

October 17, 2011

Site Permit Application for a Large Wind Energy Conversion System

Community Wind South, LLC

Nobles County, Minnesota

PUC Docket Number: IP-687/WS-11-863

PREPARED FOR:

COMMUNITY WIND SOUTH, LLC  
800 S KNISS AVENUE, SUITE 2  
LIVERNE, MN 56156

PREPARED BY:



WSB & ASSOCIATES, INC.  
701 XENIA AVENUE SOUTH, SUITE 300  
MINNEAPOLIS, MN 55416

**Project Name:** Community Wind South, LLC

**Project Location:** Nobles County  
Larkin Township (T103N, R42W, Sections 13, 23-24)  
Summit Lake Township (T103N, R41W, Sections 17-20, 30)

**Applicant:** Community Wind South, LLC on behalf of Zephyr Wind, LLC; Moriah Wind, LLC; Chinook Wind, LLC; and Summit Transmission, LLC

**Authorized Representative:** Mark Willers

**Signature:** 

**Company:** Minwind Energy, LLC

**Address:** 800 S. Kniss Ave, Suite 2  
Luverne, MN 56156

**Phone Number:** (507) 283-9140

**Fax:** (507) 283-9170

**Email address:** mkwill@minwind.com

**Preparer of Application:** Andrea Moffatt

**Signature:** 

**Address:** WSB & Associates  
701 Xenia Avenue - Suite 300  
Minneapolis, MN 55416

**Phone Number:** (763) 287-7196

**Email Address:** amoffatt@wsbeng.com

TABLE OF CONTENTS

**1. APPLICANT INFORMATION ..... 1**

1.1 ROLE OF PERMIT APPLICANT IN CONSTRUCTION AND OPERATION OF LWECS ..... 1

1.2 OPERATOR OF THE LWECS ..... 1

1.3 NAME OF PERSON(S) TO BE THE PERMITTEES ..... 1

**2. CERTIFICATE OF NEED ..... 2**

**3. STATE POLICY ..... 2**

**4. PROJECT DESCRIPTION AND OVERVIEW ..... 2**

4.1 PROJECT LOCATION ..... 2

4.2 SIZE OF THE PROJECT AREA IN ACRES ..... 3

4.3 RATED CAPACITY ..... 3

4.4 NUMBER OF TURBINE SITES ..... 3

4.5 METEOROLOGICAL TOWERS ..... 3

4.6 PERCENT OF WIND RIGHTS SECURED ..... 3

4.7 OWNERSHIP STATEMENT ..... 4

**5. PROJECT DESIGN ..... 4**

5.1 DESCRIPTION OF PROJECT LAYOUT ..... 4

5.2 DESCRIPTION OF TURBINES AND TOWERS ..... 4

5.3 DESCRIPTION OF ELECTRICAL SYSTEM ..... 4

**6. DESCRIPTION AND LOCATION OF ASSOCIATED FACILITIES ..... 5**

6.1 TRANSMISSION AND PROJECT SUBSTATIONS ..... 5

6.2 COLLECTOR AND FEEDER LINES ..... 5

6.3 ASSOCIATED FACILITIES ..... 5

6.4 PERMITTING PROCESS ..... 5

**7. WIND RIGHTS ..... 5**

**8. ENVIRONMENTAL IMPACTS ..... 6**

8.1 DEMOGRAPHICS ANALYSIS ..... 6

8.2 LAND USE ..... 7

8.2.1 *Local Zoning and Comprehensive Plans* ..... 7

8.2.2 *Conservation Easements* ..... 10

8.3 NOISE ..... 10

8.3.1 *Wind Turbine Noise Estimates* ..... 11

8.3.2 *Impact* ..... 12

8.3.4 *Method Used to Determine Impacts* ..... 12

8.4 VISUAL IMPACTS ..... 13

8.4.1 *Impacts on Public Resources* ..... 13

8.4.2 *Impacts on Private Lands* ..... 14

8.4.3 *Shadow Flicker* ..... 14

8.5 PUBLIC SERVICES AND INFRASTRUCTURE ..... 16

8.5.1 *Roads* ..... 16

8.5.2 *Telecommunications* ..... 17

8.5.3 *Communication Systems* ..... 18

8.5.4 *Television* ..... 19

8.6 CULTURAL AND ARCHEOLOGICAL IMPACTS ..... 20

8.6.1 *Description of Resources* ..... 20

8.6.2 *Impacts* ..... 21

8.7	RECREATIONAL RESOURCES .....	21
8.7.1	<i>Description of Resources</i> .....	21
8.8	PUBLIC HEALTH AND SAFETY.....	24
8.8.1	<i>Electromagnetic Fields</i> .....	24
8.8.2	<i>Aviation</i> .....	24
8.9	HAZARDOUS MATERIALS.....	25
8.10	LAND-BASED ECONOMIES.....	26
8.11	TOURISM .....	27
8.12	LOCAL ECONOMIES .....	27
8.12.1	<i>Tax Payments</i> .....	28
8.12.2	<i>Impacts and Mitigation</i> .....	28
8.13	TOPOGRAPHY .....	28
8.14	SOILS .....	28
8.14	GEOLOGIC AND GROUNDWATER RESOURCES .....	29
8.15	SURFACE WATER AND FLOODPLAIN RESOURCES .....	30
8.15.1	<i>Surface Water and Floodplain Resources</i> .....	30
8.15.2	<i>Wildlife Lakes</i> .....	31
8.15.3	<i>100-Year Federal Emergency Management Agency (FEMA) Floodplains</i> .....	31
8.16	WETLANDS.....	32
8.17	VEGETATION.....	33
8.18	WILDLIFE .....	34
8.18.1	<i>Existing Wildlife Resources</i> .....	34
8.18.2	<i>Waterfowl Feeding and Resting Areas</i> .....	39
8.18.3	<i>Important Bird Areas</i> .....	39
8.19	RARE AND UNIQUE NATURAL RESOURCES .....	40
8.19.1	<i>Description of Resources</i> .....	40
8.19.2	<i>Native Prairie</i> .....	40
<b>9.</b>	<b>SITE CHARACTERIZATION .....</b>	<b>41</b>
9.1	DESCRIBE THE FOLLOWING: .....	41
9.1.1	<i>Interannual variation</i> .....	41
9.1.2	<i>Seasonal variation</i> .....	41
9.1.3	<i>Diurnal conditions</i> .....	41
9.1.4	<i>Atmospheric stability</i> .....	41
9.1.5	<i>Turbulence</i> .....	41
9.1.6	<i>Extreme conditions</i> .....	42
9.1.7	<i>Speed frequency distribution</i> .....	42
9.1.8	<i>Variation with height</i> .....	43
9.1.9	<i>Spatial variations</i> .....	43
9.1.10	<i>Wind rose (see guidance)</i> .....	43
9.1.11	<i>Other meteorological conditions</i> .....	43
9.2	LOCATION OF OTHER WIND TURBINES WITHIN 10 MILES FROM THE PROJECT BOUNDARY .....	43
<b>10.</b>	<b>PROJECT CONSTRUCTION .....</b>	<b>44</b>
10.1	ROADS AND INFRASTRUCTURE.....	44
10.2	ACCESS ROADS.....	44
10.3	ASSOCIATED FACILITIES .....	44
10.4	TURBINE SITE LOCATION .....	45
10.5	POST-CONSTRUCTION CLEANUP AND SITE RESTORATION .....	45
10.6	OPERATION AND MAINTENANCE OF THE PROJECT .....	45
10.7	COSTS .....	46
10.8	SCHEDULE .....	46
10.9	ENERGY PROJECTIONS .....	46
10.10	DECOMMISSION AND RESTORATION .....	46

11. IDENTIFICATION OF OTHER PERMITS ..... 46

12. REFERENCES ..... 48

**LIST OF FIGURES**

Figure 1: Project Location

Figure 2: Project Area & Facilities

Figure 3: Turbine Layout with Setbacks

Figure 4: Nobles County Zoning Map

Figure 5: Public Land Ownership & Recreation

Figure 6: Noise Modeling Results

Figure 7a: Worst Case Flicker Modeling Results

Figure 7b: Real Case Flicker Modeling Results

Figure 7c: Hours of Shadow Flicker

Figure 8: Threatened/Endangered Species and Cultural Resources

Figure 9: Topographic Map

Figure 10: Soil Survey of Nobles County

Figure 11: Site Geology

Figure 12: Surface Waters

Figure 13: FEMA Flood Map

Figure 14: National Wetlands Inventory-Overview

Figure 15: National Wetlands Inventory

Figure 16: Land Cover

Figure 17a: Wind Characteristics

Figure 17b: Wind Characteristics

Figure 17c: Wind Characteristics

Figure 18: Existing Turbines

Figure 19: Crane Pad Details

**LIST OF APPENDICES**

Appendix A: Figures

Appendix B: Data Request Letters and Agency Responses

Appendix C: Blondo Consulting: Cultural Resources Review

Appendix D: Comsearch Reports

Appendix E: Noise and Flicker Mapping and Analysis

Appendix F: Avian and Bat Assessment

Appendix G: Topeka Shiner (*Notropis topeka*) Habitat: Construction Recommendations

Appendix H: FIRM Panels

Appendix I: NSP Layout Approval

## LIST OF ACRONYMS

ADT	Average Daily Traffic
ASOS	Automated Surface Observation System
BMP	Best Management Practice
BOP	Balance of Plant
CRP	Conservation Reserve Program
CWS	Community Wind South, LLC
DNH	Determination of No Hazard
DNR	Department of Natural Resources (also MnDNR)
EMF	Electromagnetic Field
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FSA	Farm Service Agency
FPPA	Farmland Protection Policy Act
GAP	Gap Analysis Program
IEC	International Electrotechnical Commission
ISO	International Organization of Standardization
KV	Kilovolt
LLC	Limited Liability Company
LWECS	Large Wind Energy Conversion System
MDH	Minnesota Department of Health
MISO	Midwest Independent Transmission System Operator
MnDOT	Minnesota Department of Transportation
MPCA	Pollution Control Agency (also PCA)
MPUC	Minnesota Public Utilities Commission
MS	Minnesota Statute
MV	Medium voltage
MW	Megawatt
NEC	National Electric Code
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NSP	Northern States Power
NWI	National Wetland Inventory
PPA	Power Purchase Agreement
RIM	Reinvest in Minnesota
ROW	Right-of-way
SCADA	Supervisory Control and Data Acquisition
SHPO	State Historic Preservation Office
SNA	Scientific and Natural Area
SWCD	Soil and Water Conservation District
SWPPP	Storm Water Pollution Prevention Plan
USFWS	US Fish and Wildlife Service (also FWS)
USGS	United States Geological Survey
WPA	Waterfowl Protection Area
WMA	Wildlife Management Area

## **1. APPLICANT INFORMATION**

### **1.1 Role of permit applicant in construction and operation of Large Wind Energy Conversion System (LWECS)**

Northern States Power Company (“NSP”) submitted an application to the Minnesota Public Utilities Commission (“MPUC”) seeking a certificate of need to construct and install four high voltage transmission lines in southwestern Minnesota in 2001. As a condition of approval, the MPUC required NSP to purchase energy from 60 MW of locally-owned wind energy facilities as defined in the final Order. See Order Granting Certificate of Need Subject to Conditions, MPUC Docket No. E002/CN-01-1958, (March 11, 2003). Community Wind South, LLC (“CWS”) was created to develop approximately 30 MW of the required locally-owned generation on sites in Nobles County. CWS is managed by local landowners and representatives from the Nobles County area.

One requirement of the MPUC Order is that local landowners be given an opportunity to invest in the “locally-owned” projects. To facilitate these investments, CWS created three ownership entities; Chinook Wind, LLC (“Chinook”), Moriah Wind, LLC (“Moriah”) and Zephyr Wind, LLC (“Zephyr”); each of which will own 10 MW of the overall generating facility. In addition, CWS created Summit Transmission, LLC (“Summit”) as the entity which will design, install and operate the necessary transmission and interconnection facilities between the turbines and the NSP interconnection point. The generating and transmission facilities are collectively referred to as the “Project.”

CWS is responsible for development of the overall project, and hired Minwind Energy, LLC to assist in development efforts. It is anticipated that an outside investor will purchase majority interests in Chinook, Moriah and Zephyr, with CWS and other local owners retaining an interest. CWS will continue to assist with development, financing and operation of the project on an ongoing basis.

### **1.2 Operator of the LWECS**

Chinook, Zephyr and Moriah will operate their respective generating facilities and Summit will operate the transmission and interconnection facilities. CWS, local investors, and the equity investor will control each of these four entities and be responsible for permit compliance. The turbine manufacturer will be responsible in the first five years, and possibly longer, for maintenance and repair of the turbines themselves.

### **1.3 Name of person to be the Permittee**

Because of the structure of ownership, Permittees will include Chinook Wind, LLC, Moriah Wind, LLC, Zephyr Wind, LLC and Summit Transmission, LLC, with respect to their respective facilities.

**2. CERTIFICATE OF NEED**

No Certificate of Need is required for the Project. The Project is not a “large energy facility” as defined in Minnesota Statutes Section 216B.2421 because it is less than 50,000 kW in size and its only transmission lines will be at 34.5 kV. See Minnesota Statutes (MS) Section 2421, Subd. 2(1)(2010). In addition, the Project would be exempt as a qualifying facility pursuant to MS Section 216B.2423, Subd. 8(1)(2010).

**3. STATE POLICY**

Pursuant to Minnesota State Statute § 216F.03, Community Wind South, LLC, will site the Project in an orderly manner compatible with environmental preservation, sustainable development, and the efficient use of resources. The purpose of this site permit application is to provide information about the wind resource itself, as well as and human and environmental resources within the Project Area.

