated to be required for the Project Substation. Based on the Project size, and if the Vestas turbines are selected for the

Project, no O&M Facility is planned. In the event that a turbine different from Vestas is selected, an O&M Facility may be needed for the Project.

3.0 ENGINEERING AND OPERATIONAL DESIGN OF PROJECT

This section provides a summary description of the Project layout and associated facilities, wind turbines and related structures, electrical system, construction, operation and maintenance, costs, schedule and decommissioning/restoration of the site.

3.1 Project Layout and Associated Facilities

The Project will consist of 19 to 21, 1.5 to1.65 MW wind turbines, transformers, collection and transmission lines, one Project substation, access roads, two temporary met towers, and one permanent met tower. No O&M Facility is planned due to the size of the Project and if the Vestas turbines are selected. The Project's preliminary site layout is for 31.5 MW and preliminary turbine locations, access roads, collection lines, transmission line interconnect and Project Substation are shown in **Exhibit A-3**, which are subject to change during the Project preconstruction surveys, design, micrositing and related activities.

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

3.2 Operational Design

3.2.1 Description of Turbines, Towers and Foundations

Analysis of wind direction data suggests that the optimal turbine string alignments are generally from southwest to northeast. Design of the turbine array and collection system will minimize energy loss due to wind turbine wakes, turbulence, and electrical line losses.

The Project will have a nameplate capacity of up to 31.5 MW. With an expected net capacity factor (NCF) of 38-41% for the Vestas V82 turbine on 80 m towers, the projected average annual output is approximately 5,111,595 to 6,433,992 kilowatt-hours per year (gross). Final output will depend on final design, selected turbine, site-specific features, and equipment.

Morgan Wind is evaluating which wind turbine it will procure for the Project. Criteria used in turbine selection include: 1) availability of turbines; 2) cost of turbines; 3) proximity of turbine manufacturer to Project footprint; and 4) turbine suitability for the Project's wind data. While final turbine selection has not been made, Morgan Wind is currently considering the Vestas V82-1.65 MW turbine and the GE 1.5 MW sle turbine. Morgan Wind may select turbines by other turbine vendors in the 1.5 to 1.65 MW range; these turbines may have slightly different hub

heights (ranging from 60-80 m (197-262 feet)) and/or rotor diameters (RDs) (ranging from 70-82 m (230-269 feet)) than the Vestas and GE models herein described.

Table 3-1 shows the characteristics of the Vestas and GE turbines. These turbines are designed for use in low temperature climates and they utilize large rotors that are designed to perform in low to medium wind conditions. These turbines are also designed with a low operating sound level for use in more populated areas.

Table 3-1: Wind Turbine Characteristics

Design Features	Vestas V82 1.65 MW Wind Turbine	GE 1.5 MW sle Wind Turbine
Nameplate Capacity	31.35 MW (19 units x 1.65 MW = 31.35 MW)	31.5 MW (21 units X 1.5 MW = 31.5 MW)
Hub Height	229.6 ft (70 m) or 262.5 ft (80 m)	262.5 ft (80 m)
Total Height (turbine tip in vertical position)	364 ft (111 m) or 396.9 (121 m)	388.8 ft (118.5 m)
Rotor Diameter	269 ft (82 m)	252.6 ft (77 m)
Design Life	20 years	Minimum of 20 years
Cut in Wind Speed	7.8 mph (3.5 m/s)	7.8 mph (3.5 m/s)
Capacity Factor	41% at 16.8 mph (7.5 m/s) at hub height	NA
Cut out Wind Speed	44.7 mph (20 m/s)-after 10 minutes 53.7 mph (24 m/s)-after 1 minute 71.6 mph (32 m/s) -after 1 second	55.9 mph (25 m/s) 60.4 mph (27 m/s) 67.1 mph (30 m/s)
Rotational Speed	14.4 rpm	10.1 to 22.2 rpm (variable)
Distance to 50 dBA Noise Level	1,080 ft (329.3 m) at a maximum based upon noise levels from an independent third party assessment.	725 ft (221 m) based on manufacturers data
Power Regulation	Computer-based control of all turbine functions with the option of remote monitoring. Output regulation and optimization via Active-Stall®.	Each turbine will be equipped with GE's patented WindVAR Control capability (active blade pitch control) and Low Voltage Ride-Thru technology (LVRT) for demanding reliability standards.
Voltage Generation	690 V per turbine	690 V per turbine
Tower	Conical tubular monopole	Multi-coated, conical tubular steel with safety ladder to the nacelle (service platform for 10 m hub height)
Nacelle bedplate	EN-GJS-400-18U-LT	Cast Iron
Main Bearings	Spherical roller bearing	Dual bearing main shaft to reduce axial and radial loads on the gearbox

Table 3-1: Wind Turbine Characteristics		
Design Features	**Vestas V82 1.65 MW Wind Turbine**	**GE 1.5 MW sle Wind Turbine**
Supervisory Control and Data Acquisition (SCADA)	As available from manufacturer	Each turbine is equipped with SCADA controller hardware, software and database storage capability.
FAA Lighting	As required by FAA	Standard FAA lighting
Foundation	Per manufacturer specifications, foundation structural engineer design, and site conditions	Per manufacturer specifications, foundation structural engineer design, and site conditions

Additional operational features of the wind turbine, such as the control panel, wind speed and direction sensors, automated SCADA system, turbine access, etc., will be evaluated and determined during design.

The towers will be conical tubular steel in accordance with manufacturer's requirements. Platforms are typically connected with a ladder or lift and a fall arresting safety system for access to the nacelle.

Foundations will be designed by a licensed foundation structural/geotechnical engineer in accordance with manufacturer's specifications based upon site soil conditions and applicable load criteria (e.g. inertia, mass and aerodynamic forces). Typical foundation design include freestanding towers connected by stud races embedded in concrete or by anchor bars embedded in the foundation with high quality grout (e.g. L-flange tower base or T-flange tower base). Geotechnical surveys, turbine tower load specifications and cost considerations will dictate final design parameters of the foundations.

3.2.2 Setbacks

The Project has been designed to ensure consistency with setbacks established in recent LWECS site permits that have been approved by the PUC and by PUC actions, such as adoption of General Permit Standards for projects under 25 MW.[2] This includes a wind access buffer of 5 RD in the prevailing wind direction and 3 RD in the non-prevailing wind direction; a noise setback meeting Minnesota Noise Standards, Minnesota Rules Chapter 7030; at least a 500 foot setback from homes; a 250 foot setback from public roads and recreational trails; and a 250 foot setback from roads and project boundaries for meteorological towers. While Redwood and Brown Counties both maintain wind energy conversion system (WECS) ordinances, they do not apply to LWECS with a nameplate capacity greater than 5 MW.

[2] See *Order Establishing General Wind Permit Standards*, Docket No. E,G-999/M-07-1102, Issue Date January 11, 2008; http://energyfacilities.puc.state.mn.us/documents/19302/PUC%20Order%20Standards%20and%20Setbacks.pdf.

3.3 Related Equipment and Facilities

3.3.1 O&M Facility

If Morgan Wind uses the Vestas turbines it will negotiate an operation and maintenance service agreement with a vendor and utilize the vendor's off-site facility for O&M needs. The agreement will provide that the vendor will store necessary O&M materials and related equipment for the Project at a nearby vendor site located off the Project Area. In that case, Morgan Wind does not plan to construct an O&M Facility for the Project.

If turbines other than the Vestas models are used for the Project, an O&M Facility may need to be constructed for the Project. In this case Morgan Wind anticipates that the O&M Facility will be located within the Project Area and most likely be located at the same site as the Project Substation (see **Exhibit A-3**). Morgan Wind has an option to acquire approximately four acres of land for the Project Substation site. Morgan Wind anticipates that the four acre site is of sufficient size to locate both the Project Substation and the O&M Facility.

3.3.2 Step-Up Transformers and Project Substation

Morgan Wind engaged an Engineering/Procurement/Construction (EPC) contractor for design and construction management of the Project. The EPC contractor is currently working on preliminary design plans for transformers and the Project Substation. Morgan Wind expects that power will be collected from each turbine and transformed to 34.5 kV via a pad mount transformer. All turbine transformers will likely be connected via an underground 34.5 kV collection system to one collector Project Substation. The power cables will be installed to a transformer located the Project Substation. Morgan Wind has identified a preliminary Project Substation site, indicated in **Exhibit A-3** and the final Project Substation site will be determined as design of the Project progresses. From the Project Substation, power will be transmitted to the point of grid interconnection (POI) described below.

Construction of the collector Project Substation and interconnection into the POI will be in accordance with MISO standards. As previously indicated, an LGIA has been executed and is in place for the Project.

3.3.3 Power Collection Lines and Interconnection

The EPC contractor is also working on preliminary electrical system design and interconnection details. Turbines will likely be interconnected by communication and power collection lines, which are planned to be placed underground, where possible. Power cables and communication lines (if a wireless system is not used for communication) from the turbine locations to the Project Substation will be buried, where possible, in trenches adjacent to Project access roads on private property under easement or under consideration for easement for this Project. At this

time, three 34.5 kV circuits that collect power from the turbines are planned to be built to the new Project Substation (see **Exhibit A-3**). The estimated total length of the collections lines is approximately 13 miles. These collection lines will be buried, where possible. If conditions exist that prevent burying them, these lines will be installed overhead on pole structures ranging in height from 25 to 40 feet in height. A new 34.5/69 kV transformer and related equipment will be installed at the new Project Substation.

The Morgan Wind Project will interconnect and deliver power into the MISO system at a specified pole location on the Xcel Energy 69 kV transmission line which runs between Morgan and Sleepy Eye (#0719). A new 69 kV overhead transmission line measuring approximately 450 feet in length may need to be constructed from the Project Substation, or a tap used, to the POI at the above location (**Exhibit A-3**). The switchgear for the Project and will be located adjacent to the interconnect transmission line. Morgan Wind currently plans to construct the Project Substation near the POI at the Xcel Energy transmission line.

3.3.4 Roads and Temporary Construction Areas

The EPC contractor is also working on preliminary design of temporary and permanent access roads, construction areas and turbine sites. Permanent service roads will be built adjacent to the towers, allowing access both during and after construction. The permanent roads will measure approximately 16 feet (4.9 m) wide and will be approximately 6 miles in length. Service roads will be designed and constructed to adequately support the size and weight of maintenance vehicles and to withstand inclement weather. Morgan Wind will site these roads in consultation with local landowners, and meet state and local requirements.

Specific turbine locations will determine the amount of roadway to be needed for the Project. To the extent possible, Morgan Wind will design and site roads to minimize the length of roads required for the Project. In general, a 50 foot (15.2 m) diameter gravel work area centered on the base of each turbine will be needed during construction. Work areas will be located to facilitate both construction (cranes) and subsequent operation and maintenance. Siting roads in areas with unstable soil will be avoided wherever possible. All roads will include appropriate drainage and culverts while still allowing for the crossing of farm equipment.

The roads will consist of graded dirt, overlaid with geotechnical fabric (if needed) and covered with gravel. To facilitate crane movement and equipment delivery, additional gravel roadway will be temporarily installed on either side of the permanent roadway. The temporary roads will be approximately 45 feet wide.

Turbine assembly areas measuring approximately 40 by 120 foot (12.2 by 36.6 m) and gravel crane pad areas extending from the access road to the turbine foundation will be graded to a minimum of one percent, and an approximate 260 to 335 foot (79.3 to 102.1 m) area for component lay down and rotor assembly centered close to the turbine foundation which will be graded to a minimum of 5 percent.

Temporary construction areas adjacent to the turbine pads, access roads and collection lines will be restored after construction is completed. The site will be graded to natural contours, soil will be loosened if needed, and the site will be seeded if needed. Access roads will be regraded, filled, and dressed as needed after construction is completed.

3.3.5 Permanent Meteorological Tower

Once the Project is constructed, Morgan Wind will install one permanent meteorological tower within the Project Area. An 80 m (262.5 ft) met tower will be constructed at a site that will be selected based upon the final locations of the wind turbines and for proper operation of wind assessment equipment for the Project. The tower will contain anemometers, a data logger connected to the anemometers, wind direction sensors, temperature probes and communication system that can be configured at various elevations, such as at 40 m, 50 m and 60 m levels. The area required to construct the permanent met tower is expected to be approximately 100 by 100 feet (30.5 by 30.5 m), with additional land required for access roads to the permanent met tower site.

3.4 Construction

The EPC contractor will also provide construction management of the Project. Other contractors may be hired for individual areas of expertise, such as civil work, electrical work, noise analysis and turbine erection. Local contractors will be engaged to assist in Project construction where possible. The construction team will be on-site to handle materials purchasing, construction, and quality control. An on-site project manager will coordinate all aspects of the work, including ongoing communication with local officials, citizens groups, and landowners.

The EPC contractor will also oversee the installation of roads, concrete foundations, towers, turbines and blades, electrical infrastructure, as well as the coordination of materials receiving, inventory, and distribution.

Permanently impacted areas are considered to be only the land that will be disturbed by the exposed portions of the turbine foundations, permanent access roads, the Project Substation site and the O&M Facility (if any). Based upon preliminary design information, approximately 18 to 20 acres of the Project Area will be permanently impacted by the Project for the above improvements.

Additional areas will be temporarily impacted during construction. Activities causing temporary disruption include the widening of access roads for equipment transport, installation of turbine foundations, installation of electrical collector and communication cables, and staging and support purposes. Disrupted soil will be reclaimed, and temporarily disturbed areas will be restored to their previous use (*e.g.*, agricultural use) upon turbine commissioning. Temporary impacts associated with the temporary roads are estimated at 14.6 acres. The collector system

will be underground. Temporary impacts from installation of the collection lines are estimated at 15.3 acres.

3.5 Operation and Maintenance

Morgan Wind plans to operate and monitor the proposed turbines remotely. Morgan Wind will negotiate a service agreement with a vendor to provide operations/monitoring and maintenance for the Project. If Vestas turbines are used, Morgan Wind will contract with Vestas to provide O&M services, and no O&M Facility will need to be built for the Project. Vestas maintains a facility within 1.3 hours of the Project which will be used by Morgan Wind for off-site O&M needs. If GE or other turbines are used, Morgan Wind will contract with a vendor associated with the selected turbine and an O&M Facility may be built for the Project.

The Project will likely include a computer-controlled communications system that permits automatic, independent operation and remote supervision, thus allowing the simultaneous control of the wind turbines. The wind turbines will be programmed to operate autonomously and will continuously communicate with a Supervisory Control and Data Acquisition (SCADA) system that monitors operation and energy production. The SCADA system monitors wind farm status and alerts operations personnel to operational conditions that require attention. Performance data and parameters for each turbine can also be viewed in real time, and machine status can be changed. The SCADA system also reports and archives generation data. Design of the SCADA system is not yet finalized.

