MALCOLM PIRNIE

Malcolm Pirnie, Inc.
924 Vista Ridge Lane
Shakopee, Minnesota 55379
T: 952-496-2499 F: 952-496-2499
www.pirnie.com

August 4, 2010

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

Re: In the Matter of a Site Permit Application for a Large Wind Energy Conversion System for the Lake Country Wind Energy Facility in Kandiyohi and Meeker Counties, Minnesota
PUC Docket IP6846/WS-10-798

Dear Dr. Haar:

Please find attached the Site Permit Application (Application) for a Large Wind Energy Conversion System for the Lake Country Wind Energy Facility in Kandiyohi and Meeker Counties, Minnesota. This Application is being submitted via the Commission's efiling system by Lake Country Wind Energy, LLC.

Lake Country Wind Energy, LLC seeks a Site Permit authorizing construction of up to a 41 Megawatt (MW) Large Wind Energy Conversion System for the Lake Country Wind Energy Facility. The Lake Country Wind Energy Facility will include 20 (2.05MW) wind turbines, gravel access roads, a project substation, an electrical collector system, permanent meteorological towers, and an operations and maintenance building.

No confidential information is included in the Application. Therefore, only a public version is being filed electronically. A check to cover the costs of the Application will be sent to the Office of Energy Security under a separate cover.

Very truly yours,

MALCOLM PIRNIE, INC.

Jeremy P. Duehr, PWS, FPC
Sr. Project Environmental Scientist
(952) 496-2499

Cc: Mr. Scott Ek – Minnesota Office of Energy Security
Ms. Deborah Pile – Minnesota Office of Energy Security
Mr. Chuck Burdick – Lake Country Wind Energy, LLC

Lake Country Wind Energy, LLC
3033 Excelsior Boulevard • Suite 525 • Minneapolis, Minnesota 55416

PUC Site Permit Application for a Large Wind Energy Conversion System

Kandiyohi and Meeker Counties, Minnesota

Docket No.: IP6846/WS-10-798

August 4, 2010

Report Prepared By:

Malcolm Pirnie, Inc.

924 Vista Ridge Lane
Shakopee, Minnesota 55379
952-496-2499

6523-003

Project Name:	Lake Country Wind Energy Project
Project Location:	Kandiyohi County, Minnesota
	Gennessee Township – T119N, R33W, S 1-4, 10-21, 24
	Harrison Township – T120N, R33W, S 33-36
	Meeker County, Minnesota
	Acton Township – T119N, R32W, S 5-8, 17-18
Applicant:	Lake Country Wind Energy, LLC
Authorized Representative:	Mr. Chuck Burdick,
	Sr. Wind Developer,
	National Wind, LLC,
	Manager of Lake Country Wind Energy, LLC
Signature:	Charles R Burdick
Address:	3033 Excelsior Blvd., Suite 525, Minneapolis, MN 55416
Phone:	(612)-746-6638
Fax:	(888)-867-0688
Email:	cburdick@nationalwind.com
Preparer of Application:	Malcolm Pirnie, Inc.
	Mr. Jeremy P. Duehr
	Sr. Project Scientist
Signature:	Jeremy P Duehr
Address:	924 Vista Ridge Lane, Shakopee, MN 55379
Phone:	952-496-2499
Fax:	952-496-2499
Email:	jduehr@pirnie.com

Contents

List of Tables

Appendices

Acronyms Used in the Report

AADT	Annual Average Daily Traffic
BBS	Breeding Bird Survey
BLM	Bureau of Land Management
BMP	Best Management Practice
C-BED	Community-Based Energy Development
CN	Certificate of Need
CRP	Conservation Reserve Program
CFR	Code of Federal Regulations
dBA	Decibels A-weighted
DEED	Minnesota Department of Employment and Economic Development
DHS	Department of Homeland Security
DOC	Minnesota Department of Commerce
DoD	United States Department of Defense
DOE	United States Department of Energy
DOT	Minnesota Department of Transportation
DNR	Minnesota Department of Natural Resources
DRG	Dispersed Renewable Energy Generation
EMF	Electromagnetic Field
EPA	Environmental Protection Agency
EPC	Engineering/Procurement/Construction
ESA	Environmental Site Assessment
°F	Degrees Fahrenheit
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
ft	Feet
FIRM	Flood Insurance Rate Map
ht	Height
Hz	Hertz
IEC	International Electrotechnical Commission
in	Inch
ISTS	Individual Sewage Treatment System
km	Kilometer
kV	Kilovolt
LLC	Limited Liability Company
LWECS	Large Wind Energy Conversion System
m	Meter
MCBS	Minnesota County Biological Survey
MCOV	Maximum Continuous Operating Voltage
MDH	Minnesota Department of Health
mi	Mile
MISO	Midwest Independent System Operator
MN	Minnesota
MPCA	Minnesota Pollution Control Agency
mph	Mile per hour
MRLC	Multi-Resolution Land Characteristics Consortium

m/s	Meters per second
MW	Megawatt
N/A	Not Applicable
NCDC	National Climatic Data Center
NEXRAD	Next Generation Radar
NHD	National Hydrography Dataset
NLCD	National Land Cover Database
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPS	National Park Service
NRCS	Natural Resource Conservation Service
NRG	NRG Systems
NRHP	National Register of Historic Places
NWCC	National Wind Coordinating Committee
NWI	National Wetland Inventory
p.m.	Post Meridiem
PPA	Power Purchase Agreement
PUC	Public Utilities Commission
PWI	Public Waters Inventory
RCRA	Resource Conservation and Recovery Act
RD	Rotor Diameter
REpower	REpower Systems
RIM	Reinvest in Minnesota
ROW	Right-of-Way
rpm	Revolution per minute
SCADA	Supervisory Control and Data Acquisition
SPCC	Spill Prevention Control and Countermeasures
SWPPP	Stormwater Pollution Prevention Plan
TI	Turbulence Intensity
U.S.	United States of America
USDA	United States Department of Health
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
Ve50	Maximum wind gust over 50-year return for 3-second average
V	Volt
WECS	Wind Energy Conversion System
WMA	Wildlife Management Area
WPA	Waterfowl Production Area

1. Introduction

Lake Country Wind Energy, LLC (Lake Country or the Applicant) submits this Site Permit Application (Application) to the Minnesota Public Utilities Commission (PUC) for a site permit to construct and operate the Lake Country Wind Energy Project (Project) in Kandiyohi and Meeker Counties, Minnesota (See Section 4.1 and Figure 1). The Project is a Large Wind Energy Conversion System (LWECS) of up to 41 megawatts (MW) of nameplate capacity. Currently, Lake Country anticipates using up to 20 REpower MM92 2.05 MW turbines.

Lake Country Wind Energy, LLC is a Minnesota Limited Liability Company formed for the purpose of developing the Lake Country Wind Energy Project. National Wind, LLC is the manager of the Project and currently owns a minority share of Lake Country Wind Energy, LLC.

Lake Country intends to enter into one or more 20-year Power Purchase Agreements (PPAs) with utility off-takers for the sale of power generated from the Project. Lake Country expects a commercial operation date on or before December 31, 2012. Upon request of the PUC, Lake Country will provide a copy of the respective PPAs when they are fully executed.

The Project is a LWECS, as defined in the Wind Siting Act, Minnesota Statutes § 216F.01-216F.07. A Site Permit is required for the Project under Minn. Stat. § 216F.04. A Certificate of Need is not required for the Project because it is not a large electric power facility, pursuant to Minn. Stat. § 216B.243 (See Section 3.1).

Lake Country proposes to construct the Project on approximately 16,047 acres (25 square mi or 65 square km) of agricultural land (Figure 1). Upon completion of the Project, approximately 19.4 acres (0.08 square km or 0.03 square mi) of the 16,047 acres will be converted to turbines and associated infrastructure. Lake Country has designated the 16,047 acres of land as the Project Area for permitting purposes to ensure adequate area is included in the permit review process and to provide siting flexibility for Project optimization and to minimize environmental impacts by allowing sufficient room to buffer natural features and other constraints that exist within the site.

The Applicant currently anticipates using REpower 2.05 MW MM 92 turbines. The turbines will be sited on agricultural land to minimize impacts to the surrounding area and located to maximize the capture of wind resources. The turbines will consist of 100 m (328 ft) towers with 92.5 m rotors (269 ft) for a maximum height of 146 m (479 ft). A

final siting plan will be developed and appropriate approvals/permits obtained prior to construction.

In addition to the 20 turbines, the Project includes buried collection cables, a substation, an operation and maintenance facility, two temporary meteorological towers, one permanent meteorological tower, and access roads (See Sections 5.1 – 5.4). The Project is expected to generate between 139,480 and 142,747 MW (139,480,000 and 142,747,000 kW) annually.

The purpose of this Application is to provide the PUC with information about the wind and environmental resources within the Project Area in order to aid in siting the Project in an orderly manner that is compatible with environmental preservation, sustainable development, and the efficient use of resources.

2. Application Information

2.1. Project Ownership

Lake Country Wind Energy, LLC was formed by National Wind, LLC in partnership with residents in the vicinity of the Project. Lake Country is developing the project, and National Wind, LLC is the manager of the Project. Lake Country intends to qualify as a Community-Based Energy Project (C-BED). The community will benefit from the participation of local individuals in the Project as investors, owners, and advisors. Lake Country received letters of support from the Kandiyohi and Meeker County Commissioners (Appendix B).

2.2. Construction, Operations, and Maintenance

Lake Country has not yet selected Construction, Operations, and Maintenance vendors, but anticipates doing so through a qualified bid process. Vendors will be selected on the basis of experience, capabilities, safety history, and price.

2.3. Lake Country Wind Energy Interest in other LWECS Projects in Minnesota

Lake Country has not developed or retained ownership in other LWECS in Minnesota. National Wind has fully developed one project in Minnesota, two project phases in North Dakota and is actively developing additional community wind projects in Minnesota, Colorado, Iowa, North Dakota, Ohio, South Dakota, and Texas including the following LWECS in Minnesota:

Jeffers Wind Energy Center. Cottonwood County, MN. National Wind (then Wind Energy Developers) initiated the development of the Jeffers Wind Energy Center in late 2003. The development was capitalized by 60+ area landowners forming the ownership entity, Summit Wind, LLC. Xcel Energy selected Jeffers Wind Energy Center as a provider of 50 MW of electricity. Jeffers Wind Energy Center was constructed in 2008 and is in operation. The Jeffers Wind Energy Center is currently owned by Outland Renewable Energy.

Goodhue Wind. Goodhue County, MN. Goodhue Wind is a 78 MW LWECS. A PPA with Xcel Energy, financing, and turbines have been secured. A Site Permit Application has been accepted by the PUC. A draft site permit has been prepared and is currently undergoing public review and comment. The Goodhue project is also undergoing public review and comment for its certificate of need. Goodhue Wind plans to begin

construction in 2010 and for commencement of commercial operation on or before December 31, 2011.

High Country Energy. Dodge, Olmsted and Mower Counties, MN. High County is a 300 MW LWECS currently under development.

Little Rock Wind. Big Stone County, MN. Little Rock is a 49.5 MW LWECS currently under development.

Norfolk Wind Energy. Renville County, MN. Norfolk is a 40 MW LWECS currently under development.

Root River Energy. Fillmore and Mower Counties, MN. Root River is a 300 MW LWECS currently under development

3. Compliance with the Wind Siting Act and Minnesota Rules 7854

The Wind Siting Act requires the siting of LWECS in an orderly manner compatible with environmental preservation, sustainable development, and the efficient use of resources (Minn. Stat. § 216F.03). The Lake Country Project is a LWECS, as defined in the Wind Siting Act, Minnesota Statutes § 216F.01-216F.07. A Site Permit is required for LWECS under Minn. Stat. § 216F.04. An application for a site permit for a LWECS must meet the substantive criteria set forth in Minn. Stat. §216E.03, subd. 7 and Minnesota Rules Chapter 7854. Lake Country has provided sufficient wind resource, project design, technical specifications, and environmental characteristics of the Project to allow a thorough evaluation of the reasonableness of the proposed Project Area for the Lake Country Wind Energy Project.

3.1. Certificate of Need

A "large energy facility" includes generators larger than 50 MW and certain high voltage transmission lines. A Certificate of Need (CN) is required for large energy facilities, including LWECS, pursuant to Minn. Stat. § 216B.243. A CN is not required for this Project because it is smaller than 50 MW and plans to use an existing 69 kV transmission line. Therefore, it does not meet the definition of a large energy facility under the statute.

4. Proposed Site

4.1. Proposed Project Location

The Lake Country Project is located in west-central Meeker County in Swede Grove and Acton Townships and in east-central Kandiyohi County in Gennessee, Harrison, and Kandiyohi Townships (Figures 2 and 3). The City of Atwater is within the Project Area (Figure 4). No turbines will be sited within 1,200 ft (366 m) of the City of Atwater The City of Kandiyohi is to the west of the Project Area and Grove City is to the east. For the purposes of the PUC Permit Application, the Project Area is defined as encompassing nearly 25 square mi (65 square km or 16,047 acres) of land to ensure adequate area is included in the permit review process in order to allow some flexibility for Project optimization and to minimize environmental impacts by allowing sufficient room to buffer natural features and other constraints that exist within the site. Upon completion of the Project, approximately 19.4 acres (0.08 square km or 0.03 square mi) of the 16,047 acres will be converted to turbines and associated infrastructure.

The Project Area is irregular in shape and straddles the Kandiyohi and Meeker County line. U.S. Highway 12 bisects the Project Area (Figure 3). The southern boundary approximates 15th Ave. SE and 30th Ave. SE in Kandiyohi County and 250th St. in Meeker County. The eastern boundary is 2 miles east of the Kandiyohi and Meeker County lines. The northern-most boundary is one mile north of the boundary between Harrison and Gennessee Townships in Kandiyohi County and 283rd St. in Meeker County. The western-most boundary is 120th St. in Kandiyohi County.

Electricity generated from the Project will be routed to a project substation within the Project Area using underground collector lines. The substation will be located in the northwest corner of section 6 in Acton Township, Meeker County (Figure 2). The power will then be routed from the substation to the existing Xcel Energy 69 kV line. The substation will be located adjacent to the existing transmission line. Thus, the construction of above ground transmission lines is not expected to be necessary. Lake Country has completed a purchase agreement for the project substation.

4.2. Wind Characteristics

Lake Country has conducted an assessment of wind characteristics in the Project Area. The assessment was conducted using WindPro software and utilized wind data that was collected onsite at a 60-m (197 ft) temporary meteorological tower located in Section 35, Harrison Township, Kandiyohi County. The temporary meteorological tower has been collecting continuous wind data since September 2008 and will continue to collect wind

data for the foreseeable future. The tower has NRG anemometers located at 59, 50, 40, and 30 m (194, 164, 131, and 98 ft). The anemometers consist of paired anemometers at 59 and 50 m (194 and 164 ft) and individual anemometers at 40 and 30 m (131 and 98 ft). Two wind vanes are located at 57 and 48 m (189 and 159 ft). An additional 100-m (328-ft) temporary meteorological tower was erected in Section 18 of Gennessee Township in July 2010. The tower will be used to supplement the data collected to-date at the existing meteorological tower.

Long-term wind data was collected at a 70-m (229.7 ft) meteorological tower, 10 km (6 mi) east of the Project Area near Hector, MN. The wind data was collected by the United States Department of Energy (DOE) and the Minnesota Department of Commerce (DOC) from July 2003 to October 2006. The tower had three sensors located at 70, 50, and 30 m (229.7, 164, and 98 ft). The total recovery rate for the data was 83 percent.

4.2.1. Interannual Variation

From 2003 to 2006, the average wind speed at an elevation of 70 m (229.7 ft) for the Hector meteorological tower was 6.9 m/s (15.4 mph) with yearly averages ranging from 6.7 to 7.3 m/s (15.0-16.3 mph). This indicates a total variability of approximately 8 percent over the three year period.

4.2.2. Seasonal Variation

In general, the average wind speeds are highest in the spring and winter and lowest in the summer (Table 4-1). Wind speeds appear to increase through the fall and peak in December and again in May before dipping to annual lows in the summer.

Table 4-1:
Average winds speeds (m/s) by month and season at a 70-m metrological tower near Hector, MN from July 2003 to October 2006

Month	Dec	Jan.	Feb.	Mar.	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Month Average (m/s)	7.8	7.4	7.0	7.4	7.5	7.9	6.2	4.9	5.4	6.7	7.3	7.4
Season	Winter			Spring			Summer			Fall		
Season average (m/s)	7.4			7.6			5.5			7.1		

4.2.3. Diurnal Conditions

According to meteorological data collected onsite, the wind speed peaks during three, two-hour time periods during a typical 24-hour period. The highest wind speeds occur from 9 p.m. to 11 p.m., 2 a.m. to 4 a.m., and 1 p.m. to 3 p.m. The overall wind speed varies little during the day with average wind speeds ranging from 6.35 m/s to 6.95 m/s (14.2 – 15.5 mph).

4.2.4. Atmospheric Stability

The studies engaged to determine wind speed and energy production for this Project do not include information necessary to calculate atmospheric stability. Atmospheric stability of the Project Area is expected to be moderately stable based upon the similarities in topography between the Project Area and Minneapolis-St. Paul International (MSP) Airport in Bloomington, Minnesota and the calculated atmospheric stability at the MSP Airport. The STAR (STability ARray) data from National Climatic Data Center (NCDC) reports atmospheric stability of the MSP Airport at approximately 6 degrees.

4.2.5. Turbulence

The Turbulence Intensity (TI) is defined as the measured standard deviation of wind speed over an hour, divided by the mean wind speed for the same period. Average TI at an elevation of 59 m (194 ft) for the onsite meteorological tower was calculated as 13 percent for the period of September 2008 to October 2009. The calculated TI of 13 percent is within the normal operating range for most commercial wind generators.

4.2.6. Extreme Conditions

Extreme wind conditions were defined by Lake Country as wind speeds greater than 15 m/s (33.5 mph) estimated at 100-m (328 ft) at the onsite meteorological tower. Thirty sample periods had extreme wind speeds. The average extreme wind speed measured onsite was 17.7 m/s ± 2.8 m/s (39.6 m/s ± 6.3 mph). It is estimated that wind speeds of 25.3 m/s (56.6 mph), 29.6 m/s (66.2 mph), 31.4 m/s (70.2 mph), 33.8 m/s (75.6 mph), 35.7 m/s (79.9 mph), and 37.5 m/s (83.9 mph) correspond to 1-year, 5-year, 10-year, 25-year, 50-year, and 100-year wind events.

The REpower MM92 is designed to withstand a certain level of loading caused by an extreme wind event. As defined in the International Electrotechnical Commission (IEC) 61400-1 wind turbine design/safety standard, the largest speed to be considered is called Ve50, which is the maximum gust over a 50-year return period for a 3-second average time period. In a Ve50 situation, the control system of the turbine is assumed to be able to pitch the blades in a feathered position, resulting in minimal rotor torque. The Ve50 limit for the REpower 2.05 MM92 is 59.5 m/s (133 mph). The predicted 100-year event would be 37.5 m/s (83.9 mph). Therefore, the extreme wind conditions as measured onsite are well within the loading limits tested by REpower.

4.2.7. Speed Frequency Distribution

The hourly wind speeds collected at the Lake Country temporary meteorological tower from September 2008 to October 2009 have a distribution that ranges from 6.3 to 7.0 m/s (14 to 15.6 mph) at 100 m above the Project Area (Figure 5). Approximately 49 percent of the total wind speeds collected fall within the range of 6 to 9 m/s (13.4 to 20.1 mph) and 79 percent fall within the range of 4 to 11 m/s (8.9 to 24.6 mph).