**4. PROJECT DESCRIPTION AND OVERVIEW**

**4.1 Project Location**

The Project is located in Nobles County in southwestern Minnesota, approximately two miles south of Wilmont, Minnesota (**Figure 1**). The Project is located in all or parts of the Township, Range, and Sections listed in Table 4-1 below:

**Table 4-1: Project Location**

County	Township Name	Township	Range	Section
Nobles	Summit Lake	103N	41W	17-20, 30
Nobles	Larkin	103N	42W	13, 23-24

The Project currently proposes to use 15 REPower 2.05 megawatt (MW) turbines with 100 meter (328 feet) hub heights within a 3,080 acre area. The rated nameplate capacity of the Project is 30.75 megawatts (MW). The rotor will be 92.5 meters (303.5 feet) in diameter. The rotor swept area will be 6,717 square meters (72,308 square feet). Additional description of the associated facilities is discussed in **Sections 5 and 6** of this application. This project area is surrounded on three sides by the Nobles Wind Farm (see **Figure 18**) owned by NSP. The existing Nobles Wind Farm has 134, 1.5 MW turbines. (Nobles Wind Farm docket number IP6646/WS-09-584). Therefore, the Community Wind South, LLC project will essentially be a “project within a project”. The permitting considerations for the Nobles Wind Farm, previously approved, are largely applicable to the proposed Project Site.

The use of REPower turbines is premised on investment by a particular investor, the likelihood of which is considered to be very high. In the event that final agreements are not reached with the investor, the Project will consider use of comparable turbines at almost exactly the same locations

proposed for the REPower turbines, such as the AVIC HD 2.0 MW turbine, with a 93.0 meter rotor diameter, the Gamesa 2.0 MW G90 turbine with a 90 meter rotor diameter, or other equivalent turbines. Use of these alternative turbines will not alter siting or other environmental effects of the Project in a material way.

#### **4.2 Size of the Project Area in Acres**

The project is composed of approximately 3,080 acres of primarily agricultural land. Community Wind South, LLC will site the equipment and facilities within the 3,080 acre Project Area as shown on **Figure 2**. This will allow some siting flexibility in the event that the current turbine locations are found to be unsuitable, and will provide sufficient room for buffers and setbacks required for avoiding impacts with houses, residences, and existing natural resources.

#### **4.3 Rated Capacity**

The rated nameplate capacity of the Community Wind South, LLC wind farm using REPower turbines is 30.75 megawatts (MW) and using comparable turbines will be no less than 30 MW.

#### **4.4 Number of Turbine Sites**

The Community Wind South, LLC wind farm will consist of 15 REPower 2.05 megawatt wind turbines or 15 equivalent turbines.

#### **4.5 Meteorological Towers**

One anemometer tower is currently located in the SE  $\frac{1}{4}$ , Section 23, Township 103 North, Range 42 West; this tower was permitted by Nobles County and has been in operation since October 2007. This temporary met tower will be decommissioned and removed prior to turbine erection, and a permanent freestanding structure will be installed. The permanent tower will be sited in accordance with International Electrotechnical Commission (IEC) guidelines for power performance testing of wind turbines and is currently proposed for placement in the SE  $\frac{1}{4}$ , Section 13, Township 103 North, Range 42 West.

#### **4.6 Percent of Wind Rights Secured**

Wind rights to 100% of the 3,080 acres in the Project footprint are secured. The total land area secured consists of 23 leases with 36 land owners. All landowners within the Project site are participating in the Project through leases or easements, with one exception. One landowner has elected not to sign an easement as he does not wish to have any encumbrances on the title to his land. He is not opposed to the Project; he simply wishes not to sign any agreement that might bind or restrict his property rights. His property is

approximately 11 acres located in the NE1/4 of Section 24 along Heiselroth Avenue north of Turbine 5 (**Figure 3**). His property is outside of the 1,200 foot setback of any of the turbines.

#### **4.7 Ownership Statement**

Community Wind South, LLC and its principals and affiliates have no other ownership in any other Large Wind Energy Conversion System (LWECS) located in Minnesota.

### **5. PROJECT DESIGN**

#### **5.1 Description of Project Layout**

Preliminary site layouts are shown on **Figure 2**. Approximately 91% of the land cover within the Project Area is agricultural (mainly row crop). Impacts from turbines and associated facilities will occur primarily to the agricultural land cover, although approximately 4,000 linear feet of underground collection line may be installed through grassland areas, creating temporary impacts. Impacted grasslands will be restored to pre-construction condition.

The final layout will incorporate setbacks from occupied residences, road rights-of-way, and land over which the wind rights are not controlled. The design of the project will maintain setbacks of 1,200 feet from occupied residences, 250 feet from the edge of the road rights-of-way, and a setback meeting Minnesota Noise Standards, Minnesota Rules Chapter 7030. Project setbacks as they relate to the preliminary site layout for the turbine model proposed are provided in **Figure 3**.

#### **5.2 Description of Turbines and Towers**

The Project is expected to consist of 15 – 2.05 MW REPower turbines. The model number for the turbines is MM92. These turbines will have a hub height of 100m(328ft) standing on tubular steel towers and a rotor diameter of 92.5 m (303.5 ft), connected by underground wire for communication and electrical output.

#### **5.3 Description of electrical system**

The electrical system will be a 34.5 kilovolt (kV) underground three (3) phase collection system. The underground trench will house three separate appropriately sized fully shielded direct bury medium voltage (MV) cables, a bare copper ground wire, and an appropriately sized armored fiber optic cable for transmittal of supervisory control and data acquisition (SCADA) information. Separate collection systems will connect the Chinook, Moriah and Zephyr facilities and then converge at a common collection point. A fenced in collector yard, comprised of appropriate protection and metering equipment will be located at the southeast corner of the SE ¼ of Section 18,

Township 103 North, Range 41 West (Summit Lake Township); power will be sent 19,908 feet by two sets of underground 34.5 kV cables to the existing Nobles County substation owned by NSP north of Reading, MN.

## 6. DESCRIPTION AND LOCATION OF ASSOCIATED FACILITIES

### 6.1 Transmission and Project Substations

See Section 5.3 above. No separate Project substation facilities will be needed; all such facilities will be included in NSP's existing Nobles County Substation.

### 6.2 Collector and Feeder Lines

All collection lines will be underground and rated at 34.5 kV as described above in Section 5.3 (see **Figure 3**).

### 6.3 Associated Facilities

Associated facilities include pad mount transformers at the base of each turbine, compacted gravel engineered access roads, 34.5 kV collector lines, a collector yard, an existing temporary meteorological tower, and a permanent meteorological tower. The collector yard will be a fenced-in area approximately 40 feet by 60 feet. It will also include a small metal building for electronic monitoring equipment. Power will be sent by underground cable for 19,908 feet to the existing Nobles County substation. An operation and maintenance facility will not be constructed at the Project site as the Project will use an existing facility in Luverne, MN.

### 6.4 Permitting Process

In addition to this State permit, the applicant has met with Nobles County engineers and with township boards with regard to right-of-way and any other necessary local permits. Community Wind South, LLC will adhere to all County and local zoning requirements. A listing of the permits needed for the Project are included in **Section 11**.

## 7. WIND RIGHTS

Wind rights are acquired through 23 lease or easement agreements with 36 landowners. All 3,080 acres in the Project footprint are under lease or easement agreement. All landowners within the Project site are participating in the Project through leases or easements, with one exception. One landowner has elected not to sign an easement as he does not wish to have any encumbrances on the title to his land. He is not opposed to the Project; he simply wishes not to sign any agreement that might bind or restrict his property rights. His property is approximately 11 acres located in the NE1/4 of Section 24 along Heiselroth Avenue north of Turbine 5 (**Figure 3**). His property is outside of the 1,200 foot setback of

any of the turbines.

## 8. ENVIRONMENTAL IMPACTS

In conformance with Minnesota Rules 7854, an environmental analysis associated with the Project has been completed. As part of this analysis, background information was obtained and reviewed including:

- Natural Resource Conservation Service (NRCS) Soils Map
- National Wetland Inventory (NWI) map
- Department of Natural Resources (DNR) Public Waters Map
- United States Geologic Survey (USGS) map
- Parks mapping
- Public Recreation Information Map
- Natural Heritage Database Information (NHIS)
- Topography
- Land use and land cover
- Avian nesting areas and migration routes
- Minnesota Ornithologists Union
- Prime farmland data
- Nobles County Comprehensive Plan
- Federal Emergency Management Agency Floodplain Maps
- State Historical Preservation Office information
- U.S. Census Bureau information
- U.S. Fish and Wildlife Service (USFWS)
- State Office of Geographic and Demographic Analysis information

Information request letters and preliminary project information were also sent to various governmental and regulatory agencies for applicable comments and concerns. These letters were sent to the DNR, USFWS, Nobles County Planning and Zoning Department, and the Nobles County Soil and Water Conservation District. This correspondence is included in **Appendix B**.

In general, the Project location is rural with an agricultural-based economy. Corn and soybeans are the primary row crops produced in the area and the county also ranks high for livestock production, primarily cattle and hogs (MN Department of Agriculture 2009). The topography consists of gently rolling hills. Potential environmental impacts associated with the Community Wind South, LLC wind project are discussed below.

### 8.1 Demographic Analysis

The Project will be located in central Nobles County, approximately two miles south of Wilmont in Larkin and Summit Lake Townships (**Figure 1**).

The area is primarily rural and sparsely populated. Information from the U.S. Census Bureau from 2009 estimated the population of Nobles County at 20,278. This was a slight decrease from the 2000 census which estimated the population at 20,832, and a decrease from the 1960s when the County was at the height of its

population with 22,365 residents.

Urban populations in the County steadily increased from 1940 to 1980. Since the 1980s, the population has decreased. From 1980 to 1990, the population decreased 4.6%. The City of Wilmont, located approximately two miles north of the Project area, is the nearest population center and had an estimated population of 296 in 2009.

Information from the US Census Bureau from 2009 indicates that the number of households in the County increased by 127 between 2000 and 2009. The average household size in the County was 2.42; the total population was 20,278 and there were 8,592 households.

The primary employment opportunities in the County revolve around agriculture in addition to the Swift pork processing plant. The median household income in 2009 was \$42,042. **Table 8-1** summarizes some of the population and economic characteristics of the County and townships in which the Project is located. The two affected townships are sparsely populated. The Project is expected to bring 50 to 60 temporary and five to eight permanent jobs to the area. No significant impact to local demographics is expected. No specific mitigation is needed.

**Table 8-1: Population and Economic Characteristics**

Location	Population	Per Capita Income	Families Below Poverty Line (%)
<b>Nobles County</b>	<b>20,278</b>	<b>21,656</b>	<b>11.8</b>
Summit Lake Township	338	20,813	3.3
Larkin Township	146	26,299	0.0

Source: U.S. Census Bureau, 2005-2009 American Community Survey

## 8.2 Land Use

### 8.2.1 Local Zoning and Comprehensive Plans

#### 8.2.1.1 Adopted Comprehensive Plans

Nobles County has a Comprehensive Plan that was adopted in 2001 and a Water Management Plan that was adopted in 2009. **Table 8-2** summarizes the Land Use Plans for the Local Governments within the Project Area.

**Table 8-2. Comprehensive Plan Inventory for Local Government Units**

Local Government	Plan Name	Year Adopted/Updated	Associated Development Plan(s)
Nobles County	Comprehensive Plan	2001	Water Management Plan
Summit Lake Township	NA	NA	NA
Larkin Township	NA	NA	NA

**8.2.1.2 County or Local Ordinances**

The Nobles County Zoning Ordinance, section 729, addresses Wind Energy Conversion System Regulations established in the County and the associated setback requirements. Many of the setback requirements are similar to those required by the Public Utilities Commission (PUC), but some may be more restrictive. **Table 8-3** summarizes the setback requirements established by Nobles County Zoning Ordinance in relation to the Project.

**Table 8-3. Local Setback Requirements**

Resource	Nobles County	Proposed Project
Property Lines	1.25 times the total height <sup>a</sup>	1.25 times the total height <sup>a</sup>
Neighboring Dwellings	750 feet	400 m (1312 feet); all known residents < 50dB
Road Rights-of-Way	1 times the height <sup>a</sup> , may be reduced for minimum maintenance roads or roads with an ADT of less than 10	1 times the height <sup>a</sup>
Other Rights-of-Way	To be considered by planning commission	To be considered
Internal Turbine Spacing	None specified	3 RD for crosswind spacing and 6 RD for downwind spacing
Public Conservation Lands Managed as Grasslands	600 feet (there is no prohibition on cables crossing grasslands)	None specified
Wetlands, USFWS Types III, IV, and V	600 feet	600 feet (type unknown though, therefore might be unnecessary)
Other Structures	To be considered	To be considered

Resource	Nobles County	Proposed Project
Other Existing WECS	To be considered based on: - Relative size of the existing and proposed WECS -Alignment of the WECS relative to the predominant winds -Topography -Extent of wake interference impacts -Property line setback of existing WECS -Other setbacks required	3 RD for crosswind spacing and 6 RD for downwind spacing
Wind Access	None specified	For worst case scenario: 5 RD on the prevailing wind directions and 3 RD on the non-prevailing wind directions to non-participating parcels
Sand and Gravel Operations	None specified	None specified
Aviation	None specified	None specified
Native Prairies	None specified	None specified

a. Total height means from the base of the turbine to the tip of the blade at its highest point.