On-site service and maintenance activities include routine inspections, regular preventive maintenance on all turbines and related facilities, and unscheduled maintenance and repair. Routine minor maintenance on the wind turbines, electrical power system, and communications system include maintenance of oil levels and filters, tightening of bolts, minor electrical repairs, upgrading of computer software, and system testing. Civil maintenance includes maintaining Project structures, access roads, drainage systems, and related facilities. The service vendor will also provide labor, services, consumables, and parts required to perform scheduled and unscheduled major maintenance on the wind farm, including repairs and replacement of parts and removal of failed parts.

The service vendor will maintain all necessary tools, instruments for routine service, repairs and Project/site operational control. Turbine maintenance will be performed in a cyclical fashion during the Project lifetime. Maintenance of transformers and transmission lines (if any) will conducted annually and will be scheduled and performed during non- or low-wind periods.

Other maintenance activities include cooperation with local governmental agencies regarding environmental concerns, including the management of lubricants, solvents, and other hazardous materials, and the implementation of appropriate security measures.

During turbine commissioning and initial commercial operation, turbines will be inspected on-site daily to ensure they are functioning properly. Following the start up period during the initial

commercial operation date, the turbines will be remotely monitored on a daily basis. Planned service and maintenance will include: 1) the first service inspection scheduled approximately two months after the turbines have been commissioned (activities include tightening bolts, greasing bearings, filtering gear oil, and other routine maintenance activities); and 2) semiannual service inspections which being six months after the first service inspection (activities include lubricating the turbine and a safety testing).

3.6 Financing and Costs

Morgan Wind is capitalized by Wind Renewable Fund, L.P., a Delaware limited partnership. Any additional development capital will be supported by financing through Wind Renewable Fund, L.P. and Midwest Wind Finance, LLC. Financing is not a risk to initiation of construction because of Midwest Wind Finance's capabilities in raising funds through lenders and investors on a global basis. The Project will ultimately be financed at or after the Commercial Operation Date (COD).

Final costs for the Project have not been confirmed and specific cost information is confidential to Morgan Wind. However, Morgan Wind is in receipt of Balance of Plant (BOP) and turbine pricing for the Project and, based upon similar projects, Morgan Wind estimates that the total ultimate capital cost of the wind farm Project to be approximately $74 million, or approximately $2,350 per installed kilowatt (kW) of nameplate capacity, depending on final interconnection costs, as well as infrastructure costs for access road construction and electrical collection systems. The bulk of Project costs are borne by the wind turbines. Capital costs include cost of development, engineering, permitting, procurement and construction.

Based upon similar projects, Morgan Wind estimates operating costs of the completed Project to range from $1.50 to $1.75 million per year. Operating costs include costs associated with operating and maintaining the Project, repairs and warranties, transmission and infrastructure maintenance, management and financing fees, land lease payments, energy production tax, insurance, royalties and electric usage costs.

Morgan Wind will be responsible for financing all pre-development, development, and construction activities. Morgan Wind anticipates financing the cost of all pre-development activities through Wind Renewable Fund, L.P. Construction will be financed through third-party investment funding and construction financing. Permanent funding will be provided by Midwest Wind Finance, LLC and third party sources of debt and equity capital. Morgan Wind will be owned by Midwest Wind Finance, LLC.

3.7 Project Schedule

Morgan Wind anticipates beginning construction of the Project in late 2009, with a goal of beginning commercial operation in late 2010. To do this, Morgan Wind has acquired land options and is in the process of obtaining necessary easements from landowners, which should be completed in the late summer or fall of 2009. Morgan Wind expects the LWECS Site Permit

to be issued within approximately six months of filing this Application. Preconstruction surveys and studies are currently underway and will continue through fall 2009. Equipment procurement will be initiated upon the issuance of the LWECS Site Permit and will continue through construction.

Morgan Wind will be responsible for undertaking environmental review and obtain all permits and approvals required for the Project and in accordance with issuance of the LWECS Site Permit. The commercial operation date is dependent on the completion of the interconnection, permitting, and other development activities. All interconnection studies have been completed, a LGIA was executed on September 30, 2008, and a PPA is being negotiated with a utility off-taker for Project electricity which is expected to be finalized in May 2009.

3.8 Energy Projections

For the wind resource assessment and energy production analysis of the Project, V-Bar used the WindPRO computer program models. The Vestas V-82 1.65 MW wind turbine with a hub height of 80 m (262.5 ft) with a 30-50 m shear and an expected long-term mean annual 80-m wind speed of roughly 16.3-17 mph (7.3-7.6 m/s) was used for the analysis of the Project Area. To reduce wake losses, a turbine spacing of four rotor diameters was applied to optimize the wind farm layout. The analysis considered a wind turbine layout consisting of 19 Vestas V-82 turbines. The annual energy production, park array efficiency, and capacity factors were calculated once a preliminary layout was determined.

The preliminary assessment indicates a gross capacity factor of 38-41% and an annual energy production (AEP) of 5,111,595 to 6,433,992 kWh, with a net annual energy production of 4,600,436 to 5,790,593 kWh.

Final energy estimates will be analyzed after the final design of the wind farm has been completed. Wind data from the two temporary met towers will be used to develop the final energy estimates.

3.9 Decommissioning and Restoration

Morgan Wind anticipates that the life of the Project will be no less than 25-30 years and it requests the right to re-apply for a LWECS Site Permit and continue operation of the Project upon expiration of the original LWECS Site Permit. The estimated decommissioning cost in current dollars is expected to be $58,000 per turbine, including associated facilities.

Morgan Wind requests the right to re-evaluate decommissioning alternatives at the end of the LWECS Site Permit term and to update decommissioning costs. Morgan Wind may decide to re-apply for a LWECS Site Permit and continue operation of the Project, depending on sale of power from the Project. Morgan Wind may also decide to retrofit, repower or replace the

turbines and power system with upgrades based on new or available technology to continue to operate the Project.

The Project decommissioning and restoration plan will be in general accordance with the requirements of Minnesota Rules 7836.0500, subp. 13, and the ordinances of Redwood and Brown Counties. Within 18 months from the time the facility ceases to operate decommissioning will be complete. Morgan Wind will be responsible for all costs to decommission the Project and associated facilities. Based on estimated costs of decommissioning and the salvage value of decommissioned equipment, the salvage value of the wind farm is expected to exceed the costs of decommissioning, but this will depend upon the prevailing rates for salvage value of the equipment and labor costs.

The salvage value of the turbines and other components should ensure that sufficient funds will be available to pay for decommissioning and restoration costs. To the extent that the salvage value does not cover decommissioning costs, and to ensure sufficient funds are available for this, Morgan Wind will review and update the estimated costs for decommissioning and restoration in 2025, or 15 years after Project commissioning. A revised cost estimate of decommissioning and salvage value will be submitted to the PUC for review and comment. Beginning in the year the Project is commissioned, Morgan Wind with either create an initial reserve fund or enter into a surety bond agreement and create an escrow account, or provide for a combination of both a reserve and surety bond, that will ultimately fund $1-1.2 million (plus earned interest) to pay for decommissioning and site restoration costs after Project operations cease, to the extent that the salvage value does not cover decommissioning costs.

Decommissioning will involve removal of all above-ground wind facilities including towers, turbine generators, transformers, overhead cables, buildings, and ancillary equipment. Foundations will be removed to a depth of 4 feet below grade. All access roads will be removed unless the affected landowner provides written notice that the road or portions of the road can remain. Additionally, any disturbed surface shall be graded, reseeded, and restored as nearly as possible to its preconstruction condition.

4.0 ENVIRONMENTAL ANALYSIS

In accordance with Minnesota Rules Chapter 7836, Morgan Wind provides the following description of the environmental conditions of the Project Area. Morgan Wind has considered exclusion and avoidance criteria in selecting the Project Area, consistent with MPUC procedures on LWECS siting criteria.

Morgan Wind sent letters to various regulatory and governmental authorities to request review of the Project Area for applicable comments and concerns. A list of the agencies who received this letter is included in **Appendix C**. Responses from agencies that responded with comments regarding the proposed Project are discussed in the following sections. A copy of agency correspondence and responses is included in **Appendix D**, as further discussed in the following sections.

4.1 Description of Environmental Setting

The Project location is entirely rural with an agricultural-based economy. Corn, wheat, oats, soybeans and hay are the predominant crops in both Redwood and Brown Counties. The Counties also produces livestock, including hogs, beef cattle, dairy cows and poultry. The landscape in the Project Area ranges is gently undulating. Elevations in the Project Area vary only slightly from 1,056 feet amsl in the western portion to 1,001 feet amsl in the eastern portion.

4.2 Demographics

4.2.1 Description of Resources

The Project is located in southwestern Minnesota in a rural/agricultural region with a population density of 8.2 people per square mile. The Project is located in portions of Brown and Redwood Counties. The 2000 census population for Brown County was 26,911 which is estimated to have constricted by 3.1% through 2007, resulting in a population of 26,073. The 2000 census population for Redwood County was 16,815, which is estimated to have constricted by 5.7% through 2007, resulting in a population of 15,851. The number of housing units in Redwood County followed the population trend and decreased by 1.6%, while the number of housing units in Brown County actually increased by 3.7%.

The largest industries employing residents in Brown County are educational services and health care, with social assistance, manufacturing, retail trade, and agriculture respectively employing 57.9% of the workforce. The largest industries employing residents in Redwood County are identical to Brown County and employ 58.1% of the workforce.

Brown County had a median household income of 38,900 in 1999 which grew 25% to 48,697 by 2007. Redwood County had a median household income of 37,352 in 1999. Due to its population size no updated economic estimates are produced for Redwood County by the Census Bureau. Generally, the per capita incomes in the townships where the Project is located are lower than the counties they are located in. Although incomes are less, the poverty levels in these townships are substantially lower than those of their respective counties. **Table 4-1** summarizes population and economic characteristics of the geographies which the Project encompasses.

Table 4-1: Population and Economic Characteristics

Location	Population	Per Capita	Population Below Poverty Line (%)
Brown County	**26,073**	**23,628**	**6.9%**
Eden Township	321	22,425	3.2%
Redwood County	**16,815**	**18,903**	**7.7%**
Morgan Township	305	15,950	0.7%

4.2.2 Impacts

A number of full time jobs in the area are expected to result from the Project due to construction and operation of the Project. One or two full time jobs are expected for operating the Project. The communities near the Project are also expected to receive substantial positive economic impacts. Short-term impacts to the areas socioeconomic resources are expected to be minor. Some land which is currently being used for agriculture will be removed from production for the length of the lease. Landowners will be compensated for this loss. Both landowners within the Project Area who receive a wind turbine on their property and those who do not will be compensated for wind rights through easements. Construction is expected to stimulate some local industries and should have no negative impacts to the local industries as a whole. There is no indication that any minority or low-income population is concentrated within the Project Area, or that the wind turbines will be placed in an area occupied by a minority group.

To the extent possible, Morgan Wind plans to use local contractors and suppliers for portions of the construction. Wages and salaries paid to contractors and workers in Brown and Redwood Counties will contribute to the overall personal income of the region. Additional personal income will be generated for residents in the counties and state by circulation and recirculation of dollars Morgan Wind pays for business expenditures and for state and local taxes. Equipment, fuel, operating supplies, and other product and service expenses will benefit businesses in the counties and the state. Landowners having a turbine or other Project facilities on their land will receive a royalty or lease payment annually for the life of the Project. Such payments should strengthen the local economy.

Construction and operation of the Project will provide long-term beneficial impacts to the counties' tax bases and it will contribute to improving the local economy in this part of Minnesota. As described in other nearby wind farm site permit applications, the development of wind energy in this area of Minnesota has been important in diversifying, supporting and strengthening the personal income and property tax base of southwestern Minnesota.[3].

In addition to creating jobs and personal income, lowering property taxes and improving infrastructure, the Project will pay an energy production tax to the local units of government of 0.12 cent per kWh of electricity produced, resulting in an annual wind energy production tax ranging from approximately $5,520 to $6,949. Indirect economic benefits include creation of new jobs in manufacturing, operations and technology.

[3] See Minnesota Public Utilities Commission, Docket Nos. IP6631/WS-07-388 (Site Permit Application for a Large Wind Energy Conversion System for the Elm Creek Wind Project in Jackson and Martin Counties, Minnesota (June 15, 2007); NSP-WGR-1-95 (NSP Phase II). See also *Assessing the Economic Development Impacts of Wind Power* (2003), Northwest Economic Associates, which analyzes the NSP Phase II/Lake Benton I Wind Project in Lincoln County, MN.

4.2.3 Mitigation

Effects to regional socioeconomics as a result of the proposed Project will be primarily positive due to an influx in wages and expenditures at local businesses during construction and an increase in the counties' tax bases from the construction and operation of the wind turbines and associated infrastructure. In addition, the lease payments paid to landowners will offset potential financial losses associated with removing land from agricultural production and wind rights. Therefore, because no impacts are anticipated, no mitigative measures are proposed.

4.3 Noise

4.3.1 Description of Resources

In Minnesota, statistical sound levels (L Level Descriptors) are used to evaluate noise levels and identify noise impacts. The L_5 is defined as the noise level exceeded 5% of the time, or for three minutes in an hour. The L_{50} is the noise level exceeded 50% of the time, or for 30 minutes in an hour. Land areas, such as picnic areas, churches, or commercial spaces, are assigned to an activity category based on the type of activities or use occurring in the area. Activity categories are then categorized based on their sensitivity to traffic noise. The Noise Area Classification (NAC) is listed in the Minnesota Pollution Control Agency (MPCA) noise regulations to distinguish the categories.

Table 4-2 identifies the established daytime and nighttime noise standards by NAC. The standards are expressed as a range of permissible dBA within a one hour period; L_{50} is the dBA that may be exceeded 50 percent of the time within an hour, while L_{10} is the dBA that may be exceeded 10 percent of the time within the hour.

Table 4-2: Noise Standards by Noise Area Classification

Noise Area Classification	Daytime		Nighttime	
	L_{50}	L_{10}	L_{50}	L_{10}
1	60	65	50	55
2	65	70	65	70
3	75	80	75	80

Because human hearing is not equally sensitive to all frequencies of sound, the most noticeable frequencies of sound are given more "weight" in most measurement schemes. The A-weighted scale corresponds to the sensitivity range for human hearing. Noise levels capable of being heard by humans are measured in dBA, which is the A-weighted sound level recorded in units of decibels.

A noise level change of 3 dBA is barely perceptible to human hearing. A 5 dBA change in noise level, however, is clearly noticeable. A 10 dBA change in noise level is perceived as a doubling

of noise loudness, while a 20 dBA change is considered a dramatic change in loudness. **Table 4-3** shows noise levels associated with common, everyday sources.