4.2.8. Variation with Height

Wind speed variation with height, or wind shear, was calculated using the power law wind shear model, which is based upon the relative distance from the ground. The equation for calculating wind shear is $S/So = (H/Ho)\alpha$ where So and Ho are the speed and height of the lower level of wind and α is the power coefficient. The power coefficient varies due to terrain roughness, atmospheric stability and variation in height. The wind shear exponent from 40 to 59 m (131 to 194 ft) was 0.23 and is consistent with the relatively flat terrain of the Project Area.

4.2.9. Spatial Variation

Significant variation in wind speed is not anticipated, due to the relatively uncomplicated, flat terrain of the Project Area. In general, wind resources at 100 m (328 ft) within the Project Area were between 7.4 – 7.9 m/s (16.6 – 17.7 mph) with wind resources higher in the western portions of the Project Area than in the eastern portions (Figure 5).

4.2.10. Wind Rose

Based upon data collected from the onsite meteorological tower, the wind generally flows across the Project Area from the north-northwest (15.4 percent), west-northwest (14.9 percent), south (12.1 percent), and south-southeast (10.6 percent) the majority of the time (Figure 5).

In addition to the wind analysis conducted by Lake Country, the DOC commissioned WindLogics, Inc. to create wind speed maps of Minnesota using data collected from towers located across the state. Data used to develop the Wind Maps was statistically adjusted to accurately represent long-term (40-year) wind speeds over Minnesota. The 2006 DOC wind study mapped a mean annual wind speed at an elevation of 80 m (262 ft) above Project Area ground level as 7.45 to 7.98 m/s (16.7 to17.9 mph), which corresponds well with Lake Country's preliminary assessment. At an elevation of 100 m (328 ft) above ground level, mean annual wind speed is mapped as 8.07 to 8.59 m/s (18.1 to 19.2 mph).

4.3. Other Meteorological Conditions

Rainfall, snowfall, and temperature information for Willmar, MN was obtained from the NCDC and is outlined below in Table 4-2. Willmar is the closest NCDC station to the Project Area and is located approximately 11.3 km (7 mi) to the west of the Project Area.

The NCDC recorded extreme weather events in the Project Area from January 1950 through October 2008. The extreme weather events recorded include blizzards, extreme cold, excessive heat, flash floods, fog, funnel clouds, hail, heavy rain, heavy snow, high wind, lightning, and tornados. Extreme weather recorded specifically for Atwater includes a funnel cloud (2005), hail (1999, 2001, 2002, 2004, 2005, 2008(2 events)),

tornados (2000, 2003, 2005), and thunderstorm winds (1996: 80 mph and 2005: 60 mph (3 storms)). Extreme weather events prior to 1996 were not provided in the NCDC report.

Table 4-2:
Climatic Conditions Collected at Willmar State Hospital, MN and summarized in Climatology of the U.S. No. 20, 1971-2000, National Climate Data Center, Asheville, NC

	Temperature (°F)				Precipitation (inches)			
Month	**Mean Daily Minimum**	**Mean Daily Maximum**	**Mean Extreme Minimum**	**Mean Extreme Maximum**	**Average Precipitation**	**Minimum Precipitation**	**Maximum Precipitation**	**Average Snowfall**
January	-1.0	18.8	-5.0	23.5	0.82	0.05	3.18	11.9
February	6.7	25.6	2.7	30.5	0.62	0.07	2.50	7.0
March	19.7	37.4	18.5	38.6	1.54	0.27	3.81	9.5
April	33.7	54.7	35.8	53.1	2.13	0.25	5.51	2.3
May	47.0	69.2	52.4	66.0	3.22	0.48	7.21	#
June	56.5	78.0	59.7	74.3	5.16	0.56	9.37	0.0
July	60.8	81.8	64.6	76.3	3.76	0.86	9.89	0.0
August	58.2	79.4	63.5	74.6	3.78	0.39	8.65	0.0
September	48.0	70.7	53.8	65.6	2.80	0.50	8.06	#
October	35.8	57.5	41.0	52.9	2.17	0.02	5.69	0.3
November	21.4	37.7	20.5	39.9	1.55	0.09	4.18	8.4
December	5.8	23.5	-1.5	23.9	0.66	0.02	1.85	8.3
Year	32.7	52.9	-5.0	76.3	28.21	0.02	9.89	47.7

4.4. Other Wind Turbines in the Area

The PUC has not issued a LWECS Site Permit for other projects in Kandiyohi or Meeker Counties. In 2009, however, the PUC approved a site permit for the Glacial Ridge Wind Project, a 20 MW LWECS located in Pope County, which is northwest of the Project Area adjacent to Kandiyohi County. Lake Country also reviewed the Federal Aviation Administration (FAA) obstructions database to determine if wind turbines taller than 200 ft are located in Kandiyohi or Meeker Counties. No records of wind turbines taller than 200 ft were found in Kandiyohi or Meeker Counties.

4.5. Wind Rights

Lake Country initiated the Project in 2008 and has received commitments for wind rights over 53 square km (20 square mi or 13,124 acres) of privately owned land within the Project Area. The existing land rights encompass 80 percent of the Project Area and are more than sufficient to site the 41 MW of wind turbines proposed for the Project. The wind rights were obtained via a combination of easements and participation agreements. The easements provide Lake Country with rights to the wind flowing over the parcel of land and to construct the Project on that parcel of land. In addition, the participation

agreements provide Lake Country with setback waivers, but do not provide the right to construct the Project on the parcel. Additional agreements may allow easements for collector lines, access roads, and other infrastructure needed for the Project. Both the easement and the participation agreement allow for 30 years of Project operation with options to operate the Project an additional 20 years. Lake Country is currently seeking one or more 20-year PPAs.

Sixty-six landowners owning 167 parcels consisting of 12,819 acres within the Project Area have signed easements with Lake Country. The easements include full easements over 12,526 acres owned by 64 landowners, participation agreements over 294 acres owned by three landowners and 108 acres pending the negotiation of an easement with one landowner. Additional wind rights are being negotiated with land owners within the Project Area to provide supplementary land in order to optimize the turbine and electrical system layout and allow additional opportunities to maximize environmental preservation.

5. Design of Project

Lake Country has sufficient land under easement to construct its Project and provide siting flexibility during the Project development process. Lake Country is in the process of acquiring wind rights and participation agreements over additional properties in order to optimize the site layout.

Lake Country has also investigated inventories of infrastructure, wetlands, public waters, known cultural resources, native habitats, public lands, and other potentially sensitive areas in order to minimize potential impacts to those resources. Lake Country will continue to collect additional information about the resources within the Project Area as the design of the Project develops.

The Project is currently planned as an array of 20 REpower 2.05 MW MM92 wind turbines, pad mount transformers, collection lines, Supervisory Control and Data Acquisition (SCADA) communication lines, a project substation, access roads, two temporary meteorological towers, one permanent meteorological tower, and an operations and maintenance facility. The preliminary turbine and transformer locations for the 41 MW Project are shown in Figure 2. The Project will interconnect to an existing Xcel Energy 69 kV transmission line with a proposed project substation in section 6 in Acton Township, Meeker County. The exact placement of Project features is subject to change during the project preconstruction surveys, detailed engineering, and micrositing.

The final layout will, at a minimum, incorporate setbacks as required by the PUC's General Wind Turbine Permit Setbacks and Standards for Large Wind Energy Conversion Systems (LWECS) Permitted Pursuant to Minnesota Statute § 216F.08 (Table 5-1) and those adopted by Meeker County. Lake Country understands that Kandiyohi County does not have ordinances governing LWECS and thus defers to the PUC General Siting Guidelines. A summary of the Kandiyohi County ordinance has been included in the application for reference purposes (Appendix C).

Lake Country's design will meet or exceed setbacks required by the PUC and by Meeker County. Lake Country's design has incorporated additional voluntary setbacks and has accounted for the non-permitted or conditionally-permitted use of LWECS in various county zoning districts and will not site turbines within the Kandiyohi or Meeker County's Shoreland Management, Residential, Commercial, Industrial, and Urban Expansion Districts.

Lake Country has instituted setbacks that will minimize impacts to residents within and adjacent to the Project Area. Lake Country has more than doubled the minimum PUC requirements for setbacks from residential dwellings by instituting a 366-m (1,200 ft) setback. The setback from residential dwellings has been increased, when necessary, in order to meet state noise exposure requirements and additional siting adjustments to reduce visual impacts from shadow flicker (see Section 6.3). Lake Country has also voluntarily incorporated more restrictive setbacks from road right-of-way than are required by the PUC in order to minimize the potential for ice shedding on adjacent roads. The Project incorporates Meeker County's right-of-way setback of 1 x turbine height plus 3 m (10 ft) which equals 149 m (489 ft) from all right-of-way. Lake Country has also setback turbines 161 m (528 ft) from all public right-of-way, except unpaved township roads in Kandiyohi County. Setbacks of 122 m (400 ft) have been instituted from unpaved township roads. The 400 ft setback is expected to provide adequate protections from passing motorists as it exceeds the PUC required setback by 150 ft and the reduced traffic levels on unpaved township roads present a lower risk for ice shedding related problems then paved roads within the county.

Lake Country has excluded turbines from Shoreland Management Districts. The Counties' Shoreland Management District's constitute a 305-m (1000-ft) and a 30-m (100-ft) buffer from the ordinary high water mark of public water basins and public watercourses, respectively. The public waters that are subject to the Shoreland Management District are those identified by Kandiyohi and Meeker Counties. Generally, the Shoreland Management Districts correspond to most, but not all water basins mapped by the Minnesota Department of Natural Resources (DNR) Public Waters Inventory (PWI). Meeker County's ordinance is more restrictive than the Shoreland Management District and results in 3 x 5 RD setbacks from all of Meeker County's public water basins and other wetlands greater than 5 acres in size.

The DNR requested that Lake Country exclude State of Minnesota Wildlife Management Areas (WMAs) from the Project Area (Appendix D). Lake Country's revised Project Area explicitly excludes WMAs.

The DNR requested turbine setbacks of 3 x 5 RD from public waters and 5 RD from WMAs. However, Lake Country's adherence to the PUC required setback of 3 x 5 RD from adjacent landowners, a setback of 1,200 ft from residential dwellings, and Lake Country's exclusion of turbines from Shoreland Management Districts resulted in turbines that were already sited outside of the DNR requested setbacks of 5 RD from WMAs and 3 x 5 from public waters.

Table 5-1:
Lake Country's Project setbacks compared to setbacks required by the Minnesota Public Utilities Commission (PUC) and Meeker County, MN

Resource	As Designed	MN PUC	Meeker County
Non-participating Property Lines	3 RD on east-west axis and 5 RD north-south axis[1]	3 RD on east-west axis and 5 RD on north-south axis[1]	3 RD on east-west axis and 5 RD on north-south axis[1]
Residential Dwellings	366 m (1,200 ft)	152 m (500 ft)[2] and sufficient distance to meet state noise standard	1 x total ht + 3 m (10 ft)[3,4]; 305 m (1,000 ft)[5] and sufficient distance to meet state noise standards
Right-of-Way	1.1 x total ht[6] from all roads except 122 m (400 ft) from township roads and avoid private right-of-way	76 m (250 ft)[7]	1 x total ht + 3 m (10 ft)[8]
Public Conservation Lands	3 RD on east-west axis and 5 RD north-south axis[1]	3 RD east-west axis and 5 RD on north-south[1]	3 RD on east-west axis, and 5 RD on north-south axis[1]
Wetlands, Streams and Ditches	Avoid impacts to public waters and public waters wetlands; 3 RD on east-west axis and 5 RD on north-south axis from Types III, IV, and V wetlands[1,9]; 305 m (1,000 ft) from public water basins subject to shoreland ordinance[10]; 92 m (300 ft) from public watercourses subject to shoreland ordinance[10]	Avoid public waters wetlands; No setback required	3 RD on east-west axis and 5 RD on north-south axis from Types III, IV, and V wetlands[1,9]; 305 m (1,000 ft) from public water basins subject to shoreland ordinance[11]; 92 m (300 ft) from public watercourses subject to shoreland ordinance[11]
Existing WECS	N/A	No setback required	3 RD on east-west axis and 5 RD on north-south axis[1]

[1] 3 RD for Repower 2.05 MM92 turbine is 278 m (910 ft); 5RD for Repower 2.05 MM92 turbine is 463 m (1,517 ft)
[2] 152 m (500 ft) plus distance to meet state noise standard
[3] 1 times the total height (ht) + 3 m (10ft) is 149 m (489 ft)
[4] Distance for owner occupied dwellings
[5] Distance for non-owner occupied dwellings
[6] 161 m (528 ft) from edge of public roads right-of-way
[7] Setback 76 m (250 ft) from edge of public roads right-of-way
[8] 1 times the total height (ht) + 3 m (10ft) is 149 m (489 ft) from public and non-public right-of-way
[9] Meeker County wetlands Circ39 types 3,4 and 5 which are greater than 5 acres in size
[10] Meeker and Kandiyohi County shoreland areas
[11] Meeker County shoreland areas

Resource	As Designed	MN PUC	Meeker County
Internal Turbine Spacing	3 RD on east-west axis and 5 RD on north-south axis[1]	3 RD on east-west axis and 5 RD on north-south axis[1]	No setback required
Parks	N/A	Case by case basis	No setback required
State Trails	N/A	Case by case basis	No setback required
Significant Historic Sites	Avoided[12]	No setback required	No setback required
Native Prairies	Avoided[13]	Turbines cannot be placed in native prairies unless approved in the native prairie protection and management plan	Turbines cannot be placed in native prairies unless approved in the native prairie protection plan
Sand & Gravel Operations	Avoided active sand and gravel operations	Turbines cannot be placed in active sand and gravel operations unless negotiated with landowner	Turbines cannot be placed in active sand and gravel operations
Aviation	5 nautical mile setback from all surrounding FAA regulated airports	Structures cannot create an obstruction to navigable airspace of public and private airports	Structures cannot create an obstruction to navigable airspace or public and private airports in Meeker County

The USFWS requested that Lake Country setback turbines 0.5 mile (804 m) from State and Federally owned or leased land and 0.25 mile (402 m) from state or federally funded projects, e.g., Conservation Reserve Program (CRP), Wetland Reserve Program (WRP), depending upon results from pre-construction surveys. Due to required setbacks, no buildable area for turbines exists within 0.5 mile of a State or federally owned land. Buildable area does exist within 0.5 mile of USFWS leased land and 0.25 mile of state or federally funded projects. Lake Country has avoided siting turbines on state or federally funded projects and will setback turbines from state or federally funded projects when practicable.

Construction of the Project will entail grading and temporary land disturbing activities associated with constructing turbine pads, drainage systems, access roads, storage areas, and operation and maintenance facilities and placement of underground cables and collector lines. Soil disturbance and compaction will be minimized and confined to as small of an area as possible and topsoil will be protected and segregated when practicable. All facilities will be installed only as necessary to fully accommodate all aspects of the construction, operations, and maintenance of the Project.

[12] A Phase I cultural resource assessment will be completed on the site to determine if there are significant historic sites present.
[13] Includes avoidance of land enrolled in Conservation Reserve Program and Reinvest in Minnesota (RIM).

Lake Country will update the project layout provided in this Application as the Project design develops so that an up-to-date representation of the turbine locations and project substation are provided.

5.1. Description of Turbines, Towers, Foundations, and Other Equipment

The Project will be a LWECS with a nameplate capacity of 41 MW and will consist of up to 20 REpower 2.05 MW MM92 series wind turbine generators. The turbines will be sited on agricultural land to minimize impacts to the surrounding area and located to maximize the capture of wind resources. The turbines will consist of 100-m (328 ft) towers with 92.5-m rotors (269 ft) for a maximum height of 146 m (479 ft). The REpower turbine has a rated wind speed of 12.5 m/s (28 mph) with a cut-in wind speed of 3.0 m/s (6.7 mph) and a cut-out wind speed of 24 m/s (53.7 mph). Each REpower turbine will have a variable speed from 7.8 to 15 rpm and will have a swept area of 6,720 square m (72,333 square ft, 1.7 acre).

The REpower 2.05 MW MM92 series turbine is a three-bladed, upwind, active yaw, and electronically controlled wind turbine. It has individually adjustable blades for pitch and speed control with a yield optimized, variable speed turbine generator. The turbine utilizes a combined planetary/spur gearbox design with a ratio of 1:120. The variable speed operation results in low conversion loss and high total efficiency as converter output is limited to a maximum 20 percent of the overall output. The turbine gearbox is cast and is supported by elastomeric bushings, which provide noise reduction.

Turbines will be protected from lightning through a grounding and shielding system that will be installed during installation of the foundation. The grounding system will be designed according to local soil conditions. The purpose of the grounding system is to establish a low resistance and safe path for lighting to reach the ground. Each turbine blade contains a copper wire that extends from the blade tips through the rotor and nacelle and down the tower to the buried ground grid. Lightning rods are attached to the anemometer and wind vane located on the top of the nacelle to offer additional protection to the turbine nacelle.

5.1.1. Towers

Turbine towers consist of four multi-coated, conical tubular steel sections with a lockable steel door at the base of the tower, interior lighting, electrical, control, communication cables, a control system located at the bottom of the tower, and a safety ladder or lift with fall arresting safety system for access to the nacelle. Tower surfaces are sandblasted, coated for protection against corrosion, and painted with non-glare paint. Individual tower sections are delivered to the site and bolted together during the tower erection

phase. A service platform at the top of each section allows for access to the tower's connecting bolts for routine inspection.

5.1.2. Foundations

The turbine foundations will be designed by a licensed structural/geotechnical engineer in accordance with manufacturer's specifications. Foundation designs will be based upon site conditions and applicable load criteria. Site conditions will be determined during geotechnical surveys of the site, which will be undertaken prior to initiating final foundation design. Foundation designs will incorporate the results of analyses to determine bearing capacity, amount of settlement, stress levels, deformation levels, overall stability, ground improvement, and ground behavior. Typical foundation designs include freestanding towers connected to the foundation by anchor bolts embedded in concrete with high quality grout. The anchor bolts are tied to rebar and rebar cages, which are installed throughout the foundation.

Lake Country contracted with Barr Engineering Company (Barr) to conduct a preliminary analysis of soil properties within the Project Area and to utilize that information and foundation load documents from the REpower MM92 with a 100-m tower to generate a draft foundation design. Based upon Barr's analysis, a spread-type foundation is an example of a foundation that will likely be used for this Project. The spread-type foundation is an octagonal foundation that is 2 m tall (6 ft 8 in) and 17.7 m (58 ft) in diameter (Appendix E). The pedestal and an embedded steel ring extend skyward from the base and will be used to mount the turbine tower. The central pedestal is 6 m (19 ft 6 in) in diameter and 0.8 m (2 ft 6 in) tall. The central pedestal extends approximately 15 cm (6 in) above ground. Approximately 513 cubic yards of concrete and 43 tons of steel will be used for each foundation. Site geotechnical conditions and turbine tower load specifications will dictate final foundation design.

Turbine foundations are constructed onsite by first placing reinforcing re-bar and re-bar cages, pouring of the foundation concrete, and installation of the turbine ground grid around the outside base of the foundation. Prior to installing the turbine, native soil is removed from the area and stockpiled for soil surface amendment. Subsoil, rock, and other debris that is removed will be profiled and disposed of at an approved site.

5.1.3. Meteorological Towers

Lake Country installed one, 60 m (196.9 ft) temporary meteorological tower in September 2008 and one, 100 m (328 ft) temporary meteorological tower in July 2010 (see Section 4.2 for a full discussion of pre-construction meteorological towers).

A permanent 80 m (262 ft) meteorological tower will be installed when construction of the Project is complete. The permanent meteorological tower will be sited in an appropriate location for assessing wind. The tower will be equipped with an NRG

datalogger connected to calibrated anemometers, wind direction sensors, and temperature probes that can be configured at 80, 70, and 60 m (263, 230, 197 ft) levels. The ground area required to install the meteorological towers is approximately 104 by 117 m (341 by 384 ft). An access road will also be required for the meteorological tower.