**8.2.1.3 Current and Future Zoning**

The Nobles County Future Land Use Map currently guides the development of areas outside of Worthington as AG-Agricultural (**Figure 4**). The Nobles County Comprehensive Plan also outlines Countywide goals related to land use. It is the goal of the County to:

- Preserve agriculturally productive land uses as a vital resource to the County;
- Continue to ensure minimal land use conflicts concerning basic farming operations, feedlots, and residential/urban land uses;
- Allow for adequate residential development in rural areas taking care not to upset any agricultural or environmentally sensitive areas;
- Continue to develop the livability and diversity of Nobles County by preserving existing farmhouse sites;
- Supply communities with options for long-term residence within the residential sector;
- Continue to provide adequate balance between residential development and protection of agricultural and environmentally sensitive areas;
- Continue to enhance possibilities for development of

commercial and industrial enterprise within Nobles County that are compatible with current resources; and

- Protect the County's water supply from pollution.

## **8.2.2 Conservation Easements**

### **8.2.2.1 Description of Resources**

Some parcels of land within the Project Area are known to be enrolled in the Conservation Reserve Program (CRP; **Figure 5**). The CRP program is administered by the U.S. Farm Service Agency (FSA) in an effort to remove environmentally sensitive land from agricultural production and conserve habitat for wildlife. These easements can be for a duration of 10 or 15 years.

### **8.2.2.2 Impacts**

The proposed Project is not anticipated to permanently impact any CRP properties. Temporary impacts may occur as a result of installing collector lines. All necessary arrangements will be made with the landowners and FSA.

### **8.2.2.3 Mitigation**

If any portion of the proposed Project will result in a temporary disturbance of CRP properties, the lands will be revegetated using a seed mix that meets the Minnesota CRP standards to match their pre-disturbance state.

## **8.3 Noise**

The rural setting of the Project Area typically has background noise levels in the 35-45 decibel range with higher levels in the 45-60 decibel range near roads. Background noise in the area is a result of wind, farming equipment/operations, and vehicles. A comparison of typical noise generators is outlined below.

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

SOURCE: "A Guide to Noise Control in Minnesota"  
Minnesota Pollution Control Agency (2008)

The Minnesota Pollution Control Agency has the power to adopt noise standards pursuant to Minnesota Statute Section 116.07, subd. 2. The adopted standards are set forth in Minnesota Rules Chapter 7030. The MPCA standards require A-weighted noise measurements. Different standards are specified for daytime (7:00 AM – 10:00 PM) and nighttime (10:00 PM – 7:00 AM) hours. The noise standards specify the maximum allowable noise volumes that may not be exceeded for more than 10 percent of any hour (L10) and 50 percent of any hour (L50). Household units, including farm houses, are included in Land Use Classification 1. **Table 8-4** shows the MPCA State noise standards. All the land within the Project Area is considered Land Use Class 1.

**Table 8-4: MPCA State Noise Standards – Hourly A-Weighted Decibels**

Land Use	Code	Day (7:00 AM - 10:00 PM) dBA		Night (10:00 PM - 7:00 AM) dBA	
		L <sub>10</sub>	L <sub>50</sub>	L <sub>10</sub>	L <sub>50</sub>
Residential	NAC-1	65	60	55	50
Commercial	NAC-2	70	65	70	65
Industrial	NAC-3	80	75	80	75

Since wind farms generate a relatively constant noise volume, the anticipated noise from wind farms are typically reported in terms of an equivalent sound level (L<sub>eq</sub>) that has the same energy and A-weighted level as the community noise over a given time interval rather than reporting both L<sub>10</sub> and L<sub>50</sub>. When describing relatively constant sound levels, the L<sub>10</sub> and L<sub>50</sub> values will be roughly equal. This equivalent sound level is most appropriately compared to the state L<sub>50</sub> standards. The difference between L<sub>eq</sub> and L<sub>50</sub> is mathematically similar to the difference between the *mean* and the *median* for a data set. These values will be roughly equal for data sets without extreme values or statistical outliers (such as wind turbine noise).

### 8.3.1 Wind Turbine Noise Estimates

**Figure 6** shows the anticipated noise impact caused by the

proposed wind turbines. The analysis estimates the maximum noise impact caused when all 15 proposed turbines are operating simultaneously under normal conditions. The analysis estimates that the noise impact from the proposed turbines on any receptor within the Project Area will not be greater than 42.7 d(B)A. A more detailed noise analysis has been completed for the Project and is included in **Appendix E**.

### **8.3.2 Impact**

A single turbine within the Project Area is warranted to generate a maximum apparent sound power level no greater than 104 decibels immediately adjacent to the turbine at hub height. The decibels decrease as the receptor moves further away from the turbine. In general, a setback of 304.8 meters (1,000 feet) from all receptors is desired to ensure that the noise generation of multiple turbines will be less than 50 decibels at any receptor. The Project will provide at least a 366 meter (1,200 foot) setback in all cases (**Figure 3**). The sound a turbine makes can be described as a “whoosh” sound when the rotors are moving. On a windy day, the sound of the turbines is generally masked by the sound of the wind.

### **8.3.4 Method Used to Determine Impacts**

WindPro 2.7 software was used to model the wind turbine noise impacts. The analysis used the ISO-9613-2 general noise model and assumed a ground attenuation factor of 0.5 throughout the area. A ground attenuation factor represents the ability of the ground and surrounding area to absorb sound. It is represented by a number between 0 and 1 where 0 represents an urban area with all hard surfaces where sound is reflected by these surfaces. A ground attenuation factor of 1 represents a densely vegetated area where sound is absorbed by the surrounding surfaces, such as a densely wooded area. A factor of 0.5 was used for this analysis to indicate the existing conditions of not completely vegetated and not completely hard surfaces. This is a commonly used factor as an industry standard for these types of analyses to reflect the existing ground cover in rural agricultural areas. A total of 36 potential receptors (e.g. residences) were modeled.

### **Mitigation**

The turbines will be sited to comply with the State of Minnesota’s noise standards. General MPUC permitting standards require a minimum of 500-foot setbacks from occupied residences, and recent decisions reflect setbacks of 1,000 feet from participating landowners and 1,500 feet from non-participating landowners. The proposed siting layout meets these standards. Prior to the start of construction the sound emissions of the Project will be modeled using the final turbine locations and the maximum warranted sound output to ensure compliance with the State standards.

## 8.4 Visual Impacts

The existing land cover within the Project Area is primarily agricultural (row crops and grazing). The topography of the area is generally flat with some gently rolling hills that are punctuated by drainageways and scattered wetlands and grasslands. Homesteads are scattered throughout the Project Area and are often bordered by small groves of deciduous and coniferous trees planted as windbreaks. It is anticipated that 15 wind turbines will be placed throughout the Project Area. These turbines will be on 100 meter (328 feet) towers with 92.5 meter (303.5 feet) diameter rotors for a total height of 146.25 meters (479.8 feet). These proposed turbines will likely be visible from several areas within and adjacent to the Project Area.

The Project Area is adjacent to the Nobles Wind project on three sides (**Figure 18**). The existing Nobles Wind Farm has 134, 1.5 MW General Electric turbines. The Community Wind South project will essentially be a “project within a project”.

Community Wind South, LLC proposes the following mitigation measures to reduce the visual impact of the turbines in the area:

- Turbines will be uniform in color;
- Turbines will not be located in biologically sensitive areas such as public parks, Wildlife Management Areas (WMAs), Scientific and Natural Areas (SNAs), Waterfowl Protection Areas (WPAs), or wetlands;
- Turbines will be illuminated only to meet the minimum FAA requirements for obstruction lighting of wind turbine farms (e.g. the turbines will not be lit unless required by the FAA);
- Collector lines will be buried to minimize aboveground structures within the turbine layout;
- Existing roads will be used for construction and maintenance where possible to minimize the amount of new roads constructed; access roads created for the wind farm facility will be located on gentle grades to minimize erosion, visible cuts and fills; and
- Temporarily disturbed areas will be converted back to cropland or otherwise reseeded with native seed mixes appropriate for the Project Area.

### 8.4.1 Impacts on Public Resources

The nearest public resource to the Project Area is the Blue Bird Prairie Wildlife Management Area (WMA), located approximately one mile southeast of the Project Area (**Figure 5**). Four other WMAs and one Waterfowl Protection area (WPA) are located within five miles of the Project Area. Although it is possible that the proposed turbines could be visible from these areas, there are 134 wind turbines existing within the current viewshed from the Nobles Wind

project that borders the Project on three sides. Therefore, visual impact from the additional turbines is anticipated to be minimal.

#### **8.4.2 Impacts on Private Lands**

Although a buffer of at least 365 meters (1,200 feet) will exist between wind turbines and private residences, the turbines will likely still be visible. It is a matter of perception as to whether the impact will be negative or positive. The wind turbines may be perceived as a disruption in the landscape to some and as points of visual interest to others. The existing viewshed of the area has been highly altered since pre-settlement times and currently consists of open expanses of agricultural land and rural residential. In addition, several existing wind turbines in the Nobles Wind Farm are visible bordering the Project Area on the east, west, and south.

The Federal Aviation Administration (FAA) requires obstruction lighting for structures over 200 feet above ground. Community Wind South, LLC will comply with the minimum FAA requirements when placing obstruction lighting on turbines. Lighting on turbines within the Project will be synchronized. As an additional mitigation measure, the color of the turbines is such that they blend in with the surrounding area. Furthermore, post-construction operation of the wind farm is not anticipated to significantly increase the daily human activity or traffic in the area. Therefore, the area will also retain a rural nature as opposed to being converted to a more industrial or higher residential area.

#### **8.4.3 Shadow Flicker**

Shadow flicker occurs when the blades of a turbine pass in front of the sun to create a recurring shadow on an object, such as a residence. Shadow flicker will occur only under certain environmental conditions and is impacted by various factors such as:

- Sun, cloud cover and visibility (such as fog);
- Sun angle and sun path, which varies by season;
- Turbine location to the residence;
- Wind direction;
- Obstacles, such as trees or buildings; and
- Operation of the turbine.

If a turbine is not moving, it will not cause shadow flicker. Shadow flicker for the whole Project and an individual representative turbine were evaluated within WindPRO software using the 100 meter (328 feet) turbine hub design proposed for the Project. The full flicker analysis report is included in **Appendix E**. Two scenarios were considered, worst-case and real-case. The worst-case scenario assumes that the wind turbines are always in operation, always

facing into the sun, and that there is no cloud cover. These assumptions are unlikely to occur. The real-case statistically reduces the shadow flicker hours by taking into consideration the directional distribution and sunshine probabilities. Both scenarios used “greenhouse” sensors (shadows viewable from all angles), assumed no vegetation or obstacles block the shadows, that a shadow is possible when the sun is three degrees above the horizon, and a distance limit of 2,000 meters (6,561.6 feet). This distance is generally an industry standard used within the flicker modeling program. This distance is regarded as far enough to dissipate any shadow affect and have no significant impact and therefore the analysis does not go beyond the 2,000 meters (6,561.6 feet).

Two flicker scenarios were developed: worst-case (**Figure 7a**) and real-case (**Figure 7b**). The worst-case scenario estimates the potential shadow flicker by assuming that the turbines are always operating directly perpendicular to the sun. This represents the most severe flicker impacts theoretically possible based on the position of the turbines relative to the receptors (e.g. homes) and the sun. However, the worst-case flicker scenario is not anticipated to occur. Since the flicker impacts to any residence will vary based on which direction the turbine is pointing (which depends on the direction the wind is blowing), assumptions were made about the number of hours per year the turbines will be operating in each direction. The real-case scenario uses the estimated operating hours per direction and meteorological data (turbines will not produce shadows on days with heavy cloud cover regardless of sun position or operating direction) to estimate the most likely flicker scenario. The worst-case flicker impact on a single residence is estimated to be 76 hours per year. The real-case flicker impact at the same residence is estimated to be 25 hours per year.

**Figure 7c** shows the real-case likely hours of shadow flicker per year at circumferential locations 1,000 feet from the base of a single turbine and the resulting isopleths. The 1,000 feet (304.8 meters) was used as this is the guidance provided by the Minnesota Department of Commerce for this analysis. The actual design of the Project will provide over 1,200 feet (365.7 meters) of setback between the turbines and nearby houses. **Table 8-5** shows the potential shadow durations per day at these circumferential locations.

**Table 8-5: Shadow Flicker Hours per year at 1000 feet (304.8 meters) from center of turbine base\***

Direction	Worst-Case Shadow Hours per Year (h/year)	Worst-Case Shadow Days per Year (days/year)	Worst-Case Max Shadow Hours per Day (h/day)	Real-Case Shadow Hours per Year (h/year)
N	71:08	72	1:12	21:33
NE	90:35	106	1:08	26:11
E	98:03	124	1:05	43:51
SE	0:00	0	0:00	0:00
S	0:00	0	0:00	0:00
SW	0:00	0	0:00	0:00
W	100:04	115	1:09	43:05
NW	124:39	144	1:13	41:40

*\*Turbine height used was 146.25 meters (479.8 feet); based on 100 meter (328 feet) hub with 92.5 meter (303.5 feet) rotor diameter.*

Shadow flicker mitigation systems will be considered where necessary. If shadow flicker impacts are encountered, Community Wind South, LLC will commit to addressing any issues by monitoring and measuring flicker at the receptor. If measurements show that the shadow flicker hours will exceed 40 hours on an annual basis, specific monitoring mitigation at the receptor will be considered. The 40-hour threshold was used based upon similar studies conducted in Minnesota. Potential mitigation strategies include installing window treatments or vegetative screening to block the visual effects of the shadow flicker.

## 8.5 Public Services and Infrastructure

The Project is located in southwestern Minnesota in a lightly populated, rural area. The existing public services and infrastructure within the Project Area include gravel and paved roads, electrical service, and telephone service. On-site wells provide water to the farmsteads in the area. Municipal water is provided by Lincoln Pipestone Rural Water. On-site septic systems provide the sanitary service to the farmsteads.

