Public Utilities Commission

City of New Ulm

Administration
310 First North Street
New Ulm, Minnesota 56073

Telephone: (507)-359-8264
Fax: (507)-354-7318
E-mail:

May 5, 2009

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

Subject: Draft Site Permit Application for the New Ulm Wind Project, Nicollet County, Minnesota

Dear Dr. Haar;

The New Ulm Public Utilities Commission (NUPUC) submits this draft application to the Minnesota Public Utilities Commission for a Site Permit to construct and operate the New Ulm Wind Project. The Project would have a nameplate capacity of up to 10.5 megawatts and as such, is a Large Wind Energy Conversion System as defined by the Wind Siting Act, Minnesota Statute §216F.01. The Project consists of up to 5 turbines located approximately 5 miles north of the City of New Ulm in Nicollet County, Minnesota. The NUPUC plans to use the output from the Project to meet the State of Minnesota Renewable Objectives requirement as outlined in Minnesota Statute §216B.1691.

Sincerely,

New Ulm Public Utilities Commission

Gary Gleisner
Director of Utilities

Attachment

cc: Patrick Wrase, New Ulm Public Utilities Commission
Leslie Knapp, EDAW|AECOM
Edgar Preissner, Sargent & Lundy, LLC.
Keith Anderson, Howard R. Green Company

New Ulm Public Utilities Commission Site Permit Application for a Large Wind Energy Conversion System

New Ulm Wind Project Nicollet County, Minnesota

May 5, 2009
PUC Docket No: E282/WS-09-178

Prepared For:

New Ulm Public Utilities Commission
310 First North Street
New Ulm, MN 56073

Prepared by:

Howard R. Green Company
2550 University Avenue W., Suite 400N
St. Paul, MN 55114

With support from:

Sargent & Lundy, LLC
55 East Monroe Street
Chicago, IL 60603-5780

EDAW|AECOM
161 Cheshire Lane North, Suite 500
Minneapolis, MN 55441

Table of Contents

Acronyms vi

Section 1.0 Introduction 1

Section 2.0 Proposed Site 3
- 2.1 Identification of Project Area 3
- 2.2 Projected Output 3
- 2.3 Wind Characteristics in Project Area 3
  - 2.3.1 Interannual Variation 4
  - 2.3.2 Seasonal Variation 4
  - 2.3.3 Diurnal Conditions 4
  - 2.3.4 Atmospheric Stability 6
  - 2.3.5 Hub Height Turbulence 6
  - 2.3.6 Extreme Wind Conditions 6
  - 2.3.7 Wind Variation with Height 7
  - 2.3.8 Speed Frequency Distribution Wind Variation 7
  - 2.3.9 Spatial Wind Variation 7
  - 2.3.10 Wind Rose 7
- 2.4 Other Meteorological Conditions at Proposed Site 7
- 2.5 Location of Other Wind Turbines in General Area 11

Section 3.0 Wind Rights and Setbacks 12
- 3.1 Wind Rights 12
- 3.2 Other Setback Requirements 12

Section 4.0 Project Design 13
- 4.1 Project Layout 13
- 4.2 Major Wind Turbine Components 13
- 4.3 Project Electrical System 14
- 4.4 Associated Facilities 14

Section 5.0 Environmental Analysis 15
- 5.1 Description of Environmental Setting 15
- 5.2 Socioeconomic Information 16
  - 5.2.1 Demographics 16
  - 5.2.2 Economy 16
  - 5.2.3 Environmental Justice 17
  - 5.2.4 Impacts to Socioeconomics 17
  - 5.2.5 Mitigation Measures for Socioeconomics 19
- 5.3 Noise 19
  - 5.3.1 Description of Resources 19
  - 5.3.2 Noise Impacts 20
  - 5.3.3 Mitigation Measures for Noise 22
- 5.4 Visual Resources 22
  - 5.4.1 Description of Resources 22
  - 5.4.2 Visual Impacts 23
  - 5.4.3 Mitigation Measures 24
- 5.5 Public Services and Infrastructure 24
  - 5.5.1 Description of Resources 24
  - 5.5.2 Impacts on Public Services and Infrastructure 25
  - 5.5.3 Mitigation Measures 26
- 5.6 Cultural and Archaeological Resources 26
  - 5.6.1 Description of Resources 26
  - 5.6.2 Impacts to Cultural and Archaeological Resources 26
  - 5.6.3 Mitigation Measures 26