5.2. Description of Roads and Temporary Construction Areas

Temporary roads and construction areas will also be built prior to construction. Cranes and equipment delivery trucks will require roads that are wider than the permanent access roads. Efforts will be made to minimize topsoil loss and soil compaction. Temporary roads will consist of a gravel road that will be approximately 14 m (45 ft) wide and will coincide with permanent roads. Turbine assembly will require an approximate 12.2 by 36.6 m (40 by 120 foot) gravel crane pad area extending from the access road to the turbine foundation. The crane pad will be graded to a minimum of 1 percent slopes. In addition, a component lay down and assembly area of approximately 79 by 102 m (260 by 335 ft) will be graded to a minimum of 5 percent slopes and will be centered near the turbine foundation. After construction, the gravel from temporary roads and crane pads will be removed and all natural contours will be restored. Disturbed areas will be seeded if necessary.

Permanent access roads will be built to allow access to towers during and after construction. Access roads will be sited to minimize the impact to existing and future land use activities adjacent to the roads and to minimize the amount of roads constructed for the Project. The roads will meet local and state requirements. The access roads will consist of gravel surface, underlain with geotechnical fabric, if necessary, and will be approximately 5 m (16 ft) wide. Access roads will have a low profile to allow farm machinery to cross and will also include appropriate drainage and culverts. Access roads will be adequate to support the size and weight of maintenance vehicles and will allow passage under all weather conditions. An 11 m (35 ft) diameter gravel work area will also be built at the base of each turbine. The exact locations of roads will be determined concomitantly with the final turbine layout. Roads will be sited in coordination with local landowners.

5.3. Description of LWECS Electrical System, Transformers

In 2008, the Minnesota Transmission Owners completed a Dispersed Renewable Energy Generation (DRG) Study for the Minnesota Department of Commerce, Office of Energy Security. The DRG revealed an interconnection opportunity at the Atwater substation in Kandiyohi County, Minnesota. National Wind filed a 40 MW interconnection request for this location, securing queue position H067 for the Lake Country Project. The Project's interconnection request is currently being studied by Midwest Independent System Operator (ISO). An interconnection agreement is expected by September 2010.

Coordination with the Midwest ISO and Xcel Energy resulted in the need to construct a project substation, which will serve as the Project's interconnection point. The project substation will be located south of 30th Ave. NE on the east side of 210th St. NE in Section 6 of Acton Township, Meeker County.

The project substation will be adjacent to, and will interconnect directly with Xcel Energy's 69 kV transmission line, which is positioned in a north-south alignment in the Project Area along the Kandiyohi and Meeker County line. The 69 kV transmission line will serve as the conduit through which power generated from the Project will flow. The project substation footprint is expected to encompass approximately 1,394 square m (15,000 square ft) and include associated switching and protection equipment as well as metering equipment and a small control house. The project substation is expected to consist of one nominally rated 48 KV maximum continuous operating voltage (MCOV) transformer. The use of the existing 69 kV line will preclude the need for construction of feeder lines or a new above ground transmission line for the Project. The project substation will conform to Midwest ISO standards. The design of the substation will be finalized when the Midwest ISO completes the facility study.

The power generated by each turbine will be collected and transformed at the turbine pad from 575 V to 34.5 kV using a 2100 kVA pad mounted step-up transformer. The pad mounted transformers will meet all state code requirements as well as industry standards. Each transformer will be configured in a loop fed, dead front arrangement. Transformers will be equipped with locking doors to prevent unauthorized entry and bollards to protect against accidental impacts from service equipment or farm machinery.

The turbines will be interconnected via buried communication cables, 34.5 kV electrical collector lines, and junction boxes within the Project Area. The turbine arrangement is such that each of the two collector lines will carry the power from 10 turbines. Cables and collectors will be buried adjacent to access roads when practicable and will be sited entirely on land under easement, with the exception of road crossings. The collectors will be buried to a depth of 1.2 m (48 in) to minimize risk of the line being struck during soil alteration practices including agricultural and otherwise. The project's collector lines will converge at the proposed 69 kV project substation.

The final electrical system design and interconnection details will be determined based on studies currently underway and through discussions with the Project's utility off-taker and Midwest ISO. The Project will meet electrical design requirements, including power factor, voltage control, and grid system protection set forth by the Midwest ISO and the utility off taker.

5.4. Description and Location of Associated Facilities

An operations and maintenance facility is expected to be constructed as part of the Project. The location of the facility has not been determined, but will be sited as the design of the Project is finalized. The facility will likely be sited near the project substation and will house equipment to operate and maintain the Project including switchgear. The facility is expected to consist of 1 to 2 buildings with an approximate footprint of 3,000 to 5,000 square feet. A gravel parking lot will be installed adjacent to the facility.

The Project includes a system for simultaneously controlling the wind turbines by using a computer-controlled communications system that permits automatic, independent operation and remote supervision. Each turbine will be programmed to operate autonomously and will do so under normal conditions. The turbines will continuously communicate with a SCADA system that monitors turbine operation and energy production. The SCADA system collects data on wind turbine generation, availability, alarms and communication error information, and meteorological and communications data. The SCADA system will monitor the status of turbines individually and the wind farm as a whole and will alert operations personnel to operational conditions that require attention. Performance data and parameters for each machine can also be reviewed in real time and machine status can be changed remotely. All generation data can be summarized in reports and will be archived by SCADA. The actual SCADA system for this Project has not been finalized. Lake Country will enter into contractual agreements with a third party to provide off-site operations, and on-site service and maintenance of the Project.

6. Environmental Analysis

In compliance with Minnesota Rules Chapter 7854, an environmental analysis of the Project Area and vicinity was conducted to identify existing conditions and potential impacts from the proposed Project. Agency coordination letters were also sent to various regulatory and government entities to request information that would assist in determining impacts from the proposed Project. Agency coordination letters and responses are provided in Appendix D. Information obtained from background review and agency coordination is provided in this section.

6.1. Demographics

The Lake Country Wind Energy Project is located in Swede Grove, Acton, Gennessee, Harrison, and Kandiyohi Townships covering area in both Meeker and Kandiyohi Counties. Meeker County is located approximately 46 miles west of the Minneapolis-St. Paul metropolitan area (Figure 1). The county covers approximately 1,673 square km (646 square mi) and is comprised of nine cities including Cedar Mills, Cosmos, Darwin, Dassel, Eden Valley, Grove City, Kingston, Litchfield, and Watkins and 17 townships (Meeker County Website).

Kandiyohi County is located to the west of Meeker County, approximately 71 miles to the west of the Minneapolis-St. Paul metropolitan area (Figure1). The county covers approximately 2,238 square km (864 square mi) and is comprised of 12 cities including Atwater, Blomkest, Kandiyohi, Lake Lillian, New London, Pennock, Prinsburg, Raymond, Regal, Spicer, Sunburg, and Willmar and 24 townships.

Kandiyohi County has roughly double the population of Meeker County and slightly under twice the number of housing units and households (Table 6-1). In both counties the greatest percentage of workers are employed in management, professional and related occupations (Table 6-2). The labor force and unemployment rates in both counties dropped between April 2009 and April 2010 (Table 6-3).

The median household income in Meeker County in 2008 was $50,127, 13 percent below the state average for that year and the percentage of families below the poverty level during the previous 12 months was 7.2 percent, less than one percent above the state average for 2008 (U.S. Census Bureau).

The median household income in Kandiyohi County in 2008 was $50,876, 12 percent below the state average for that year, and the percentage of families below the poverty

level during the previous 12 months was 6.9 percent, less than half a percent above the state average for 2008 (U.S. Census Bureau).

Table 6-1:
General Residential and Housing Characteristics

	Meeker County			Kandiyohi County		
	1990	2000	2008	1990	2000	2008
Residents	20,846	22,644	23,156	38,761	41,203	40,679
Residents / square mi	32	35	36	45	48	47
Housing Units	9,139	9,821	10,792	16,669	18,415	19,802
Housing Units / square mi	14	15	17	19	21	23
Household Size (avg)	2.67	2.58	2.41	2.64	2.53	2.28
Households	7,651	8,950	9,398	14,298	15,936	17,187
Households / square mi	12	14	15	17	18	20

Source: U.S. Census Bureau, American Community Survey and Decennial Census

Table 6-2:
Employment Percentage in 2008 by Industry for the Civilian Employed Population 16 Years and Over

County	Management, Professional, and Related Occupations	Service Occupations	Sales and Office Occupations	Farming, Fishing, and Forestry Occupations	Construction, Extraction, Maintenance, and Repair Occupations	Production, Transportation, and Material Moving Occupations
Meeker	25.8	15.3	22.4	1.6	11.3	23.6
Kandiyohi	33.6	16.4	22.5	2.1	8.8	16.5

Source: U.S. Census Bureau, American Community Survey

Table 6-3:
Year-Over-Year Labor Force and Unemployment Rates

	April 2009		April 2010	
County	Labor Force	Unemployment Rate	Labor Force	Unemployment Rate
Meeker	12,891	11.5	12,231	9.2
Kandiyohi	24,121	7.3	23,561	6.1

Source: Minnesota Department of Employment and Economic Development

6.1.1. Impacts

The Project is not anticipated to have negative impacts to the demographics of the two counties. The Project is anticipated to bring 100 temporary jobs during construction, two permanent operations and maintenance jobs and additional business to the area during construction activities. There is no evidence that minority or low-income populations are concentrated within the Project Area, therefore no impacts to these populations are anticipated. A very small percentage of agricultural land will be permanently lost due to installation of the turbines. Landowners will be compensated through lease agreements and the areas surrounding the turbines will still be farmed.

6.1.2. Mitigation

The proposed Project is anticipated to have temporary beneficial impacts through the creation of jobs and spending due to construction activity. Impacts to owners who will lose some agricultural lands will be compensated and such payments are anticipated to also have a beneficial impact to the community. Therefore, no specific mitigation action is proposed.

6.2. Noise

Noise is defined as any loud, discordant or disagreeable sound or sounds. More commonly, in an environmental context, noise is defined simply as unwanted sound. Certain activities inherently produce sound levels or sound characteristics that have the potential to create noise. Numerous environmental factors determine the level or perceptibility of sound at a given point of reception. These factors include: distance from the source of sound to receptor; surrounding terrain; ambient sound level; wind direction; temperature gradient; and relative humidity (Beranek, 1993; Thumann and Miller, 1990). For example, warm air near the ground overlain by cooler air at low altitude can cause the sound waves generated by wind turbines to curve upwards, away from the ground and human receptors while cold air near the ground overlain by warmer air at low altitude can have the reverse effect (Singal, 2005). Characteristics of a sound, e.g., amplitude (loudness), frequency (pitch), impulse patterns and duration, are also important determining factors that influence perception of sound. The combination of sound characteristics, environmental factors and the physical and mental sensitivity of a receptor to a sound determine whether or not a sound will be perceived as a noise (Beranek, 1993).

Wind turbines produce mechanical and aerodynamic sound. Mechanical sound is generated via the gear box, generator, hydraulic pumps, yawing machinery and other moving mechanical parts contained in the turbine nacelle (Jakobsen 2005). Early generation wind turbines produced mechanical tonal sounds (a “hum” or “whine” at a steady pitch). This problem has been nearly eliminated in modern turbine design.

Methods of controlling mechanical noise are well known and include the use of a cast gearbox supported by elastomeric bushings.

Aerodynamic sound is produced by interaction of a turbine blade with air turbulence it produces as it rotates (Brooks, 1989). Aerodynamic sound is the dominant type of sound produced by wind turbines and can be generated at frequencies below and across the range of human hearing, which extends from 20 Hz (low pitch) to 20,000 Hz (high pitch)(Colby *et al.* 2009; Beranek, 1993). The "swishing" or "whooshing" sound sometimes used to describe aerodynamic sound is the result of amplitude modulation (Moorhouse *et al.* 2007). Amplitude modulation can be observed in close proximity to a wind turbine where the volume of the sound produced can increase and decrease in rhythm with the passing of the wind turbine blades. Typically, the amplitude modulation decreases and the sound assumes a steadier, less modulating character as distance from the turbine increases (Colby *et al.* 2009; Jakobsen 2005). Modern wind turbine blade designs and maintenance techniques target increased efficiency through reductions in turbulence, which has the added benefit of reducing overall aerodynamic noise (Colby *et al.* 2009).

The Lake Country Project will be located in a rural setting where night-time background sound is estimated to be between 20-40 decibels (dBA). Wind farm sound is typically 40 to 50 dBA at 1000 to 2000 ft from the wind farm (Colby et al 2009). Preliminary noise modeling for the Project suggests wind farm sound is between 35 to 40 dBA at 1000 to 2000 ft from the turbines. As stated above, typical distance and sound levels will vary depending upon the turbine and environmental factors. In addition, the placement of wind turbines where wind speed is higher than average, the background noise of the wind tends to mask any sounds that might be produced by operating wind turbines, especially since the turbines will only run when the wind is blowing.

The PUC requires that LWECS comply with Minnesota Pollution Control Agency (MPCA) standards. Per PUC Docket number EG-999/M-07-1102, Exhibit A, "projects must meet Minnesota noise standards, Minnesota Rules Chapter 7030, at all residential receivers (homes). [The] [r]esidential noise standard [for residential receivers] NAC 1, [is] L50 dBA during overnight hours. Setback distance [shall be] calculated based on site layout and turbine for each residential receiver." Meeker County has a lower baseline setback requirement from residential dwellings than the PUC (Table 5-1). However, Meeker County also requires that noise generating projects comply with MPCA rules/standards for maximum daytime and nighttime levels. LWECS in Minnesota are also subject to other applicable setbacks from homes and adjacent property boundaries (Table 5-1).

6.2.1. Impacts

Operation and maintenance of the wind farm may increase sound levels within the Project Area. The sound level generated from the wind turbines will vary with the speed of wind and distance of the receptor from the turbine. In general, on windier days, turbines can create more noise than less windy days; however, the increase in wind tends to mask the noise generated by the turbine. Lake Country modeled the 20 REpower 2.05 MW MM92 turbines to ensure that each residential dwelling within or adjacent to the Project Area does not experience sounds levels that exceed MPCA standards (Figure 6). The most restrictive standard that guided Lake Country was the MPCA's nighttime L50 of 50 dBA.

Lake Country's modeling was conducted using the Decibel extension in WindPro. The model used Danish Codes with a wind speed of 8.0 m/s (17.9 mph), sound output of 104.2 dBA from each REpower turbine and an air absorption rate of 5 dB per km. Lake Country's conceptual turbine layout will not exceed state noise L50 standards of 50 dBA at residential receivers at night. One residential dwelling will receive a maximum of 45 dBA of sound from the turbines. The remaining residential dwellings will receive less than 45 dBA of sound. Preexisting screening, such as buildings and trees, around residential dwellings was not included in the model and is expected to further reduce the level of sound heard at each residential dwelling from that which was modeled.

Infrasound and low frequency sound emitted from wind turbines is not detrimental to human health or safety. Infrasound and low frequency sound frequencies range from 4 to 20 Hz and 10 to 200 Hz, respectively (Leventhall *et al.* 2003). The typical range of human ear frequency detection is 20 Hz to 20,000 Hz; however, the human ear does not respond uniformly to all frequencies. For example, humans perceive a 50 Hz sound at 50 dB to be equally loud as a 1000 Hz sound at 20 dB. Similarly, humans cannot typically hear a 50 Hz sound at 40 dB while a 100 Hz sound at 40 dB is plainly audible. Investigations of wind turbine sound show very low frequency sounds are not typically produced above the minimum human hearing threshold and will not be audible below approximately 50 Hz at typical distances (Hayes 2006; Kamperman and James 2008 quoted in Colby *et al.* 2009).

There is no evidence for direct physiological effects from either infrasound or low frequency sound at levels generated by wind turbines, indoors or outdoors (Colby *et al.* 2009). Because the human ear does not respond uniformly to all frequencies, negative effects of sound are directly dependent on the frequency level of sound with higher frequency sounds of equal amplitude presenting a greater risk of negative effect than lower frequency sounds of equal amplitude (Colby *et al.* 2009). The sound amplitudes and frequencies generated by wind turbines are not likely to be at a sufficient level to generate deleterious effects via speech interference, noise-induced hearing loss, task interference, or internal organ damage (Colby *et al.* 2009). Nonetheless, audible low

frequency sounds and amplitude modulating sounds may be annoying to some people especially at initial exposure (Leventhall *et al.* 2003). Annoyance is a subjective response that varies widely among people, cannot be measured or easily predicted, and is not considered an adverse health effect or disease of any kind (Colby *et al.* 2009).

6.2.2. Mitigation

Potential noise impacts to the neighboring properties or other affected receptors have been and will continue to be considered in the design, siting, and construction of the proposed project. Lake Country has and will continue to strive toward executing an easement with landowners within the Project Area that have not executed an easement. Landowners that participate in and receive economic compensation from projects are less likely to find sound emitted from projects as annoying (Maynard et al. 2009). Turbines will be setback a minimum of 366 m (1,200 ft) from residential dwellings. This setback was voluntarily initiated by Lake Country and represents more than double the minimum required by the PUC. In accordance with the Minnesota Public Utility Commissions Order Establishing General Wind Permit Standards, setbacks distance will be calculated based on site layout and turbine for each residential receiver. The project has been designed to comply with Minnesota Rules Chapter 7030.

6.3. Visual Impacts

Viewshed

The existing Project Area is a rural agricultural area. Seventy-eight percent of the Project Area is covered by cultivated crops. Approximately eight percent of the area is pasture and planted grass. The topography of the area is generally level with some gently rolling areas that are punctuated by drainageways, scattered wetlands and lakes. Farmsteads are scattered throughout the Project Area. The City of Atwater is located within the center of the Project Area and Grove City is located less than two miles to the east of the Project Area. According to the Multi-Resolution Land Characteristics Consortium's *2001 National Landcover Database*, the residents within the cities have a viewshed of low, medium and high intensity development (See Section 6.16). Residents along the periphery of the cities have a viewshed of open expanses consisting of agricultural lands, woodland, and wetland. Rural residents within and surrounding the Project Area have a viewshed of open expanses of agricultural lands, woodland, open water and wetlands.

Shadow Flicker

Shadow flicker can be described as the intermittent shadows that a rotating wind turbine casts on the ground which may be observed at times of the day when the sun is directly behind the rotor from an observer's position. Shadow flicker is a function of many factors, including the wind speed and direction, variation in sunlight intensity and position, the latitude of the location, topography, and presence of obstructions (Nielsen

2003 cited in NRC 2007). Shadow flicker is not important at distant sites, e.g., greater than 1,000 ft., except in the morning and evening when shadows are long.

6.3.1. Impacts

Viewshed

The turbines will be sited on agricultural land to minimize impacts to the surrounding area and located to maximize the capture of wind resources. The turbines will consist of 100-m (328 ft) towers with 92.5-m rotors (269 ft) for a maximum height of 146 m (479 ft). FAA approved lighting will be attached to a selection of turbines throughout the Project Area per FAA lighting requirements.

The turbines will be visible from the cities of Atwater and Grove City and from roadways near and within the Project Area. The turbines will be visible from Diamond Lake and the County Park on the west side of Diamond Lake. The turbines will also be visible from at least two WPA's to the west of the Project Area. While these turbines will modify the visual landscape, it is a matter of perception of whether this is a negative or positive modification. It is not likely that the visual impact is quantifiable or will cause economic damage. For example, a study of the effects of wind farms on the value of almost 7,500 properties within 10 miles of wind farms found that neither the view of the wind facility or the distance of the home from the wind facility was found to have a consistent, measurable, or statistically significant influence on home sales prices (Hoen *et al.* 2009).