### 8.5.1 Roads

There are approximately 13 miles of existing roads within the Project Area (**Table 8-6**). Eight and a half miles of road are under the County's jurisdiction and 4.5 miles are under the jurisdiction of townships.

**Table 8-6: Existing roads within Project Area**

Road Name	Classification	Average Daily Traffic	Miles
T142 (Heiseiroth Ave)	Township	23	2
CSAH60 (Fellows Ave)	County	175	0.5
CSAH13 (Jones Ave)	County	260 south of 200 <sup>th</sup> St 205 north of 200 <sup>th</sup> St	3
T100 (King Ave)	Township	77	0.5
CR68 (180th St)	County	35	1.5
T139 (190th St)	Township	74	1.5
CSAH14 (200th St)	County	225 west of Jones Ave 320 east of Jones Ave	3.5
T140 (210th St)	Township	112	0.5
	<b>Total County</b>		<b>8.5</b>
	<b>Total Township</b>		<b>4.5</b>
	<b>Total</b>		<b>13</b>

Average Daily Traffic (ADT) counts provided from Minnesota Department of Transportation

**Impacts**

While there is anticipated to be a higher than normal level of traffic on the roads during the construction of the Project, this increase in traffic will be short-term. Once construction is complete, it is anticipated that traffic levels will return to pre-construction levels. The only exception will be the maintenance vehicles that will visit the turbine sites on occasion. However, this activity will not increase traffic levels significantly. Any traffic disruptions as a result of construction will also be short-term in nature.

Some damage to the roads is anticipated given their weak structure. Examples of the type of damage expected include rutting, heaving, and the development of potholes on the roadway surface. The Project entities will enter into road development agreements with Nobles County and either Township as required to address road damage and repairs.

**Mitigation**

Any damage to the roadways as a result of the Project will be repaired or reimbursed based on the road development agreements between the Project entities and Nobles County or affected townships.

**8.5.2 Telecommunications**

Telephone service in Nobles County is provided by Frontier Communications, Centurylink, Citizens Telecommunications Company of Minnesota, Northern Iowa Telephone Company, or Lismore Cooperative Telephone Service. The construction and operation of the proposed wind farm is not expected to disrupt telephone service in the Project Area. Underground telephone facilities will be located prior to construction through a Gopher State

One call by a local utilities service and these facilities will be avoided. Community Wind South, LLC will also coordinate with the local telecommunication providers to ensure that any collection or transmission lines installed as part of the Project will not disrupt, and are compatible with, the existing telephone communication systems. If any disruption occurs, CWS would work with the local provider to return service and then coordinate with the local provider to identify and agree upon further necessary improvements.

### **8.5.3 Communication Systems**

#### **Weather & Military Radar**

The FAA's Department of Defense Screening Tool (2011) was used to assess potential impacts to Nexrad, Long Range Radars, and military operations. NEXRAD consists of Weather Surveillance Radar - 1988 Doppler radars. The preliminary evaluation determined that there will be minimal to no impact to Weather Surveillance Radar - 1988 Doppler (WSR-88D) weather radar operations. Long-range radar consists of Air Defense and Homeland Security radars. The preliminary evaluation determined that there are no anticipated impacts to Air Defense and Homeland Security radars within the proposed development area. The proposed site was evaluated to determine if any Military Operation Areas (MOA) were in the vicinity. The preliminary review indicated that there are not any likely impacts to military airspace.

#### **Microwave**

According to information gathered from the Federal Communications Commission (FCC) database, there are no microwave towers within the Project Area. The nearest tower is located approximately 0.5 miles west of the Project boundary, with two other towers occurring over three miles away. Comsearch was retained to complete an analysis of potential microwave interference. All microwave paths that intersected the Project Area were identified, and a Worst Case Fresnel Zone (WCFZ) was calculated for each of these paths. One turbine, Turbine 4, was identified as causing potential microwave interference. The Minnesota Department of Transportation (Mn/DOT) Office of Electronic Communications was contacted regarding potential microwave interference. Mn/DOT indicated they would prefer 100 foot (30.48 meters) clearance from the centerline of the beam path to the tip of the blade. Turbine 4 was moved to comply with these guidelines. The full report is available in **Appendix D**.

#### **Cellular Phones**

A preliminary review was done using the FCC database. The nearest cellular towers are approximately eight miles from the Project

boundary. Numerous wind turbines currently exist between the Project Area and these towers. No impact is anticipated as a result of the Project.

#### **AM/FM Radio**

Potential interference with AM radios is only expected when turbines are within two miles of directive antennas and a half mile from non-directive antennas. FM radio stations may experience interference if turbines are located within 2.5 miles of the broadcast antennas. According to data from the FCC there are no AM or FM radio stations located within the Project Area or within the distances specified for each above. Comsearch was retained to complete an assessment of potential impacts to AM/FM stations. Their search identified one AM station and seven FM stations within approximately 18.5 miles of the Project Area. The closest AM station is more than 7.75 miles from the Project Area. The nearest FM station antenna is also located more than 7.75 miles away. No impacts are anticipated as a result of the Project; therefore no mitigation measures are required. The full report is available in **Appendix D**.

#### **Land-Mobile Stations**

Land-mobile stations provide critical telecommunication services such as emergency response, public safety, and local government communications. Comsearch was retained to assess potential impacts to land-mobile stations. Their search identified five land mobile stations in the vicinity of the Project Area. The land mobile sites identified are typically unaffected by the presence of wind turbines. Impacts are not anticipated as a result of the Project; therefore no mitigation measures are required. The full report is available in **Appendix D**.

#### **8.5.4 Television**

Off-air television stations transmit signals which can be received directly on a television receiver from a land-based broadcast facility. Television stations that are most likely to provide off-air coverage will be located within approximately 40 miles of the Project Area. Comsearch was retained to analyze off-air stations where service could potentially be affected by the Project.

#### **Impacts**

A total of nine licensed and operating television stations occur within 40 miles of the Project Area. Of these, six stations were full-power digital stations and three were low-power digital stations. The six full-power digital stations may experience disrupted reception in and around the Project Area; however the three low-power stations are located at a distance where the turbines are not likely to cause disruption. The full report from Comsearch is located in **Appendix D**.

### **Mitigation**

Community Wind South, LLC is committed to constructing and operating the Project in a manner that minimizes impacts to off-air television reception. If issues arise during the construction or operation of the Project, the applicant will work with the affected residents to determine the cause of the interference and reestablish acceptable reception. If it is proven that the interference is a result of the Project, Community Wind South will work with the specific landowner to reach an agreeable solution. Potential mitigation strategies include having alternative television service installed, such as cable or satellite.

## **8.6 Cultural and Archeological Impacts**

### **8.6.1 Description of Resources**

The Project Area, located in central Nobles County, is near the border of two archeological regions. The western portion of Nobles County is within the Southwest Riverine archeological region and the eastern portion is within the Prairie Lakes region (Anfinson 1990). The Rock River is the major drainage way of the Southwest Riverine region and Early Prehistoric sites are most likely located along streams and near glacial features. There are few Middle Prehistoric sites within the region, with the majority of sites belonging to the Late Prehistoric period. The Prairie Lakes region has the swell and swale topography typical of a ground moraine. The western edge of the region, where the Project is located, lies the Prairie des Coteau highland. Early Prehistoric sites are relatively common, while Middle Prehistoric sites are rare (Anfinson 2009).

Blondo Consulting, LLC was retained to perform a preliminary investigation of previously identified archeological resources within the Project Area and within a 0.5 mile buffer surrounding the Project Area. The State Historic Preservation Office (SHPO) was also contacted regarding the presence of any archaeological, architectural, or historic sites within the Project Area. No historic structures were identified within the Project Area, however many of the historic architectural properties in the State have not been identified, and so an absence of properties in this report does not preclude their existence. Two archaeological sites were identified by both Blondo Consulting, LLC and the SHPO (**Table 8-7; Figure 8**). Specifics as to the location of these sites cannot be shown so they are generally shown on **Figure 8**. A full report of these findings is available in **Appendices B and C**.

**Table 8-7. Previously Recorded Cultural Resources**

Site Number	Site Name	Legal Location	Site Type	Project Area/Buffer
21N00028	Indian Hill Site II	T103N R41W Sec. 18	Prehistoric Artifact Scatter	Project Area
21N00029	Indian Hill Site I	T103N R41W Sec. 18	Prehistoric Artifact Scatter	Project Area

**8.6.2 Impacts**

The overall goal of the Project is to avoid archaeological and historical sites. Two of the turbines are proposed to be located in an area where archeological sites were identified in 1979 that were characterized as unknown prehistoric artifact scatters. Additional ground survey will be completed if required by the Public Utilities Commission or SHPO for the areas to be disturbed by the Project.

In the event that an archeological site is found during construction, the integrity and significance of the site will be addressed in terms of the potential of the site to be eligible for listing in the National Register of Historic Places (NRHP). If such sites are found to be eligible for listing in the NRHP, mitigation measures will be developed in consultation with SHPO, the State Archeologist, and any relevant American Indian communities. If previously unknown archaeological resources are inadvertently encountered during construction and/or operation, the discoveries will be reported to SHPO.

**8.7 Recreational Resources**

**8.7.1 Description of Resources**

Recreational opportunities within Nobles County include hunting, fishing, snowmobiling, camping, biking, and hiking. Information from the Department of Natural Resources (DNR), U.S. Fish and Wildlife Service (USFWS), and Nobles County was reviewed to determine the recreational resources present within the Project Area. Based on this information, there are no public recreation opportunities within the Project Area. However, there are five Wildlife Management Areas (WMAs) and one Waterfowl Production Area (WPA) located within five miles of the Project Area. There are an additional eleven WMAs, one County Park, and a Scientific and Natural Area (SNA) area located within ten miles of the Project Area. State snowmobile trails are also present surrounding the Project Area. The recreational resources are summarized in **Table 8-8** below. **Figure 5** shows the recreational resources present within five miles of the Project Area.

**Table 8-8. Recreational Resources Near Project Area**

Recreation Area	Distance from Project Area (miles)	Size (acres)	Managed For	Recreational Opportunities
Bluebird Prairie WMA	1	78	Upland Game	Wildlife Viewing, Hunting
VanDrie Ridge WMA	3	82	Upland Game, Winter Habitat	Wildlife Viewing, Hunting
Groth WMA	3	73	Waterfowl	Wildlife Viewing, Hunting
Enick WMA	4	50	Waterfowl	Wildlife Viewing, Hunting
Herlein-Boote WMA	4	250	Waterfowl	Wildlife Viewing, Hunting
Bloom WPA	4.5	159	Waterfowl	Wildlife Viewing, Hunting
Swessinger WMA	6	69	Upland Game	Wildlife Viewing, Hunting
Lambert Prairie WMA	6.5	82	Upland Game, Waterfowl	Wildlife Viewing, Hunting
Stable Banks WMA	6.5	48	Upland Game	Wildlife Viewing, Hunting
Adrian Lower County Park	6.5	36	N/A	Day Use, Camping
Dewald WMA	7	16	Upland Game	Wildlife Viewing, Hunting
Windy Acres WMA	7.5	159	Upland Prairie, Upland Game, Winter Habitat	Wildlife Viewing, Hunting
County Line WMA	7.5	164	Waterfowl, Upland Game	Wildlife Viewing, Hunting
Pheasant Run WMA	8	32	Upland Game	Wildlife Viewing, Hunting
Compass Prairie SNA	8	20	Native Prairie	Wildlife Viewing, Native Plant Viewing
Fenmont WMA	8	526	Upland Game, Waterfowl	Wildlife Viewing, Hunting
Schuering WMA	8	37	Upland Game, Waterfowl	Wildlife Viewing, Hunting

Recreation Area	Distance from Project Area (miles)	Size (acres)	Managed For	Recreational Opportunities
Cleanwater WMA	8.5	35	Nesting Wildlife	Wildlife Viewing, Hunting
Lone Tree WMA (North and South)	9	483	Waterfowl, Upland Game	Wildlife Viewing, Hunting
Campepedan WMA	10	81	Upland Game	Wildlife Viewing, Hunting
State Snowmobile Trail	Varies	N/A	N/A	Snowmobiling

Wildlife Management Areas are operated by the Minnesota DNR and were established to protect lands which have a high potential for wildlife production. These areas provide recreational opportunities such as hunting, wildlife and native plant viewing, and nature photography to the public.

Waterfowl Production Areas are owned and managed by the USFWS. These areas are intended to preserve critical habitat for waterfowl and other wildlife. The recreational opportunities available to the public at these areas include wildlife viewing, photography, plant viewing, and hunting.

The Scientific and Natural Area program is managed by the Minnesota DNR. These areas are designated to preserve ecological diversity and rare species within the State. Recreational opportunities in these areas consist of wildlife and plant observation and photography. More intensive recreational activities, such as hunting or camping, are not generally allowed in these areas.

Nobles County supports several County parks. Adrian Lower County Park is located in the town of Adrian and offers day-use recreational opportunities such as disc golf and swimming. A campground, owned by the City of Adrian, is also located within the Park and offers camping opportunities.

**Impacts**

There are no public recreational opportunities located within the Project Area. The nearest public land is located one mile away from the Project Area. The proposed turbines may be visible from some of the other areas; however, there are 134 wind turbines existing within the current viewshed from the Nobles Wind project that borders the Project on three sides. Therefore, visual impact from the additional turbines is anticipated to be minimal.

**Mitigation**

The project will not encroach onto any public recreational resources; therefore, mitigation measures are not proposed at this time.