Table 4-3: Common Noise Sources and Levels	
Sound Pressure Level (dBA)	**Noise Source[a]**
140	Jet Engine (at 25 meters)
130	Jet Aircraft (at 100 meters)
120	Rock and Roll Concert
110	Pneumatic Chipper
100	Jointer/Planer
90	Chainsaw
80	Heavy Truck Traffic
70	Business Office
60	Conversational Speech
50	Library
40	Bedroom
30	Secluded Woods
20	Whisper

[a]Source: Minnesota Pollution Control Agency (1999)

Nighttime noise levels are low to mid-30 dBA within the Project Area, which area typical of those in such rural settings. The dBA scale is A-weighted decibels based on the range of human hearing. Low to mid-30 dBA are relatively low background levels and higher levels may exist near roads, farmsteads and other areas of human activity. Wind conditions in the Project Area tend to increase ambient noise levels compared to other rural areas.

4.3.2 Impacts

Operation and maintenance of the Project wind turbines and associated facilities will create increased noise levels. The sound level varies with the speed of the turbine, the distance of the receptor from the turbine, and surface characteristics of the site. The turbine speed, in turn, depends on the weather conditions. Generally, on more windy days turbines can create more sound. However, increases in noise levels within the Project Area are expected to be minimal due to the noise levels produced by the wind itself, especially at the setback distances required to meet the minimum 500 foot setback from homes and the noise setbacks in the Minnesota Noise Standards under Minnesota Rules Chapter 7030.

At the Project substation, the source for noise is primarily the transformers, which can create a humming noise. The nearest occupied home to the proposed Project substation is located approximately 1,800 feet away from the proposed Project substation site. It would be unlikely that substation noise would be audible at this farmstead/home, especially given the proximity of each to State Highway 68.

4.3.3 Mitigation

Morgan Wind is taking into account in the design, siting and construction of the proposed wind farm Project possible noise impacts to nearby rural residences/farmsteads and other potentially affected parties. The Vestas V82 1.65 MW and the GE 1.5 MW sle wind turbines are being considered for the Project. The calculated noise setback is based on the highest noise level of the wind turbines under consideration for the Project.

Morgan Wind calculated the sound power level (Lp) information provided by the manufacturers of the Vestas V82 wind turbine, GE 1.5 MW sle wind turbine, and third party noise assessments when available to assess representative noise levels for the Project (see **Table 3-1**). Morgan Wind confirmed the presence of inhabited residences and farmsteads during field reviews of the Project Area. Morgan Wind then calculated the distance to the 50 dBA sound level to meet State noise requirements to arrive at the setback shown in **Exhibit A-3**.

According to manufacturer's data, the maximum noise level for the Vestas V82 1.65 MW turbine is approximately 103.3 dBA. According to third party noise assessments of the Vestas V82, the maximum noise level is 109.9 dBA According to manufacturer's data the maximum noise level for the GE 1.5 MW sle, including the uncertainty band, is $\leq$ 106 dBA. No third party assessment of the GE model is available for review.

As described in Sections 3.2.1 and 3.2.2, and based on the following evaluation, Morgan Wind has incorporated setbacks of at least 1,200 feet (365 m) from inhabited residences and 250 feet (76 m) from public roads in the preliminary site layout shown in **Exhibit A-3**. Morgan Wind will maintain an appropriate setback from inhabited residence to stay below the MPCA Nighttime Noise Limit of 50 dBA. The 1,200 feet (365 m) noise setback is based upon the calculated distance to the 50 dBA noise level for the highest noise output associated with the wind turbines being considered (see below), plus another 129 feet (39 m) as a safety factor to account for GIS-based mapping accuracy. As shown in **Exhibit A-3**, no residences are located within the calculated 50 dBA setback area. This analysis indicates that the preliminary turbine locations meet the requirements for the State noise setback of 50 dBA for the turbines being considered for the Project.

Morgan Wind will further analyze the noise footprint of the Project of the proposed Vestas V82 and GE 1.5 MW sle wind turbines using average wind speeds within the Project Area and WindPRO version 2.6.1.252 module Decibel for Noise Impact Calculation.

Morgan Wind is in the process of analyzing background noise levels within the Project Area and in the later stages of the Project anticipates contracting a noise expert to assess the impact of the wind farm on the area. With this information, Morgan Wind may conduct noise testing or modeling to evaluate various wind turbine scenarios for the planned Project to determine possible noise impacts and address required noise setbacks.

In accordance with the standards established in other LWECS site permits issued by the PUC, Morgan Wind will use at least a 5 RD setback from the boundaries of leased areas within the

Project Area perimeter along the north-south axis (downwind spacing) and a 3 RD setback on the east-west axis (crosswind spacing). A 250 foot setback from all public roads will be employed. If the sound characteristics of the selected turbine are different from those discussed in the Application, Morgan Wind will address setbacks to ensure compliance with MPCA noise standards.

4.4 Visual Impacts

4.4.1 Description of Resources

The topography of the Project Area is relatively flat and is interrupted only by a small number of county judicial ditches which drain the Project Area. The typical visual landscape within the Project Area consists of agricultural fields, farmsteads with trees planted as windbreaks, and active or fallow fields (see **Exhibit A-5**).

The majority of landscape within the Project Area can be classified as agricultural and rural open space. Within the Project Area local vegetation is predominantly agricultural crops, including corn, soybeans, small grains, and forage crops, which visually create a low uniform cover. Little or no pasture ground was observed though commercial scale livestock confinements are scattered across the Project Area. It was noted that these were primarily turkey rearing facilities though some may contain hogs. A mix of deciduous and coniferous trees planted for windbreaks typically surrounds farmsteads which were established to prevent wind erosion and shelter dwellings. Occasional patches of native willows and wetland grasses surround the ditches

Aside from the local vegetation the main focal points present in the agricultural landscape are the farm residences and buildings. Of the structures present a portion date back to the 19th and early 20th centuries and area representative of that era of Minnesota farm architecture. Other major focal points within the Project Area, though not visible from afar, are the judicial ditches which are generally large, some up to 10 feet wide with 10-15 foot side embankments.

A recently installed temporary Project met tower exists just north of the Project Area and has slightly altered the landscape from being strictly agricultural. The tower was installed in December 2008 and it is located in section 19 of Eden Township near the intersection of Terrance Avenue (the county line) and County Highway 30 (see **Exhibit A-3**). The base elevation of the met tower is 1,230 feet, which is approximately 26 feet lower than the highest point found within the Project Area. The tower has a height of 198 feet (60 m) and it is visually apparent throughout the Project Area except for areas containing trees, buildings etc. A second Project temporary met tower was installed within the Project Area on April 20, 2009 (see **Exhibit A-3**). This met tower is also 198 feet (60 m) in height.

In addition to the above met towers, 51 other towers exist within 10 miles of the Project Area, which includes microwave, FM, and FAA “obstacles”. It is possible that because these data were sourced from agencies that do not coordinate data some records may overlap. To date,

southwestern Minnesota in general has seen the majority of wind farm development relative to other parts of the state. Of the local area counties, Lincoln, Pipestone, Lyon and Murray rank 1st through 4th respectively in a state which ranks 4th nationally for existing wind power capacity. The presence and visual effect of towers and turbines have existed in the general vicinity of the Project Area for many years.

4.4.2 Impacts

The visual effect of the Project will depend largely upon perceptions of observers. The visual contrast added by wind farms may be perceived as a visual disruption or as points of visual interest with their own aesthetic quality and appeal. Post-construction operation of the wind farm will not generate much traffic or significantly increase day-to-day human activity in the area. The Project Area will therefore retain its rural sense and remote character. The proposed Project would not involve any ongoing industrial use of non-renewable resources or emissions into the environment.

Wind farms may appear industrial to some. However, the turbines function to "farm" the wind for energy. While existing wind farms are located in the adjacent counties to the Project Area, because the existing wind farms are not located in the immediate vicinity of the Project, the proposed Project should not cumulatively contribute to the visual effect of the existing wind farms. Additionally, the location of the proposed Project relative to the existing wind farms will limit the extent to which the proposed Project is viewed as a disruption to the area's scenic integrity.

The presence of turbines within the viewshed of natural areas may also affect the aesthetic quality of those areas being used by persons. It can be argued that seeing turbines from a natural area may detract from that experience. However, the same is true of other human habitation or commercial structures in the Project Area, and the presence of turbines may be less intrusive than these human activities. No WMAs, or other protected natural areas, exist within the Project Area though it is possible that the proposed turbines could be visible from such nearby locations.

4.4.3 Mitigation

Morgan Wind will work to avoid or minimize, to the extent possible, visual impacts into the final design and siting of the Project. Morgan Wind will work with landowners to identify concerns related to Project aesthetics and to address visual impacts. Morgan Wind proposes the following mitigative measures:

- Turbines will be uniform in color;
- Turbines will not be located in biologically sensitive areas such as public parks, WMAs, SNAs, WPAs, or wetlands;

- Turbines will be illuminated to meet the minimum FAA requirements for obstruction lighting of wind turbine farms (e.g. reduce number of lights on turbines and synchronized red strobe lights);
- Collector lines will be buried to minimize aboveground structures within the turbine array;
- Existing roads will be used for construction and maintenance where possible to minimize the amount of new roads constructed;
- Access roads created for the wind farm facility will be located on gentle grades to minimize erosion, visible cuts and fills; and
- Temporarily disturbed areas will be converted back to cropland or otherwise reseeded to blend in with existing vegetation.

4.5 Public Services and Infrastructure

4.5.1 Description of Resources

Local Services

The Project is located in a lightly populated, rural/farming area in south central Minnesota. Public services to farmsteads and rural residences within the Project Area include transportation/roadways and electric. The closest city to the Project Area is the City of Morgan (City) bordering the western boundary of the Project Area (**Exhibit A-2**). The City provides sanitary sewer, water, natural gas and communication services to its residents. Additionally, the City's emergency services include a full time police department and a volunteer fire department and ambulance service.

Electrical Service

There are currently two utility transmission lines within the Project Area. A Great River Energy (GRE) 69 kV transmission line runs along and crosses the northern boundary of the Project Area. An Xcel Energy (Xcel) 69 kV transmission line bisects the Project Area along Minnesota Highway 68, then turns north along the western Project Boundary. Two substations associated with the GRE and Xcel transmission lines are located adjacent to and outside of the western and northeastern Project Area. The alignment of both transmission lines and substations are indicated by **Exhibit A-3**.

Water Supply

Townships within the Project Area have limited public infrastructure services. Homes and farmsteads typically utilize on-site water wells and septic systems for individual household and farming needs as verified by the county well index (CWI). If an O&M Facility is constructed for the Project, an on-site water supply well would be installed near the O&M Facility.

Roads

Existing roadway infrastructure in and around the Project Area consists of county and township roads that generally follow section lines, in addition to private unpaved farmstead driveways and farming access roads. Various County State Aid Highways (CSAHs), County Roads (CRs), township roads and a State Trunk Highway (STH) provide access to the Project Area. The State Trunk, County State Aid Highways, and County Roads are two-lane paved roads. The remaining roads within the Project Area are two-lane gravel roads. The topography of the area allow for the creation of a road network providing good access to most locations within the Project Area. This is a strength to this specific Project location as impacts such as new roads having to be built will be held to a minimum so existing uses, namely agriculture, can continue unaltered (**Exhibits A-2** and **A-3**).

There are no federal roads within the Project Area. There are a number of CSAHs within the Project Area. There is one, paved asphalt CSAH (CSAH 3) located in Redwood County, which changes to CSAH 30 in Brown County. The remaining roads are dirt and gravel. There are also some unmaintained section line roads within the Project Area.

Traffic

The existing traffic volumes on the area's county roads and highways are documented in **Table 4-4** and **Exhibit A-7**. Minnesota State Highway 68 has the highest Annual Average Daily Traffic (AADT) count at 2200 vehicles per day. For purposes of comparison, the functional capacity of a two-lane paved rural highway is in excess of 5,000 vehicles per day. Except for Minnesota State Highway 68, the highest existing AADT in or near the Project area is 660 vehicles per day on Redwood CSAH 3. Redwood CSAH 3 runs through the city of Morgan and bisects the central portion of the Project Area east to west, turning into CSAH 30 in Brown County. Brown CSAH 7 bisects the central portion of the Project Area running north and south and has a maximum AADT of 100 in the Project Area.

Table 4-4: Existing Daily Traffic Levels

Roadway Segment Description		Existing Annual Average Daily Traffic (AADT)
Minnesota State Highway	Minnesota State Highway 68 (Bisecting southern portion of Project Area)	2200
Redwood County	CSAH 3 from Morgan east into Brown County	660
Brown County	CSAH 7 North from Evan	100

Sources: MnDOT 2008/2005 Traffic Volume General Highway Map Brown County/2007 Traffic Volume General Highway Map, Redwood County. MnDOT 2008 (http://www.dot.state.mn.us/traffic/data/maps/thcountymapdex.html)

Telephone, Microwave, and Other Communication Reception

Existing communication towers are discussed in Section 4.4.1. Telephone service is provided by Qwest and other local telephone companies to farmsteads, rural residences and businesses in the area. Morgan Wind will retain a qualified party to complete a microwave search and interference study on existing non-Federal Government microwave telecommunication systems, including digital television broadcast systems. Morgan Wind will provide the PUC a copy of the results and assessment when is it available.

4.5.2 Impacts

The Project is anticipated to have minimal effect on the existing services and infrastructure of the area. Morgan Wind will design the Project in accordance with the results of the telecommunication study to avoid impacts to the existing communication infrastructure and other existing infrastructure. The following is a brief description of the impacts that are possible during the construction and operation of the Project.

Local Services

Possible impacts to the local services include coming into contact with pipelines which transport gas products during construction activities.

Electrical Service

Impacts to the electrical service could be possible when the Project's electrical system is connected into the existing transmission infrastructure. Additionally, construction equipment coming in contact with the transmission lines could result in an impact. Outcomes would include the loss of electricity to the areas being serviced by this transmission line and possible high voltage lines being displaced onto roadways.

Water Supply

Construction and operation of the proposed Project will not affect the water supply. No installation or abandonment of water supply wells is anticipated for the Project. However, if any water supply wells are installed or abandoned, it will be accomplished in accordance with applicable law and requirements of the Minnesota Department of Health (MDH).

It is not anticipated that the Project will require the appropriation of surface water or permanent dewatering. Temporary dewatering may be required during construction for specific turbine foundations and/or electrical trenches. Water use during construction may occur to provide dust control and water for concrete mixes and other construction purposes.

Roads

Equipment and materials used in the erection of wind farms can be extremely heavy. Possible weight related impacts to roads include physical damage to the structure of the road itself and/or damage to culverts and bridges.

On February 12, 2009 Morgan Wind sent letters to the Minnesota Department of Transportation (MnDOT) and both the Brown and Redwood County Highway Departments for comments on the Project. On February 27, 2009 the Brown County Highway Department (BCHD) indicated it had no major concerns with the Project. However, BCHD indicated the Project will require driveway permit(s), construction of driveways must follow county standards, over size permits will be needed from Brown County, construction of structures and substations must follow county setback requirements, and more maintenance of roads will likely be required. BCHD also indicated that over weight permits will not be allowed during spring load restrictions.