Shadow Flicker

Shadow flicker can be a nuisance to people living near a wind energy project if the project is not properly designed to avoid impacts to residents. Important considerations for shadow flicker impacts are the intensity, frequency, and duration of shadow flicker exposure. The intensity of shadow flicker is dependent upon the intensity of the sun and other ambient atmospheric conditions. Frequency of shadow flicker is dependent upon the frequency of the turbine rotor. The REpower 2.05 MW MM92 turbines have variable rotor frequencies of 7.8 to 15 rpm. The rotor frequencies translate into 0.1 to 0.3 Hz. Frequencies above 10 Hz are necessary to cause epileptic seizures (NRC 2007). Thus, shadow flicker created by the proposed project is not likely to cause epileptic seizures.

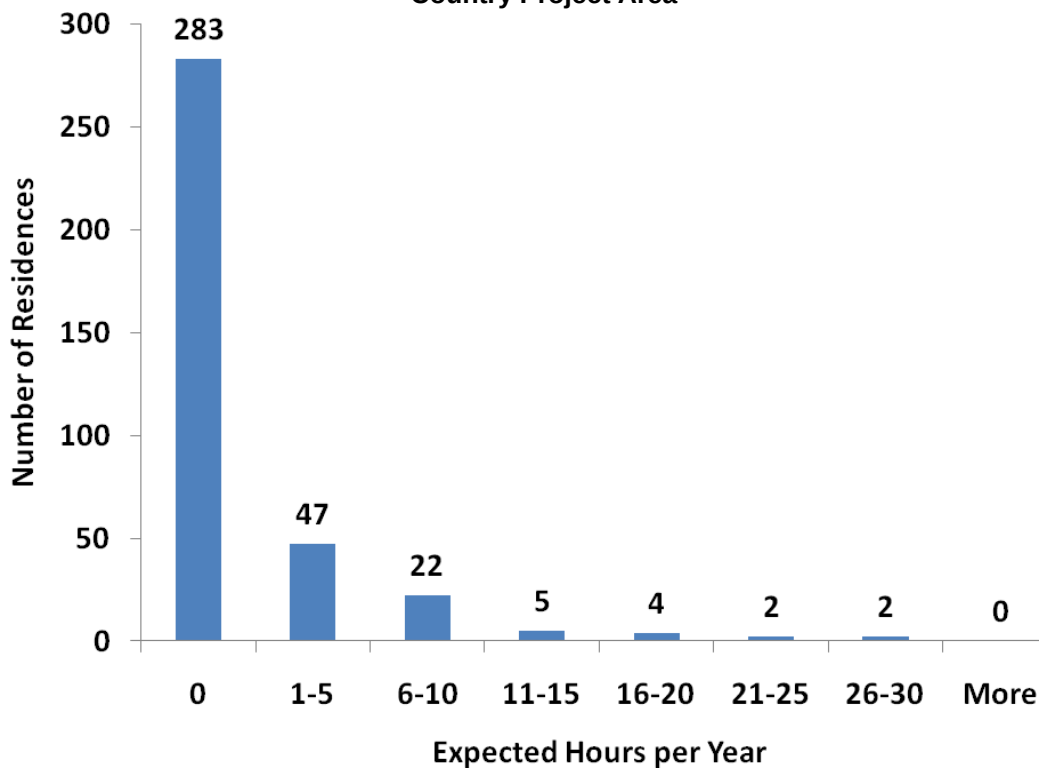
The duration of shadow flicker is dependent upon the angle of the sun and the geographic position of the receptor in relation to the wind turbine. Lake Country used WindPro to model the maximum amount of exposure that a residential dwelling would experience in a given year. WindPro utilizes the specific dimensions of the turbine model and characteristics of the site, topography, wind speed and direction, and a distribution of sunshine hours to generate its modeled exposure levels. Lake Country's estimate is based upon the assumption that the walls of each residence are comprised of clear glass and are

not surrounded by buildings or trees. Thus, the estimate did not take into account the solid walls of the residence, a potential for no windows in the area that will receive the exposure, existing screening or weather conditions that would result in reductions of shadow flicker intensity and duration. Thus, Lake Country's estimate is considered conservative.

Lake Country has designed the Project to minimize shadow flicker on residential dwellings. Seventy-eight percent of the residential dwellings within one-mile of the Project Area will not be exposed to shadow flicker (Figure 7). Four residential dwellings may receive more than 20 hours of shadow flicker per year with the maximum exposure that may be realized at a residential dwelling of 27 hours and 32 minutes per year. The maximum exposure of 27 hours and 32 minutes is approximately 0.6 percent of the maximum possible daylight hours in a year (4460 hours) for this region as determined by the U.S. Naval Observatory sun or moon rise and set tables.

Figure 7.

Expected Shadow Flicker Exposure at Residential Dwellings within 1-mile of the Lake Country Project Area



6.3.2. Mitigation

Viewshed

The following measures will be used to minimize the visual impact of the turbines in the area:

- The gray/white color of the turbines is designed to blend into the skyline;
- The turbines will not be placed in park areas or sensitive habitat areas;
- Turbines will not be lit unless required by the FAA;
- Collector lines will be buried underground;
- Areas not used for crop production that are temporarily disturbed to create the turbine sites and access roads will be re-seeded if necessary to match surrounding vegetation; and
- Turbines will be placed at least 366 m (1,200 ft) from all residential dwellings.

Shadow Flicker

Appropriate modeling and setbacks have been applied to ensure shadow flicker will be minimized to a level that will not require mitigation. Lake Country has and will continue to strive toward executing an easement with landowners in the Project Area that have not already executed an easement. Landowners that participate in and receive economic compensation from projects are less likely to find visual impacts as a negative impact. However, if shadow flicker becomes a problem in the future, screening measures, such as tree planting, can be employed to block the flickering shadows that are cast on residential dwellings.

6.4. Public Services and Infrastructure

The Project Area is located in west-central Minnesota in a rural/agricultural area. Existing infrastructure in the area includes paved and gravel roads and utility services (Figure 8). U.S. Highway 12 and rural township and county roads bisect the area.

Electrical Service

Electrical service in the two-county Project Area includes Xcel Energy, Kandiyohi Co-op, and Meeker Cooperative Light and Power. There are currently two transmission lines greater than 60 kV that traverse the Project Area. Xcel Energy has both a 69 kV line that crosses from north to south across the eastern portion of the Project Area and a 69 kV tap that services the City of Atwater.

Transportation and Roads

U.S. Highway 12 bisects the Project Area. The southern boundary approximates Kandiyohi County Highway 23 and 30th Ave SE. The eastern-most boundary of the Project Area is in alignment with 525th Avenue, southwest of Grove City. A number of other township and county roads cross the Project Area. Information from MN/DOT for 2008 (Kandiyohi County) and 2009 (Meeker County) indicates that the AADT for Highway 12 within the Project Area averages between 5,000 and 5,700 vehicles. The

local roads in the area consist of graded and drained section roads, gravel and stone roads and various bituminous roads.

Air Traffic

No publically-owned airports are located within the Project Area. Two publically-owned airports are located near the Project Area. The Willmar Municipal Airport – John L. Rice Field has two precision instrument asphalt runways and is located two miles west of Willmar in Kandiyohi County, approximately 9.7 miles west of the Project Area. According to 2009 data, the airport averages 343 flight operations per week (AirNAV 2010). The Litchfield Municipal Airport also has two precision asphalt runways and is located half a mile southeast of Litchfield in Meeker County and 10 miles east of the Project Area. According to 2009 data, the airport averages 134 aircraft operations per week (AirNAV 2010).

Railroad

There is daily rail service into Willmar, Atwater and Litchfield provided by Burlington Northern Santa Fe Railroad. The Burlington Northern Santa Fe Class I railway traverses the Project Area following the Route 12 corridor.

Water Supply

On-site wells provide water to the farmsteads in the area. Municipal water is provided by the City of Atwater (wells).

Sanitary Sewer

The farmsteads in the area are served by on-site septic systems. Wastewater in Atwater is handled by a stabilization pond system.

Telecommunication Facilities and Microwave Beam Paths

There are three microwave towers (Table 6-1), two meteorological towers, and one wireless communication tower within the Project Area. In addition, 15 private land mobile towers are distributed throughout the Project Area (Table 6-2). Multiple microwave, broadcast and communication towers are present within two miles of the Project Area. According to an analysis completed by Comsearch, four microwave beam paths cross the Project Area (Appendix F). Lake Country also contacted the Minnesota Department of Transportation (DOT) Office of Communications to determine if any County or State communication paths are planned for the Project Area. No County or State microwave beam paths or other communications paths are present or planned for the Project Area.

Table 6-4:
Microwave Towers Located within the Lake Country Project Area

Owner	Call Sign	Location
Flagship Broadcasting, LLC	WLO533	45° 8' 16.8" N, 94° 46' 51"
Kandiyohi, County of	WQBM635 WQBM637	45° 8' 19.2" N, 94° 46' 35"
RCC Minnesota, Inc	WPNI854 WPNI857 WPNI858	45° 9' 47" N, 94° 47' 11"

Source: Federal Communications Commission: Media Bureau 3/21/2010

Table 6-5:
Private Land Mobile Towers Located within the Lake Country Project Area

Owner	Call Sign	Location
Amdahl, Donald	KNEX352	45° 6' 37" N, 94° 43' 18"
Animal Health Services	WPYY390	45° 9' 10" N, 94° 46' 24"
Atwater, City of	KET221	45° 8' 4" N, 94° 46' 46"
Atwater, City of	WPNP583	44° 8' 17" N, 94° 45' 56"
Behm, Myron D.	KOE936	45° 9' 27" N, 94° 47' 16"
BNSF Railway Company	WPPB702	45° 8' 12" N, 94° 46' 56"
Bushmills Ethanol	WQDT826	45° 42' 11" N, 94° 52' 6"
Daytons Bus Service	WNAC486	45° 8' 0" N, 94° 46' 47"
Earl B Olson Farms	WPVW604	45° 8' 18" N, 94° 46' 15"
Gratz, Dale H.	WYL403	45° 8' 41" N, 94° 47' 8"
Jennie O Turkey Store	WQIU623	45° 8' 17" N, 94° 46' 14"
Nelson, Dean A	WNUA389	45° 6' 10" N, 94° 50' 14"
Schultz, Scott	WPIC468	45° 8' 0" N, 94° 43' 38"
Schultz, Scott	WPIC468	45° 9' 9" N, 94° 44' 15"
Sliden Jr., Donald	WNPO649	45° 7' 32" N, 94° 44' 14"

Source: Federal Communications Commission: Media Bureau 3/21/2010

Radar

The main public use airports with radar in the region are the Willmar Municipal Airport – John L. Rice Field located two miles west of Willmar and the Litchfield Municipal Airport located less than one mile southeast of Litchfield.

6.4.1. Impacts

The proposed project is not anticipated to have a significant impact on existing public infrastructure and services. A summary of possible impacts is outlined below:

Electrical Service

Construction of the Lake Country Project is anticipated to add up to 20 REpower 2.05 MW MM92 turbines and associated power collection systems within the 26 square mile Project Area. The Project will generate approximately 41 MW of nameplate capacity. In addition to the 20 turbines, the Project would include buried collection cables, one project substation, an operation and maintenance facility, two temporary meteorological towers, and one permanent meteorological tower. The impact of the Project on the electrical infrastructure within the Project Area is currently being studied by the Midwest ISO. The final design of the Project will be compliant with Midwest ISO requirements to ensure the long-term functioning of the electrical infrastructure in the area.

Transportation and Roads

Construction of the turbines will require some access roads and temporary turning areas to be constructed on private property to accommodate construction and maintenance activities. Roads would be constructed so as to minimize disturbance to agricultural fields and to maximize efficiency of gaining access to the turbines. The access roads will be constructed as gravel roads that are about 4.8 m (16 feet) in width. Temporary turning areas will be constructed to provide adequate turning radii for the vehicles transporting turbine blades and towers. Impact to wetlands and wildlife resources will be avoided and minimized to the maximum extent practicable. If wetland impacts are unavoidable appropriate permits and mitigation will be obtained. During construction, a temporary increase in traffic and temporary road closures are expected in the area. Due to the minimal traffic in the area and temporary nature of the traffic increase no significant impacts are anticipated. The presence of U.S. Highway 12 is expected to provide sufficient access to the Project Area for project construction and emergency service vehicles.

Air Traffic

Lake Country's preliminary turbine layout does not include turbines within five nautical miles of a public use airport and will not penetrate primary, horizontal, conical, or approach or transitional surfaces as defined by Minnesota Rules 8800.1200. Therefore, no impacts to air traffic are expected.

Lake Country also used the FAA/DoD online screening tool as a preliminary indication of potential for impacts to military training routes and special airspace. No impacts to military training routes, special airspace, or weather radar are expected. The tool provides a first level of feedback and single points of contact within the DoD/DHS and NOAA to discuss impacts/mitigation efforts on the military training mission and NEXRAD weather radar. The use of this tool does not in any way replace the official FAA processes/procedures, but does provide an initial review of potential for impact.

Lake Country will complete a formal review process with the FAA and the MN DOT Office of Aeronautics to ensure that the final turbine siting design receives appropriate permits and does not adversely impact air traffic in the area. The turbines will be lit to comply with any FAA regulations.

Portions of the Project Area are serviced by aerial spraying companies that apply pesticides and herbicides to crops. Anecdotal evidence from some landowners within the Project footprint suggests that aerial spraying is increasingly being replaced by terrestrial sprayers. Nonetheless, wind turbines may create hazards for aerial sprayers when not sited properly. Lake Country has contacted aerial sprayers that, to its knowledge, service the Project Area in order to begin discussions about minimizing impacts to aerial sprayers and agricultural producers that use aerial sprayers. Lake Country's permanent meteorological tower will be painted and will have markers on guy-wires to increase visibility and reduce risks to aerial sprayers.

Water Supply

Construction and operation of the turbines will not require connection to a water supply, abandonment of wells, or construction dewatering. The operations and maintenance facility will require a water supply. The source of the water supply will be dependent upon the location of the facility and its proximity to Atwater.

Sanitary Sewer

Construction and operation of the turbines and associated facilities will most likely require the installation of a septic system for the operation and maintenance facility. It will not impact existing septic systems.

Telecommunication Facilities and Microwave Beam Paths

Construction and operation of the turbines will not impact telephone service to the area. Lake Country has avoided mapped microwave beam paths that cross the Project Area to ensure the turbines will not interrupt communications. No impacts are expected.

Radar

A preliminary review of the area indicates a low likelihood of potential impact to radar systems in the area. Lake Country will complete a formal review process with the FAA to ensure that the final turbine siting design does not adversely impact radar installations in the area. Lake Country used the FAA Department of Defense (DoD) online preliminary screening tool as a preliminary indication of potential for impacts to military training routes, long-range radar, and NEXRAD (next generation radar) Doppler weather radar. The tool provides a first level of feedback and single points of contact within the

DoD/Department of Homeland Security (DHS) and National Oceanic and Atmospheric Administration (NOAA) to discuss impacts/mitigation efforts on the military training mission and NEXRAD weather radar. The use of this tool does not in any way replace the official FAA processes/procedures, but does provide an initial review of potential for impact.

6.4.2. Mitigation

Construction, operation, and maintenance of the turbines sites will be in conformance with local, state and federal requirements. No significant infrastructure impacts are anticipated by this project and as such, no major mitigation will be required. Some roads will need to be upgraded and some access roads constructed in support of the Project.

The turbines will be lit to comply with FAA regulations and will be visible in the area. Each turbine will receive a Determination of No Hazard to Air Navigation from the FAA and the associated MN/DOT Aeronautic Office concurrence will be obtained before construction.

Transportation and Roads

The Project Area is within a rural area with low population density. Temporary increases in traffic are expected during construction, but will reduce greatly when construction is complete. Lake Country will prepare a routing plan, communication plan, and onsite instructions to defer to local traffic regulations and officials. Lake Country will coordinate temporary fill associated with increasing turning radii with the appropriate landowner and township, county, or state agency. Temporary fill will be removed and the contours and vegetation of the fill area will be restored as necessary to pre-construction conditions.

Air Traffic

Lake Country has taken steps to minimize the effects of turbines on aerial spraying by:

- Applying setbacks of 3 x 5 RD from non-participating landowners to leave the aerial applicator with room to maneuver;
- Placing turbines in a linear fashion whenever able to minimize the degree to which land is impacted;
- Spacing the turbines so that land is utilized efficiently;
- Providing a buffer of five nautical miles from the nearest airport to provide adequate distance for take-off and landing;
- Placing electrical collector and transmission lines underground whenever practicable.

6.5. Cultural and Archaeological Resources

Beaver Creek Archaeology, Inc. performed a Level I Cultural Resources Inventory for an area of potential effect that encompassed approximately 202 square km (49,950 acres), approximately 88 percent of the Project Area (Appendix G). The Level I Cultural Resources Inventory consists of a literature review and file search. A file search was conducted at Minnesota State Historical Society in April 2008. The search identified one archeological site and 39 historical/architectural sites, most of which are located within the Atwater city limits.

In 2010, Malcolm Pirnie requested that Minnesota Historical Society conduct a review of historical and cultural resources located in the counties and townships of the current 41 MW Project Area. The review identified one archeological site and 27 historical sites within the Project Area, and several others located in the surrounding vicinity (Figure 9). One architectural resource, the Hotel Atwater, located on Atlantic Avenue in the City of Atwater, is listed on the National Register of Historic Places (NRHP). A complete list of sites identified in the 2010 historical/archeological inventory review is provided in Appendix D.

The land use in the proposed Project Area is dominated by agricultural activities with scattered water, woodland, and grassland habitats. The availability of water within the Project Area increases the likelihood that the area was settled and used by humans during prehistoric and historic time periods. It is anticipated that this historical agricultural use of the land has significantly disturbed archeological resources that might have existed in the area. However, the Project Area has a high potential for containing cultural resource sites, and as such, a cultural resource inventory will be performed.

6.5.1. Impacts

All known architectural and archaeological resources will be avoided to the extent practicable. Architectural resources were identified in the Level I Cultural Resources Survey and the Minnesota Historical Society Inventory Review. The proposed 366 m (1,200 ft) setback from all residential dwellings, including the city limits of Atwater, will avoid direct impact to structures and will minimize the visual impacts to these structures. Although the Project Area has been previously disturbed by agricultural practices, there is potential to impact archeological resources. Known archaeological resources will be identified and avoided.

6.5.2. Mitigation

A Phase I pedestrian survey of proposed construction areas will be conducted to verify the existence of known cultural resources and to document previously undocumented cultural resources within the Project Area prior to the initiation of any land disturbance activities. The results of the Phase I pedestrian survey will be used to identify and

minimize impacts. In the event a cultural resource is encountered during the Phase I pedestrian survey and it cannot be avoided, actions will be taken to comply with Section 106 of the National Historic Preservation Act, including coordinating identification and mitigation actions with the Minnesota State Historic Preservation Office in accordance with federal law and state law.

6.6. Recreational Resources

Recreational opportunities within Kandiyohi and Meeker Counties include hunting, snowmobiling, camping, hiking, fishing, waterfowl hunting, and bird watching. Information on recreational resources was gathered from the Department of Natural Resources, the Litchfield Chamber of Commerce, the Willmar Lakes Area Chamber of Commerce, the Meeker and Kandiyohi County websites and the USGS 30 x 60 Minute Quadrangle map for Litchfield, Minnesota. Several recreation areas are present within the Project Area. Gordy Johnson Little League Field, Centennial Park, and Homer Bach Softball Field are located within Atwater. There are no Wildlife Management Areas (WMA) or Waterfowl Production Areas (WPA) in the Project Area. There are three WMAs within one mile of the Project Area. These areas are shown on Figure 10 and include the following:

- Butternut WMA is a 150-acre area consisting of woodlands, wetlands, grasslands and food plots. It provides hunting opportunities for deer, small game, forest game birds, pheasant, waterfowl, and turkeys.