5.7 Recreational Resources 27
5.7.1 Description of Resources 27
5.7.2 Impacts on Recreational Areas 27
5.7.3 Mitigation Measures 27
5.8 Human Health and Safety 28
5.8.1 Description of Resources 28
5.8.1.1 Air Traffic 28
5.8.1.2 Electromagnetic Fields 28
5.8.1.3 Security 28
5.8.1.4 Traffic 28
5.8.2 Impacts to Public Health and Safety 28
5.8.2.1 Air Traffic 28
5.8.2.2 Electromagnetic Fields 28
5.8.2.3 Security 28
5.8.2.4 Traffic 29
5.8.3 Mitigation Measures 29
5.8.3.1 Air Traffic 29
5.8.3.2 Electromagnetic Fields 29
5.8.3.3 Security 29
5.8.3.4 Traffic 29
5.9 Hazardous Materials 30
5.9.1 Description of Resources 30
5.9.2 Impacts from Hazardous Materials 30
5.9.3 Mitigation Measures 30
5.10 Effects on Land-Based Economics 30
5.10.1 Agriculture/Farming/Forestry/Mining 30
5.10.1.1 Description of Resources 30
5.10.2 Impacts to Land-based Economics 31
5.10.2.1 Agriculture/Farming 31
5.10.2.2 Forestry 31
5.10.2.3 Mining 31
5.10.3 Mitigation Measures 31
5.10.3.1 Agricultural/Farming 31
5.10.3.2 Forestry 32
5.10.3.3 Mining 32
5.11 Tourism and Community Benefits 32
5.11.1 Description of Resources 32
5.11.2 Impacts for Tourism and Community Benefits 32
5.11.3 Mitigation Measures 32
5.12 Topography 32
5.12.1 Description of Resources 32
5.12.2 Impacts on Topography 33
5.12.3 Mitigation Measures 33
5.13 Soils 33
5.13.1 Description of Resources 33
5.13.2 Impacts on Soils 34
5.13.3 Mitigation Measures 34
5.14 Geologic Resources 34
5.14.1 Description of Resources 34
5.14.1.1 Bedrock 34
5.14.1.2 Surficial Deposits 35
5.14.1.3 Aggregate Potential 36
5.14.2 Impacts to Geology 36
5.14.3 Mitigation Measures 36

5.15 Groundwater Resources 36
5.15.1 Description of Groundwater Resources 36
5.15.2 Impacts to Groundwater Resources 37
5.15.3 Mitigation Measures 37
5.16 Surface Water and Floodplain Resources 37
5.16.1 Description of Resources 37
5.16.1.1 Surface/Public Waters 37
5.16.1.2 Water Quality 37
5.16.1.3 Floodplains 37
5.16.2 Impacts to Surface Water and Floodplain Resources 38
5.16.2.1 Surface/Public Waters 38
5.16.2.2 Water Quality 38
5.16.2.3 Floodplains 38
5.16.3 Mitigation Measures 38
5.17 Wetlands 38
5.17.1 Description of Resources 38
5.17.2 Impacts for Wetlands 39
5.17.3 Mitigation Measures 39
5.18 Vegetation 39
5.18.1 Description of Resources 39
5.18.2 Impacts to Vegetation 39
5.18.3 Mitigation Measures 39
5.19 Wildlife Resource 40
5.19.1 Description of Resources 40
5.19.1.1 Birds and Bats 40
5.19.1.2 Fish and Mammals 40
5.19.2 Impacts to Wildlife 40
5.19.3 Mitigation Measures 40
5.20 Rare and Unique Natural Resources 41
5.20.1 Description of Resources 41
5.20.2 Impacts to Rare and Unique Resources 41
5.20.3 Mitigation Measures 41

Section 6.0 Project Construction 42
6.1 Construction Activities 42
6.2 Construction Management 43
6.3 Foundation Design 44
6.4 Civil Works 44
6.5 Commissioning 45

Section 7.0 Project Operation and Maintenance 46
7.1 Project Control, Management, and Service 46
7.2 Maintenance Schedule 46
7.3 General Maintenance Duties 47
7.4 Operations and Maintenance Facility 48

Section 8.0 Costs 49

Section 9.0 Project Schedule 50
9.1 Land Acquisition 50
9.2 Permits 50
9.3 Procurement, Manufacture and Delivery 50
9.4 Construction 50
9.5 Construction Financing 50
9.6 Permanent Financing 50

9.7 Expected Commercial Operation Date 51

Section 10.0 Energy Projections 52

Section 11.0 Decommissioning and Restoration 53
11.1 Decommissioning and Restoration 53
11.2 Estimated Decommissioning Costs in Current Dollars 53
11.3 List of Decommissioning Activities 54
11.3.1 Turbine Removal 54
11.3.2 Turbine Foundation Removal 54
11.3.3 Underground Electrical Collection System 54
11.3.4 Overhead Collection Lines 55
11.3.5 Substation and Switching Station 55
11.3.6 Access Roads and Construction Pads 55
11.3.7 Site Restoration Process Description 55