On March 12, 2009 MnDOT District 7 (Mankato and Windom) provided comments regarding the Project. MnDOT indicated a District permit will be needed if work is to be done in the state right of way, including roads and driveways (including temporary radii extensions), utilities, etc. An Oversize Permit will be needed for over dimension vehicles travelling on state highways. MnDOT also provided additional guidance concerning transmission line projects, for information should this be required.

At this time no correspondence has been received from the Redwood County Highway Department. Morgan Wind will work with all parties involved to address any concerns, and adhere to any requirements they may have in relation to their transportation infrastructure.

Temporary and permanent gravel access roads will be constructed for the Project. Temporary roads will be approximately 35-40 feet wide to accommodate delivery of the turbines, towers, and related equipment and supplies, and to provide access to cranes required for construction of the wind tower generators. The final length of new roads is dependent on the size of turbine selected, turbine layout and final design which are still in process. Permanent access roads will also be used during operation of the Project by operation and maintenance crews for gaining access to inspect and service the wind turbines. In general, the access roads will be located between the towers. Permanent roads will be approximately 16 feet wide and low profile to allow cross-travel by farm equipment.

Traffic

Possible impacts to traffic would take place during the construction phase of the Project which can take months. Construction traffic will use the existing road systems for access to the Project Area.

Letters requesting comments on the possible traffic impacts to the local roads have been sent to the City of Morgan, Eden and Prairieville Townships (Brown County), Morgan and Brookville Townships (Redwood County), Brown County and Redwood County. At this time no correspondence has been received from any of the parties in which contact was attempted.

Telephone, Microwave, and Other Communication Reception

Construction of the Project components could sever existing telecommunications infrastructure. Morgan Wind will conduct telecommunication studies to determine where infrastructure may exist so it can be avoided. Construction and operation of the proposed wind farm is intended to not impact the telephone service to the Project Area. Therefore, no detrimental impacts to radio and television reception are anticipated.

4.5.3 Mitigation

Construction and operation of the Project will be in accordance with all associated federal, state, and local permits and laws, as well as industry construction and operation standards. The Project is anticipated to have minor effects on the existing infrastructure during Project construction and operation. Therefore, extensive mitigation measures are not proposed.

Local Services

Based upon data from the National Pipeline Mapping System, produced by the Pipeline and Hazardous Materials Safety Administration and MnDOT's General Highway Map Series no pipelines are located in the Project Area. Thus no impacts are expected to local services.

Morgan Wind will contact Gopher One Call prior to site design. If any pipelines, pipeline easements, or any other obstructions are reported Morgan Wind will design the Project to avoid impacts within the Project Area. If impacts cannot be avoided to any pipelines, Morgan Wind will contact the respective owner prior to construction and coordinate appropriate permitting and approvals prior to construction.

With the addition of substation and transmission capacity, no impact to local services is anticipated and no mitigation is proposed. No impacts are anticipated to any natural gas pipelines. Therefore, no mitigative measures are proposed.

Electrical Service

Morgan Wind will hire experienced professionally certified contractors for all phases of construction to guarantee that no impacts occur. No disruption of power to residences or local businesses is anticipated to occur as a result of construction or operation of the proposed Project.

The Project will require station service from the local electric provider when the wind project is not generating electricity. Morgan Wind will purchase station service from a local electrical utility. Morgan Wind will follow required configurations for the electrical system to prevent impacts to the existing transmission system. No additional mitigation is proposed.

Water Supply

In the event that water supply wells are abandoned or installed, or EBHs are installed, Morgan Wind will do so in accordance with applicable Minnesota law and MDH requirements. If

temporary dewatering is required during construction activities, discharge of dewatering fluid will be conducted under the requirements of the National Pollutant Discharge Elimination System (NPDES) permit and Storm Water Pollution Prevention Plan (SWPPP).

Roads

Prior to construction Morgan Wind will coordinate with all necessary local and state entities to ensure that the weights being introduced to area roads are acceptable. Morgan Wind will work with the City of Morgan, Eden and Prairieville Townships (Brown County), Morgan and Brookville Townships (Redwood County), Brown County, Redwood County and MnDOT regarding roadway concerns, right-of-way work (if any), and setbacks during construction of the Project. Morgan Wind will also work closely with the landowners in the placement of access roads to minimize land-use disruptions during construction and operation of the Project to the extent possible.

Traffic

Current traffic levels on the affected roadways in the Project Area are well below roadway capacities and construction traffic will be perceptible but similar to seasonal variations in traffic, such as autumn harvest. Minnesota State Highway 68 will likely be used for delivery of the tower components, turbines and related construction materials. However, the timing of such deliveries will be managed to avoid significant impacts to traffic on State Highway 68.

Morgan Wind will work with City of Morgan, Eden and Prairieville Townships (Brown County), Morgan and Brookville Townships (Redwood County), Brown County and Redwood County and MnDOT regarding traffic, access, and permitting oversize loads during construction of the Project. Therefore, construction activities are not expected to affect traffic levels. Operation and maintenance activities will also not noticeably increase traffic within the Project Area.

Telephone, Microwave, and Other Communication Reception

Morgan Wind will conduct telecommunication studies prior to construction, including possible impacts on digital television reception. Once the studies are completed the turbine layout will be altered, if necessary, to avoid interference with any microwave paths found in the Project Area. Construction and operation of the proposed wind farm is intended to not impact the telephone service to the Project Area. Therefore, no detrimental impacts to radio and television reception are anticipated.

At this time, no impacts are anticipated to microwave or television and, therefore, no mitigative measures are proposed. Should the telecommunications study identify areas of potential impact from the proposed Project, Morgan Wind will initially attempt to relocate planned structures to locations which avoid such areas. In the event that relocation is not possible, Morgan Wind will contact the owner of the affected facility and work with it to mitigate, permit, design, and construct planned structures to minimize potential interference.

Prior to construction, Gopher One Call will be contacted to locate underground facilities so they can be avoided. To the extent Project facilities cross or otherwise affect existing telephone lines or equipment, Morgan Wind will make arrangements with applicable service providers to avoid interference with such facilities. Morgan Wind will not operate the wind farm so as to cause microwave, radio, telephone, television or navigation interference contrary to FCC regulations or other applicable law. If operation of the Project causes such interference, Morgan Wind will take the steps necessary to correct the problem.

4.6 Cultural and Archaeological Resources

4.6.1 Description of Resources

The proposed Project Area is located within the Prairie Lakes South Archaeological Region (2s) (Anfinson 1990). The Prairie Lakes South Region is located in southwestern Minnesota and includes Brown, Cottonwood, Jackson, Lac Qui Parle, Lyon, Martin, Redwood, Watonwan and Yellow Medicine counties and portions of Blue Earth, Faribault, Lincoln, Murray, Nobles and Pipestone Counties. The Prairie Lakes South Archaeological Region encompasses all of the defined Project Area.

Topography is typified by ground moraine swell and swale terrain. Habitation sites in this region are commonly located near wooded areas and on major river terrace systems. Resource procurement sites may be located anywhere in the region and would be dependent on which resource was being sought.

In winter 2009, Morgan Wind conducted a review of records at the Minnesota State Historic Preservation Office (SHPO) and Office of the State Archaeologist (OSA) for the Project Area and industry standard one mile buffer around the Project Area. The background literature search identified fourteen historic architectural properties located within one mile of the proposed Project Area (see **Exhibit A-10**), all. A summary of the identified historic architectural properties is provided in the following **Table 4-5**.

No previously recorded archaeological sites were located within the project area or one-mile buffer. The lack of recorded archaeological sites may be due to the lack of formal investigations conducted in the area.

Fourteen historic structures were identified during the records search. All fourteen of the properties are located within the corporate boundaries of the town of Morgan, located on the western edge of the project area. Only five of the historic structures are located within the five mile buffer. Because the project buffer bisects the town of Morgan, all historic structures within the corporate boundaries of the town were included in this previously recorded cultural resources review. The concentration of inventoried historic strictures within the town of Morgan is the result of a single survey conducted in 1978. Thirteen of the fourteen structures listed were recorded as the result of that survey. The Morgan Water Tower (RW-MOC-014) was added to

the inventory in 1990. The paucity of inventoried historic structures in the project area external to the town of Morgan region is likely due to limited investigation of the area. None of the recorded structures have been evaluated for eligibility to be listed on the National Register of Historic Places (NHRP).

Table 4-5: Previously Inventoried Historic Structures

Site Number	Description	Location	NRHP Status	Project/ Buffer
RW-MOC-001	Eagle Rover Mill Elevator	T111, R34, S16	Unevaluated	
RW-MOC-002	German Methodist Episcopal	T111, R34, S16	Unevaluated	
RW-MOC-003	Axel Hanson House	T111, R34, S15	Unevaluated	Buffer
RW-MOC-004	Koehne Garage	T111, R34, S15	Unevaluated	Buffer
RW-MOC-005	Morgan Farmers' Elevator	T111, R34, S16	Unevaluated	
RW-MOC-006	Nels Jensen Store	T111, R34, S16	Unevaluated	
RW-MOC-007	Service Station	T111, R34, S16	Unevaluated	
RW-MOC-008	State Bank of Morgan	T111, R34, S16	Unevaluated	
RW-MOC-009	Morgan Public School	T111, R34, S16	Unevaluated	Buffer
RW-MOC-010	Chicago & Northwestern Railroad Depot (moved)	T111, R34, S16	Unevaluated	
RW-MOC-011	Morgan Milling Company	T111, R34, S15	Unevaluated	Buffer
RW-MOC-012	Morgan Co-op Creamery	T111, R34, S16	Unevaluated	
RW-MOC-013	Morgan Community Building	T111, R34, S15	Unevaluated	Buffer
RW-MOC-014	Morgan Water Tower	T111, R34, S16	Unevaluated	

(Key: Site Number = reference number for recorded property; Description = name of historic structure or description of type of structure; Location = amended legal description of recorded property; NRHP Status = status of structure as either "Listed" on the NRHP or as of yet "Unevaluated"; Project/Buffer = relative location of recorded structure, "P" in project area, "B" in one-mile buffer.)

4.6.2 Impacts

Construction of the Project components could impact cultural or architectural resources that may be located within the Project Area via excavation, trenching or other land disturbing activities required for the Project. On February 11, 2009, Westwood, on behalf of Morgan Wind, sent the Minnesota SHPO a letter informing it of the Project requesting comments. On March 12, 2009 SHPO provided comments on the Project and recommended that an archeological survey be completed for the Project (**Exhibit D**).

While Morgan Wind will attempt to avoid archeological sites, the proposed construction activities for the Project have the potential to impact such sites or to add to the visual impacts in

the region of the Project Area. In the event that an impact would occur, Morgan Wind would determine the nature of the impact and consult with the SHPO on whether or not the resource was eligible for listing in the National Register of Historic Places (NRHP).

4.6.3 Mitigation

As requested by SHPO, Morgan Wind will conduct an archeological study of the area prior to construction in accordance with the methodology described in **Exhibit E**. Morgan Wind will attempt to avoid impacts to identified archeological and historic resources to the extent possible. If archaeological sites are found during archaeological investigations or during construction, the integrity such sites and significance would be addressed in terms of the site's potential eligibility to the NRHP. If such sites are found to be eligible for the NRHP, appropriate mitigative measures will need to be developed in consultation with Minnesota SHPO, the State Archaeologist, and consulting American Indian communities. While avoidance would be a preferred action, mitigation for Project-related impacts on NRHP-eligible archaeological and historic resources may include resource or additional documentation through data recovery.

Mitigation for Project-related impacts on NRHP-eligible archaeological resources may include adjustment of the array during the micrositing phase of the Project if necessary to minimize impacts on a resource and/or additional documentation through data recovery. Should previously unknown archaeological resources or human remains be inadvertently encountered during Project construction and/or operation, the discoveries will be reported to the SHPO. With regard to a discovery of human remains, procedures would be followed to ensure that the appropriate authorities would become involved quickly and in accordance with local and state guidelines

4.7 Recreational Resources

4.7.1 Description of Resources

Information from the U.S. Fish & Wildlife Service (USFWS), Minnesota Department of Natural Resources (DNR), and Brown and Redwood Counties were reviewed to identify any recreational resources within and near the Project Area. Significant recreational resources identified within Brown and Redwood Counties include the Minnesota River Valley, Fort Ridgeley State Park, multiple DNR Scientific and Natural Areas (SNAs) and Wildlife Management Areas (WMAs), and recreational trails.

There are no DNR Wildlife Management Areas (WMAs), Scientific and Natural Areas (SNAs), USFWS Waterfowl Production Areas (WPAs), State Parks, or State Forests within the Project Area. There are few natural lakes within Brown and Redwood Counties, but numerous drainages, creeks and rivers. The Minnesota River, located north of the Project Area, is an important recreational destination for boaters, fisherman, and wildlife enthusiasts.

The DNR's Recreational Compass Website indicates limited recreational opportunities near the Project Area (MnDNR 2009). The nearest state lands appear to be Cedar Mountain WMA and Cedar Mountain SNA, both located along the Minnesota River, approximately 5 miles north of the Project Area. Additional recreational opportunities are located at Fort Ridgley State Park and Minnriver WMA, both located approximately 6 miles northeast of the Project Area. The nearest DNR Public Water is Lone Tree Lake, approximately ¾ of a mile northeast of the Project Area. Lone Tree Lake does not have a Public Access to it. The nearest Public Access areas are canoe landings along the Minnesota River north of the Project Area.

Fort Ridgley State Park offers a variety of recreational opportunities near the Project Area. The park offers camping and lodging facilities, picnicking, a nine hole golf course, trails and a historic site. Nearby WMAs and SNAs offer low impact recreation opportunities such as hunting, fishing, hiking and bird watching. The Brown County Park system consists of one year round park with campground, three day use parks and four maintained canoe accesses to the Cottonwood River. None of the four County parks or four river accesses are within 5 miles of the Project Area. Redwood County owns one public park, Plum Creek County Park; this park is located more than five miles from the Project Area.

According to the Minnesota Department of Natural Resources website Minnesota offers over 20,000 miles of groomed snowmobile trails, and 18,000 miles are maintained by local snowmobile club volunteers (MnDNR 2008). State trail 193 runs between Morgan and Evan along State Highway 68, bisecting the southwestern portion of the Project Area as shown on **Exhibit A-6**. There are no public off-highway vehicle (OHV) trails or facilities located within the Project Area or either of the Counties

4.7.2 Impacts

The Project will be designed in a way that will avoid any and all direct impacts to recreational resources within the Project Area. The only potential impacts could be access road crossings of the Grant-in-Aid snowmobile trail along State Highway 68. This would result in additional crossings of the snowmobile trail but would in no way impede snowmobile traffic. This is extremely unlikely to occur, because access roads from State Highway 68 will be avoided whenever possible as indicated in **Exhibit A-3**. No scenic vistas along the Minnesota River Valley are expected to be impacted, the top of bluff along most of the river in this area is treed and looking down into the Minnesota River Valley, the turbines will not be visible.