- Grovelund WMA is a 27-acre unit consisting of an open lake with a narrow band of lowland grass and cattail. It provides hunting opportunities for pheasant and waterfowl and viewing opportunities for wetland wildlife.

- Yohi WMA - This 85-acre area contains a large open water wetland and a smaller, shallower basin; woody cover plantings, grass covered fields of seeded natives and non-native grasses. It provides hunting opportunities for deer, small game, pheasant and waterfowl and viewing opportunities for wetland and prairie wildlife.

There are three WPAs within one mile of the Project Area. The WPAs are managed by the USFWS. These include the Ella Lake WPA, Summit Lake WPA, and Uncle Matt's Lake WPA. The WPAs are open to hunting, fishing, and trapping.

Combined, there are 6 golf courses within Kandiyohi and Meeker Counties but only one is located within the Project Area. The Island Pine Golf Course and Country Club is located on Wyoming Avenue in the City of Atwater. It is an 18-hole course which is open seven days a week. The golf course has signed an easement agreement with Lake Country.

No state recreational trails, scientific and natural areas, local, state or national parks, local, state, or national forests or state forest campgrounds are located within five miles of the Project Area. One private snowmobile trail cross from north to south through Atwater with an east-west branch that starts north of Atwater and continues to the north of Grove City. Approximately 9.3 miles of the Glacial Lakes Snowmobile Trail is within the Project Area. The trail is a grants-in-aid snowmobile trail that receives grant funding from the DNR and is maintained by the E-Z Riders Sno Club, which is based in Wilmar. A portion of the trail has been designated as a primary corridor by the Minnesota United Snowmobilers Association.

6.6.1. Impacts

The above-listed WMAs and WPAs are located outside of the Project Area. Turbines will not be located within these sites or within any other public lands and will be setback a minimum of 3 and 5 RD from adjacent WMAs and WPAs, 305 m (1,000 ft) from lakes in the Counties' Shoreland Management Districts and 3 and 5 RD from other public lands except for the Island Pine Golf Course and Country Club, which has portions of its land under easement. No turbines have been sited on the golf course. Lake Country has avoided siting turbines on or within 210 ft of the Glacial Lakes Snowmobile Trail. Any impact to these conservation/recreational facilities would be visual in nature, since none of the turbines will be constructed within these recreational areas.

6.6.2. Mitigation

Turbines will not be sited within or immediately adjacent to parks, forests, WMAs, WPAs or scientific and natural areas and setbacks will minimize other potential impacts. Lake Country has contacted the E-Z Riders Sno Club to inform the club about the Project and to evaluate any concerns that the club may have. As of the writing of this application, no concerns have been raised by the club. Lake Country will work with the club to address any concerns it may have including rerouting the trail to create additional distance between the turbines and the trail. Adequate land area appears to be available to move the Glacial Lakes Snowmobile trail away from turbines, if necessary. Therefore, no additional mitigation is required.

6.7. Public Health and Safety

Emergency Response

Emergency fire and ambulance service for the Project Area are provided by Willmar, Atwater, and Grove City. Rice Memorial Hospital in Willmar is the closest emergency care facility to the Project Area. A helicopter landing site is located at Rice Memorial hospital in Willmar, which is 13 km (8 mi) from the Project Area.

Electromagnetic Fields

Electromagnetic fields (EMF) can be manmade or natural. Natural EMF's can be a result of lightning and static electricity. Manmade EMF's are created whenever people use electricity and an electric current is flowing through a conductor, as in household appliances or electric transmission lines. Electric fields are produced by voltage and these fields can be shielded by objects such as trees, buildings and skin. In contrast, magnetic fields are produced by current and these fields pass through most materials. Both electric and magnetic fields weaken with increasing distance from the source.

There has been concern about EMF's and potential health risks since the 1970's. A number of epidemiological studies have been conducted in an attempt to determine if EMF's pose a health risk. While some of these studies have found a weak association between leukemia and exposure to EMF, other studies have found no connection. Laboratory studies have also been conducted but have not been able to substantiate a direct relationship between increased EMF and increased cancer risks.

Information from the Minnesota Department of Health (MDH) indicates that the results of these studies are insufficient to determine if there is a cause and effect relationship between EMF and health issues. The MDH continues to monitor EMF research and supports avoidance measures. Exposure to EMF can be reduced by increasing the distance between the EMF source and the recipient.

Stray Voltage

The electrical system of the Project has been designed to not cause stray voltage. Problems with stray voltage typically arise in single phase electrical systems that are grounded, which gives rise to ground currents and stray voltage. The Project's electrical system is not expected to cause stray voltage because it will be a three-phase balanced system and the distribution system will not be grounded. Thus, the system will in no way discharge electric current into the ground and will not cause stray voltage.

Security

The project is proposed in a lightly populated area. Construction, operation and maintenance are anticipated to have minimal impacts on residents in the rural area. Appropriate measures will be implemented during and after construction to ensure the safety of residents, including any necessary lighting, fencing, signage, and locked doors on transformers and turbines.

Ice Shedding

The potential for ice shedding from the turbine blades is an additional, potential health and safety concern for LWECS in Minnesota. Under some weather conditions ice may accumulate on the exposed parts of the turbine blades. Icing of turbine blades, if it occurs, is likely to be limited to a few days a year (Seifert *et al.* 2003). The accumulated ice may break off as temperatures rise and ice thaws from the rotor, blades, and wind sensors. Ice shedding can occur while the turbine is in a stationary position or may occur when the turbine blades are rotating. If ice is shed while the turbine is stationary, the shedding event is not likely to be any different than that which occurs from any other stationary tower or other elevated source of accumulated ice (Seifert *et al.* 2003). If the ice is shed while the turbine is rotating there is a potential for the ice to be cast away from the base of the turbine. However, ice fragments typically break into small parts as they break away from the turbine blades (Seifert *et al.* 2003). Large or long ice fragments experience more aerodynamic drag than small pieces and are more likely to fall closer to the base of the turbine than smaller pieces (Seifert *et al.* 2003).

6.7.1. Impacts

Emergency Response

The Project will not hinder the ability of local emergency response personnel from responding to emergencies in and adjacent to the Project Area. Lake Country will develop an emergency response plan prior to Project construction. Lake Country will coordinate the implementation of that plan with local emergency response units.

Electromagnetic Fields

There will be EMFs associated with the collector cables and any equipment through which electricity is flowing. There is not conclusive evidence from research that EMFs can pose a significant impact. In addition, care will be taken to minimize and avoid interferences with communications systems in the area. A study of EMF's associated with the project has not been conducted.

Stray Voltage

The Project's electrical system is not expected to cause stray voltage because it will be a three-phase balanced system and the distribution system will not be grounded. Thus, the system will in no way inject current into the ground and will not cause stray voltage.

Security

Lake Country will provide security measures on all Project facilities. There will be no impacts to security associated with this Project for the area.

Ice Shedding

Current wind turbine designs, engineering and operational controls, and Lake Country's setbacks make the likelihood of ice shedding on residential dwellings or public roads remote. Lake Country has implemented 366 m (1,200 ft) setbacks from residential dwellings to reduce impacts from sound and shadow flicker on the residential dwellings. Lake Country has also implemented setbacks of 122 m (400 ft) from township roads and 161 m (528 ft) from all other roads in the Project Area in order to minimize the risk of ice shedding on public roads. The implementation of these setbacks, the agricultural and rural character of the Project Area, and the lack of regular human activity below the turbines in winter will reduce the potential for ice shedding to cause a safety concern. Therefore, safety issues from ice shedding are not considered likely for the proposed Project.

6.7.2. Mitigation

Emergency Response

Lake Country will develop an emergency response plan in coordination with local emergency response units.

Electromagnetic Fields

While there is no conclusive evidence of harmful effects of EMF, increasing the distance between the source and receptors decreases the EMF. The addition of these transmission facilities, turbines, and substation is not anticipated to significantly increase the EMFs in the area therefore no mitigation will be necessary.

Stray Voltage

The collector system lines will be buried to a nominal depth of four feet underground and will be a 3-phase system and will not be grounded in order to avoid causing stray voltage.

Security

Appropriate lighting, fencing and signage will be installed in the Project as security measures.

Ice Shedding

Appropriate setbacks that have been applied preclude the need for additional setbacks to accommodate the infrequent potential for ice shedding. No additional mitigation is necessary.

6.8. Hazardous Materials

A records review was conducted to evaluate the past and present environmental conditions of the proposed Project Area and surroundings. A search of databases maintained by the United States Environmental Protection Agency (EPA) and Minnesota Pollution Control Agency (MPCA) indicates that several sites of potential contamination are located within the proposed Project Area and the surrounding vicinity.

The EPA's Envirofacts Data Warehouse was researched to identify superfund sites, facilities that have reported hazardous waste activities and facilities that have reported toxic releases within the vicinity of the Project. The search identified no National Priorities List (NPL) Superfund sites within Kandiyohi and Meeker Counties. The NPL is the list of national priorities among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States and its territories. The NPL is intended primarily to guide the EPA in determining which sites warrant further investigation. The search did indicate that there are five inactive, state-listed superfund sites within Kandiyohi and Meeker Counties. They are the Willmar City Dump, Kandiyohi Sanitary Landfill, Atwater Groundwater Contamination Site, HWK Enterprises Facility, and the Meeker County Sanitary Landfill. Only the Atwater Groundwater Contamination Site is within the Project Area.

Under the Resource Conservation and Recovery Act (RCRA), the EPA regulates facilities that generate, transport, store, and/or dispose of hazardous wastes. Numerous RCRA facilities were identified in the proposed Project Area and within one-half mile of the Project's boundaries. All of the sites are concentrated within the municipality boundary of Atwater or along US Highway 12. Nineteen sites were reported, in total, as facilities that have permitted releases to the air, water, or land (EPA Envirofacts). Sixteen of the nineteen sites are within the Project Area.

The MPCA *What's in My Neighborhood Interactive Mapper* was researched to identify properties that have already been investigated and cleaned-up, as well as those currently enrolled in MPCA monitoring programs. Seventy sites were identified within the proposed Project Area and thirteen additional sites were identified within one-half mile of the proposed Project Area. Fifty-six of the eighty-three sites are currently listed as active sites on the MPCA website. The active sites include thirty-six feed lots, eight hazardous waste (small to minimal quantity) generators, six multiple activity generators, one construction stormwater discharger, and one wastewater discharger. Only one active site has undergone enforcement action. The Bushmills Ethanol Facility located at 17025 Highway 12 NE in Kandiyohi County has active air quality, hazardous waste, and wastewater permits. It also has an inactive stormwater construction permit along with inactive storage tanks. In July 2007 the facility underwent a full compliance evaluation for its air permit which resulted in an enforcement action against the facility. The facility

accepted a stipulation agreement, and after paying a $250,000 penalty, the enforcement action was closed on 10/14/09 (MPCA What's in My Neighborhood Interactive Mapper).

Two of the active sites (Thorp Oil Company Bulk Plant at 510 Atlantic Avenue and the Laidlaw Welding Facility at 105 4th Street) in the City of Atwater are included in the MPCA's leaking tank database as having undergone petroleum remediation. In October 2003 a release of diesel fuel was discovered at the Thorp Oil Company Bulk Plant which was subsequently reported in April 2004. Free product was not discovered but contaminated groundwater and soils were observed on site. The MPCA lists that contaminated soils remain on site even after the complete site received closure in September 2008. In November 2003 a used oil leak was discovered and reported at the Laidlaw Welding Facility. Free product was not observed on site but groundwater contamination did occur and contaminated soils still remain on site since the site received full closure in December 2006. The MPCA website indicates that it is unknown whether the leaked caused offsite contamination.

Current agricultural uses of the proposed Project Area pose the potential for hazardous materials such as petroleum products, herbicides, and pesticides, which are not within the MPCA database. Older farmsteads may also have unmarked waste dumps of unknown content.

Construction and operation of the Project will require the use of hazardous materials, such as petroleum products, antifreeze, and lubricating oils by contractors and Project personnel. Hazardous materials will be handled according to local, state and federal laws and regulations.

6.8.1. Impacts

A Phase I Environmental Site Assessment (ESA) will be conducted at the proposed Project Area. The Phase I ESA will be used to further identify known hazardous material sites and potential contamination located within the Project Area. Hazardous materials sites will be considered in the design, siting, and construction of the proposed Project. Impacts are anticipated to be minimal since known sites will be avoided.

Operations of the Project will not generate hazardous materials. Small amounts of hazardous materials may spill during application or transfer of materials. In addition, the risk exists for transformers or the substation to be compromised and for hazardous materials to spill onto the ground.

6.8.2. Mitigation

A Phase I ESA will be conducted and the findings used to minimize impacts to hazardous materials sites. If contaminated soils are encountered during construction, Lake Country will develop and implement appropriate procedures for their proper management and

coordinate the removal, disposal, and/or treatment of the soil, as necessary. If contaminated groundwater is encountered during construction, Lake Country will implement appropriate measures for proper management and treatment of the water, as necessary.

Hazardous materials, including fluids and oils, used in the wind turbines, transformers, substation, and operations and maintenance facility will be contained within the turbine nacelle, within the containment systems of the transformers and substation, or within the operations and maintenance facility, in accordance with applicable storage regulations. Lake Country will likely be classified as a very small quantity generator by the MPCA as defined by Minn. Rules 7045. Thus, Lake Country will seek a license for generating hazardous waste. All vehicles and equipment used on site will be properly maintained such that the engines will function within manufacturer's standards or parameters to minimize air emissions and loss of any fuels or fluids. In the event of a spill or release to the ground, the contractor shall stop the source of the release while making appropriate internal notifications, and implement appropriate recovery alternatives.

If Lake Country determines it to be necessary to have an aboveground storage tank with a capacity greater than 500 gallons, Lake Country will file a notification form with the MPCA to register the tank. If the tank is greater than 10,000 gallons or has the potential to spill into a water of the U.S., Lake Country will prepare and file a spill pollution prevention and countermeasures (SPCC) plan with the MPCA. Secondary containment systems will be implemented as outlined in the SPCC plan.

6.9. Land Based Economics

Approximately 78 percent of the Project Area is utilized for agricultural production. Although the exact breakdown of which crops are produced within the Project Area is unknown, according to 2007 data from the United States Department of Agriculture (USDA), Kandiyohi County is home to 1,386 farms with farming acreage totaling 417,138 acres. The majority of farms (58 percent) reported sales less than $20,000 for the 2007 census year. The top crop items produced in 2007 in Kandiyohi County included corn for grain with 153,299 acres harvested, soybeans with 97,779 acres harvested, forage vegetation with 17,111 acres harvested and sugar beets with 13,362 acres harvested. In 2007 Kandiyohi County led the State in sales of poultry and eggs, sheep, goats and their byproducts, and other crops/hay. The County ranked fourth in the State in aquaculture sales.

In 2007 Kandiyohi County's top livestock items included turkeys (1st in State), hogs and pigs, cattle and calves, bees, and sheep and lambs. The total market value of crop sales in Kandiyohi County in 2007 was $114,677,000 with livestock sales totaling $194,390,000. The total value of agricultural sales in 2007 ($309,067,000) was 34 percent greater than recorded for census year 2002 (USDA 2009).

Meeker County was home to 1,146 farms in 2007, which was a five farm increase over census year 2002. The total farming area within the County in 2007 was 321,781 acres and the majority of farms (58 percent) reported sales less than $20,000 for the census year. The top crop items produced in 2007 in Meeker County included corn for grain with 128,639 acres harvested, soybeans with 92,550 acres harvested, forage vegetation with 12,821 acres harvested, corn for silage with 6,900 acres harvested and wheat for grain with 4,678 acres harvested. The top livestock items included turkeys (4th in State), layers, pullets, cattle and calves and hogs and pigs. The total market value of crop sales in 2007 was $82,416,000 with livestock sales totaling $121,621,000. The total value of agricultural sales in 2007 ($204,037,000) was 58 percent greater than recorded for census year 2002 (USDA 2009).

There are no significant forestry resources located within the Project Area. Limited mining does occur in both Kandiyohi and Meeker Counties.

6.9.1. Impacts

The turbines will be sited on existing agricultural land. A small area of approximately 3,925 square m (42,253 square ft, < 1 acre) or less will be taken out of production for the construction and operation of each turbine. To provide a high estimate of the footprint of the turbines the following assumptions were made:

- Each turbine would have a 161 square meter (1,732 square ft, 0.04 acre) footprint. This includes a 10.5 m (35 ft) diameter circle under each turbine that includes a 4.5 m (15 ft) diameter foundation and a 6.0 m (20 ft) diameter gravel skirt.
- An average of 0.8 km (0.5 mi) of 5 m (16 ft) wide roadway would be associated with each turbine.
- This equates to a total of 3,925 square m (42,240 square ft, < 1 acre) of land per turbine.

With 20 turbines being sited, this results in approximately 0.08 square km (19.4 acres) of land conversion within the 65 square km (25 square mi or 16,047 acres) Project Area. This represents approximately a 0.1 percent change in land cover for the Project Area. Agricultural activity is expected to continue between the turbine sites, thereby reducing impacts associated with the creation and operation of the wind energy facility.

Effects on property values are may be positive due to the increased income received as payments for wind easements and for turbines. Permanent negative effects on property value from the Project are not expected. A study of the effects of wind farms on property values within 10 miles of the wind farms found that neither the view of the wind facility or the distance of the home from the wind facility was found to have a consistent, measurable, or statistically significant influence on home sales prices (Hoen *et al.* 2009).

6.9.2. Mitigation

The turbines will be sited so as to maintain the agricultural use for the landowners to the greatest extent feasible while still allowing access to the turbines. Agricultural activities will still be allowed to continue between the turbine sites.

6.10. Tourism and Community Benefits

Recreational opportunities within Kandiyohi and Meeker Counties include hunting, golfing, snowmobiling, camping, hiking, fishing, waterfowl hunting, and bird watching. There is several public recreation areas within the Counties, which are further discussed in Section 6.6.

Meeker County

The Minnesota Department of Employment and Economic Development (DEED) reported that in 2009 there were 42 leisure and hospitality establishments in Meeker County. These establishments provided approximately 429 employment positions, accounting for less than seven percent of all industry employment for that quarter. The Minnesota Department of Revenue reported that in 2007 (the most recent year available online) the leisure and hospitality Industry gross sales were over $16 million, accounting for less than two percent of total industry. Traveler expenditures from June 2005 to May 2006 were approximately $28.5 million, accounting for 0.24 percent of the state total. Total economic impact from traveler expenditures during that time reportedly contributed to 688 full time jobs and $1.1 million in local revenue (Explore Minnesota 2009).

Kandiyohi County

The Minnesota DEED reports that in the third quarter of 2009 there were approximately 100 leisure and hospitality establishments in Kandiyohi County that provided approximately 1,721 employment positions, accounting for less than eight percent of all industry employment. The Minnesota Department of Revenue reported that in 2007 the leisure and hospitality Industry gross sales were over $65 million, accounting for approximately three percent of total industry. Traveler expenditures from June 2005 to May 2006 were approximately $84.2 million, accounting for 0.71 percent of the state total. Total economic impact from traveler expenditures during that time reportedly contributed to 2028 full time jobs and $3.2 million in local revenue (Explore Minnesota 2009).

6.10.1. Impacts

No impacts to tourism and community benefits are anticipated from the proposed Project. Diamond Lake and Green Lake are large recreational waterbodies within Kandiyohi County. The Project Area is 0.1 mi from Diamond Lake and over 5 mi from Green Lake. Although there are numerous tourist and recreational opportunities in the vicinity, the

proposed Project Area is currently dominated by agricultural fields that offer little in this resource category.

6.10.2. Mitigation

No impacts are anticipated, therefore no specific mitigation action is proposed.