Section 12.0 Agency and Public Contacts 56
12.1 Agency Contacts 56
12.1.1 Minnesota Department of Natural Resources 56
12.1.2 Minnesota State Historic Preservation Office 56
12.1.3 United States Fish and Wildlife Service 56
12.1.4 Nicollet County/Township Officials 56
12.2 Landowners 57

Section 13.0 Identification of Required Permits and Approvals 60

Section 14.0 Bibliography 61

Tables

Table 2-1 Project Locatio 3
Table 2-2 Average Monthly Temperatures 11
Table 3-1 Setback Distances for a Single Wind Turbine 12
Table 4-1 Wind Turbine Specifications 13
Table 5-1 Minority Populations 2007 18
Table 5-2 Low-Income Populations 2007 18
Table 5-3 Typical Sound Levels for Common Conditions and Activities 20
Table 5-4 State of Minnesota Noise Standards dBA 21
Table 5-5 Existing Daily Traffic Levels within the Project Area 25
Table 13-1 Permits and Approvals 59

Graphics

Graphic 2-1 December 2008 Diurnal Variation 5
Graphic 2-2 January 2009 Diurnal Variation 5
Graphic 2-3 February 2009 Diurnal Variation 6
Graphic 2-4 December 2008 Wind Speed Frequency Distribution 8
Graphic 2-5 January 2009 Wind Speed Frequency Distribution 8
Graphic 2-6 February 2009 Wind Speed Frequency Distribution 9
Graphic 2-7 December 2008 Wind Rose – Normalized Wind Speed and Direction Occurrences 9
Graphic 2-8 January 2009 Wind Rose – Normalized Wind Speed and Direction Occurrences 10
Graphic 2-9 February 2009 Wind Rose – Normalized Wind Speed and Direction Occurrences 10
Graphic 5-7 Project Location in Nicollet County 15
Graphic 5-8 Sound Pressure Levels measured at the WTGS Operating and Parked versus the Standardized Wind Speed at 10 m above ground (fitted by a 2nd order regression) 21
Graphic 5-9 Representation of the Proposed Wind Project – Looking to the Northwest 24

Figures
(Follow Text)

Figure 1-1 State and County Location Map
Figure 1-2 Project Location Map
Figure 5-1 MnDOT 2007 Traffic Volume Map
Figure 5-2 Water Resource Map

Appendices
(Follow Text)

Appendix A Wind Data
Appendix A-1 New Ulm Public Utilities, Minnesota Wind Resource Analysis (July 2007)
Appendix A-2 Wind Summary Data from the NUPUC On-Site Meteorological Tower (December 2008-February 2009)
Appendix A-3 Data Quality Review – Sibley Met Tower Summary Report (January 2009)
Appendix A-4 Wind Resource Analysis Program (WRAP) Report for Mountain Lake
Appendix B Wind Turbine Manufacturer Specifications
Appendix C ComSearch® Licensed Microwave Search and Worst Case Fresnal Zone
Appendix D Agency Coordination Letters
Appendix E Project Schedule

Acronyms

AADT	Average Annual Daily Traffic
ASTM	American Society for Testing and Materials
BMP	Best Management Practice
C-BED	Community-Based Energy Development
CEQ	Center on Environmental Quality
CR	County Road
CSAH	County State Aid Highway
CWA	Clean Water Act
dBA	Decibel
DOT	U.S. Department of Transportation
EMF	Electromagnetic fields
ESA	Environmental Site Assessment
F	Fahrenheit
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
Hz	Hertz
kV	Kilovolt
kWh	Kilowatt hour
LGU	Local Governmental Unit
LWECS	Large Wind Energy Conversion System
m	Meter
m/s	Meter per second
msl	Mean sea level
DNR	Minnesota Department of Natural Resources
MISO	Midwest Independent Transmission System
MnDOT	Minnesota Department of Transportation
MPCA	Minnesota Pollution Control Agency
mph	Miles per hour
MW	Megawatt
MWh	Megawatt hour

NAC	Noise area classification
NPDES	National Pollution Discharge Elimination System
NUPUC	New Ulm Public Utilities Commission
NWI	National Wetland Inventory
O&M	Operation and Maintenance
PCBs	Polychlorinated biphenyls
PCPI	Per capita personal income
PPA	Power Purchase Agreement
PUC	Public Utilities Commission
PWI	Public Waters Inventory
RD	Rotor diameter
REC	Recognized environmental condition
RHA	Rivers and Harbors Act
RPM	Revolutions per minute
SCADA	Supervisory Control and Data Acquisition
SHPO	Minnesota State Historic Preservation Office
SNA	Scientific Natural Area
SWCD	Soil and Water Conservation District
SWPPP	Stormwater Pollution Prevention Plan
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geologic Survey
WCA	Wetland Conservation Act
WMA	Wildlife Management Area
WOUS	Waters of the U.S.
WPA	Waterfowl Production Area
WRAP	Wind Resource Analysis Program