No impacts to tourism and community benefits are anticipated. Renewable energy production has become very important to the U.S. economy. As a result, interest in wind farms has increased. Wind farms are becoming an important tourism attraction and the addition of this Project to the community is expected to increase the draw of travelers to this area rather than deter visitors and tourism.

4.7.3 Mitigation

Encroachments by the Project into SNAs, county and state parks, and recreational trails are not planned or expected. Therefore, mitigation measures are not proposed.

4.8 Human Health and Safety

4.8.1 Description of Resources

Air Traffic

There are no registered airports located within 10 miles of the Project Area. A review of the AirNav, LLC (AirNav 2009) database revealed the nearest registered airports within 15 miles are as listed in **Table 4-6**.

Table 4-6: Nearby Airports

Airport ID	Airport Location	Airport Name	Distance from Project
RWF	REDWOOD FALLS, MN	REDWOOD FALLS MUNICIPAL AIRPORT	10.3 nm NW
D42	SPRINGFIELD, MN	SPRINGFIELD MUNICIPAL AIRPORT	11.6 nm SSW
Y58	SLEEPY EYE, MN	SLEEPY EYE MUNICIPAL AIRPORT	13.4 nm SE

In addition to the registered airports, one unregistered private airstrip within the Project Area and one unregistered private airstrip just south of the Project Area were observed during the field review of the Project Area completed by Morgan Wind.

Electromagnetic Fields

Possible health effects associated with wind turbines and transmission of electricity generally include Electric and Magnetic fields (EMF) and noise. Noise was previously discussed in Section 4.3.

Electric and Magnetic Fields (EMF) are the electric and magnetic fields that are coupled together, such as in high frequency radiating fields. The term EMF refers to electric and magnetic fields that are present around electrical devices. Electric fields arise from the voltage or electrical charges and magnetic fields arise from the flow of electricity or current that travels along transmission lines, power collection (feeder) lines, substation transformers, house wiring, and electrical appliances. The intensity of the electric field is related to the voltage of the line and the intensity of the magnetic field is related to the current flow through the conductors (transmission line wire). Once energized, the proposed facility will generate electromagnetic fields.

Security

Redwood and Brown Counties, in addition to the local entities, maintain procedures and infrastructure to aid in protecting the public and mitigating damage in the event of an emergency.

The proposed wind farm Project Area is also located in an area that has a relatively low population density. According to the 2000 U.S. Census (US Census Bureau 2000), there were 26,911 people residing in Brown County and 16,815 people residing in Redwood County. Approximately 72 % of the population of Brown County lives in the three largest towns: New Ulm (13,594 people), Sleepy Eye (3,515) and Springfield (2,215). The population of Eden Township, Brown County, where the Project is proposed was 321 people in the 2000 Census. Approximately 43 % of the population of Redwood County resides in its three largest Cities, Redwood Falls (5,459), Lamberton (859) and Morgan (903). The population of Morgan Township, Redwood County, where the Project is proposed was 305 in the 2000 census. Data from Redwood County's Comprehensive Plan (Redwood County 2007) indicates the county expects a 1% decrease in population from the 2000 census to the 2010 census. A similar decrease is expected in Brown County.

Given that the population within this general location of the Counties is on the decline, and low in overall density, it is not anticipated that construction and operation of the Project will have any meaningful impacts on the security and safety of the local population.

Traffic

The existing Annual Average Daily Traffic (AADT) levels for roadways in the vicinity of the Project Area are discussed in Section 4.5 and summarized in **Exhibit A-7**. The additional traffic anticipated by the construction and operation of the Project is not expected to reach levels that would create problems for the regional roadway system.

4.8.2 Impacts

Air Traffic

The Project may impact air traffic and safety due to construction of the wind turbines and associated facilities. The Project is not expected to create significant impacts on air traffic in the region because there are only two unregistered airfields and no airports located within the Project Area and only one other facility is known to be registered within ten miles of the Project (the Redwood Falls Regional Airport). The installation of wind turbine towers in active croplands and installation of overhead collection lines, if needed, increases a potential for collisions with crop-dusting aircraft. However, overhead collection lines are expected to be similar to existing distribution lines (located along the edges of fields and roadways) and the turbines would be visible from a distance and lighted according to FAA requirements. Crop-dusting operations are conducted during daylight hours and usually by local pilots with knowledge of the area. This coupled with the visible nature of the towers is expected to result in no impact to local air traffic.

Except for the two private grass airfields, all known airports are a significant distance from the Project Area. Morgan Wind will coordinate with the FAA to confirm that the Project will not interfere with local aviation operations. Morgan Wind contacted the FAA on February 11, 2009 via a Request for Comment Letter for comments on the proposed Project. If the FAA requests, Morgan Wind will submit an application for a hazard determination by the FAA for the Project and work with the FAA regarding the hazard determination and coordinate siting the wind turbines.

Morgan Wind also contacted the Minnesota DOT Office of Aeronautics (MnDOT OA) on February 12, 2009 for comments on the proposed Project. On February 13, 2009 MnDOT OA provided comments and requested that Morgan Wind review MnDOT information concerning tall tower permitting and Minnesota structure height regulations, and also provide FAA Aeronautical Study Numbers and the latitudes and longitudes for each turbine site (**Appendix D**). With the requested information, the MnDOT OA indicated it would review the site locations and provide its comments at that time.

Electromagnetic Fields

Extensive research by the National Institute of Environmental Health Sciences (NIEHS 1999) has determined that extra low frequency EMF exposures pose any health risks to humans is weak.[4] In 2002 NIEHS prepared a booklet that summarized worldwide EMF health research studies conducted after 1999 (NIEHS 2002). The NIEHS determined that since 1995, the two major U.S. reports concerning the impact of EMF exposure on human health both concluded that "limited evidence exists for an association between EMF exposure and increased leukemia risk, but when all the scientific evidence is considered, the link between EMF exposure and cancer is weak." *Id*.

The Minnesota EQB addressed the matter of EMF with respect to new transmission lines in a number of separate dockets from 2003 to 2005. See Docket Nos. 03-64-TR-XCEL (161 kV Lakefield Junction to Fox Lake Substation line); 03-73-TR XCEL (345 kV Split Rock Substation to Lakefield Junction Substation line); 04-84-TR-XCEL (115 kV Buffalo Ridge Substation to White Substation line) and 04-81-TR-Air Lake-Empire (115 kV line in Dakota County). In June 2005, in Docket No. 03-73-TR-XCEL for the 345 kV line connecting the Split Rock and Lakefield Junction substations, the EQB made the following finding with regard to EMF:

> 118. No significant impacts on human health and safety are anticipated from the Project. There is at present insufficient evidence to demonstrate a cause and effect relationship between EMF exposure and any adverse health effects. The EQB has not established limits on magnetic field exposure and there are no Federal or Minnesota health-based exposure standards for magnetic fields. There is uncertainty, however, concerning long term health impacts and the Minnesota Department of Health and the EQB all recommend a "prudent avoidance" policy in which exposure is minimized.

[4] See Electric and Magnetic Fields Research and Public Information Dissemination (EMF RAPID) Program.

While there is no conclusive research evidence that EMFs pose a significant health impact from power lines and wind turbines, the turbines will be installed no closer than 1,200 feet from occupied residences, where EMF is expected to be at background levels. Based on the most current research on EMFs, and the distance between any turbines or collector lines and occupied homes, the proposed Project is not anticipated to have significant impact to public health and safety due to EMFs.

Security

The Project will add to the number of emergency response locations that will be part of both Brown and Redwood Counties EM systems. Wind turbines constructed as part of the Project will be registered with both of the Counties EM emergency response system and Morgan Wind will work with the County EM to develop appropriate response procedures. The Project Area is also located in a lightly populated rural/farming area. Project construction and operation is expected to have little impact on the security and safety of local residents. As with any large construction project, some risk of worker or public injury exists during construction. However, Morgan Wind and its construction representatives and workers will prepare and implement work plans and specifications in accordance with applicable worker safety requirements during construction of the Project. Morgan Wind will also control public access to the Project during construction and operation.

Traffic

While the Project is located in an area of relatively low population density, increased road traffic is expected in the short term during construction of the Project. An increase in traffic will also create the possibility of an increased chance of traffic accidents in the local area. Additionally, increased wear and tear of local roads is also expected from delivery of Project materials and equipment which has the potential of creating hazardous conditions for traffic.

The maximum construction traffic is expected to be approximately 275 additional vehicle trips per day, and the functional capacity of a two-lane paved rural highway is in excess of 5,000 vehicles per day. The existing traffic volumes on the area's county roads and highways are documented in **Table 4-4** in Section 4.5 and **Exhibit A-7**. Minnesota State Highway 68 has the highest Annual Average Daily Traffic (AADT) count at 2200 vehicles per day. For purposes of comparison, the functional capacity of a two-lane paved rural highway is in excess of 5,000 vehicles per day. Except for Minnesota State Highway 68, the highest existing AADT in or near the Project area are 660 vehicles per day on Redwood CSAH 3. Redwood CSAH 3 runs through the city of Morgan and bisects the central portion of the Project Area east to west, turning into CSAH 30 in Brown County. Brown CSAH 7 bisects the central portion of the Project Area running north and south and has a maximum AADT of 100 in the Project Area.

Because many of the area roadways have AADTs currently well below capacity, the addition of 275 vehicle trips would be perceptible, but similar to seasonal traffic increases such as observed during autumn crop harvest. Use of State Highway 68 for construction of the Project Area will be managed to avoid significant impacts to traffic on this highway. Truck access to the northern

portion of the Project Area is generally served by Brown County CSAH 7 from the south and Redwood CSAH 3 (CSAH 30 in Brown County) from the west. Once the Project is completed, maintenance crews will periodically drive through the Project Area to monitor and maintain the wind turbines. Turbines and substations will occasionally require repair, which will create a temporary slight increase in area traffic

4.8.3 Mitigation

Air Traffic

If requested by the FAA, the Morgan Wind will work with and coordinate siting the wind turbines with the FAA. The wind turbines and temporary meteorological towers will be equipped with lighting in compliance with FAA requirements. Temporary meteorological towers will also have supporting guy wires which will be marked with colored safety shields. Permanent meteorological towers installed at the Project's completion will be painted in compliance with FAA requirements and they will be free-standing with no guy wires.

As requested by the Minnesota Department of Transportation, Office of Aeronautics (**Appendix D**), Morgan Wind will review information on Tall Tower Permitting and Minnesota Structural Height Requirements and provide MnDOT OA information on the turbine height, locations, elevation and distance from nearby airports, as the Project progresses and this information becomes available.

Morgan Wind will notify local airports, aerial applicators, and hospitals regarding the new towers and turbines to reduce the risk to crop dusters, emergency helicopters, and other local aircraft.

Electromagnetic Fields

Although there is no conclusive evidence of harmful effects of EMFs, increasing the distance between source and receptors decreases the strength of EMFs. Therefore, the planned distances between occupied residences and proposed facilities should mitigate possible harmful effects of EMFs and, therefore, no impacts due to EMFs are anticipated. Consequently, no mitigative measures are proposed. Morgan Wind will continue to follow developments concerning EMF and will respond to new information regarding EMFs as applicable to the Project.

Security

Morgan Wind will coordinate with both Redwood and Brown County Emergency Management (EM) offices for the purpose of saving lives and protecting property related to the Project during natural, manmade or other incidents. Morgan Wind will provide required information and work with both the Counties EM offices to develop procedures for response to emergencies, natural hazards, hazardous materials incidents, manmade problems (e.g. fire, etc.) and related incidents concerning the Project. Morgan Wind will also work with both the Counties EM offices to be registered with the Rural Identification/addressing (fire number) system and 911 system coordination emergency response.

While no impact to the security of local residents is expected as a result of construction or operation of the Project, Morgan Wind will use the following security measures to reduce the possibility of property damage or personal injury at the Project Area:

- The Project wind turbine locations will be registered with the Counties EM offices and Morgan Wind will work with the Counties EM offices to develop appropriate procedures for emergency responses related to the Project;
- Towers will follow the PUC setback requirements;
- Contractors will use proper construction and maintenance methods to ensure minimal impacts to workers and public health and safety;
- Morgan Wind and its contractors provide temporary (safety) and permanent fencing, warning signs, and locks on equipment and wind power facilities during construction and operation of the Project;
- Morgan Wind will conduct regular operation and maintenance and inspections during the life of the Project to address potential blade failures, minimizing the potential for blade throw. If problems are identified, Morgan Wind will perform immediate repairs;
- Turbines will be situated on solid steel enclosed tubular towers where electrical equipment will be located, except for the pad-mounted transformer. Access to the tower will only be allowed through a solid steel door that will be locked when not in use. External electrical equipment will be clearly marked with appropriate warning signs;
- One to two permanent meteorological towers will be included in the Project and the guy wires on any temporary towers will have color sleeves at ground level to increase visibility to people at ground level; and
- Where necessary or requested by landowners, Morgan Wind will construct gates or fences around the facilities.

Traffic

Because of the rural location of the Project and the relatively low volumes of traffic on adjacent roadways, significant impacts to area traffic are not anticipated. Consequently, no mitigation is proposed. However, Morgan Wind will notify Township and County road officials of the construction schedule and will repair road damage occurring during construction of the Project. Specific additional truck routes will be dictated by the location required for delivery. Additional operating permits will be obtained for oversized truck movements.

4.9 Hazardous Materials

4.9.1 Description of Resources

Potential hazardous materials within the Project Area would be associated with agricultural use of the land, which includes use of petroleum products (diesel fuel, gasoline, natural gas, heating oil, lubricants, and maintenance chemicals), pesticides and herbicides. Older farmsteads may also contain lead-base paint, asbestos-containing building materials (e.g. shingles and siding), and polychlorinated biphenyls (PCBs) in electrical transformers. Unmarked farmstead waste dumps which may contain various types of wastes are also commonly found in rural/farming areas. Morgan Wind is in the process of conducting a Phase I Environmental Site Assessment (Phase I ESA) in accordance with ASTM Standards E1527-05 to assess the environmental condition of the Project Area. Recognized Environmental Conditions (RECs) present within the Project Area will be identified and evaluated. Wind turbines and associated Project facilities will be sited in locations that avoid RECs.

The Minnesota Pollution Control Agency "What's In My Neighborhood?" database (MPCA 2009) of known and potential sources of soil and ground water contamination was consulted for the Project Area. The nearest mapped sites are the Morgan Dump, located just north of the Town of Morgan, and the Evan Dump, located just south of the Town of Evan. Both of these sites are unpermitted dumps.