6.11. Topography

Information obtained from the Minnesota DNR indicates that the Project Area ranges in elevation from approximately 340 m to 389 m (1,117 to 1,276 ft) (NGVD88). The lowest elevations occur along the tributary streams of Minnetaga Lake in the southwestern corner of the Project Area. Elevations rise steadily to the north and east along a ridge of higher land which crosses the west-central portion of the Project Area. The greatest elevations occur to the west, southwest and south of Atwater. The highest elevation, 389 m (1,276 ft), occurs northeast of the intersection of U.S. Highway 12 and 165th Street. Elevations decrease to the east of Atwater along a tributary of the middle fork of the Crow River and to the southeast of Atwater along the headwaters of a tributary of Long Lake. A relatively large portion of land to the west, southwest and south of Atwater has greater than 12 percent slopes (Figure 11). Additional steep slopes are concentrated in the southeast corner of the Project Area to the northwest of the intersection 525th Avenue and 250th Street.

6.11.1. Impacts

Siting and construction of the turbines and access roads will require some grading of the Project Area. However, this grading is not anticipated to be significant and will be completed in such a manner as to tie into existing contours to the greatest extent practical.

6.11.2. Mitigation

Slopes greater than 12 percent will be avoided whenever practicable due to potential constructability and erosion issues. As significant site grading is not anticipated, and steep slopes will largely be avoided mitigation measures are not proposed at this time.

6.12. Soils

Information from the Soil Surveys for Kandiyohi (1987) and Meeker Counties (1999) was reviewed. Results from the review indicate that approximately 77 percent of the Project Area lies within the Wadenill-Sunber-Delft and Wadenill-Swedegrove-Muskego soil associations, 11 percent within the Guckeen-Marna soil association, 11 percent in the Estherville-Hawick-Lena and Kanaranzi-Estherville-Biscay soil associations and 0.6 percent in the Sparta-Darfur-Litchfield soil association (Figure 12). The Esterville-Hawick-Lena and Kanaranzi-Estherville-Biscay associations are similar in composition and properties as are the Wadenill-Sunburg-Delft and Wadenill-Swedegrove-Muskego associations. Descriptions of the six associations appear below.

Estherville-Hawick-Lena Association. Soil textures for this association include loam and sandy loam. Infiltration is generally poor. Common landform settings for this association include moraines and outwash plains. Slopes range from 0 to 18 percent.

Guckeen-Marna Association. Soil textures for this association include loam and clay loam. Infiltration rates range from good to poor. Common landform settings for this association include moraines and till plains. Slopes range from 0 to 18 percent.

Kanaranzi-Estherville-Biscay Association. Soil textures for this association include silt loam, loam, and clay loam. Infiltration is generally fair to poor. Common landform settings for this association include floodplains and terraces. Slopes range from 0 to 40 percent.

Sparta-Darfur-Litchfield Association. Soil textures for this association include sands and loams. Infiltration ranges from good to poor. Common landform settings for this association include outwash plains, terraces and deltas. Slopes range from 0 to 6 percent.

Wadenill-Sunburg-Delft Association. Soil texture for this association is a loam. Infiltration ranges from good to poor. Common landform settings for this association include moraines and till plains. Slopes range from 2 to 35 percent.

Wadenill-Swedegrove-Muskego Association. Soil textures for this association include loam and muck. Infiltration ranges from good to poor. The common landform setting for this association is moraines. Slopes range from 0 to 12 percent.

6.12.1. Impacts

As with any soil disturbance, construction of the turbines and access roads can increase the potential for compaction, erosion and sedimentation. Construction of the turbine sites and access roads will involve temporarily disturbing on average 0.03 square km (7.5 acres) of land per turbine. This equates to 0.6 square km (148 acres) of temporary disturbance. The turbines may be sited on prime agricultural land, which will preclude agricultural activities on that land for the life of the Project. Upon completion of the project approximately 0.08 square km (19.4 acres) of land will be converted to turbines and associated infrastructure.

6.12.2. Mitigation

Turbines and access roads will be sited to take into account the contours of the land and prime farmland locations to minimize impact. An Erosion and Sediment Control (E&SC) Plan and a Stormwater Pollution Prevention Plan (SWPPP) will be prepared prior to Project construction. Erosion and sediment control measures, including silt fence, temporary mulch, and any required temporary seeding, will be used during construction. The topsoil is usually separated and stockpiled where the roads and turbines are constructed and then restored to the disturbed areas. The separation of topsoil prior to

construction is expected to minimize the impacts of soil compaction. Turbines will be sited to minimize impacts to prime agricultural land to the extent practicable. Topsoil will be salvaged when practicable.

6.13. Geologic and Groundwater Resources

The Project Area falls within the Minnesota River Prairie subsection of the Prairie Parkland Province ecological region. The Minnesota River cuts through this subsection, creating a valley between large till plains. The land surface of the Province was heavily influenced by the most recent glaciations. Ice sheets crossed the Province several times during the Wisconsin glaciation, depositing a mantle of drift 30 to 180 m (100 to 600 ft) thick in most places. Because of the thick mantle of drift covering most of the Province, bedrock exposures are rare, being limited to the deeply down-cut Minnesota River valley and a few places where quartzite bedrock highs protrude through thinner drift in the southwestern corner of the Province (MN DNR 2001).

The Project Area falls within the Central Groundwater Province. Sand aquifers in the Central Groundwater Province are generally thick sandy, clayey glacial drift overlying Precambrian and Cretaceous bedrock. Where sandy aquifers are present, generally large quantities of groundwater exist. Where sand aquifers are absent, the weathered and fractured Precambrian bedrock is used as a local water source but groundwater quantities are low to moderate (MN DNR 2001).

Depth to bedrock within the Project Area ranges from 61 to 122 m (200 to 400 ft) (Land Management Information Center 1982). There are approximately 26 wells located within the Project Area (MDH 2009). Well depths are highly variable and range from 7 to 138 m (24 to 451 ft) with static water levels (for those wells where it has been recorded) ranging from 2.4 to 33 m (8 to 107 ft).

6.13.1. Impacts

The Project is not anticipated to have an impact on groundwater or geologic resources. Water supply needs will be minimal and can be accommodated by local supplies. Soil disturbance activities are expected to be limited to the upper layers of soil and are not expected to encounter bedrock.

6.13.2. Mitigation

Turbines will not be sited in areas with significant geologic features. Soil borings at the turbine sites will be conducted for use in structural designs and attention will be paid to sealing the borings if it is determined that the bedrock in those areas is soluble to ensure that water does not flow down boreholes and weaken bedrock structure.

6.14. Surface Water and Floodplain Resources

There are several waterbodies listed on the DNR Public Waters Inventory that are located within the Project Area including all or part of seven public water basins, 10 public water wetlands, one public watercourse, two altered-natural watercourses that are Meeker County drainage ditches and scattered wetland (Figure 13, See Section 6.15 for a discussion of wetland resources). The majority of the Project Area has been developed for agricultural use and stormwater is conveyed from the Project Area by overland flow into wetlands, lakes, drainage ditches, and streams. The larger waterbodies within the Project Area include Summit Lake, Wheeler Lake, Pay Lake, and Moe Lake.

No waterbodies within the Project Area are listed as impaired by the MPCA (Figure 14). The closest impaired waterbody is Diamond Lake, which has completed Total Maximum Daily Loads (TMDLs) defined for both mercury and phosphorous. Diamond Lake is located approximately 189 m (620 ft) northwest of the Project Area between County Highway 4 and 165th Street. Lake Elizabeth is an impaired waterbody that is located approximately 2,400 m (1.5 mi) from the Project Area. A small portion of the Project Area is within the Lake Elizabeth watershed. There is no direct hydrologic connection between the Project Area and Lake Elizabeth. Long Lake is an impaired waterbody that is located approximately 2,600 m (1.6 mi) to the southeast of the Project Area. It is hydrologically connected to the Project Area via a 12,500 m (7.8 mi) segment of County Ditch 28 Seventeen of the 20 turbines are sited within the Diamond Lake watershed (Figure 15). Three turbines are sited within the County Ditch 47 watershed. No turbines are sited within the Lake Elizabeth or Long Lake watersheds.

According to the Flood Insurance Rate Map (FIRM) for Kandiyohi County (Federal Emergency Management Agency (FEMA) Panel 207629) and Meeker County (FEMA Panel 27028004), the Project Area is located outside the 100-year flood zone. However, there are numerous surface waterbodies located in the Project Area that may be prone to flooding during snow melt and rain events. The City of Atwater was not mapped and FEMA did not provide flood risks for this area.

6.14.1. Impacts

Siting of the turbines will typically be located on the higher points in the landscape, thereby avoiding low lying areas prone to flood. No turbines or access roads will be sited within public water basins or public water wetlands. The PUC does not allow turbines or access roads to be sited within public water wetlands. Access roads and collector lines may cross public watercourses if the DNR issues a permit authorizing such activity. The proposed project may have some short-term effects on surface water resources due to stormwater runoff during construction.

6.14.2. Mitigation

The Project will be required to apply for and receive a permit under the MPCA administered National Pollution Discharge Elimination System (NPDES). Impacts to surface waters will be minimized during construction through the Project's compliance with NPDES permit requirements, which will require the use of appropriate best management practices (BMPs) to treat stormwater runoff and minimize erosion from disturbed construction areas. The use of best management practices during construction will ensure that TMDL levels are not exceeded for Diamond Lake or other impaired waterbodies during construction.

6.15. Wetlands

Water resource data were obtained from USFWS National Wetlands Inventory (NWI), the National Hydrography Dataset (NHD) provided by the USGS, and the DNR PWI (see Section 6.14). These data sets represent the approximate location of wetlands and streams in the Project Area. The USFWS generates NWI data on a USGS 7.5-minute quadrangle 24,000:1 scale basemap. The NWI wetlands are classified using the classification system described by Cowardin *et al.* (1979), in Classification of Wetlands and Deepwater Habitats of the United States. This classification regime categorizes wetlands into five systems, marine, estuarine, riverine, lacustrine (lakes) and palustrine (all other wetlands). Within these system categories, wetlands are further divided by substrate material, flooding regime, and vegetative life form.

NWI mapping shows wetlands totaling approximately 6.0 square km (2.3 square mi or 9 percent) of the Project Area (Figure 15). Of the 6.0 square km of wetlands, approximately 82 percent (4.9 square km or 1.9 square mi) are Circular 39 Types 3 (Shallow Marsh), 4 (Deep Marsh), and 5 (Shallow Open Water) wetlands (USFWS 2009). The remaining wetlands with the Project Area are palustrine Type 1 wetlands (0.34 square km or 0.13 square mi), emergent Type 2 wetlands (0.15 square km or 0.06 square mi), scrub/shrub Type 6 wetlands (0.065 square km or 0.03 square mi), forested Type 7 wetlands (0.43 square km or 0.17 square mi), and Type 80 wetlands (0.07 square km or 0.03 square mi), which are associated with Atwater's wastewater treatment facility. Approximately 1.9 square km (0.7 square mi), 32 percent of the total wetland area, are palustrine wetlands with altered hydrology. The data indicates that 1.8 square km (0.7 square mi) of wetlands has been partially drained or ditched and that 0.1 square km (0.05 square mi) has been excavated. The impacted wetlands are distributed throughout the Project Area.

The high resolution (1:24,000) NHD data shows the approximate location of 15.5 km (9.6 mi) of intermittent streams and ditches within the Project Area. The majority of the streams and ditches flow south to lakes and wetlands south of the Project Area, north to the Crow River via Diamond Lake and County Ditch 47, or east to Grove Creek, which is

also a tributary to the Crow River. Two ditch systems and one public watercourse comprise the most defined drainage-ways in the Project Area. The County Ditch 47 watershed is drained by Judicial Ditch 17 and County Ditch 47. Judicial Ditch 17 flows east then north from the City of Atwater to connect with County Ditch 47, just west of the intersection of 283rd Street and 515th Avenue. County Ditch 47 flows north in the northeast portion of the Project Area and eventually drains into the Crow River in Union Grove Township. The Long Lake watershed is drained by County Ditch 28, which flows west then south in the southeast corner of the Project Area. County Ditch 28 eventually drains into Long Lake to the east of the Project Area.

6.15.1. Impacts

Wetland impacts will be avoided and minimized to the maximum extent practicable. If wetland impacts are unavoidable, Lake Country will apply for and receive the necessary permits and complete the required mitigation. Wetlands within the Project Area may be subject to one or more of three regulatory programs. The DNR regulates any activity that would impact or cross a waterbody listed in the PWI. The U.S. Army Corps of Engineers (USACE) regulates discharges of dredge or fill material into "waters of the U. S." through Section 404 of the Clean Water Act (CWA). The USACE will assert its jurisdiction if it is found that a water (wetland, watercourse, lake, etc.) to be impacted is a "water of the U.S." A determination as to whether a wetland or other waterbody is a "water of the U.S." involves a fact-based investigation, which is conducted by the USACE. The third level of wetland regulation is achieved via the Minnesota Wetland Conservation Act of 1991, as amended (WCA). The WCA regulates all waters and wetlands in Minnesota that are not listed in the PWI. The WCA is administered locally by Kandiyohi County or the Meeker County Soil and Water Conservation District (SWCD).

No turbines or access roads will be placed within public waters or public waters wetlands. The PUC does not allow turbines to be sited within public waters wetlands. Access roads and collector lines may cross public waters wetlands and public watercourses if permitted by the DNR and the USACE.

Lake Country will avoid non-PWI wetlands and waterbodies when siting turbines, access roads, and the project substation. Collector lines and other communication infrastructure may be buried under wetlands if an alternative path is impracticable. The installation of collectors and communication cables through wetlands will be completed via vibratory plow or directional boring, which do not result in jurisdictional impacts for purposes of the WCA and the CWA.

6.15.2. Mitigation

Public waters and other potential wetlands have been mapped by Lake Country and the current design avoids impacts to all public waters and other wetlands mapped in the NWI

and NHD. Prior to construction, Lake Country will conduct a wetland field survey in areas that are proposed for construction. Field surveys will ensure wetlands and streams are avoided to maximum extent practicable. If avoidance of wetlands and/or streams is not possible, Lake Country will use construction methods such as vibrational plow or directional boring to avoid jurisdictional impacts to wetlands. Lake Country will apply for and receive required permits, as necessary, from the DNR, USACE, Kandiyohi County, or Meeker County SWCD prior to construction. Jurisdictional wetland impacts will be mitigated as required by the appropriate permits.

6.16. Vegetation

National Land Cover Database (NLCD) 2001 land cover mapping was analyzed for land cover types and percent covers within the Project Area. The NLCD is produced through a cooperative project conducted by the Multi-Resolution Land Characteristics (MRLC) Consortium. The MRLC Consortium is a partnership of federal agencies, consisting of the USGS, NOAA, EPA, USDA, U.S. Forest Service (USFS), National Park Service (NPS), USFWS, Bureau of Land Management (BLM) and the NRCS.

According to the 200l NLCD mapping, approximately seventy-eight percent of the Project Area is classified as cropland (Figure 16). This designation is assigned to areas used for the production of annual crops such as corn, soybeans, and vegetables and where crop vegetation accounts for greater than twenty percent of the total vegetation. Other vegetated land covers include hay/pasture land (7.6 percent of Project Area), deciduous forestland (2.0 percent of Project Area), emergent/herbaceous wetlands (1.6 percent of Project Area), woody wetlands (0.7 percent of Project Area), grassland (0.4 percent of Project Area), scrub/shrub land (0.3 percent of Project Area), evergreen forestland (0.08 percent of Project Area), and mixed forestland (0.07 percent of Project Area).

Non-vegetated covers/uses include open water areas (2.6 percent of Project Area) and barren land (0.007 percent of Project Area). Light development is present within the Project Area, but most of the developed land has impervious cover less than fifty percent of the total cover (5.9 percent of Project Area). The remaining developed land, with impervious cover above fifty percent, accounts for less than one-half of one percent of the Project Area (Table 6-3).

Western EcoSystems Technology, Inc. conducted a field review of a large portion of the Project Area in April 2008 (Appendix G). During the survey, no areas of native prairie were observed and little planted grass was found. The Project Area does contain approximately 2.9 square km (1.1 square mi) of CRP lands.[14] This program provides

[14] CRP acreage estimated from 2008 GAP Stewardship GIS data obtained from MN DNR Data Deli. Lake Country requested current CRP location information on Tuesday, April 6th, 2010 from the USDA Farm Service Agency via the Freedom of Information Act (FOIA). The FOIA request was denied as Section

public funds to landowners to protect critical habitat and to establish resource-conserving vegetative covers on lands that had previously been involved in row crop agriculture. Therefore, CRP lands are not likely to contain native prairie. In total, lands with protected vegetated covers account for approximately four percent of the Project Area.

Table 6-6:
Summary of Land Use within the Lake Country Project Area in Kandiyohi and Meeker Counties, Minnesota

Land Use	Acres	% Composition
Cultivated Crops	12,827	78.2
Pasture/Hay	1,249	7.6
Developed, Low Intensity	733	4.5
Open Water	426	2.6
Deciduous Forest	332	2.0
Emergent Herbaceous Wetlands	260	1.6
Developed, Open Space	226	1.4
Woody Wetlands	117	0.7
Grassland/Herbaceous	69	0.4
Developed, Medium Intensity	67	0.4
Scrub/Shrub	57	0.3
Evergreen Forest	13	0.08
Developed, High Intensity	13	0.08
Mixed Forest	10	0.07
Barren Land	1	0.007

Source: National Land Cover Database, Multi-Resolution Land Characteristics Consortium, 2001.

6.16.1. Impacts

Approximately 80,000 square m (861,113 square ft., 19.4 acres) of the Project Area will be used for the turbines and access roads. The vegetation that will be disturbed will primarily be agricultural in nature. The annual planting of row crops on agricultural land requires routine disturbance, which excludes most perennial and native plant communities. Turbines will not be constructed in wooded areas or in wetland areas since those vegetation types are primarily located within public lands and/or proximate to wetlands and lakes in the Project Area. Turbines will be setback from large waterbodies and will not be sited on public lands or wetlands. Lake Country has also avoided siting turbines on CRP lands, which is believed to constitute the majority of non-public grassland in the Project Area. The operation and maintenance of the turbines is not expected to impact perennial or native vegetation in the area.

1619(b) of the Food, Conservation, and Energy Act of 2008 prohibits disclosure of the information requested.

6.16.2. Mitigation

A pedestrian survey of the proposed disturbance areas will be conducted prior to initiating construction. The survey will be conducted to verify that native prairie is not impacted by the Project. If native prairie is encountered, Lake Country will explore options to avoid the native prairie. If the native prairie cannot be avoided, a prairie management plan will be prepared in coordination with the DNR.

The vegetation at the turbine locations and access roads will be disturbed and removed. Topsoil will be removed and restored to the disturbed areas once construction is complete. All temporarily disturbed areas will be re-vegetated as necessary.

6.17. Wildlife

The wildlife species within the bounds of the Project Area are tied to the plant communities and land cover present. Approximately 78 percent of the Project Area is developed or cultivated cropland, which is not preferred habitat for most species of wildlife. It has been shown that habitat conversions of pasture and hayland (Herkert 1991, Askins 1993, Herkert *et al.* 1996) and grasslands systems (Samson and Knopf 1994, Herkert 1995) to agricultural production have a detrimental impact on grassland bird populations. Alternatively, the ring-necked pheasant (*Phasianus colchicus*) is highly dependent on habitats in and around croplands and agricultural landscapes (NRCS 1999). Similarly, a study of white-tailed deer (*Odocoileus virginianus*) populations and mortalities in an intensively farmed (>80% land cover) region of Minnesota indicates that adult and fawn female and neonates have high survivability in these landscapes (Brinkman *et al.* 2004). The greatest causes of mortality to deer were human induced (hunting and vehicle collisions).