**8.8 Public Health and Safety**

**8.8.1 Electromagnetic Fields**

Electromagnetic fields (EMFs) can be man-made or natural. Natural EMFs can be created by lightning and static electricity. Man-made EMFs are created wherever people use electricity and an electric current is flowing through a conductor, such as in household appliances or electric transmission lines. Electric fields are produced by voltage and these fields are easily shielded by objects (e.g., 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.

**Impacts**

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

**Mitigation**

Exposure to an EMF can be reduced by increasing the distance between the EMF source and the recipient. The project electrical collector system lines will be buried to a nominal depth of four feet underground. The addition of these turbines and associated infrastructure is not anticipated to significantly increase the EMFs in the area. No mitigation is necessary.

**8.8.2 Aviation**

According to the Federal Aviation Administration (FAA), one registered airport is located within ten miles of the Project Area. This airport is located in Worthington (OTG), approximately ten nautical miles southeast of the Project Area.

### **Impacts**

The Federal Acquisition Regulation (FAR) Part 77 surfaces for each airport have been reviewed. Based on our analysis, we have determined that locating a wind turbine within the proposed site will not impact any airport Part 77 surfaces.

The addition of 15 turbines within the Project Area may affect local crop dusting activities. The Minnesota Aeronautical Chart produced by the Minnesota Department of Transportation is available and shows wind turbine locations throughout the state. This chart is updated annually and will include the Community Wind South, LLC turbines after construction is complete. This chart can be found at <http://www.dot.state.mn.us/aero/avoffice/ops/aeromap/2010/Minnesota Chart Composite 3-11-10 Final.pdf>.

### **Mitigation**

No mitigation is necessary; however the FAA will require obstruction lighting at each wind turbine location according to FAA AC 70/7460-1K, Obstruction Marking and Lighting. Final clearance and approval from the FAA must be obtained once the final turbine sites are determined by submitting FAA Form 7460-1, Notice of Proposed Construction, or Alteration for each turbine location. In addition, the Mn/DOT Aeronautics Office may require a permit for each wind turbine location. FAA Determinations of No Hazard (DNH) have been provided for every proposed turbine location.

## **8.9 Hazardous Materials**

Due to the agricultural nature of the land within and adjacent to the Project Area, potential hazardous materials would likely result from spill of petroleum products, pesticides, and herbicides. Some farmsteads could also have unmarked waste dumps containing various types of wastes common to agricultural practices. Other potential hazardous materials could be present at older farmsteads in the form of lead-based paints, asbestos-containing building materials, and polychlorinated biphenyls (PCBs) in electrical transformers.

A search of the Minnesota Pollution Control Agencies "What's in My Neighborhood?" database (MPCA 2011) listed five registered feedlots within the Project Area. No other sites were mapped within the Project Area.

### **Impacts**

The proposed Project will not impact the feedlots within the Project Area. Potential impacts as a direct result of the Project could occur as a result of the maintenance of the turbines. Small amount of grease, lube oil, hydraulic oil, and cleaning solvents could be used. If these products are not properly stored or managed these products could leach into the soil and possibly the

local surface or ground waters.

### **Mitigation**

Impacts to hazardous materials are not expected with this Project. The proposed Project has been designed to avoid farmsteads and other occupied buildings. Therefore, any potential unmarked waste sites will be avoided.

Any products used for vehicle operation and maintenance during the construction of the Project will not be stored on-site. The products that may be used to maintain the turbines will be stored and disposed of in a manner consistent with local, state, and federal regulations.

## **8.10 Land-based Economies**

According to the USDA's 2007 Agricultural Census, approximately 92% of the land within Nobles County is cropland. Likewise, the majority of the land within the Project Area is in agricultural production. Corn and soybeans are the primary cultivated crops within the Project Area and grazing areas for livestock are also present.

There are no significant forestry resources within the Project Area. Mining operations are minimal in Nobles County and account for only 0.03% of the land use.

### **Impacts**

The turbines are proposed to be sited on existing agricultural land. A small area of one acre or less will be out of production for the construction and operation of each turbine. To provide a high estimate of the footprint of the impact of the turbines, the following assumptions were made:

- Each turbine would have a 0.04 acre footprint. This includes a 60 foot diameter circle (18.3 meters) roughly four feet below finished grade under each turbine that includes a 15.288 foot (4.6 meters) diameter foundation pedestal exposed above ground and a six foot (1.8 meters) wide gravel skirt (grounding ring) around the exposed pedestal for the purpose of reducing step potential. Step potential is the voltage that occurs between the feet of a person standing near an energized, grounded object. It is equal to the difference in voltage, given by the voltage distribution curve, between two points at different distances from the "electrode". A person could be at risk of injury during a fault simply by standing near the grounding point. Providing the grounding ring as alluded to here will provide additional safety mitigation by reducing step potential.
- When estimating the amount of surface land that will be occupied by improvements and equipment, Community Wind

South, LLC assumes a maximum of 0.5 miles of 16 foot wide road per turbine post construction. During construction roads will include 8 foot compacted shoulders for a total width of 32 feet. The average length of road per turbine is anticipated to be less, but this estimate allows for special requests that may be made by property owners. Preliminary road layouts indicate that 3.14 miles of access roads will be constructed within the Project Area. The majority of these access roads will be less than 0.5 miles long.

With up to 15 turbines being sited, this results in approximately 5.2 acres of land conversion within the 3,080 acre Project Area. This represents a less than 1% change in land cover for the Project Area. Agricultural activity is anticipated to continue between the turbine sites, thereby reducing impacts associated with the creation and operation of the wind energy facility.

### **Mitigation**

The turbines and associated facilities will be sited 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 between the turbine sites.

## **8.11 Tourism**

There are currently no tourism attractions within the Project Area. Areas in proximity to the Project Area that attract tourism include the Pioneer Village and Okabena Lake in Worthington, MN. The nearby WMAs and WPAs provide some tourism benefits through hunting.

### **Impacts**

No impacts to tourism are anticipated with the proposed Project. Positive impacts may occur as a result of the Project if the turbines themselves become a tourist attraction or if local groups use the turbines as an educational opportunity for those wishing to learn about alternative energy. Citizens in the communities surrounding the Project benefit from the payments landowners receive for wind easements on their property. These landowners will likely contribute to the local economy by investing these proceeds into local products and services.

### **Mitigation**

No impacts to tourism are expected with the proposed project; therefore, no mitigation measures are proposed.

## **8.12 Local Economies**

This project will create 50 to 60 construction jobs, five to eight permanent jobs, and will offer an investment opportunity for local residents (\$2 - \$5 million of the roughly \$50 million project total).

### **8.12.1 Tax Payments**

Currently, it is possible that the County and Townships may receive \$0 - \$10,000/turbine in revenue, depending on the state legislature's determination.

### **8.12.2 Impacts and Mitigation**

It is anticipated that the County will see an increase in their tax base as a result of the construction and operation of the Project. Any economic loss to individual landowners as a result of removing agricultural land from production will be offset by the easement payments made to the landowners. A positive influx of wages and spending at local businesses during construction is also anticipated. As a result, no negative impacts are anticipated from this Project and no mitigation is proposed.

## **8.13 Topography**

The Project is located within the Prairie Parkland Province near the border of the Coteau moraines and Inner Coteau subsection. The topography of this area was influenced by the most recent glaciations. U.S. Geological Survey Topographic Maps indicate that the elevation within the Project Area ranges between 1648 feet above mean sea level (AMSL) in the southeast near the East Branch of Kanaranzi Creek to 1748 AMSL near the southwestern portion of the Project Area (**Figure 9**). The area is a combination of relatively flat areas with regions of rolling hills. An unnamed drainage ditch flows through the center of the Project Area and the topography associated with these areas is comprised of steeper topography and some small ravines.

### **Impacts**

Siting and construction of the turbines and their associated facilities will require minimal grading of the area. This grading will be minimal and will be completed in a manner so as to tie into the existing contours.

### **Mitigation**

Significant grading is not anticipated with the proposed Project; therefore, mitigation measures are not needed at this time. The Project will require a National Pollutant Discharge Elimination (NPDES) construction permit. An erosion and sediment control plan and Storm Water Pollution Prevention Plan (SWPPP) will be prepared for the construction project and the disturbed areas will be seeded after construction to stabilize the area.

## **8.14 Soils**

Information from the Nobles County Soil Survey was reviewed. The soils in the area are a complex mix, most of which are loam, clay loam, and silty clay

loam. Overall, most of the soil within the Project Area is non-hydric. Because of the agricultural practices within the area, many of the hydric soil areas are drained to allow use as cropland. **Figure 10** shows the detailed soil information for the area.

### **Impacts**

As with any soil disturbance, construction of the turbines and access roads can increase the potential for erosion and sedimentation. Construction of the turbine sites and access roads will involve temporarily disturbing at the most approximately two to six acres of land per turbine. This equates to 30 to 90 acres of temporary disturbance. Erosion control methods such as silt fence and temporary mulch will be used during construction. The topsoil is generally removed and stockpiled where the roads and turbines are constructed and then spread back over the disturbed areas. Construction of the Project will permanently remove approximately 5.2 acres of land from agricultural production.

### **Mitigation**

Wind turbines and road accesses will be sited to take into account the contours of the land and prime farmland locations to minimize impact. An erosion and sediment control plan and Storm Water Pollution Prevention Plan (SWPPP) will be prepared for the project and the disturbed areas will be seeded after construction to stabilize the area. This plan will identify MPCA's Best Management Practices (BMPs) for reducing soil erosion during construction. The project will also be subject to the requirements of the NPDES Construction permit.

## **8.15 Geologic and Groundwater Resources**

The project is located on deposits of glacial till more than 300 feet thick (**Figure 11**). The underlying bedrock is Cretaceous shale and sandstone. The glacial sediments are mostly unsorted till that is primarily clay and silt. The eastern half of the project is located on till that was deposited beneath glacial ice. The western half of the project is located on till that was deposited as a moraine or sediment piled up by the edge of the moving ice. Both of these tills are locally stream-washed and coarser grained than typical for the area. Finally, there is sand and gravel deposited by melting ice, located generally in the center of the area. No unusual geological conditions, such as sinkholes, are expected at this site.

The vast majority of wells in Nobles County draw water from any of several buried confined sand and gravel aquifers. Turbine foundation construction is unlikely to affect local water supply from the buried confined sand and gravel aquifers. One possible exception is penetrating the confining layer for one of these aquifers with a driven pile, soil boring, etc. when that particular aquifer is artesian (confined under pressure). This could disturb the aquifer hydraulics and cause problems with local wells. However, artesian conditions have not been identified in this area and further investigation

will be undertaken to determine the actual conditions for any site and foundation design. Geotechnical testing will occur at all turbine locations and will consist of core-penetration testing.

### **Impacts**

The project is not anticipated to have any impacts on groundwater or geologic resources. Water supply needs will be minimal and can be accommodated locally. There is the risk of construction impacting any shallow artesian aquifers that might be located beneath the site. Since these conditions have not been identified, the risk is quite small. Worst case involves compromise of a confining layer that causes water level to drop locally, effectively causing interference with the operation of some nearby wells.

### **Mitigation**

Soil borings at the turbine sites will be obtained for structural design purposes, and special attention paid to sealing the borings in areas where buried confined aquifers are encountered to ensure that the construction activity does not affect the hydraulics of the confined aquifer.

## **8.16 Surface Water and Floodplain Resources**

### **8.16.1 Surface Water and Floodplain Resources**

The Project Area is located within the East Kanaranzi Creek subwatershed of the Rock River watershed. Storm water runoff is directed overland and via drain tile over agricultural areas to ditches, intermittent streams, and eventually into the various tributary creeks. The main water bodies within and adjacent to the study area are shown on **Figure 12** and include the following:

- East Branch Kanaranzi Creek, DNR Public Watercourse
- Unnamed Creek, DNR Public Watercourse
- Unnamed Creek, DNR Public Watercourse

The Department of Natural Resources (DNR) has jurisdiction over these three watercourses within the Project Area. There are no other DNR Public Waters or Wetlands present within the Project Area.

There is one impaired waterbody in proximity to the Project Area. A portion of the East Branch of Kanarazi Creek is located approximately one mile south of the Project Area and is impaired for E. Coli.

Construction of the turbines and associated roads will result in disturbing two to six acres of land per turbine over the 3,080 acre site. This equates to 30 to 90 acres of temporary disturbance. Upon completion of the project, approximately 5.2 acres of land will be

converted to turbines and associated infrastructure. The siting of the turbines will avoid low points in the landscape, thus preventing impact on wetlands, streams or associated floodplains. Access roads will be located to avoid floodplains and wetlands.

The project will not result in additional E. Coli directed to the East Branch of Kanaranzi Creek.

The additional impervious surface created by the project is anticipated to be up to 0.04 acre per turbine, including the turbine foundation and gravel skirt. Access roads are estimated at a total of 3.68 acres (total project area). Allowing for the collector facility, the total number of acres utilized by the project equates to a maximum of 5.2 acres over the 3,080 acre site. These areas will be disconnected and separated by vegetation so as to reduce impact of a small amount of increased storm water volume.

Turbines and access roads will be sited to avoid the low areas of the Project Area. However, If access roads need to be constructed in drainageways, culverts to allow cross drainage and to prevent impounding water will be created. A National Pollutant Discharge Elimination System (NPDES) Construction permit will be obtained and the project will adhere to the requirements of this permit. If it is determined that the Project will impact a U.S. or Minnesota Public Waters, the Applicant will apply for the necessary permits prior to construction.

#### **8.16.2 *Wildlife Lakes***

The Department of Natural Resources (DNR) has designated Wildlife Lakes that restrict the use of motorized boats to reduce disturbance to waterfowl. Based on a review of information available from the DNR, there is no designated Wildlife Lake nor are there any natural lakes located within the Project Area. North and South Badger Lakes and Heron Lake are the nearest designated Wildlife Lakes and are located approximately 13 miles north and 24 miles east of the Project Area, respectively.