During construction, vehicles and equipment will use gasoline, diesel and other petroleum products. In operation, the Project is not expected to generate significant amounts of hazardous waste or materials. The wind turbines will use synthetic gear box oil, hydraulic fluid, and gear grease. Materials used for operating the wind farm will be maintained by a service provider and brought to the Project Area as needed.

4.9.2 Impacts

Possible impacts associated with the introduction of hazardous materials into the environment might occur from use of an O & M Facility. If an O&M Facility is constructed for the Project, minimal amounts of hydraulic oil, lube oil, grease and, possibly, cleaning solvents would be used on the site. If not properly managed, these materials have the capacity to leach into the soils and potentially contaminate the local aquifer. If no O&M Facility is constructed for the Project, these materials would be stored at an off-site vendor location and brought to the Project site for use in the Project.

4.9.3 Mitigation

Morgan Wind will design and construct the turbine layout to avoid farmsteads and other buildings by at least 1,200 feet, thereby avoiding potential encounters with hazardous materials

and unmarked waste dumps. Therefore, impacts associated with hazardous materials are not anticipated.

Hydraulic oils and lubricants used within the wind turbines will be contained within the turbine nacelle, or at the off-site location of the service provider selected to maintain the Project. If an O&M Facility is constructed for the Project, Morgan Wind will properly manage, store and use hazardous materials used in operating the Project. Morgan Wind will ensure that wastes generated by the Project are properly stored and disposed of using certified waste handlers.

If no O&M Facility is built for the Project, fuels and lubricants for vehicles and maintenance equipment will be properly stored and contained off-site according to applicable local, state and federal regulations by the service provider. Transformer oil will be contained within the electric transformers, and fluid levels will be monitored during scheduled maintenance at each turbine and transformer location. Small amounts of hydraulic oil, lube oil, grease, and cleaning solvent may be used on site and stored off-site by the service provider. When fluids and lubricants are replaced, the waste products will be handled and disposed of according to local, state and federal regulations through an approved waste firm.

4.10 Effects on Land-Based Economics

4.10.1 Description of Resources

Agriculture

Land use within the Project Area is primarily agricultural as shown in the Land Cover Map (**Exhibit A-8**). In 2007, over 89% of the land in Brown County (roughly 354,000 acres) was used for agriculture by approximately 1,129 farms (USDA, 2007 Census Report). Redwood County had similar numbers with over 90% of the county in agricultural production (554,000 acres) on 1,215 farms. Major crops grown within both Brown and Redwood Counties include: corn, wheat, oats, soybeans, and hay. Predominant livestock raised in the counties includes beef and dairy cows and poultry. Drain tiles and storm water management structures related to farming operations are located within the Project Area.

As shown on **Exhibit A-11**, 25.3% of the farmland within the Project Area is considered prime, 71.4% is prime farmland when drained and 3.2% is considered farmland of statewide importance. Very little land (approximately 0.1%) is neither non-prime farmland nor farmland of statewide importance.

Both Brown and Redwood Counties offers conservation programs that compensate landowners for setting aside wetlands and grasslands for conservation purposes, or implementing conservation practices on their land. These programs provide another source of income for local farms and landowners. Some of these programs include the Conservation Reserve Program (CRP), Reinvest in Minnesota (RIM), Wetland Reserve Program (WRP), and the Environmental Quality Incentive Program (EQIP). These programs vary in their requirements, payments, and

the length of time for which a piece of property must be enrolled. Some of these easements are perpetual in nature. **Exhibit A-12** displays CRP and RIM lands within the Project Area.

Large-scale animal production has been a growing component of the agricultural industry in recent years, and feedlots used for the confined feeding, breeding or holding of animals are a common practice for animal production. The MPCA is the state agency charged with regulating animal feedlots in Minnesota. Counties may also be delegated by the MPCA to administer the program for feedlots that are not under federal regulation. There are currently 427 registered feedlots in Brown County and 348 registered feedlots in Redwood County that have 50 or more (10 in shoreland districts) animal units (MPCA 2007). Morgan Wind confirmed the presence of 8 poultry feedlots within the Project Area during a field review. The feedlots within the Project Area were evenly dispersed between Brown and Redwood counties.

Forestry

There are no significant forestry resources within the Project Area. Minnesota Land Cover Classification mapping (**Exhibit A-8**) indicates that only 2% of the Project Area is forested. Most of the forested areas are in association with existing farmsteads. Because of Brown and Redwood Counties agricultural histories, much of the once native woodlands were removed for agricultural production of row crops. Therefore, economically important forestry resources are no longer found in this portion of either county. Farmsteads within the Project Area typically contain forested areas in the form of woodlots and shelterbelts.

Mining

There are no significant mining resources within the Project Area. However, crushed rock, sand, and gravel are extracted from mines around both counties primarily for the purpose of building roads. Based on a review of the MN/DOT Aggregate Source maps for Brown and Redwood Counties (Mn/DOT 2001), no quarries or gravel pits are located within the Project Area.

4.10.2 Impacts

Agriculture

The Project will permanently impact some cropland and rangeland for construction of structures, access roads, and associated infrastructure. Construction activities associated with the Project (e.g. grading, soil compaction, access roads, turnaround areas, temporary construction staging areas, etc.) will also temporarily impact agricultural land. Specific temporary and permanent impacts to all agricultural lands will be determined once turbine, road and the Project Substation locations have been finalized. Drain tiles may be impacted by construction activities.

Overall, impacts to agriculture as a result of the Project are anticipated to be short term, minimal and are not anticipated to significantly alter crop production. Once in operation, it may occasionally be necessary for Morgan Wind to complete repairs, or clear vegetation around a turbine or facility, which could result in additional temporary impacts to agricultural operations. These interruptions are anticipated to be infrequent and short term.

Some livestock operations and pasture land may be temporarily disrupted during the installation of the wind turbines and associated infrastructure. Morgan Wind will keep landowners informed about work being completed on their property, and contractors will ensure fenced pasture land remains secure. Aside from the specific areas where wind turbines, roads, and infrastructure are physically located, the remaining portions of the property will be available for grazing and use by livestock. The Project will have little, if any, long-term effects on the ability of the land to be productive for raising livestock.

Forestry

No impacts to forestry resources are anticipated. Forested areas near farmsteads and waterbodies will be, for the most part, avoided by the proposed Project. While significant tree removal is not anticipated, some trees and limbs may occasionally need to be removed to install access roads, or trimmed to prevent damage to electrical lines from wind and ice, and to ensure reliable operation.

Mining

No impacts to mining resources or operations are anticipated.

4.10.3 Mitigation

Agriculture

To the extent possible, Morgan Wind will design the Project and locate wind turbines, access roads and associated facilities to avoid or minimize temporary and permanent impacts on farmland. Turbine and facility siting will include discussions with landowners to identify features on their property, including drain tiles and other encumbrances that should be avoided. All potential Project construction encumbrances are detailed by the landowner upon the initial wind easement or land lease agreement, which will then be sited by Morgan Wind prior to construction activities.

Only land for the turbine, access roads, and supporting infrastructure will be permanently taken out of crop production. Additional farmland may be temporarily impacted for use during construction as staging and access areas. Soil compaction is a temporary impact. The construction equipment used in the erection of wind turbines, much like agricultural equipment, is designed with wide tires and tracks to distribute their weight over a larger area. This minimizes the degree of soil compaction resulting from construction. Once construction is complete Morgan Wind will assess disturbed areas and determine whether excessive soil compaction has occurred with the affected landowner(s). In those areas were excessive soil compaction has occurred due to the Project, Morgan Wind will work with the landowner and negotiate an appropriate corrective action (e.g. by tilling, chiseling, or other methods).

To the extent practicable, staging areas will be placed in previously disturbed locations to minimize the impact to agricultural production. While significant impacts to drain tiles and other

existing facilities due to Project construction and operation are not anticipated, Morgan Wind will develop and implement a drain tile mitigation plan. The plan will address steps that will be taken to avoid, repair or replace drain tile that may be impacted by the Project. Morgan Wind will design and construct access roads, buried utilities, overhead utilities and other ground disturbing activities to avoid existing drain tiles. In the event a drain tile becomes inadvertently damaged, Morgan Wind will implement the drain tile plan and repair or replace the impacted drain tile. Prior to beginning any site work, Morgan Wind will contact the landowner where the work will be conducted and review the location of the work and identify the presence of drain tiles or other drainage structures.

Impacts on agricultural crops, livestock, native vegetation, and landscaped areas are anticipated to be minimal. Landowners will be reimbursed for potential damage incurred to crops, livestock, and property in a manner consistent with the terms of the lease or easement agreement. Once the Project is completed, Morgan Wind will restore vegetation within disturbed areas as close as practicable to its original condition. Post construction restoration will largely depend upon the amount of disturbance occurred on the site and the soil types at each location. Sites used for temporary storage of material staging and access areas typically experience significant amounts of traffic which will likely require tilling prior to seeding to loosen compacted soils.

Morgan Wind plans to avoid impacts to RIM land, and will minimize impacts to CRP land to the extent possible. If CRP land is impacted, Morgan Wind will work with the USDA NRCS, as well as the landowner to remove the impacted portion of the parcel from the CRP program.

On February 24, 2009 Morgan Wind received a comment letter from Joe Kristoff, USDA (**Appendix D**) indicating that the Project will not require a Farmland Conversion Impact Rating (Form AD-1006) because the Project will receive no federal funding.

Forestry

No impacts to forestry resources are anticipated and no mitigative measures are proposed. However, Morgan Wind will coordinate with affected landowners for replacement of trees lost on private property as a result of the Project.

Mining

No impacts to mining resources are anticipated and no mitigative measures are proposed.

4.11 Tourism and Community Benefits

4.11.1 Description of Resources

Brown and Redwood Counties have multiple recreational opportunities available (see Section 4.7). Tourism is an important part of local cities and both counties economies. Important tourism resources in the counties include the parks and public land. Local town festivals and fairs are other important tourism draws. The City of Morgan is the closest city to the Project

Area and hosts the area's largest Farm Show, called FarmFest every year.

4.11.2 Impacts

No negative impacts to tourism and community benefits are anticipated. Renewable energy production has become very important to the U.S. economy. As a result, interest in wind farms has increased and they are becoming an important tourism attraction. The addition of this Project to the community is not expected to impact travelers to this area; however, it could possibly increase local tourism. The community will benefit with the addition of jobs related to construction and O&M of the Project. It is estimated that one full time position is created for every 13 turbines erected, thus the Project will create approximately 1.5 new jobs.

4.11.3 Mitigation

No negative impacts to tourism and community benefits are anticipated and no mitigative measures are proposed. Any increased traffic from visitors to the Project Area is not expected to be great enough to impact roads or traffic which would require mitigation.

4.12 Topography

4.12.1 Description of Resources

Elevations in the Project Area vary slightly from 1,056 feet above mean sea level (amsl) in the western portion of the site to 1001 feet amsl in the eastern portion. An elevation map of the Project Area is shown in **Exhibit A-9**. With the exception of steep topography along the banks of the Minnesota River Valley, this area of the state is characterized by gently rolling to level ground moraine topography. The basic geologic framework of the site includes approximately one hundred feet of glacial drift underlain by sandstones, clays and cretaceous shales (65-145 million years ago). Drift is considered any material (sand, clay, gravel, and boulders) left behind by glacial activity (Bray, 1985). The site is relatively high and flat and falls off in all directions towards the Minnesota River.

4.12.2 Impacts

Construction of the turbines, associated facilities, access roads and collection/transmission lines will require some grading. Morgan Wind will be able to minimize the length of access roads for the Project because of the number and locations of public roads across the Project Area. Therefore, significant impacts to topography are not anticipated because the layout and siting will be done in such a way as to tie into existing public roads and existing topographic contours to avoid steep terrain, and minimize cut and fill requirements.

4.12.3 Mitigation

As shown on the preliminary layout map (**Exhibit A-3**), Morgan Wind is considering the location of the proposed turbines in relation to steep slopes and other topographic features. Areas of steep slopes are being avoided. Care will also be taken when siting the locations of collection/feeder lines, transmission lines and access road to minimize grading activities within and near steep terrain to the extent possible. Best management practices will be used surrounding graded areas in accordance with state standards (e.g. silt fence and biologs) to prevent erosion into regional waterways and wetlands.

4.13 Soils

4.13.1 Description of Resources

The portion of the project area within Brown County is mapped as Webster-Nicollet-Okoboji Association on the General Soil Map of Brown County (1986). This association consists of nearly level, poorly drained, moderately well drained, and very poorly drained, loamy and silty soils on till plains and ground moraines. This association is found on ground moraines characterized by slopes that rise as much as 10 feet above low lying areas. Depressions are common and relief is low.

The portion of the Project Area within Redwood County is mapped as Canisteo-Normania-Okoboji Association (**Exhibit A-12**). This association is characterized by poorly drained, moderately well drained and very poorly drained, nearly level soils that formed in glacial till or silty alluvial sediments derived from glacial till on uplands. The soils that make up this association are in broad areas of ground moraines that have short, irregular, convex knolls. These knolls range from 1 to 10 feet above the floor of the lowland till plain. Closed depressions are common. The mapped soil units within the Project Area are summarized in **Table 4-7**.

Table 4-7: Soils Series Mapped Within Project Area

Soil Number	Soil Name	Hydric Soil	Drainage Class	Prime Farmland Classification	Acres
L83A	Webster clay loam, 0 to 2 percent slopes	Yes	Poorly drained	Prime farmland if drained	3535.0
86	Canisteo clay loam	Yes	Poorly drained	Prime farmland if drained	2347.6
L85A	Nicollet clay loam, 1 to 3 percent slopes	No	Moderately well drained	All areas are prime farmland	1383.2
L201A	Normania loam, 0 to 3 percent slopes	No	Moderately well drained	All areas are prime farmland	989.8
L163A	Okoboji silty clay loam, depressional, 0 to 1 percent slopes	Yes	Very poorly drained	Prime farmland if drained	914.9
L163A	Okoboji silty clay loam, depressional, 0 to 1 percent slopes	Yes	Very poorly drained	Prime farmland if drained	646.5

Table 4-7: Soils Series Mapped Within Project Area					
L84A	Glencoe clay loam, depressional, 0 to 1 percent slopes	Yes	Very poorly drained	Prime farmland if drained	322.5
386	Okoboji muck	Yes	Very poorly drained	Farmland of statewide importance	285.8
102B	Clarion loam, 1 to 4 percent slopes	No	Well drained	All areas are prime farmland	178.2
421B	Ves loam, 1 to 4 percent slopes	No	Well drained	All areas are prime farmland	113.9
102B2	Clarion loam, 3 to 6 percent slopes, eroded	No	Well drained	All areas are prime farmland	42.6
999B2	Ves-Estherville-Storden complex, 3 to 6 percent slopes, eroded	No	Well drained	Farmland of statewide importance	37.4
423	Seaforth loam	No	Moderately well drained	All areas are prime farmland	33.9
818	Lemond-Linder-Estherville complex	No	Well-Somewhat poorly drained	Farmland of statewide importance	12.0
1931	Essexville sandy loam	No	Poorly drained	Not prime farmland	10.8
954B2	Ves-Storden loams, 3 to 6 percent slopes, eroded	No	Well drained	All areas are prime farmland	8.5
999C2	Storden-Estherville-Ves loams, 6 to 12 percent slopes, eroded	No	Well drained	Farmland of statewide importance	7.6
954C2	Storden-Ves loams, 6 to 12 percent slopes, eroded	No	Well drained	Farmland of statewide importance	5.8
884	Delft-Webster complex	Yes	Poorly drained	Prime farmland if drained	4.9
920B	Clarion-Estherville-Storden complex, 2 to 6 percent slopes	No	Well drained	Farmland of statewide importance	4.8
247	Linder loam	No	Somewhat poorly drained	All areas are prime farmland	1.1
921B2	Clarion-Storden loams, 3 to 6 percent slopes, eroded	No	Well drained	All areas are prime farmland	0.5

Of the soils mapped within the Project Area, 25.3% of the Project Area is mapped as soils that are considered prime, 71.4% is prime farmland when drained and 3.2% is considered farmland of statewide importance. Only 0.1% of the site is neither prime farmland nor farmland of statewide importance.