As discussed, some animal species benefit, or are not negatively impacted by cultivated croplands, the use of the land by wildlife is tied to the animal's ability to find suitable habitat (i.e., food, water, shelter, and protection of young) within the landscape. Some species can find these resources within croplands while others cannot. Ultimately, wildlife presence or absence within the agriculturally dominated Project Area will be species generally associated with agricultural landscapes.

Lake Country has assessed the Project Area for potential impacts to wildlife according to the *Wind Turbine Advisory Committee Recommendations: Guidelines* (Guidelines), which were presented to the Secretary of the Interior on March 4, 2010. The voluntary guidelines were developed with the primary purpose of describing the information typically needed to identify, assess, and monitor the potentially adverse impacts of wind energy projects on wildlife and their habitats, especially migratory birds and bats. The information is intended as a guide to the wind industry to make the best possible choices on the location, design, and operation of projects and to avoid or minimize the risks to wildlife and their habitats. The Guidelines provide a tiered approach to assist in

providing the appropriate types and amount of baseline information required for adequate review of a project and to ensure the amount of investigation is in proportion to the anticipated level of risk to wildlife and their habitats. Risk is defined in the Guidelines as the likelihood that adverse impacts will occur to individuals or populations of species of concern as a result of wind energy development and operation.

The Guidelines consist of up to five iterative tiers: Tier 1 – Preliminary evaluation or screening of potential sites; Tier 2 – Site characterization; Tier 3 – Field studies to document site wildlife conditions and predict project impacts; Tier 4 – Post-construction fatality studies; and Tier 5 – Other post-construction studies. At each tier, potential issues are identified and questions formulated to guide the development process. If sufficient data are available at a particular tier the project proceeds to one of three outcomes: the project is abandoned due to unacceptable risk; the project proceeds without additional data collection; or the project is modified, mitigation proposed, or post-construction monitoring is indicated. Lake Country has combined its Tier 1 and 2 evaluations because it had identified an area of interest based upon the results of the 2008 DRG Study completed for the Minnesota Department of Commerce, Office of Energy Security. The DRG study indicated that 40 MW of capacity were available at the Atwater substation (see Section 5.3). Lake Country used its 40 MW interconnection request as the basis for exploring potential development opportunities around Atwater. To that end, Lake Country defined a 340 MW area of interest around Atwater.

Lake Country conducted its Tier 1 and Tier 2 evaluation by simultaneously assessing its 340 MW area of interest for a project footprint that is environmentally appropriate and also contains sufficient landowners interested in participating in the Project. Lake Country's ultimate goal was to determine a project footprint that has lower habitat values, and subsequently lower potential risk to wildlife, than other areas within the 340 MW area of interest. In its evaluation, Lake Country evaluated the area of interest using the Guidelines' suggested questions and information gathered in a Site Characterization Study conducted by Western EcoSystems Technology, Inc., a review of publicly available information, a raptor nest survey, and consultations with the DNR and the USFWS to determine the presence of species of concern, critical habitat areas, or large areas of intact habitat. Publicly available information consisted of the DNR Natural Heritage Information System (NHIS), Minnesota County Biological Survey (MCBS) Native Plant Communities, the MCBS Sites of Biodiversity Significance and the MCBS Railroad Rights-of-Way Prairies. These databases were reviewed for federal and state threatened and endangered species, special concern species and rare and unique natural resources.

Primary concerns raised in Lake Country's preliminary evaluation included the presence of State species of concern, WMAs, WPAs, other conservation land, and lakes and wetland habitats scattered throughout the 340 MW area of interest and the potential use

of those areas by waterbirds. The DNR and USFWS also expressed concern about bald eagle nests and a colonial waterbird nesting area within and adjacent to the 340 MW area of interest (Appendix D). Lake Country also conducted multiple field reviews of the Project Area in 2009 to confirm the results of the desktop data and a raptor nest survey in the spring of 2010. The results of the raptor nest survey are not included in this application due to the sensitivity of nesting raptors to disturbance. The locations of raptor nests will be provided to the Public Utilities Commission in a separate disclosure. Lake Country used the results of its evaluation to reduce its 340 MW area of interest to the current 41 MW Project Area presented in this application. The Project Area represents Lake Country's best efforts to locate a Project Area that poses the lowest risk to wildlife and their habitats. The DNR and USFWS have reviewed the Project Area and Lake Country's methods to assess the area of interest.

The Project Area proposed in this Application was specifically delineated to exclude species of concern, WMAs, WPAs, and other known sensitive habitats, and to create a significant buffer between raptor nests and turbines. The Project Area is primarily comprised of agricultural land uses. Based upon the information collected in Tiers 1 and 2, the Project Area excludes species of concern, critical habitat areas, and large areas of contiguous habitat. The DNR has provided written confirmation that the reduction in size from the 340 MW area of interest to the current 41 MW Project Area has reduced the potential for impacts to wildlife (Appendix D). The USFWS informed Lake Country that no critical habitat or federally threatened or endangered species are known to exist in the Project Area. The Project Area does contain two NHIS records of known native vegetation communities in Meeker County. Lake Country has avoided these areas and does not have turbines sited within Meeker County. In addition, no federal, state, tribal, or local agency has demonstrated the potential presence of a population of a species at risk of impact due to habitat fragmentation. No apparent topographic ridge is present that would congregate raptors or other migrants that use ridges.

Information concerning potential wildlife use of the Project Area that was collected in Lake Country's Tier 1 and 2 evaluation is summarized below. Lake Country used this information to determine potential risk to wildlife from the Project and to determine if additional evaluation was necessary to adequately assess potential risk.

Avian and Bat Species

Lake Country reviewed potential ranges of bats using species range maps provided by Bat Conservation International. Two species of bats on the State's list of special concern species, the northern myotis (*Myotis lucifugus*) and eastern pipistrelle (*Perimyotis subflavus*), have not been documented within the Project Area, but may be found in Kandiyohi or Meeker Counties. Potential roosting habitat within the Project Area can be found in the form of forests, tree rows and buildings. Roosting habitats are typically

associated with open water and dwellings. The northern myotis was designated a species of special concern in Minnesota in 1984, at which time it was known from only a few widely distributed localities in the state (MN DNR 2010). The species generally forages for insects over water and forest clearings and under tree canopies, using echolocation to catch prey and to navigate. The eastern pipistrelle was also designated in Minnesota as a species of special concern in 1984. It has never been found in large numbers, and no maternity colony has ever been found in the state (MN DNR 2010). Eastern pipistrelles hibernate in caves, mines, and tunnels and they forage mainly over water.

The nearest U.S. Geological breeding bird survey (BBS) routes are Knapp (Route 50017) and New London (Route 50064). The New London route is north of the Project Area and the Knapp route is to the east. Abundant breeding birds observed during 2009 for both routes were the red-winged blackbird, common yellowthroat, ring-necked pheasant, mourning dove, and the American robin. Besides these species the overall Minnesota River Prairie region is an important nesting region for waterfowl. The presence of open water and large wetland complexes in and near the Project Area suggests the area is used by waterfowl and other water birds. It is likely that waterfowl and water birds fly between waterbodies and to agricultural fields to forage.

A raptor nest survey was conducted within an area that consisted of the Project Area and within the DNR and USFWS recommended 2-mi (3,219 m, 10,560 ft) buffer of the Project Area in the spring of 2010. Three bald eagle nests were confirmed within a 2-mi buffer of the Project Area. One red-tailed hawk nest was found one-mile south of the Project Area and one great-horned owl nest was found in the southeastern portion of the Project Area. The exact location of the nests has been shared with the USFWS and the DNR, but is not included in this application in order to protect the nests from undue disturbance.

Mammals

Agricultural fields provide some cover in later summer months and are used as a food sources as well for some species. Larger wetland complexes also provide cover and food sources. Typical species in these areas would include mice, rabbits, and other rodents. Larger mammals such as fox, raccoon, and coyotes would also be anticipated in the area. White-tailed deer would also likely be present and would likely feed off corn and soybeans.

Reptiles and Amphibians

A number of reptile and amphibian species are expected to use the area. Various species of frogs are anticipated to breed in the wet, unplowed areas. Snakes would forage for food in the grassy areas within the site.

Summary

The Project Area contains lake and wetland habitat that may be used as congregation areas by bird species protected by the Bald and Golden Eagle Protection Act (BGEPA) or the Migratory Bird Treaty Act (MBTA), including the bald eagle and other waterbirds. Thus, Lake Country has proceeded to Tier 3 of the Guidelines and is in the process of conducting an avian impact assessment to better understand potential risks within the Project Area. As of the writing of this application, the avian impact assessment is in progress. Lake Country will coordinate with the PUC when the results of the survey have been appropriately analyzed.

The avian impact assessment includes a raptor nest search, monitoring of bald eagle nests within 2 miles of the Project Area, point-count surveys to determine species' presence in the Project Area and flight line surveys to document primary flight corridors within the Project Area. Bat surveys were not included as a part of the avian impact assessment because of the unlikelihood that species of concern, such as the northern myotis or eastern pipistrelle, inhabit the Project Area. Lake Country has coordinated its avian assessment methodology with the Minnesota DNR and the USFWS and has received written confirmation from the DNR and the USFWS that the assessment methodology is appropriate in order to understand and avoid impacts to avian resources (Appendix D). Initial correspondence from the USFWS recommended radar for assessing bird and bat use in the Project Area. However, the Guidelines state that the use of radar for determining passage rates, flight heights and flight directions of nocturnal migrating animals has yet to be shown as a good indicator of collision risk. The USFWS has not objected to Lake Country's decision to not use radar during its avian impact assessment.

6.17.1. Impacts

General Wildlife Impacts

The routine disturbance that occurs with agricultural activities is expected to remain the primary impact on wildlife in the area. The temporary disturbance associated with construction of the turbines and associated appurtenances is anticipated to have a minimal impact on wildlife. Turbines have been setback from contiguous wetland and wooded areas, reducing potential impacts to species that use these areas for foraging and cover.

Avian and Bat Impacts

The Minnesota River is an important migratory pathway for songbirds, raptors, and waterfowl (MN DNR 2006). Many species of songbirds may collide with tall man-made structures; however, no large mortality events, such as those seen at communication towers, have been documented at wind energy facilities in North America (NWCC 2004). The large mortality events observed at communication towers have occurred at structures greater than 152 m (500 ft) in height likely because most small birds migrate at elevations

of 152 m (500 ft) to 305 m (1,000 ft) (USFWS 1998) which is higher than most of the modern turbines. Migrating songbirds are likely more at risk of turbine collision when ascending and descending from stopover habitats.

Studies in Minnesota have found that changes in breeding songbird density were not detectable on a broad scale (Johnson *et al.* 2000). Breeding songbird density was reduced on CRP grasslands in the immediate vicinity of turbines (Leddy *et al.* 1999). The proposed project contains minimal grasslands and few if any native grasslands limiting overall potential impacts. Some species of sensitive grassland songbirds may be present in the Project Area near CRP lands and the areas around wetlands. Lake Country will not site turbines within CRP lands or other grassland habitat. Thus, minimal displacement of songbirds is expected.

As of the writing of this application, bald eagle use of the Project Area has been limited to the periphery of the Project Area. The closest turbine to a bald eagle nest is approximately 1.25 mi (6,600 ft or 2 km) from a proposed turbine. To Lake Country's knowledge, only one bald eagle has been killed by a wind turbine in North America. The bald eagle was struck by a turbine in Norfolk County, Ontario in April 2009. Thus, Lake Country's assessment of nesting and foraging activities in the vicinity of the Project Area and its observed setbacks from large wetland and lake habitats suggests that impacts to bald eagle will be minimized.

Bat casualties have been reported from most wind energy facilities where post construction data is available. Reported estimates of bat mortality range from 0.01-47.5 per turbine per year in the U.S. with an average of 3.4 per turbine or 4.6 per MW (NWCC 2004). Most of the bat deaths to date are migratory species and the highest numbers are found at forested, ridge-top facilities in the eastern United States. The Lake Country facility will likely result in the mortality of some bats however the degree to which they will be affected is difficult to determine.

Lake Country will use the results of its avian impact assessment to understand the potential for impacts to avian resources. It will also use the information to modify its proposed design, to the degree practicable, in order to reduce potential for impacts to avian resources. The avian impact assessment is expected to be completed in August 2010, at which time the final results of the assessment will be compiled. Lake Country will use the results to modify its project layout, if necessary, and to determine if any further action should be taken to understand avian resources.

6.17.2. Mitigation

Turbines will be sited primarily on agricultural land with setbacks from public waters and WPAs and WMAs, respectively. Turbines will not be sited on land enrolled in CRP. The observance of setbacks and liberal use of buffers is expected to minimize adverse

impacts to the wildlife within the area to the extent practicable. The combination of the results of the avian risk assessment and the apparent proclivity of bald eagle avoidance of wind turbines suggests that Lake Country will be successful at avoiding impacts to bald eagles. No additional mitigation is expected to be needed.

6.18. Rare and Unique Natural Resources

In 2009, Malcolm Pirnie requested that the DNR conduct a review of the Minnesota Natural Heritage Information System: Rare Features Database for Lake Country's 340 MW area of interest. The Project Area was subsequently reduced in size to the proposed 41 MW Project Area. In 2010, Malcolm Pirnie made a request for DNR to update the review to account for the change in the Project Area footprint. The results of this search of the Database for information about rare and unique natural resources in relation to the Project Area are shown below in Table 6-7.

The 2010 review indicated that there are no federally listed species documented for Kandiyohi or Meeker Counties. The review did indicate that one sensitive species and one native plant community has been identified within the Project Area. The sensitive species, small white lady's slipper, was found in a native prairie remnant within a railroad right-of-way. Additional native plant communities have been identified outside, but within one mile of, the Project Area. To support these findings the Minnesota County Biological Survey (MCBS) Native Plant Communities, the MCBS Sites of Biodiversity Significance and the MCBS Railroad Rights-of-Way Prairies databases were also reviewed for state endangered, threatened and special concern species and rare and unique natural resources which may occur within, or adjacent to, the Project Area.

Table 6-7:
Rare and Unique Natural Resources in the Project Area identified through review of the Minnesota Natural Heritage Information System: Rare Features Database

Species/Resource	Minnesota Status	Location Description
Small White Lady's Slipper	Special Concern	T119N, R32W, S5; T119N, R32W, S8
Native Plant Community	N/A	T119N, R32W, S17; T119N, R32W, S20; T119N, R32W, S21

Source: Minnesota Natural Heritage Information System index report of records located within 1 mile radius of current Project Area

6.18.1. Impacts

The turbines, access roads and appurtenances have been sited to avoid native plant communities, wetlands, wooded areas and habitat for special concern species.

6.18.2. Mitigation

Lake Country will avoid or institute setbacks around sensitive resources. A more detailed review of the rare and unique resources within the Project Area will be conducted prior to final turbine siting in order to avoid impacts. Wetland impacts due to road or collector crossings will be permitted and mitigated as required by the local, state, and federal regulations.

7. Construction of the Project

An Engineering/Procurement/Construction (EPC) contractor will be hired to manage and construct the construction phase of the Project. The EPC contractor will oversee the installation of roads, concrete foundations, turbines, and electrical infrastructure. Other contractors may be hired for individual areas of expertise, such as turbine erection, civil work, and electrical efforts. Local contractors will be enlisted to assist in the construction of the Project when possible. The construction team will be on-site to handle materials procurement, 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 area that will be impacted for the life of the Project will be limited to the area disturbed for turbine foundations, access roads, substation, and associated facilities. Approximately 78,509 square m (845,064 square ft, 19.4 acre) of the Project Area will be utilized for the life of the Project. The collector system will be underground.

Temporary roads and construction areas will also be built prior to construction. Cranes and equipment delivery trucks will require roads that are wider than the permanent access roads. Efforts will be made to minimize topsoil loss and soil compaction. After construction, the gravel from temporary roads and crane pads will be removed and all natural contours will be restored. Disturbed areas will be restored to its previous use upon turbine commissioning.

8. Operation of the Project

Lake Country will enter into a contractual agreement with REpower to provide service to and maintain the turbines for 3 years, which includes the 2-year warranty period. When the warranty period ends, Lake Country will contract a qualified operations and maintenance contractor for the continued operation and maintenance of the Project. The Project's operations manager will oversee all maintenance, management, and service activities of the turbines and supporting facilities to ensure the utility interconnection is sound and the response to turbine outages is timely.

During the warranty period, the turbines will be commissioned and monitored closely to ensure they are operating within specifications. When REpower is satisfied that the turbines are fully operational and are achieving desired specifications, the turbines will be monitoring remotely. The remote monitoring will occur daily with planned service and maintenance at the following approximate intervals:

1. **First Service Inspection**: The first service inspection will occur two months after the turbines are commissioned. The inspectors will tighten bolts, grease bearings, change gear oil, and other various activities.

2. **Semiannual Service Inspection**: Routine service inspections commence six months after the first inspection. During the semiannual test the inspectors lubricate all machines and conduct a safety test on the turbines.

On-site service and maintenance activities include routine inspections, regular preventative maintenance on all turbines and related facilities. The Project's maintenance crew will also be responsible for unscheduled maintenance and repair, and routine minor maintenance on the wind turbines, electrical power systems, and communications systems. The on-site technicians will be equipped with all necessary tools, instruments for routine service, repairs, and operational control. Routine maintenance will include, but will not be limited to: maintaining oil and filters, bolt tightening, minor electrical repair, computer software upgrades, periodic testing of the SCADA and other monitoring equipment, and maintaining project structures, access roads, drainage systems, and other facilities. Transformer maintenance will be undertaken on an annual basis and will be scheduled and performed during non- or low-wind periods.

The Project's operations manager will be responsible for coordinating with local government agencies to ensure compliance with local ordinances including; management of lubricants, solvents, and other hazardous materials.

9. Costs

Final costs for the Project have not been confirmed and specific cost information is confidential to Lake Country. However, based upon similar projects, Lake Country has estimated the capital cost for the wind farm to be approximately $81,500,000 (Table 9-1). The cost estimate is based upon Lake Country's estimate of costs as of the writing of this application. Costs for turbines, commodities, and labor have been volatile over the past three years and are subject to change. Network upgrade estimates are based on preliminary studies by Midwest ISO. Final studies and costs have not yet been completed. The actual capital cost will be dependent on final costs associated with interconnection, infrastructure, turbines, electrical collection systems, as well as costs associated with development, engineering, permitting, procurement, and construction.

Table 9-1:
Estimated Development Costs of Lake Country's 41 MW LWECS

Cost Category	Estimated Cost
Turbines	$52,000,000
Construction	$14,500,000
Other Development Costs and Contingency	$11,000,000
Network Upgrades	$4,000,000
Total	**$81,500,000**

Based upon similar projects, Lake Country estimates operating costs of the complete 41 MW Project to be approximately $1.5 million per year while the turbines are under warranty. The turbines will be under the manufacturer's warranty during the first two years of operation. The operating costs will range from approximately $2 to $2.8 million per year after the warranty expires. Operating costs include costs associated with land lease payments, insurance, energy production tax, royalties, electric usage, management and financing fees, and operations and maintenance.

Lake Country will be responsible for financing all Project activities and anticipates financing the cost of all pre-development activities through internal funds and investment funding. Construction costs will be financed with third-party investment funding.

10. Scheduling

Lake Country expects to begin construction of the Project in August 2012 with commercial operation by December 31, 2012. Lake Country expects a Site Permit to be issued within approximately six months of filing this application. Preconstruction surveys and studies are underway and will continue through August 2012. Additional wind rights will continue to be acquired from additional land owners with all wind rights expected to be secured by December 31, 2010.