#### **8.16.3 *100-Year Federal Emergency Management Agency (FEMA) Floodplains***

Based on the FEMA Flood Insurance Maps, there is a designated 100-year flood zone in the areas associated with the unnamed creek that bisects the Project and also the unnamed creek that is located on the western portion of the Project Area (**Figure 13**). Flood Insurance Rate Maps were also obtained and are located in **Appendix H**.

### **Impacts**

Community Wind South, LLC will site wind turbines and access

roads to avoid floodplains. Therefore, no floodplain impacts are anticipated.

**Mitigation**

The Project will be designed to avoid impacts to floodplains; therefore, no mitigation is necessary. The County does not have a requirement for setbacks from the floodplain.

**8.17 Wetlands**

The National Wetland Inventory (NWI) map and aerial photos were reviewed for the Project Area. A cursory site inspection of the wetlands in the study area was completed on July 26, 2011. The wetlands present have been impacted by agricultural practices through drain tile, tilling, or sedimentation from runoff. The field review showed that there may be more wetlands present than indicated on the NWI. A more complete field review may be necessary during the turbine-siting stage of the project to ensure avoidance of wetlands.

The approximate 3,080 acre Project Area includes approximately 36 acres of wetlands based on the NWI as indicated on **Figures 14** and **15**. There are a number of intermittent streams throughout the Project Area and wetlands generally correspond to these areas. The DNR has jurisdiction over three of the watercourses within the Project Area as noted in **Section 8.16** and shown on **Figure 12**. There are a few larger wetland complexes in proximity to the larger drainage swales. **Table 8-9** summarizes the wetland types within the Project Area.

**Table 8-9. Summary of Wetland Types Within the Project Area\***

Circular 39 Type	Cowardin Type	Acres within Study Area
Type 1 – Seasonally flooded basin or floodplain	PEMA	2.2
Type 3 – Shallow marsh	PEMC, PEMF	32.6
Type 5 – Shallow open water	PUBG	1.2
	<b>Total</b>	<b>36</b>

*\*Based on NWI Map*

**Impacts**

Community Wind South, LLC will site wind turbines and all associated facilities to avoid permanent impact to wetlands where possible, and will adhere to the Nobles County WECS regulations which require a 600 foot setback from Type 3, 4, or 5 wetlands. If collector lines are proposed to cross any of the three DNR Public Watercourses **Figure 12**), a DNR License to Cross permit will be obtained.

**Mitigation**

The proposed Project will be designed to avoid impacts to wetlands to the

greatest extent feasible. In the event that wetlands will be permanently impacted, a wetland delineation will be performed, permits will be obtained from the relevant agencies, and mitigation will be provided. In addition, if work is performed in or near wetlands, the proper MPCA Best Management Practices (BMPs) for work near wetlands will be used to minimize impacts.

### 8.18 Vegetation

The pre-settlement vegetation within Nobles County consisted of mainly grasslands and wet prairie. Agricultural practices have now converted most of these areas to cultivated cropland, with scattered areas of grasslands (often used for grazing). Small, scattered stands of trees are present throughout the Project Area as well, often as wind breaks for farmsteads. The most recent land cover survey of the area (1990) concluded that nearly 90% of the land within the Project Area was cultivated. Based on a review of aerial photographs, the United States Geological Survey (USGS) map, and a field review, the existing vegetation within the site appears to be generally consistent with the 1990 assessment, with the exception of one 33-acre parcel of Conservation Reserve Program grassland which was established since the survey. **Figure 16** and **Table 8-10** summarizes the land cover present within the Project Area. The wetland acreage is significantly different than the NWI shown in **Table 8-9**. This is likely due to varying wetland identification methods and that many Type 1 wetlands were probably included in the "grassland" or "Row crops/Agricultural" categories. Field review of the sites supports the NWI estimates above. Information regarding any rare plant species is addressed in **Section 8.20**.

**Table 8-10. Existing Land Cover**

Land Cover	Acres	Percent of Project Area
Row crops/Agricultural	2,760	89.6%
Wooded	22	0.7%
Grasslands	257	8.3%
Wetlands/water	5	0.2%
Farmstead/Rural Residential	36	1.2%
<b>TOTAL:</b>	<b>3080</b>	<b>100%</b>

*Source: Minnesota Land Cover Classification System (1990); Gap Analysis Program (GAP) Stewardship (2008)*

### Impacts

The Project will result in conversion of approximately 5.2 acres of land. Based on the current design, the land that will be converted is primarily agricultural in nature. Annual planting of row crops currently results in routine disturbance of the land. Turbines will not be sited in wooded or wetland areas since siting them in these areas would not effectively maximize the capture of wind. Once constructed, the operation of the turbines will not impact vegetation within the Project Area. The associated facilities will be constructed to avoid and minimize impacts to non-agricultural land cover to the greatest extent feasible.

### **Mitigation**

The vegetation at the turbine and associated facility locations will be disturbed and removed. Topsoil will be removed and stockpiled in the disturbed areas. After the completion of construction, the topsoil will be used to cover the disturbed areas. The disturbed areas will be revegetated in a manner that is consistent with the pre-construction vegetation condition.

## **8.19 Wildlife**

### **8.19.1 Existing Wildlife Resources**

The USFWS's Wind Turbine Advisory Committee Recommendations (March 2010) were used to conduct preliminary site assessments for the Project. The Recommendations consists of a tiered approach. Tier 1 involves a preliminary evaluation or screening of potential project sites. This was completed by performing a desktop evaluation of the Project Area to determine if species or habitat of concern was present in the immediate vicinity of the Project Area. Publically available databases were used to qualify the site for potential development. Tier 2 is site characterization, which involves determining if any site-specific risks to wildlife could occur as a result of wind development. This was completed by contacting Federal, State, and local authorities to determine if any risks to wildlife resources existed within the Project Area. A site visit was also conducted to assess the quality and availability of habitat within the Project Area. Tier 3 consists of field studies to document the wildlife conditions on site and predict project impacts. To date, the applicant has completed Tier 1 and 2 of the Recommendations. The DNR considers the Project Area to be low risk for impacts to birds or bats and, as such, does not recommend pre-construction surveys. As a result, no additional Tier 3 studies are anticipated. The full bird and bat assessment is included in **Appendix F**.

The wildlife present within the Project Area is a result of the plant communities and land cover present. The existing land cover consists of large tracts of cultivated cropland with small, scattered areas of grassland. Small tracts of woodland are also present within the Project Area, and are often associated with farmsteads. There are no WMAs or other significant tracts of wildlife habitat present within the Project Area. Based on aerial photographs, the area has been in agricultural production since the 1930s. Wildlife present within the Project Area will be those generally accustomed to disturbance and human presence. Information regarding the potential for rare wildlife species is addressed in Section 8.20.

### **Mammals**

Based on a review of the site conditions and the DNR's list of Mammals in Minnesota, mammals likely to utilize the habitat

available in the Project Area are shown in **Table 8-11** below:

**Table 8-11: List of Mammals Potentially Within Project Area**

<b>Common Name</b>	<b>Scientific Name</b>
Badger	<i>Taxidea taxus</i>
Beaver	<i>Castor canadensis</i>
Coyote	<i>Canis latrans</i>
Gray fox	<i>Urocyon cinereoargenteus</i>
Red fox	<i>Vulpes fulva</i>
Various species of mice	Various
Eastern cottontail	<i>Sylvilagus floridanus</i>
White tailed jackrabbit	<i>Lepus townsendii</i>
Mink	<i>Neovision vision</i>
Various species of moles	Various
Muskrat	<i>Ondatra zibethicus</i>
Raccoon	<i>Procyon lotor</i>
Various species of shrews	Various
Fox squirrel	<i>Sciurus niger</i>
Thirteen-lined ground squirrel	<i>Spermophilus tridecelineatus</i>
Striped skunk	<i>Mephitis mephitis</i>
Opossum	<i>Didephis virginianus</i>
Short and long-tailed weasel	<i>Mustela erminea</i> and <i>M. frenata</i>
White-tailed deer	<i>Odocoileus virginianus</i>
Little brown myotis	<i>Myotis lucifugus</i>
Big brown bat	<i>Eptesicus fuscus</i>
Silver-haired bat	<i>Lasionycteris noctivagans</i>
Eastern red bat	<i>Lasiurus borealis</i>
Hoary bat	<i>Lasiurus cinereus</i>

Source: Department of Natural Resources (2011)

Potential bat roosting habitat within the Project Area includes trees and a few old farm buildings. However, few of the buildings appeared to be abandoned. The available stands of trees are small and scattered, generally associated with farmsteads. As a result of the habitat available, there appears to be minimal habitat available to bats within the Project Area.

**Birds**

The Project is located within the Mississippi Flyway of the United States. Avian species present may be both permanent and seasonal residents of the area, utilizing the area for breeding and nesting or stopping to rest during migration between breeding and wintering grounds. The Minnesota Ornithologists Union has compiled a list of species for Nobles County based on previous records and observations. According to this list, 271 species of birds have been recorded within Nobles County. While this list represents the majority of species that may be present within the Project Area it

should not be considered comprehensive as other species could potentially occur within the Project Area. Additionally, because the list is partially based on observations, some of these sightings include causal or accidental sightings of species which have wandered from their normal range.

A windshield survey of the available habitat and avian species present within the Project Area was conducted on July 26, 2011. Fifteen species of birds were identified within the Project Area as outlined in **Table 8-12**.

**Table 8-12: List of Birds Identified During July 2011 Windshield Survey**

Common Name	Scientific Name
American crow	<i>Corvus brachyrhynchos</i>
American goldfinch	<i>Carduelis tristis</i>
Barn swallow	<i>Hirundo rustica</i>
Common grackle	<i>Quiscalus quiscula</i>
Killdeer	<i>Charadrius vociferus</i>
Northern harrier	<i>Circus cyaneus</i>
Mourning dove	<i>Zenaida macroura</i>
Ovenbird	<i>Seiurus aurocapilla</i>
Purple martin	<i>Progne subis</i>
Red-winged blackbird	<i>Agelaius phoeniceus</i>
Ring-necked pheasant	<i>Phasianus colchicus</i>
Yellow-headed blackbird	<i>Xanthocephalus xanthocephalus</i>
Sparrows	Various species

Although one northern harrier was observed, no raptor nests were observed within the Project Area. There was little habitat present for waterfowl or waterbirds (e.g., heron), although this does not preclude their existence.

**Amphibians and Reptiles**

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

**Fish**

Given the absence of lakes, there is limited habitat available for fish within the Project Area. A few intermittent creeks run through the Project Area, but most of these areas have been channelized or otherwise altered due to the agricultural nature of the area. The DNR's NHIS database has indicated that the Topeka shiner is present within Nobles County. More information regarding this species can be found in **Section 8.20**. Information regarding construction recommendations near Topeka shiner habitat can be

found in **Appendix G**. These recommendations will be adhered to during project construction.

## **Impacts**

### *General Wildlife Impacts*

Wildlife impacts are expected to be minimal because turbines and their associated facilities will be, in general, placed on agricultural lands. The Project Area has a similar landscape to other wind farms in the region in that they are all located in predominantly agricultural areas. Turbines will be located exclusively on agricultural land.

The DNR considers the Project Area to be low risk for impacts to birds or bats (**Appendix B**). However, nationally there has been concern over the impact wind farms have on birds and bats. As a result of this concern, a number of studies have been conducted nationwide and in the region (Western Minnesota and Northern Iowa) that relate the operation of wind farms to avian and bat mortality.

### *Avian Impacts*

As a result of the concern for avian fatality, several studies have been conducted to assess collision potential. Several of these studies occurred at the Buffalo Ridge Wind Resource Area (WRA), located approximately 40 miles northwest of the Community Wind South, LLC Project Area. A study that was conducted in 1994 and 1995 in this area found eight birds that were thought to have died as a result of turbine collision (Higgins et al 2007). Osborn et al. (2000) conducted a study during the same time period and found that less than one bird was killed per turbine per year. A similar study that was conducted between 1996-2000 indicated that the average mortality per turbine ranged from 0.98 to 4.45 birds per year, which was low when compared to other wind farms in the United States (Osborn et al. 2000). Results of a study performed at the Top of Iowa (TOI) wind farm in north-central Iowa, also documented minimal avian mortality (Koford et al 2005).

Many of the studies conducted also analyzed species risk and bird behavior as a result of wind turbine placement. Osborn et al (2000) and Higgins et al (2007) indicated that passerine species are less likely to collide with wind turbines because they generally fly below the rotor swept area. They found raptors and waterfowl to be at a higher risk for collision. However, Johnson et al. (2000) documented more passerine fatalities than any other type of bird. But, similar to the other studies, they also found that raptors and waterfowl flew at a height which put them at greatest risk for collision. Leddy et al (1999) found that upland nesting game birds avoided nesting in CRP plots that had turbines located less than 180

meters away. Similar results were reported by Higgins *et al* (2007).

Overall, the authors of these studies indicate that, when sited properly, turbine collision does not pose a major threat to bird populations. When comparing the resources of the Project Area to the resources available in these studies, they appear to be similar. The TOI and Buffalo Ridge study areas are also located within the same migratory corridor as the Community Wind South Project. In addition, the habitats available for bird use at the Buffalo Ridge WRA, TOI wind farm, and Community Wind South area are similar; all areas consist of primarily cultivated row crops. As a result, similar bird species are expected to occur at each of the areas. Because of these similarities, the potential for bird fatality due to turbine collision is expected to be similar to the other studies mentioned. Specifically, the worse-case mortality at the Community Wind South project area is estimated at 4.45 birds per turbine per year, with actual mortality likely being less.