Approximately 99.9% of the Project Area qualifies as prime farmland or farmland of statewide importance, respectively (**Exhibit A-11**). Virtually all of the preliminary turbine locations are on land falling within these two classifications. It is anticipated that access roads will also be placed on lands in these two classifications. The soils that are not in these classifications are either highly erodible soils on steep slopes or are hydric soils associated with streams or wetlands.

4.13.2 Impacts

Construction of the wind turbines, associated facilities, access roads and collection/transmission lines will require grading. Approximately 99.9% of the Project Area qualifies as prime farmland or farmland of statewide importance, respectively (**Exhibit A-11**). Virtually all of the preliminary turbine locations are on land falling within these two classifications. It is anticipated that access roads will also be placed on lands in these two classifications. The soils that are not in these classifications are either highly erodible soils on steep slopes or are hydric soils associated with streams or wetlands.

Based on preliminary turbine locations, this earthwork would occur mostly in moderately well-drained to well-drained silt and sandy loam soils. None of the soils mapped for the preliminary turbine locations are muck and most are moderately sloping. None of the soils in the preliminary turbine locations appear to pose significant constraints for construction activities. As part of turbine micrositing, turbines locations may be shifted if preliminarily sited on slopes that are unsuitable for construction. Geotechnical investigations will also be undertaken at each individual turbine location to confirm suitability for turbine foundation construction. If any locations are found unsuitable, adjustments will be made to ensure that all turbine locations are suitable from a soils standpoint. Because the design of the Project is in the preliminary stages, the amount of land to be converted to wind power facilities cannot be accurately quantified. However, it is anticipated that a very small percentage of Project Area soils will be affected.

4.13.3 Mitigation

The potential for construction-related soil erosion will be minimized by siting turbines and access roads so as to avoid highly erodible soils on steep slopes. In addition to minimizing disturbance of highly erodible soils, avoiding steep topography will reduce the size of cut and fill area footprints. Morgan Wind will work with the landowners in the Project Area to site turbines and access roads so as to minimize impacts to high quality cropland and farming operations to the extent practicable.

Morgan Wind will obtain a National Pollutant Discharge Elimination System (NPDES) permit from the Minnesota Pollution Control Agency (MPCA) to discharge storm water from construction activities. A Stormwater Pollution Prevention Plan (SWPPP) will be prepared and submitted to the MPCA at the time the NPDES permit application is submitted. Appropriate Best Management Practices (BMPs) will be used during construction and operation of the project to protect topsoil and adjacent resources and to minimize soil erosion. Typical BMPs include: (1) encompassing excavated material and disturbed soil with silt fences; (2) protecting exposed soil; and (3) stabilizing restored material.

4.14 Geologic and Groundwater Resources

4.14.1 Description of Resources

Bedrock in the Project Area consists of sandstones, clays and cretaceous shales, most of which is beneath a layer of unconsolidated drift (glacial till, sand and loess). Geological mapping shows that the depth to bedrock is about 0 to 100 feet across the southern half of the Project Area, and from 100 to 200 feet (or more) in the northern half of the Project Area. Based on this data and a field review, no bedrock outcrops are located within the Project Area. Additionally, no karst features within the Project Area were indicated in Minnesota Geologic Survey data.

A gravel pit is shown to exist in the northwestern Project Area according to a 2002 US Geological Survey standard topographic map. No gravel pit exists there today. Imagery from 1991 was researched and it appears that no gravel pit existed at that time either. The area listed as a gravel pit, Section 14 of Morgan Township, is located near the highest elevation point in the Project Area. The local elevation varies significantly and farming in the area likely eroded enough top soil to reach a layer of gravely substrate which is visible in the 1991 imagery, and was noted as a "gravel pit" the 2002 USGS survey (**Exhibit A-12**).

The County Well Index (CWI) indicates that twenty-seven (27) domestic wells are located within the Project Area. Most of the groundwater used in Redwood and Brown Counties is drawn from bedrock aquifers. Domestic groundwater supply appears to be fairly accessible in the Project Area.

Recharge to the water table occurs throughout the region via infiltration of precipitation, surface water runoff from area of lower to higher infiltration, and subsurface groundwater movement from adjacent areas. Most recharge in the Project Area occurs on the more level upland areas through percolation. The Project Area contains very few depressional water bodies that would potentially be groundwater recharge areas. Groundwater discharge areas occur mainly along stream corridors as springs or seeps.

4.14.2 Impacts

No impacts to geologic and groundwater resources are anticipated as a result of construction or operation of the Project. Water supply needs for the Project will be limited to construction needs which will be provided by construction contractors, as no O&M Facility is planned for operation of the Project. On March 4, 2009 the Minnesota Department of Health (MDH) provided comments regarding the Project. The MDH indicated that wells and borings are regulated in Minnesota. Borings drilled for this Project will likely be an Environmental Bore Hole (EBH), which is subject to MDH regulation.

4.14.3 Mitigation

No impacts to geologic and groundwater resources are anticipated and no specific mitigation measures are proposed. While the potential appears low for karst conditions, Morgan Wind will ensure that the geotechnical investigations done for turbine locations include site-specific assessments for potential issues with karst. Morgan Wind will follow MDH regulations concerning EBHs, if any, for the Project.

4.15 Surface Water and Floodplain Resources

4.15.1 Description of Resources

Two watercourse systems are mapped within the Project Area (**Exhibit A-13**). Both of these water courses appear to be a mix of natural streams and excavated drainage ditches. Minnesota DNR mapping indicates that neither of the water courses are mapped as public waters within the Project Area (MN DNR 1996). Both of the two main drainages located within the Project Area drain to the Minnesota River to the north and northeast. Spring Creek, which drains the southern portion of the Project Area becomes a Public Water Watercourse downstream of the Project in Section 24, T111N, R 33W located in Brown County. An unnamed creek drains the northern portion of the Project Area and becomes a Public Water downstream of the Project in Section 4, T111N R33W located in Brown County. Portions of both of these drainages are County Ditches within the Project Area.

Two streams within Brown County (Hinderman Creek and Johns Creek) and one stream within Redwood County (Ramsey Creek) are Designated Trout Streams (State of Minnesota, 2009). Hinderman and Johns Creek are located northeast of the Project Area along the Minnesota River near Fort Ridgeley State Park. Ramsey Creek is located within the city limits of Redwood Falls northwest of the Project Area. The Project Area is not in the watershed of any of the three Designated Trout Streams.

National Wetland Inventory (NWI) Mapping indicates 30 wetland basins within the Project Area (**Exhibit A-14**) (USFWS 1991). A preliminary field review of the Project Area conducted by Morgan Wind indicates the majority of these wetland basins have been tiled and drained as a part of the row crop agriculture being conducted within the Project Area. Wetlands are discussed in detail in Section 4.16.

No DNR Public Water Wetlands or Lakes are mapped within the Project Area. The nearest DNR Public Water Wetland is Lonetree Lake, a DNR Public Water Wetland located just northeast of the Project Area.

Federal Emergency Management Agency (FEMA) floodplain mapping (Panels 2706440175B and 270015C0025C) was reviewed in a digital format to determine the extent of floodplains within the Project Area (**Exhibit A-13**) (FEMA 2000). Portions of Spring Creek in Sections 29,

31 and 32, T 111N R 33W located in Brown County has mapped floodplains within the Project Area. The portion of Redwood County where the Project is located has no flood information available. The FEMA panel is unprinted for Redwood County.

4.15.2 Impacts

None of the turbines are expected to affect streams, surface water bodies or floodplains. All turbines are expected to be located on topographically elevated uplands. The Project Area is served by an extensive network of state, county and township roads, from which all turbines can be readily accessed without crossing any streams, wetlands or floodplains. Based on the data available at this stage, no impacts to streams, wetlands or floodplains are anticipated. As the design of the Project moves forward, Morgan Wind will coordinate with the St. Paul District United States Army Corps of Engineers (USACE), and the Brown County and Redwood County Soil and Water Conservation Districts (SWCDs), the responsible local government units (LGUs) administering the Minnesota Wetland Conservation Act), to obtain concurrence that stream and surface water body impacts are being avoided. If wetlands cannot be avoided, the permitting process to be followed is described in Section 4.16.

The Minnesota Pollution Control Agency (MPCA) administers the National Pollutant Discharge Elimination System (NPDES) permit program in Minnesota and regulates construction activities that disturb more than one acre of land. As part of its NPDES permit application, Morgan Wind will develop a Storm Water Pollution Prevention Plan (SWPPP) to identify erosion and sedimentation control measures to prevent adverse water quality impacts to streams and wetlands during and after construction. The measures included in the SWPPP should be sufficient to ensure that streams and surface waters on the project site do not incur any adverse construction-related stormwater impacts.

The Minnesota DNR Division of Waters, Marshall Area office has indicated in a comment email correspondence dated February 17, 2009 that they have no comments or concerns for the Redwood County portion of the Project (see **Appendix D**).

On February 12, 2009 Morgan Wind contacted the Minnesota Department of Natural Resources (MnDNR) area hydrologist regarding the proposed Project. On March 11, 2009 the MnDNR area hydrologist provided comments indicating that no Public Water Inventory (PWI) waters are affected by the Project and that no MnDNR Protected Waters Permit is required for the Project (**Appendix D**). The MnDNR also commented that while not public waters are affected, the proposed Project area contains wetlands and private waterways, and these wetlands may be subject to WCA jurisdiction. The MnDNR recommended appropriate erosion control measures are taken for the Project.

4.15.3 Mitigation

No stream, surface water body or floodplain mitigation should be required, since all such resources are being avoided. Potential impacts from construction storm water discharges will be

mitigated through the application of the BMPs that will be described in the SWPPP for the Project.

4.16 Wetlands

4.16.1 Description of Resources

Wetland resource data was obtained from the U.S Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) and U. S. Geological Survey National Hydrography Dataset (NHD). These datasets have been combined to show the approximate locations of wetlands and streams in the Project Area (**Exhibit A-14**).

NWI wetlands cover 249 acres within the Project Area. NWI mapping indicates that 206 acres of the 249 acres of NWI mapped wetland is drained. Thirty NWI basins are mapped within the Project Area. Twenty of the NWI wetlands are mapped as Type 1 (PEMA) Seasonally Flooded Basins, eight are mapped as Type 3 (PEMC) Shallow Marsh and two are mapped as Type 4 (PEMF) Deep Marsh. Morgan Wind conducted a follow-up field review to confirm the accuracy of wetland mapping data. The review found most, if not all, of the NWI mapped wetlands were effectively drained by tile lines or ditches. One Reinvest in Minnesota (RIM) wetland restoration project that was not mapped on the NWI was noted in Section 31, T111N, R33W located in Brown County within the Project Area. No other wetlands not mapped on the NWI were noted in the field review.

4.16.2 Impacts

Possible impacts to wetlands associated with projects like this would include converting wetlands into upland area so that turbines, roads or associated facilities could be built. No wetland impacts are anticipated with the proposed Project, as all turbine locations are expected to be located on upland and should be accessed without crossing streams or wetlands. If it is determined that wetland impacts are unavoidable, impacts will be minimized as much as necessary for road construction in accordance with sequencing and replacement requirements of Section 404 of the Clean Water Act (CWA) and the Minnesota Wetland Conservation Act (WCA).

On February 13, 2009 Morgan Wind received an email comment from Tom Fischer, Minnesota Board of Water and Soil Resources (BWSR) which indicated that Morgan Wind should contact the local governmental unit contacts (Brown County, Redwood Soil and Water Conservation District) to review possible impacts of the Project on wetlands (see **Appendix D**). BWSR also indicated it would be available to assist the local governmental units with administration of the WCA.

On February 18, 2009 Morgan Wind received an email comment from Desiree Hohnstein, Brown County Wetland Administrator, recommending that Morgan Wind conduct an onsite

wetland delineation on the proposed work area to identify any wetland impacts from the Project (**Appendix D**).

On March 9, 2009 Morgan Wind received a comment letter from Marilyn Bernhardson, Redwood Soil and Water Conservation District, indicating one documented wetland is located in section 26 of the Redwood County portion of the Project Area, and that once the final turbine locations have been determined, that Morgan Wind will need to submit a WCA application so the RSWCD can do a field visit and make a final determination on permitting requirements (**Appendix D**).

On February 24, 2009 Morgan Wind received a comment letter from Joe Kristoff, Area Soil Specialist, United States Department of Agriculture (USDA), noting that because the Project does not involve federal funds, it will not need a Farmland Conversion Impact Rating (Form AD-1006), and that the wetland conservation provisions of the 1985 Food Securities Act (FSA), as amended, do not apply to this Project (**Appendix D**). However, any impact on wetlands may impact owner/operator USDA eligibility. Morgan Wind will address the above comments and wetland matters by coordinating with applicable wetland authorities to determine whether additional wetland studies/investigations or permitting will be necessary for the Project.

On March 5, 2009 Morgan Wind received a comment letter from Tamara Cameron, USACE, recommending that Morgan Wind conduct an onsite wetland delineation of all wetlands that would likely be impacted within the Project Area, and that Morgan Wind take steps to avoid and minimize wetland and other environmental impacts during Project design (**Appendix D**). The USACE indicated that prior to construction Morgan Wind must complete a Minnesota Local/State/Federal Application Form for Water/Wetland Projects and that Morgan Wind contact WCA local governmental units to discuss the Project. The USACE requested additional specific Project information for review with the permit application.