Lake Country will be responsible for undertaking all required environmental review and will obtain all permits and licenses that are required following issuance of a Site Permit from the PUC. Lake Country anticipates signing an interconnection agreement by September 2010. The commercial operation date is dependent on the completion of the interconnection, permitting, and other development activities.

11. Energy Projections

Lake Country has assessed the potential energy yield from the Project using wind data collected at its meteorological tower and the current turbine design. The Project is expected to generate between 139,480 and 142,747 MW (139,480,000 and 142,747,000 kW) annually using the 20 REpower 2.05 MW MM92 turbines.

12. Decommissioning and Restoration

The decommissioning and restoration plan for the Project will be prepared in accordance with the requirements of Minnesota Rules 7836.0500, subp. 13. Lake Country anticipates the life of the Project will be between 20 to 30 years, and it requests the right to re-apply for a LWECS Site Permit to continue operation of the Project upon expiration of the original LWECS Site Permit. Lake Country would then provide energy under a new long-term contract or on a merchant basis. The option to retrofit, repower, or replace the turbines and power system with upgrades may allow the Project to produce efficiently and successfully for an additional 20 to 30 years. As the Project reaches the design life of the turbines, issues of decommissioning vs. repowering will be evaluated. If Lake Country decides to decommission rather than repower it will do so within 12 months of the facility ceasing to operate.

Lake Country will be responsible for all costs to decommission the Project and associated facilities. Upon termination of the Project, Lake Country will dismantle and remove all towers, turbine generators, transformers, underground cables, foundations and ancillary facilities to a depth of 4 feet below the ground surface unless Lake Country and the affected landowner agree, in writing, to no removal or removal to a depth less than 4 feet. Access roads will be removed unless written approval is given by the affected landowner that portions or all of the affected roads may be retained. Lake Country will restore and reclaim the site to its pre-project topography to the extent possible. Restoration activities will be completed within 12 months of the date of termination.

Lake Country is unable to calculate a precise cost of decommissioning the Project at this time due to the preliminary nature of the Project's design. When the Project's design is finalized, Lake Country will determine the total anticipated costs for decommissioning. At that time, Lake Country will develop a detailed budgeting plan for decommissioning activities, including the anticipated costs, financing mechanisms, and appropriate financial assurance mechanisms. Lake Country will review and update cost estimates for salvage value, decommissioning and restoration 15 years after Project commissioning to ensure adequate funds will be available for decommissioning and restoration. The revised cost estimates will be submitted to the PUC for review and comment.

13. Identification of Required Permits/Applications

There are several permits and approvals that are or may potentially be required for construction of the Lake Country Project. These permits and approvals are detailed in the table below.

Table 13-1:
List of Permits and Approvals that may be required by Local, State and Federal Agencies for the construction of the Lake Country LWECS Project in Kandiyohi and Meeker Counties, Minnesota

Agency	Permit/Approval	Authority	Description
Federal			
FAA	Notice of Proposed Construction or Alteration	14 CFR Chapter 1 Subchapter E Part 77	Determination of No Hazard to Air Navigation
USFWS	Review of project regarding threatened and endangered species	Endangered Species Act 1973	The Act requires that federal agencies insure that agency actions do not jeopardize threatened or endangered species or their habitat
US Army Corps of Engineers	404 Permit	Clean Water Act	For work in wetlands and waters of the U.S.
State			
MN PUC	Site Permit	MN Rules 4401	For wind turbines – meet threshold for LWECS requiring permit
MN DNR	License to Cross Public Lands and Waters	Minn. Stat. 84.415	Required for utilities passing over, under, or across state lands and public waters.
MDH	Plumbing Plan Review	MN Rules 4715.3130	Ensures healthy and safe plumbing installation.
MN DOT	Driveway Permits		If access roads will connect to a state road
	Utility Accommodation Permit		If utilities are sited in State ROW
	Work Within a Right-of-Way Permit		If work is completed in a State ROW
	Aviation Clearance from the Office of Aeronautics	MN Rules 8800.1200	Project review by Office of Aeronautics after FAA obstruction review
	Oversize and Overweight Permit	Minn. Stat. 169.80-169.87	

Agency	Permit/Approval	Authority	Description
Local			
Kandiyohi County	Land Use / Building Permit	County Ordinance	Permit to construct an operations and maintenance facility
	Driveway Permit	County and Township Ordinances	Required for the construction of new driveways
	ISTS – Individual Sewage Treatment System License	MN Rule Chapter 7080 and County Ordinance	
	Stormwater and Erosion and Sediment Control Plan		
	Wetland Permit	Minnesota Wetland Conservation Act	May be needed If wetlands are impacted
Meeker County	Flood Plain Permit	Meeker Co. Floodplain Ordinance Section 7.1	Permit obtained from Zoning Administrator prior to construction in a floodplain.
	Stormwater and Erosion and Sediment Control Plan	County Ordinance	
	Driveway Permit	County Ordinance	Written access permit is required before construction, alteration or change of use of access within any Meeker County right-of-way.
	ISTS – Individual Sewage Treatment System License	MN Rule Chapter 7080 and County Ordinance	
	Wetland Permit	Wetland Conservation Act	May be needed if wetlands are impacted.
Other			
Burlington Northern Santa Fe	Railroad Access Permit		May be needed if utilities cross railroad right-of-way

14. References

Air NAV. 2010. FAA Airport Information for Willmar Municipal Airport-John L Rice Field (KBDH). http://www.airnav.com/airport/KBDH (Accessed May 2010)

AirNAV. 2010. FAA Airport Information for Litchfield Municipal Airport (KLJF). http://www.airnav.com/airport/KLJF (Accessed May 2010)

American Wind Energy Association. n.d. Facts About Wind Energy and Noise. http://www.awea.org/pubs/factsheets/WE_Noise.pdf. (Accessed February 2009)

Askins, R. A. 1993. Population Trends in Grassland, Shrubland, and Forest Birds in Eastern North America. Current Ornithology 11:1-34.

Beranek, L. L. 1993. Acoustics. Acoustical Society of America, McGraw-Hill, New York.

Brinkman, T. J., J. A. Jenks, C. S. DePerno, B. S. Haroldson, and R. G. Osborn. 2004. Survival of White-Tailed Deer in an Intensively Farmed Region of Minnesota. Wildlife Society Bulletin. 32(3); 726-731.City-Data. n.d. a.. Kandiyohi County, Minnesota. http://www.city-data.com/county/Kandiyohi_County-MN.html. (Accessed February 2009).

Brooks, T.F., D. S. Pope, and M. A. Marcolini. 1989. Airfoil Self-Noise and Prediction. National Aeronautics and Space Administration Reference Publication 1218.

Code of Federal Regulations. 2010. Emergency Management and Assistance, Chapter 1-Federal Emergency Management Agency, Department of Homeland Security, Subchapter B-Insurance and Hazard Mitigation. General Provisions, Definitions. 44 CFR 59.1.

Colby, W. D., R. Dobie, G. Leventhall, D. M. Lipscomb, R. J. McCunney, M. T. Seilo, and B. Søndergaard. 2009. Wind Turbine Sound and Health Effects: An Expert Panel Review. Report prepared for American Wind Energy Association and Canadian Wind Energy Association.

Environmental Protection Agency (EPA). 2010. EnviroMapper for Envirofacts. http://134.67.99.122/enviro/emef.asp?xl=-94.799713&yt=45.326801&xr=-94.219604&yb=44.89172. (Accessed May 2010).

Explore Minnesota. 2009. 2007 Annual Minnesota Sales Tax Statistics For the leisure and hospitality Industry Minnesota Total, Tourism Regions, and Counties.

http://industry.exploreminnesota.com/wp-content/uploads/2009/01/2007-annual-mn-sales-tax-contents-tables.pdf. (Accessed February 2009).

Explore Minnesota. n.d. Private Sector Jobs and Wages for Minnesota's leisure and hospitality Industry, 2006. http://industry.exploreminnesota.com/wp-content/uploads/2008/04/mnjobswages2006-leishospsectorsmntotal.pdf. (Accessed February 2009)

Federal Emergency Management Agency (FEMA). 1986. Flood Insurance Rate Map 01-55, Map Index, and Kandiyohi County, MN. Community Panel Number 270629 B.

Federal Emergency Management Agency (FEMA). 1988a. Flood Insurance Rate Map, Meeker County, Minnesota. Community Panel Number 2702800004A.

Federal Emergency Management Agency (FEMA). 1988b. Flood Insurance Rate Map, Meeker County Minnesota. Community Panel Number 2702800007A.

Hayes, M. 2006. The Measurement of Low Frequency Noise at Three UK Wind Farms. URN No.: 06/1412 http://webarchive.nationalarchives.gov.uk/+/http://www.berr.gov.uk//whatwedo/energy/sources/renewables/explained/wind/onshore-offshore/page31267.html.

Herkert, J. R. 1991. Prairie Birds of Illinois: Population Response to Two Centuries of Habitat Change. Illinois Natural History Survey Bulletin. 34:393-399.

Herkert, J.R. 1995. An Analysis of Midwestern Breeding Bird Population Trends: 1966–1993. American Midland Naturalist 134:41–50.

Herkert, J. R., D. W. Sample, and R. E. Warner. 1996. Management of Midwestern Grassland Landscapes for the Conservation of Migratory Birds. Pp. 89-116, in F. R. Thompson III (editor). Management of Midwestern Landscapes for the Conservation of Neotropical Migratory Birds. USDA Forest Service Gen. Tech. Rep. NC-187. USDA Forest Service North Central Forest Experiment Station, St. Paul, MN.

Hoen, B., R. Wiser, P. Cappers, M. Thayer, G. Sethi. 2009. The impact of wind power projects on residential property values in the U.S.: a multi-site hedonic analysis. Report prepared for the Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy. Contract No. DE-AC02-05CH1123.

Jakobsen, J. 2005. Infrasound Emission from Wind Turbines. Journal of Low Frequency Noise, Vibration, and Active Control. 24(3): 145-155.

Johnson, G.D., W. P. Erickson, M. D. Strickland, M. F. Shepherd, and D. A. Shepherd. 2000. Avian monitoring studies at the Buffalo Ridge Wind Resource Area, Minnesota

Wind Resource Area: Results of a 4-year Study. Final report for Northern States Power Company, Minneapolis, MN, by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming.

Kamperman, G.W. and R. R. James. 2008. Simple Guidelines for Siting Wind Turbines to Prevent Health Risks. Proceedings NoiseCon 2008. Dearborn, Michigan: Institute of Noise Control Engineering.

Land Management Information Center. 1982. Geologic Map of Minnesota: Depth to Bedrock, from MGS Map S-14, 1982 (Digital Version). Minnesota Planning and Minnesota Geological Survey. St. Paul, Minnesota. http://www.mngeo.state.mn.us/chouse/metadata/dpthbdrk.html (Accessed January 2010)

Leddy, K.L., K.F. Higgins, and D. E. Naugle. 1999. Effects of wind turbines on upland nesting birds in Conservation Reserve Program Grasslands. Wilson Bulletin 111(1): 100-104.

Leventhall, H. G., S. Benton, and P. Pelmear. 2003. A Review of Published Research on Low Frequency Noise and its Effects. http://www.defra.gov.uk/environment/noise/research/lowfrequency/pdf/lowfreqnoise.pdf. Accessed February 2010.

Maynard, MA: R. D. Hellweg, Jr. & R. Lampeter, 2009. Response to Wind Turbine Syndrome. (Reference number 2539-WTS-0901). Epsilon Associates, Inc.

Minnesota Department of Employment and Economic Development (MN DEED). n.d. Local Unemployment Statistics Tool, Kandiyohi County. http://www.deed.state.mn.us/lmi/tools/laus/CurrentStats.aspx. (Accessed May2010).

Minnesota Department of Employment and Economic Development (MN DEED). n.d. Local Unemployment Statistics Tool, Meeker County. http://www.deed.state.mn.us/lmi/tools/laus/CurrentStats.aspx. (Accessed May 2010).

Minnesota Department of Health. 2009. County Well Index. St. Paul, Minnesota. http://www.health.state.mn.us/divs/eh/cwi/ (Accessed May 2010).

Minnesota Department of Natural Resources (DNR). 2006. Tomorrow's habitat for the wild and rare, An action plan for Minnesota wildlife, Comprehensive wildlife conservation strategy. Division of Ecological Services, St. Paul, MN.

Minnesota Department of Natural Resources (MN DNR). 2010. Bats. http://www.dnr.state.mn.us/mammals/bats/index.html (Accessed January 2010).

Minnesota Department of Natural Resources (MN DNR). 2010. Rare Species Guide. http://www.dnr.state.mn.us/rsg/filter_search.html (Accessed January 2010).

Minnesota Department of Transportation (MN DOT). 2008. Traffic Volumes for Kandiyohi County, Minnesota. Traffic Volume Program. http://www.dot.state.mn.us/traffic/data/maps/thcountymapdex.html#65 (Accessed May 2010).

Minnesota Department of Transportation (MN DOT). 2009. Traffic Volumes for Meeker County, Minnesota. Traffic Volume Program. http://www.dot.state.mn.us/traffic/data/maps/thcountymapdex.html#65 (Accessed May 2010).

Minnesota Pollution Control Agency (MPCA). n.d. What's In My Neighborhood Interactive Mapper. http://pca-gis04.pca.state.mn.us/website/mes/mesfin/entry.htm. (Accessed May 2010).

Minnesota Pollution Control Agency. 2010. 2009 Minnesota Inventory of Impaired Waters. http://www.pca.state.mn.us/water/tmdl/tmdl-303dlist.html#finallist (Accessed May 2010).

Minnesota State Historic Preservation Office (MN SHPO). 2010. Email Re: Cultural Resources Database Search. History/Architectural Inventory. May 27, 2010.

Moorhouse, A., M. Hayes, S. von Hunerbein, B. Piper, and M. Adams. 2007. Research into Aerodynamic Modulation of Wind Turbine Noise: Final Report. University of Salford.

Natural Resources Conservation Service. 1999. Ring-Necked Pheasant. United States Department of Agriculture. Wildlife Habitat Management Institute. Fish and Wildlife Habitat Management Leaflet Number 10. Madison, MS.

National Research Council (NRC). 2007. Environmental Impacts of Wind Energy Projects. Committee on Environmental Impacts of Wind Energy Projects, Board of Environmental Studies and Toxicology, Division on Earth and Life Sciences. The National Academies Press, Washington, D.C.

Nielsen, A. 2003. Shadow Flicker Briefing. Prepared for Zilkha Renewable Energy, Portland, OR, by Wind Engineers, Inc. November 20, 2003. Available: http://www.efsec.wa.gov/wildhorse/apl/ExhibitsPDF/E09_Shadow Flicker Briefing Memo.pdf.

Samson, F.B. and F. Knopf. 1994. Prairie Conservation in North America. Bioscience 44:418–421.

Singal, S.P. 2005. Noise Pollution and Control Strategy. Alpha Science International Ltd, Oxford.

Thumann, A. and R. K. Miller. 1990. Fundamentals of Noise Control Engineering 2nd ed. The Fairmont Press. Lilburn, Georgia.

United States Census Bureau. 2008. State and County Quick Facts, Kandiyohi County, Minnesota. http://quickfacts.census.gov/qfd/states/27/27067.html. (Accessed May 2010).

United States Census Bureau. 2008. State and County Quick Facts, Meeker County, Minnesota. http://quickfacts.census.gov/qfd/states/27/27093.html. (Accessed May 2010).

United States Department of Agriculture. 2009. 2007 Census of Agriculture. United States Summary and State Data. National Agricultural Statistics Service. Volume 1, Geographic Area Series, Part 51. Updated December 2009.

United States Department of Agricultural Soil Conservation Service Soil Survey for Kandiyohi County, Minnesota. 1987.

United States Department of Agricultural Natural Resource Conservation Service Soil Survey for Meeker County, Minnesota. 1999.

United States Fish and Wildlife Service (USFWS). 2010. National Wetlands Inventory. Branch of Resource Mapping and Support. Arlington, Virginia. http://www.fws.gov/wetlands/ (Accessed May 2010)

United States Fish and Wildlife Service Wind Turbine Guidelines Advisory Committee, 2010. Wind Turbine Guidelines Advisory Committee Recommendations.

United States Geological Survey, EROS Data Center, Sioux Falls, SD, 7.5 Minute Topographical Quadrangle for Atwater, Minnesota (45094-B7).

United States Geological Survey, EROS Data Center, Sioux Falls, SD, 7.5 Minute Topographical Quadrangle for Grove City, Minnesota (45094-B6).

United States Geological Survey, EROS Data Center, Sioux Falls, SD, 7.5 Minute Topographical Quadrangle for Lake Elizabeth, Minnesota (45094-A7).

United States Geological Survey, EROS Data Center, Sioux Falls, SD, 7.5 Minute Topographical Quadrangle for Little Kandiyohi Lake, Minnesota (45094-A8).

United States Geological Survey, EROS Data Center, Sioux Falls, SD, 7.5 Minute Topographical Quadrangle for Rosendale, Minnesota (45094-A6).

United States Naval Observatory. Sun or Moon Rise/Set Tables. http://www.usno.navy.mil/USNO/astronomical-applications/data-services/rs-one-year-us

AFFIDAVIT OF SERVICE

In the Matter of a Site Permit Application for a Large Wind Energy Facility in Kandiyohi and Meeker Counties, Minnesota

MPUC Docket No.: IP-6846/WS-10-798

STATE OF MINNESOTA)
) ss.
COUNTY OF HENNEPIN)

Kristen Swenson, of the City of Minneapolis, County of Hennepin, in the State of Minnesota, being duly sworn, says that on the 4th day of August, 2010, she e-filed with the Minnesota Public Utilities Commission the following:

1. **Site Permit Application for a Large Wind Energy Conversion System for the Lake Country Wind Energy Facility in Kandiyohi and Meeker Counties, Minnesota; and**

2. **Affidavit of Service.**

A copy has also been served via electronic mail or U.S. Mail in accordance with the service list of record.

Kristen Swenson

Subscribed and sworn to before me
on August 4, 2010.

Virginia E Rahn
Notary Public

VIRGINA E. RAHN
NOTARY PUBLIC-MINNESOTA
My Commission Expires Jan. 31, 2015

4783483_1.DOC

Member Name	Email	Company Name	Address	Delivery Method	View Trade Secret
Julia Anderson	Julia.Anderson@state.mn.us	MN Office of the Attorney General	1400 BRM Tower, 445 Minnesota St., St. Paul, MN 55101-2131	Electronic Service	No
Christina Brusven	cbrusven@fredlaw.com	Fredrikson & Byron, P.A.	200 S. 6th St., Ste 4000 Minneapolis, MN 55402-1425	Electronic Service	No
Sharon Ferguson	Sharon.ferguson@state.mn.us	State of MN - DOC	85 7th Place E, Ste 500 St. Paul, MN 55101-2198	Electronic Service	No
Burl W. Haar	burl.haar@state.mn.us	MN Public Utilities Commission	121 7th Place E, Ste 350 St. Paul, MN 55101-2147	Electronic Service	No
John Lindell	agorud.ecf@state.mn.us	OAG-RUD	900 BRM Tower, 445 Minnesota St. St. Paul, MN 55101-2130	Electronic Service	No
Chuck Burdick	cburdick@nationalwind.com	Lake Country Wind Energy, LLC	3033 Excelsior Blvd. Ste 525 Minneapolis, MN 55416	Electronic Service	No
Scott Ek	Scott.Ek@state.mn.us	OES – EFP	85 7th Place E, Ste 500 St. Paul, MN 55101-2198	Electronic Service	No
Deborah Pile	Deborah.Pile@state.mn.us	OES-EFP	85 7th Place E, Ste 500 St. Paul, MN 55101-2198	Electronic Service	No
Jeremy Duehr	jduehr@pirnie.com	Malcolm Pirnie, Inc.	924 Vista Ridge Lane Shakopee, MN 55379	Electronic Service	No