#### *Bat Impacts*

Several studies have been conducted to assess the collision mortality potential for bats. In 2008, a study was published that compiled existing information on patterns of bat fatalities from 21-post construction studies which were conducted at 19 facilities across the United States and Canada. The results of the study showed that fatalities were skewed toward migratory species, that fatalities occurred primarily during midsummer and fall, and that bat fatalities were highest during low wind speeds.

Several studies have been conducted at the Buffalo Ridge Wind Resource Area (WRA), which is located approximately 40 miles northwest of the Community Wind South Project Area. Johnson *et al* (2003) documented fatality rates for this area at between 0.07 bats per turbine per year and 2.04 bats per turbine per year. They also found that nearly all of the fatalities occurred between July 15 and September 15 and consisted primarily of migratory species. A study performed by the Electric Power Research Institute and Xcel Energy (2003) indicated that an average of 2.16 bats were killed per turbine per year. The species involved was primarily the hoary bat (*Lasiurus cinereus*), a migratory species. Similar fatality results were reported by Higgins *et al* (2007) for the same area. In addition, Higgins *et al* found that more bats were killed over agricultural fields as opposed to grasslands, and more during summer than any other season.

A study performed during 2003 and 2004 at the Top of Iowa (TOI) wind farm in north-central Iowa indicated that bat mortality was minimal, although higher during fall migration. Similar to the studies performed on the Buffalo Ridge WRA, the hoary bat

appeared to experience the highest collision morality (Koford et al 2005).

Overall, the authors of these studies indicated that collision mortality did not pose a threat to the overall bat populations in these areas. When comparing the resources of the Project Area to the resources available in these studies, they appear to be similar. The landscape for all of the areas is primarily agricultural. In addition, the bat species found within the Project Area are similar to those that would occupy the Buffalo Ridge WRA and TOI wind farm areas. As a result, bat fatalities are expected to be similar to the fatalities documented in these studies. Specifically, the worst-case mortality for the Community Wind South Project is estimated to occur at a rate of 2.16 bats per turbine per year, with actual mortality likely being less. In addition, the migratory species (e.g., hoary bat) are expected to be the species most at risk for collision.

### **Mitigation**

The Project Area was chosen due to its wind resource potential and the land cover present. The lack of significant habitat within or near the Project Area reduces the chance for wildlife impacts in the area. To avoid wildlife impacts, turbines and associated facilities will be sited to avoid grasslands and woodlands. Some temporary impact may occur to the grasslands as a result of installing approximately 4,000 linear feet of underground collection line. These areas will be restored to pre-project conditions following installation. In addition, the design of the turbines themselves reduces the availability of perching areas for birds. Based on these mitigation measures, as well as the erosion control measures discussed earlier in this document, the Project is not anticipated to have an adverse impact on wildlife in the area.

#### **8.19.2 *Waterfowl Feeding and Resting Areas***

Based on a review of the DNR's Waterfowl Regulations (2010) there are no Waterfowl Feeding and Resting Areas present within the Project Area. The nearest Waterfowl Feeding and Resting area is located approximately 24 miles east, on Heron Lake in Jackson County.

#### **8.19.3 *Important Bird Areas***

Based on a review of the available information, there are no designated Important Bird Areas within Nobles County or the bordering counties in Minnesota or Iowa. South Heron Lake is in the process of being nominated as an Important Bird Area by the Audubon Society. This lake is approximately 24 miles east of the Project Area. The next nearest Important Bird Area is located over 50 miles southeast of the Project Area, near Spirit Lake, Iowa.

## 8.20 Rare and Unique Natural Resources

The DNR and USFWS were contacted regarding the potential for Threatened or Endangered species within the Project Area. The State Historic Preservation Office was also contacted regarding the potential for areas of historic, archaeological, or architectural significance. This information was addressed in **Section 8.6**. Correspondence from these agencies is located in **Appendix B**. The locations of cultural resources and threatened and endangered species are shown on **Figure 8**.

### 8.20.1 Description of Resources

Prior to receiving correspondence from the above mentioned agencies, Community Wind South, LLC performed a preliminary search using WSB and Associates' licensed NHIS database and the USFWS's Information, Planning, and Conservation System (IPaC) tool. These data indicated that the Topeka shiner (*Notropis topeka*; State & Federal Endangered), prairie bush-clover (*Lespedeza leptostachya*; Federal Threatened), and western prairie fringed orchid (*Platanthera praeclara*; Federal Threatened) are present within Nobles County.

Topeka shiners have been identified within five miles of the Project Area. Fourteen streams within Nobles County have been federally designated as critical habitat for Topeka shiners. However, based on a review of the area by the USFWS, none of these streams are within, or directly adjacent to, the Project Area. This documentation can be found in **Appendix B**.

#### Impacts

The turbines and access road will be sited to avoid the wetlands and creeks. As a result, impacts to Topeka Shiner are not anticipated.

#### Mitigation

Alteration to streams within the Project Area is not anticipated. If construction is to occur in proximity to these streams, the construction BMPs mentioned earlier in this document will serve to avoid impacting the streams. In addition, the document Recommendations for Construction Projects Affecting Waters Inhabited by Topeka Shiners (*Notropis topeka*) in Minnesota by the USFWS is located in **Appendix G** for reference.

### 8.20.2 Native Prairie

There are no documented communities of native prairie within the Project Area, but this does not eliminate the possibility of native prairie remnants occurring. The USFWS and DNR did not find any occurrences of prairie bush-clover or western prairie fringed orchid within the Project Area. In addition, onsite investigations did not find any occurrences of either plant. The land use within the Project

Area is primarily used for row crop agriculture and livestock grazing. The grasslands present are highly fragmented and disturbed, resulting in a low likelihood of remnant prairie or either threatened species being present.

### **Impacts**

Both the DNR and USFWS have indicated that no occurrences of state or federally threatened or endangered species occur within the Project Area (**Appendix B**). Overall, the potential for impact to rare or unique species within the Project Area is low. The turbine and access roads will be sited to avoid the wetlands, creeks, wooded areas, and areas with the potential for native remnant prairie.

### **Mitigation**

Impacts to native prairie are not anticipated; therefore, no mitigation is needed.

## **9. SITE CHARACTERIZATION**

### **9.1 Describe the following:**

#### **9.1.1 *Interannual variation***

The average annual wind speed at the Automated Surface Observation System (ASOS) long term reference stations varied by up to 9% (year 2010 at the Sioux Falls and Redwood station) during the reference period from 1997 to 2010 (**Figure 17b**).

#### **9.1.2 *Seasonal variation***

The seasonal cycle of the mean wind speed shows low wind speeds during the summer period at all levels (**Figure 17a**) and higher wind speeds during the winter and spring period with a maximum in April.

#### **9.1.3 *Diurnal conditions***

The highest wind speeds are measured during nighttime and in mid afternoon at all levels (**Figure 17b**). Lowest values are observed in the early morning time and in the late afternoon.

#### **9.1.4 *Atmospheric stability***

The temporary meteorological equipment used to determine wind characteristics do not normally collect the information necessary to calculate this. Therefore, at the moment we are not able to provide information about the atmospheric stability.

#### **9.1.5 *Turbulence***

Based on the tower measurement at the highest level (60m above ground level) the ambient turbulence intensity is 8.98 % at wind speeds of 15 m/s.

**9.1.6 Extreme conditions**

An extreme wind speed estimation based on a Gumbel distribution and the met tower measurement at the highest level (60m) results in an extreme wind speed of 35.1 m/s with addition of two standard deviations for a 50- year return period.

**9.1.7 Speed frequency distribution**

**Table 9-1** below shows the speed frequency distribution.

**Table 9-1. Wind Speed (m/s) Frequency Distribution**

Lower Limit	Upper Limit	Freq. [%]
0	0.5	0.45%
0.5	1.5	1.56%
1.5	2.5	3.22%
2.5	3.5	5.67%
3.5	4.5	7.85%
4.5	0.5	9.67%
5.5	6.5	11.18%
6.5	7.5	11.65%
7.5	8.5	11.08%
8.5	9.5	9.75%
9.5	10.5	8.25%
10.5	11.5	6.37%
11.5	12.5	4.68%
12.5	13.5	3.18%
13.5	14.5	2.08%
14.5	15.5	1.36%
15.5	16.5	0.79%
16.5	17.5	0.51%
17.5	18.5	0.30%
18.5	19.5	0.18%
19.5	20.5	0.13%
20.5	21.5	0.04%
21.5	22.5	0.02%
22.5	23.5	0.01%
23.5	24.5	0.01%
24.5	25.5	0.00%
25.5	26.5	0.00%
26.5	27.5	0.00%
27.5	28.5	0.00%
28.5	29.5	0.00%
29.5	30.5	0.00%
30.5	31.5	0.00%
31.5	32.5	0.00%
32.5	33.5	0.00%
33.5	34.5	0.00%
34.5	35.5	0.00%
35.5	36.5	0.00%

Lower Limit	Upper Limit	Freq. [%]
36.5	37.5	0.00%
37.5	38.5	0.00%
38.5	39.5	0.00%
39.5	40.5	0.00%

**9.1.8 Variation with height**

Wind shear is the variation in wind speeds at different elevations as a result of the surface friction within the planetary boundary. A mean wind shear factor of 0.252 is calculated over all heights (Figure 17c).

**9.1.9 Spatial variations**

Due to the flat terrain and the limited wind farm area (4 x 4 km<sup>2</sup> or 2.48 x 2.48 mi<sup>2</sup>) the spatial variation of wind speed is considered to be low.

**9.1.10 Wind rose (see guidance)**

Table 9-2 below and Figure 17a summarizes the wind rose for 16 sectors.

**Table 9-2. Wind Rose by Sector**

Sector	Wind Rose
N	8.19%
NNE	6.04%
NE	5.09%
ENE	4.35%
E	4.00%
ESE	4.34%
SE	5.61%
SSE	6.51%
S	10.41%
SSW	9.45%
SW	4.82%
WSW	3.89%
W	5.03%
WNW	6.35%
NW	8.21%
NNW	7.73%

**9.1.11 Other meteorological conditions**

Figure 17c shows the annual cycle of the temperature based on the met tower measurement three meters above ground level.

**9.2 Location of other wind turbines within 10 miles from the project boundary**

Figure 18 shows the relative locations of the 134 other wind turbines within

ten miles of the proposed Project Area. These turbines are part of the Nobles Wind Farm constructed in 2010 and are owned by NSP. CWS has requested that NSP review the proposed layout of this Project. NSP has approved the layout of the CWS Project and the letter is included in **Appendix I**.

## **10. PROJECT CONSTRUCTION**

### **10.1 Roads and Infrastructure**

A variety of construction equipment will use the roadways in the area throughout the duration of construction. No tracked equipment will travel on paved roads. The types of equipment that will travel on paved roads will be limited to rubber-tired, road-approved vehicles. All tracked equipment and cranes, including rough terrain vehicles will travel solely on gravel roads or follow crane paths cross country. The exception to this would be areas where a road crossing is required in which case the crossing will be executed in accordance with the county and township road agreements. Following completion of construction, small to medium-sized vehicles will be used to access the turbines and associated facilities for maintenance. Large, heavy equipment will only access the sites if larger components of the turbines need to be serviced. A significant number of additional trips will be made per day during peak construction periods. However, these trips are anticipated to decrease to near pre-construction levels once construction is complete.

Due to the size and turning radii of some of the construction equipment, some local roads may need to be upgraded. This typically involves widening of intersections to allow for large trucks to turn. All proposed upgrades will be coordinated through the road development agreement between the applicant and Nobles County and township authorities.

### **10.2 Access Roads**

Construction of the Project will require approximately three to four miles of access roads. These access roads will be located to facilitate both construction and operation and maintenance vehicles. The roads will be approximately 16 feet (4.88 meters) wide and of low profile to allow crossing by farming equipment. The roads will be comprised of graded dirt overlaid with geotechnical fabric (if needed) and class-5 (gravel) cover, which will be adequate to support the size and weight of maintenance vehicles. Access roadways will meet local County and Township requirements.

### **10.3 Other Associated Facilities**

The collector/protection facility will be approximately a 30 x 60 foot (9.1 x 18.2 meter) area for enclosed electrical cabinets. This yard will have bus work, metering equipment, protection equipment, grounding grid and anodes (if required). The yard will be surrounded by a security fence and will be posted with high voltage signs as necessary. There may be an

additional 10 x 15 foot (3 x 4.6 meter) building for telephone equipment depending on phone company requirements.

#### **10.4 Turbine Site Location**

Turbine construction will result in both temporary and permanent impacts. The access road will temporarily be enlarged from 16 to 28 feet (4.6 x 8.3 meter) to allow for passage of large construction equipment. A temporary gravel pad for crane operation will also be installed near the turbine location (**Figure 19**). These pads are typically 40 by 100 feet (12.2 x 30.5 meter) in size. In addition, an approximately 400 by 400 foot (121.9 x 121.9 meter) section will be graded near the turbine location. This location will be for assembly of the turbine blade and nacelle components. Following construction, both the crane pad and assembly area will be restored and all access roads will be returned to their permanent width.

The turbine foundations will be designed by a licensed engineer in accordance with the manufacturer's specifications and code requirements based on site specific conditions and applicable load criteria. The anticipation is that a standard spread footer design is what will be used at this project location which will be approximately a 50 foot diameter octagonal base at 4 feet deep with approximately a 18 foot circular pedestal at an additional 4 foot depth for a total depth of 8 feet. Volumes will be approximately 300-400 cubic yards of concrete and 80,000 pounds of reinforcing steel. This design assumption is subject to change as a result of the final geotechnical report.