4.16.3 Mitigation

Morgan Wind is currently delineating wetlands within the Project Area which coincide with proposed Project features. If wetlands are found to exist, the design of the Project will be altered accordingly to avoid impacting wetlands. If wetland impacts are determined to be unavoidable to construct Project features, permit applications will be submitted to the proper authorities including the USACE, USDA NRCS, Redwood County SWCD, and Brown County SWCD in accordance with Section 404 of the CWA and WCA. Wetland mitigation for any impacts that exceed the de-minimus levels (e.g. the maximum amount of wetland fill permitted without replacing impacts) would require wetland replacement. If wetland replacement is required, Wetland Bank Credits from an approved wetland bank in the same Wetland Bank Service Area may be purchased.

4.17 Vegetation

4.17.1 Description of Resources

The Project Area lies within the Minnesota Prairie zones. With the exception of steep slopes and drainages, virtually all of the native vegetation in the Project Area has been converted to agriculture. The National Land Cover Dataset (NLCD) indicates that the vast majority of the Project Area consists of agricultural land (**Exhibit A-8**). About 91% of the Project Area is mapped as Agriculture on the NLCD, 6% Developed land (Farmsteads and Roads), 1% Grassland, 2% Forestland, <0.1% wetland and <0.1% Shrubland. Crops grown in the Project Area consist almost exclusively of corn, soybeans and alfalfa. Some remnant grassland and deciduous forest stands exist, but most are associated with farmsteads, RIM land or on side slopes of stream or drainage ditches.

No portions of the Project Area are shown in the Minnesota County Biological Survey (MCBS) as being of any significance for biodiversity (**Exhibit A-15**; Minnesota Department of Natural Resources 1995). The nearest sites mapped in the MCBS are sites located northeast of the Project Area along the Minnesota River.

All wetlands observed within the Project Area appeared to be highly disturbed by agricultural activity. These wetlands were generally narrow bands of reed canary grass dominated wet meadow along drainage ways or drained and farmed wetlands in agricultural fields.

4.17.2 Impacts

No impacts to native vegetation are anticipated as a result of the proposed Project. All proposed turbine locations will be located on agricultural land and access roads can be sited and connected to public roads without crossing through any woodlands, grasslands or wetlands. Similarly, it is anticipated that collection/feeder lines and transmission lines can be sited to avoid such resources.

4.17.3 Mitigation

Because no impacts to native vegetation are anticipated, no mitigation measures are proposed.

4.18 Wildlife

4.18.1 Description of Resources

Wildlife species in the Project Area are those common to agricultural areas of south-central Minnesota. Mammals using the area include white-tailed deer (*Odocoileus virginianus*), red fox (*Vulpes fulva*), gray fox (*Urocyon cinereoargenteus*), raccoon (*Procyon lotor*), opossum

(*Didelphis virginiana*), cottontail (*Sylviligus floridanus*), woodchuck (*Marmota monax*), pocket gopher (*Geomys bursarius*), thirteen-lined ground squirrel (*Spermophilus tridecemlineatus*), gray and fox squirrels (*Sciurus carolinensis* and *S. niger*), southern flying squirrel (*Glaucomys volans*), mink (*Mustela vison*), striped skunk (*Mephitis mephitis*), badger (*Taxidea taxis*), meadow vole (*Microtus pennsylvanica*) and white footed mouse (*Peromyscus leucopus*).

Bird species found in the cultivated portions of the Project Area include crows (*Corvus brachyrynchos*), rock doves (*Columbia livia*), brown-headed cowbirds (*Molothrus ater*), house sparrows (*Passer domesticus*), mourning doves (*Zenaida macroura*), European starlings (*Sturnus vulgaris*), robins (*Turdus migratorius*), tree swallows (*Tachycineta bicolor*), common nighthawks (*Chordeiles minora*). The cultivated areas of the site also are likely to support ring-necked pheasants (*Phasianus colchicus*), red-tailed hawks (*Buteo jamaicensis*) and American kestrels (*Falco sparverius*). The Project Area has almost no habitat for waterfowl, wading birds (e.g. herons and egrets) or shorebirds other than the RIM land mentioned in previous sections.

Amphibian and reptile species found in the Project Area are limited due to the scarcity of wetlands. This is particularly true of frog and turtle species that require surface water. Some species of amphibians such as the Northern leopard frog (*Rana pipiens),* Western chorus frog (*Pseudacris triseriata),* American toad (*Bufo americanus)* and the Tiger Salamander *(Ambystoma tigrinum)* may utilize the habitat along the drainage ditches and streams in the Project Area. Common upland snakes in the area include common garter snake (*Thamnophis sirtalis*), redbelly snake (*Storeria occipitomaculata*) and fox snake (*Elaphe vulpine).*

4.18.2 Impacts

Wildlife habitat impacts are expected to be minimal because turbines and access roads will be placed exclusively on agricultural land. Less than 1% of the land area within the Project Area will be affected by construction. Grasslands, forested areas, streams/drainages and wetlands will be avoided whenever possible.

The Project Area has similar general habitat and wildlife species composition as many other wind farms in the upper Midwest, and it is anticipated that bird fatality rates documented at other locations will be similar to the proposed Project. Studies outside of California have identified an average of 1.83 fatalities/turbine/year for all birds (0.006 are raptors). Studies at Buffalo Ridge in Minnesota estimated 0.98 fatalities/turbine/year (West 2001). Potential indirect impacts to breeding birds due to displacement by turbines and roads are anticipated to be negligible because turbines will be exclusively on cropland.

Potential bat roosting habitat at the site includes trees and old farm buildings. Stands of trees are relatively sparse. There are several large stands of trees associated with bluffs and ravines in the along the Minnesota River north/northeast of the Project Area. Bats may forage over the entire Project Area, although the extent of use is not known. Bat fatalities have been reported for most wind farms where post-construction monitoring data is available. Reported estimates of bat mortality at wind farms through 2001 ranged from 0.07 to 10 bats/turbine/year. Bat fatality rates

in the Upper Midwest are estimated at 1.7 bats/turbine/year or 2.7 bats/MW/year (NWCC 2004). Most bat casualties at wind farms have been migratory species that conduct long migrations between summer roosts and winter hibernacula. The flat nature of the Project Area does not appear to contain topographic features that would funnel bat movements during migration.

The overall impact of the proposed Project on wildlife is expected to be minimal. Operation of the wind farm will not change adjacent land uses and only a small portion of the Project Area will be affected by construction activities. Also, because all wind farm facilities will be sited on cultivated land, habitat impacts are expected to be negligible. There is some potential for avian and bat collisions with facility turbines and meteorological towers but these impacts are unlikely to be significant.

4.18.3 Mitigation

Wildlife habitat impacts will be mitigated by: (1) siting turbines, roads and other facilities on cultivated land rather than natural wildlife habitat; (2) using tubular towers to minimize perching; (3) placing electrical collection/feeder lines underground; and (4) minimizing other Project infrastructure. Other wildlife-related mitigation measures include:

- Morgan Wind will implement a Wildlife Response Reporting System (WRRS) once turbine construction is completed. The WRRS will include protocols for field technicians, during routine maintenance operations, to report and document avian mortalities;
- Morgan Wind will construct wind turbines using tubular monopole towers and turbines will be minimally lit according to FAA requirements;
- Morgan Wind proposes to place the electrical collection/feeder system from the turbines to the Project Substation underground wherever site conditions allow; and
- The Project is being designed to avoid impacts to wetlands, streams and forested areas.

4.19 Rare and Unique Natural Resources

4.19.1 Description of Resources

Morgan Wind reviewed publicly available sources of information regarding federal and state-listed threatened and endangered species known or likely be found within the Project Area. A formal Natural Heritage Information System (NHIS) data request was submitted to the Minnesota DNR (MnDNR) Natural Heritage Program on February 11, 2009, which maintains the most up-to-date database of rare species observations. On March 3, 2009 the MnDNR Division of Ecological Resources provided the NHIS response (see below).

Federally Listed Species

The USFWS maintains a list of federally listed threatened and endangered species that are known or have the potential to exist in Minnesota counties (USFWS 2008). One federally listed species known or potentially occurring in both Brown and Redwood Counties is the Prairie bush-clover *(Lespedeza leptostachya*). Prairie bush-clover is found in gravelly soil in dry to mesic prairies. This species of plant is listed as Threatened by the USFWS. No native prairies have been identified within the Project Area, and none of the soils mapped within the Project Area are identified as dry, gravelly soils. Accordingly, no federally listed threatened and endangered species are expected to exist in the Project Area.

On February 12, 2009 Morgan Wind contacted the USFWS for comments regarding the proposed Project. As of this time, the USFWS has not yet responded. Morgan Wind will follow up with the USFWS and coordinate any concerns of threatened or endangered species it may have regarding the Project. Once a more complete understanding of USFWS concerns is developed, Morgan Wind will work with the USFWS to address them.

State-Listed Species

The Native Plant Communities and Rare Species of Brown, Renville and Redwood Counties, Minnesota indicated that no state-listed natural communities or rare species has been located within the Project Area (MnDNR 2007).

In order to further assess the likelihood that state-listed threatened, endangered and special concern species might be potentially found in the Project Area, the life histories and distribution data for each of the listed species listed for Brown and Redwood Counties were researched from the Minnesota DNR Website (MnDNR 2009). None of the listed plant species exist within the Project Area. Most listed plant species are associated with sand and gravel prairies, high quality native dominated sedge meadows and floodplain forests along larger rivers. Some species are associated with high quality remnants of habitat types that could occur in the Project Area, but do not appear to be present (e.g. mesic prairies). Due to the extent of agricultural disturbance, it is unlikely that any state-listed plant species exist in the Project Area.

The Minnesota DNR lists nine bird species, two insect, fourteen mussel, and four reptile species found in Brown and Redwood Counties as endangered, threatened or special concern, respectively. All nine bird species require habitat types that do not exist within the Project Area. Six of the listed species, Bald Eagle (*Haliaeetus leucocephalus*), Common moorhen (*Gallinula chlopus*), Forster's tern (*Sterna forsteri*), Marbled godwit (*Limosa fedoa*), Trumpeter swan (*Cygnus buccinator*) and Wilson's Phalarope (*Phalaropus tricolor*) are birds associated with wetlands/lake complexes and are very unlikely to occur on the limited water resources within the Project Area. The Cerulean warbler (*Dendroica* cerulean) requires relatively mature closed-canopy floodplain or moist upland forests. These habitat types are not present in the Project Area; therefore, it is unlikely these birds are present within the Project Area. Henslow's Sparrow (*Ammodramus henslowii*) and the Loggerhead shrike (*Lanius ludovicianus*) are associated with uncultivated native prairies and are unlikely to occur within the Project Area due to the lack of native prairie stands within the Project Area.

Four species of fish and fourteen species of mussel are listed for Brown and Redwood Counties. All of these species are native to the Minnesota River system. Due to the lack of suitable aquatic habitat within the Project Area, it is unlikely that any of the listed fish or mussel species exist within the Project Area.

The two listed insect species are both butterflies that are found on native prairies and are unlikely to occur within the Project Area. Four species of reptiles are listed for Brown and Redwood Counties. The Blanding's turtle uses shallow marsh wetland habitat dominated by native vegetation not found on the Project Area and is unlikely to occur within the Project Area. The Smooth Softshell turtle is found in river and lakes and is unlikely to occur within the Project Area. The Five-lined skink and gopher snake prefers sandy native prairie habitat and are also unlikely to occur within the Project Area.

MnDNR NHIS Response

On March 3, 2009 the MnDNR Division of Ecological Resources responded to a request for a search of the NHIS database (**Appendix D**). The MnDNR indicated there are no known occurrences of rare features within the Project Area or an area within an approximate one-mile radius of the proposed Project.

4.19.2 Impacts

No adverse impacts to Rare and Unique Resources are anticipated from the Project.

4.19.3 Mitigation

Mitigation of potential impacts to Rare and Unique Resources will be in the form of avoidance. The siting of turbines, access roads and other infrastructure will be carried out in a manner that avoids impacts to rare plant communities and threatened, endangered or special concern plant and animal species. Turbine and access road locations are expected to be entirely on cropland so as to avoid any potential rare or unique natural resources.

A preconstruction biological preservation survey will be conducted to facilitate the micrositing of turbines and roads so as to avoid such resources. On February 11, 2009 a formal request was sent to the MnDNR for a search of the NHIS database (**Appendix C**). On March 3, 2009 the MnDNR responded that there are no known occurrences of rare features within the Project Area or an area within an approximate one-mile radius of the proposed Project. (**Appendix D**).

4.20 Summary of Preconstruction Inventories

Morgan Wind will conduct the following preconstruction inventories concerning the Project:

- Biological preservation study;
- Archaeological survey;
- Telecommunication studies; and,
- Phase I Environmental Site Assessment.

Morgan Wind will submit copies of these preconstruction inventories to the PUC the sooner of either the preconstruction meeting (date to be determined) or as they become available.

5.0 IDENTIFICATION OF POTENTIAL PERMITS/APPROVALS

The federal, state and local permits or approvals that have been identified as potentially being required for the construction and operation of the Project are shown in **Table 5-1**. Permits dependent on the final site layout will be applied for after receiving PUC approval, but prior to construction.

Table 5-1: Potential Permits and Approvals Required for the Proposed Facility

Agency		Name and Type of Approval
Federal	Federal Aviation Administration	Notice of Proposed Construction or Alteration (within six miles of Public Aviation Facility and structures over 200 feet to complete a 7460 Proposed Construction or Alteration Form)
		Determination of No Hazard
	Natural Resources Conservation Service	Prime Farmland Permit
	U.S. Army Corps of Engineers	Section 404 Permit (for discharges of dredged or fill material into waters of the United States, and adjacent wetlands)
State of Minnesota	Minnesota Public Utilities Commission	Large Wind Energy Conversion System (LWECS) Site Permit
	Minnesota State Historic Preservation Office	Cultural and Historical resources review; State and National Register of Historic Sites review
	Minnesota Board of Water and Soil Resources	Wetland Conservation Act (WCA) Approval
	Minnesota Pollution Control Agency	NPDES Permit for Construction Activities and Storm Water Pollution Prevention Plan (SWPPP)
		License for Very Small-Quantity Generator of Hazardous Waste
		Spill Prevention, Control and Countermeasure (SPCC) Plan
		Section 401 Water Quality Certification
	Minnesota Department of Transportation	Utility Access Permit
		Highway Access Permit

Table 5-1: Potential Permits and Approvals Required for the Proposed Facility		
Agency		**Name and Type of Approval**
		Aviation clearance from Office of Aeronautics (review and approval of FAA 7460 permit, if needed)
		Oversize and Overweight Program
Local	Redwood and Brown Counties	Building Permits
		Conditional Use Permit
		Zoning Compliance Certificate
		Driveway Permit
		Utility Permit
		Moving Permit
		Overwidth/Overweight Permits
	Redwood and Brown Soil and Water Conservation District	Wetland Conservation Act Approval
	Morgan and Eden Townships	Road Access Permits

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