#### **10.5 Post-Construction Cleanup and Site Restoration**

Some additional areas may be impacted during construction as a result of the widening of access roads, installation of turbine components, installation of underground collector and communication cables, and for staging. Any soils that are temporarily disturbed during the construction phase of the Project will be restored to their pre-construction use. Community Wind South, LLC is committed to cleaning up construction debris and restoring temporarily impacted areas to the extent practicable, and to the satisfaction of landowners.

#### **10.6 Operation and Maintenance of the Project**

Each wind turbine will communicate directly with the Supervisory Control and Data Acquisition (SCADA) system for the Project. The SCADA system will connect all turbines with the collector/protection and any operations and maintenance facilities using armored fiber optic cables. This system will transmit data from the turbines back to the responsible maintenance party, MISO, NSP, and others as well as transmit commands from the maintenance party to the turbines so as to ensure real time management of all wind turbines within the facility as well as integration with the existing

transmission grid.

On-site turbine maintenance will involve routine inspections and regular and unscheduled maintenance of the turbines and associated facilities.

**10.7 Costs**

The total cost of the Project is estimated at \$55 - \$60 million.

**10.8 Schedule**

Construction is scheduled to begin in the second quarter of 2012; targeted completion date is October 1, 2012.

**10.9 Energy Projections**

The net capacity factor for the Project ranges from 42%-47% with yield range being 113,135 MWh to 126,000 MWh.

**10.10 Decommissioning and Restoration**

A decommissioning plan outlining the anticipated means and cost of removal will be completed in accordance with the Nobles County permitting and zoning requirements. Current power purchase agreements for the Project are twenty years in length, after which new agreements will be executed or sales will be made into the market. At the time turbines are no longer operated physically or the Project is not viable economically, turbines will be decommissioned. Restoration of the area will be completed according to Nobles County permitting and zoning requirements, leases, and the Public Utilities Commission permit. At the time turbines are decommissioned, they will be removed from site and either refurbished or salvaged depending on condition. All subsurface infrastructure will be removed to four feet below ground level and reclaimed as specified in the land leases, and all surface infrastructure will be removed and reclaimed to pre-construction conditions.

**11. IDENTIFICATION OF OTHER PERMITS**

There are a number of permits or approvals that are or may be required prior to construction of the Community Wind South, LLC Wind Project. These permits/approvals are outlined in **Table 11-1** below.

**Table 11-1. List of Potential Permits/Approvals**

Agency	Permit/Approval	Authority	Description
US Army Corps of Engineers	General Permit or Letter of Permission	Section 404 of the Clean Water Act	Requires proposed impacts to waters of the United States be avoided and minimized.

<b>Agency</b>	<b>Permit/Approval</b>	<b>Authority</b>	<b>Description</b>
FAA	Notice of Proposed Construction or Alteration	Title 14 CFR Part 77	Determination of No Hazard to Air Navigation
USFWS	Consultation and review of the proposed project regarding federally threatened and endangered species	Endangered Species Act of 1973	The Act requires all projects that are in areas designated to be habitat for endangered species to be reviewed by USFWS
MN PUC	LEGF Certificate of Need	MN Stat.216B.243, subd. 9 Rules 7849	Not required for this project
MN PUC	Site Permit	MN Rules 7854 MS 216E	For wind turbines – meet threshold for LWECS requiring permit.
MN State Historical Preservation Office	Cultural and Historical Resources Review	National Historic Preservation Act; Historical Sites Act (Minn. Stat. 138.661-138.669); Field Archaeology Act (Minn. Stat. 138.31-138.42); Private Cemeteries Act (Minn. Stat. 307)	Cultural Resources Review and State and National Register of Historic Sites Review.
MPCA	NPDES Stormwater Permit for Construction and Storm Water Pollution Plan (SWPPP)	Clean Water Act	Program designed to reduce the amount of sediment and pollution entering surface and groundwater during and after construction projects.
MPCA	Small Quantity Generator	MN Rules 7045	Hazardous Waste rules regarding storage and disposal of turbine lubricating oil.
MN DNR	Work in Public Waters	Minn. Stat. §103G.005	Applies to activities conducted below the Ordinary High Water Level of public waters and public waters wetlands.
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 (Minnesota Department of Health)	Plumbing Plan Review	MN Rules 4715.3130	Ensures healthy and safe plumbing installation. Anticipated to not apply to this project as operation and maintenance facilities already exist offsite.

Agency	Permit/Approval	Authority	Description
Nobles County SWCD	Wetland Conservation Act Approval	Minn. Stat. §103G.222-103G.2373; MN Rules 8420	Requires proposed impacts to wetlands be avoided and minimized
Nobles County	Building Permits	County Ordinance	For Operations and Maintenance Facility-not applicable
Nobles County	Conditional Use Permit	County Ordinance	For Operations and Maintenance Facility-not applicable
Nobles County	Individual Septic Tank Systems (ISTS) Permit	County Ordinance	For Operations and Maintenance Facility-not applicable
Nobles County	Driveway Permits		If turbine road will connect to a county road
Nobles County	Utility Permits	County Right-of-Way	
Nobles County	Moving permits		Need to permit oversized loads on county roads.
Mn/DOT	Driveway Permits		If access road will connect to a state road.
Mn/DOT	Utility Accommodation Permit		
Mn/DOT	Work within Right-of-Way Permit		
Mn/DOT	Haulage Permits		
Mn/DOT	Aviation clearance from Office of Aeronautics		Review and approval of FAA 7460 permits

**12. REFERENCES**

American Wind Energy Association. U.S. Wind Energy Projects – Minnesota. Available at: <http://archive.awea.org/projects/Projects.aspx?s=Minnesota>. Retrieved 8/4/11.

American Wind Energy Association. Wind Turbines and Health – May 2010. Available at: [http://www.awea.org/documents/factsheets/Wind\\_Turbines\\_and\\_Health.pdf](http://www.awea.org/documents/factsheets/Wind_Turbines_and_Health.pdf). Retrieved 8/4/11.

Anfinson, S. F. Archaeological Regions in Minnesota and the Woodland Period. 1990. *The Woodland Tradition in the Western Great Lakes: Papers Presented to Elden Johnson*, University of Minnesota.

Audubon Minnesota. 2011. Important Bird Areas Available at: <http://mn.audubon.org/birds-science-education/important-bird-areas>. Retrieved August 8, 2011.

Electric Power Research Institute. 2003. Bat Interactions with Wind Turbines at the Buffalo Ridge, Minnesota Wind Resource Area: An Assessment of Bat Activity, Species Composition and Collision Mortality.

Federal Aviation Administration. Department of Defense Screening Tool. Available at: <https://oeaaa.faa.gov/oeaaa/external/searchAction.jsp?action=searchCircleSearchAirports&searchAbout=airport&airportID=&radius=13&asnYear=&asnRegion=&asnSequence=&onAsnYear=&onAsnRegion=&onAsnSequence=&latD=43&latM=42&latS=50.30&latDir=1&longD=95&longM=48&longS=14.77&longDir=-1&submit=Search>. Retrieved August 7, 2011.

Higgins, K.F., R. G. Osborn, and D.E. Naugle. 2007. Effects of Wind Turbines on Birds and Bats in Southwestern Minnesota, U.S.A. Pages 153-175 in M. de Lucas, G. F. E. Janns, and M. R. Baena, editors. *Birds and Wind Farms: Risk Assessment and Mitigation*.

Koford, R., A. Jain, G. Zenner, A. Hancock. 2005. Avian Mortality Associated with the Top of Iowa Wind Farm.

Nobles County, Nobles County Comprehensive Plan. Updated 2001.

Environmental Protection Agency. Information on Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. EPA/ONAC 550/9-74-004, 1974.

Minnesota Department of Health. 2009. Public Health Impacts of Wind Turbines.

Minnesota Department of Natural Resources. 1996. Minnesota Land Use and Cover - A 1990's Census of the Land - Tiled. Available at: <http://deli.dnr.state.mn.us>. Retrieved August 8, 2011.

Minnesota Department of Natural Resources. 2007. Minnesota's List of Endangered, Threatened, and Special Concern Species. Available at: [http://files.dnr.state.mn.us/natural\\_resources/ets/endlist.pdf](http://files.dnr.state.mn.us/natural_resources/ets/endlist.pdf). Retrieved August 4, 2011.

Minnesota Department of Natural Resources. 2008. GAP Stewardship 2008 - All Ownership Types. Available at <http://deli.dnr.state.mn.us>. Retrieved August 8, 2011.

Minnesota Department of Natural Resources. 2011. Mammals of Minnesota. Available at: <http://www.dnr.state.mn.us/mammals/index.html>. Retrieved August 8, 2011.

Minnesota Department of Natural Resources. 2011. Recreational Compass Website. Available at: <http://www.dnr.state.mn.us/maps/compass.html>. Retrieved August 4, 2011.

Minnesota Department of Natural Resources. 2010. Minnesota Hunting Regulations. Available at: <http://files.dnr.state.mn.us/rlp/regulations/hunting/2010/waterfowl.pdf>

Retrieved August 8, 2011.

Minnesota Geospatial Information Office. MnGeo's Clearinghouse Data Catalog. AM Radio Towers, USA. 2000. Available at: <http://www.mngeo.state.mn.us/chouse/metadata/am.html>. Retrieved August 11, 2011.

Minnesota Geospatial Information Office. MnGeo's Clearinghouse Data Catalog. FM Radio Towers, USA. 2003. Available at: <http://www.mngeo.state.mn.us/chouse/metadata/fm.html>. Retrieved August 11, 2011.

Minnesota Geospatial Information Office. MnGeo's Clearinghouse Data Catalog. Cellular Tower Locations. 2003. Available at: <http://www.mngeo.state.mn.us/chouse/metadata/cellular.html>. Retrieved August 11, 2011.

Minnesota Ornithologists Union. 2011. County Checklists, Nobles County. Available at: <http://moumn.org/cgi-bin/countychecklist.pl>. Retrieved August 9, 2011.

Minnesota Pollution Control Agency. Minnesota's Impaired Waters and TMDLs Impaired Waters Viewer. 2011. Available at: <http://www.pca.state.mn.us/index.php/water/water-typesand-programs/minnesotas-impaired-waters-and-tmdls/assessment-and-listing/maps-ofminnesotas-impaired-waters-and-tmdls.html?menuid=&redirect=1>. Retrieved August 8, 2011.

Minnesota Pollution Control Agency. 2008. *A Guide to Noise Control in Minnesota*.

Minnesota Pollution Control Agency. What's in My Neighborhood database. Available at: <http://www.pca.state.mn.us/index.php/topics/environmental-data/wimn-whats-in-myneighborhood/whats-in-my-neighborhood.html>: Retrieved August 11, 2011.

Minnesota Public Utilities Commission. January 2009. Wind Turbines in Minnesota. Available at: <http://energyfacilities.puc.state.mn.us/documents/Map%20of%20Wind%20Turbines%20in%20Minnesota,%202008.pdf>. Retrieved August 4, 2011.

Minnesota Administrative Rules 2010. Wind Siting Rules, Chapter 7854. [St. Paul]: Minnesota Revisor of Statutes. <https://www.revisor.mn.gov/rules/?id=7854&view=chapter>.

Morey, G.B. and J. Meints (compilers). 2000. Geologic Map of Minnesota, bedrock geology (3rd edition) : Minnesota Geological Survey State Map Series S-20, scale 1:1,000,000.

National Institute of Environmental Health Sciences. 2002. EMF Electric and Magnetic Fields Associated with the Use of Electric Power, Questions and Answers.

National Institute of Environmental Health Sciences EMF-RAPID Program Staff, 1999. NIEHS Report on Health Effects from Exposure to Power Line Frequency Electric and Magnetic Fields.

Osborn, R. G., C. D. Dieter, K. F. Higgins, and R. E. Usgaard. 1998. Bird Flight Characteristics Near Wind Turbines in Minnesota. *American Midland Naturalist*. 139(1):29-38.

Osborn, R. G., K. F. Higgins, R. E. Usgaard, C. D. Dieter, and R. D. Neiger. 2000. Bird Mortality Associated with Wind Turbines at the Buffalo Ridge Wind Resource Area, Minnesota. *American Midland Naturalist*. 143:41-52.

United States Census Bureau. American Fact Finder: 2005-2009 American Community Survey 5-Year Estimates. Nobles County, MN. Available at: [http://factfinder.census.gov/servlet/ACSSAFFacts?\\_event=Search&geo\\_id=&\\_geoContext=&\\_street=&\\_county=Nobles&\\_cityTown=Nobles&\\_state=04000US27&\\_zip=&\\_lang=en&\\_sse=on&pctxt=fph&pgsl=010](http://factfinder.census.gov/servlet/ACSSAFFacts?_event=Search&geo_id=&_geoContext=&_street=&_county=Nobles&_cityTown=Nobles&_state=04000US27&_zip=&_lang=en&_sse=on&pctxt=fph&pgsl=010). Accessed August 5, 2011.

United States Department of Agriculture. 1980. Soil Survey of Nobles County, Minnesota.

USFWS (U.S. Fish and Wildlife Service). IPaC- Information, Planning, and Conservation System. Available at: <http://ecos.fws.gov/ipac/>. Retrieved August 10, 2011.

USFWS Wind Turbine Guidelines Advisory Committee Recommendations. March 4, 2010. [http://www.fws.gov/habitatconservation/windpower/Wind\\_Turbine\\_Guidelines\\_Advisory\\_Committee\\_Recommendations\\_Secretary.pdf](http://www.fws.gov/habitatconservation/windpower/Wind_Turbine_Guidelines_Advisory_Committee_Recommendations_Secretary.pdf)