Section 1.0
Introduction

The New Ulm Public Utilities Commission (NUPUC or the Applicant), submits this application to the Minnesota Public Utilities Commission (Minnesota PUC) for a Site Permit to construct and operate the New Ulm Wind Project (Project). The Project is a Large Wind Energy Conversion System (LWECS), as defined by the Wind Siting Act, Minnesota Statutes §216F.01. The Project site is located in Nicollet County, Minnesota (Figure 1-1). The Project will have a nameplate capacity of up to 10.5 megawatts (MW), consisting of:

- Up to 5 Vestas V82 Turbines - 1.65 MW each, or
- Up to 5 Suzlon Energy Limited S88 Turbines - 2.1 MW each.

Exact turbine models are subject to change to ensure the selection of a turbine that is both cost-effective and optimizes the available land and wind resources. The installation of the turbines may be phased with 3 turbines being installed as Phase 1. At some point in the future, the NUPUC is considering the installation of 2 more turbines as Phase 2 (Figure 1-2). It is anticipated that Phase 2 turbines will all be installed within 3 years of the Phase 1 development. Alternatively, depending on funding availability all 5 turbines may be constructed during Phase 1.

The NUPUC exists as a quasi-autonomous commission under Section 208 of the City of New Ulm Home Rule Charter and has the sole and exclusive management and control of any utility owned or operated by the City and determined to be a Public Utility by the City Council. Sections 209 through 240 of said Charter provide additional guidelines relating to the powers, duties, and responsibilities of the NUPUC Commissioners and its employees. Section 2.50 of the City Code of the City of New Ulm sets forth general provisions relating to municipal utilities, while Section 2.51 empowers the NUPUC to make, amend, repeal, and enforce regulations which are necessary and reasonable to the operation of the various municipal utilities under its jurisdiction.

The Project is depicted on Figures 1-1 and 1-2. Associated facilities include access roads, an operations and maintenance (O&M) building, and a wind electrical collection system. The NUPUC has submitted an application to the Midwest Independent Transmission System Operator, Inc. (MISO) to allow transmission of the power from the Project via a substation to be constructed on Project site and interconnecting with the existing Xcel Energy 69 kV line that runs adjacent to the Project site. Pending MISO approval, the Project is expected to be operational by the fourth calendar quarter of 2010.

Capturing wind power for the production of electrical energy produces a very low level of external impacts when compared to more traditional sources of electric power generation. This Application examines potential environmental implications and impacts of the Project on humans and the natural environment. Wind energy development presents a very low impact on society and on the natural environment due to the very manageable waste stream produced by wind turbines, the lack of air emissions, and low levels of noise associated with this form of electric energy production.

Consistent with Minnesota PUC objectives, the NUPUC is committed to optimizing the wind resources for the Project. All decisions with respect to equipment selection, site layout, and spacing are designed to make the most efficient use of land and wind resources. The NUPUC is proceeding with evaluating the Project site to optimize wind resources, transmission interconnection opportunities, and other economic factors while avoiding and minimizing impacts to environmental resources.

The NUPUC will not be selling the power to another utility, but may sell some of the energy generated through the MISO transmission network and then take delivery of the energy at the MISO CPNode NSP.NU, a discrete number assigned by MISO. The City of New Ulm will utilize all of the energy generated from the project.

This LWECS Project will comply with the terms and conditions of the Minnesota PUC Site Permit that calls for projects to be developed in a manner consistent with state policies for environmental preservation, sustainable development, and efficient use of resources.

The Project's authorized representative is:

Patrick Wrase, P.E.
Utilities Planning and Development Engineer
New Ulm Public Utilities
310 First North Street
New Ulm, MN 56073
(507) 359-8202 office
(507) 354-7318 fax
patrick.wrase@ci.new-ulm.mn.us

Section 2.0
Proposed Site

2.1 Identification of Project Area

The Project is located in Nicollet County, Minnesota approximately 5 miles north of the City of New Ulm. The Project encompasses approximately 547 acres. As of the date of this application, the NUPUC has obtained lease and easement agreements with landowners for approximately 237 acres. The Project falls within the following townships (Table 2-1).

Table 2-1
Project Location

County	Township Name	Township	Range	Section
Nicollet	Lafayette	111 North	30 West	West ½ 17
Nicollet	Lafayette	111 North	30 West	East ½ 18
Nicollet	Lafayette	111 North	30 West	19
Nicollet	Lafayette	111 North	30 West	West ½ 20

2.2 Projected Output

The Project will have an ultimate nameplate capacity of up to 10.5 MW, based on 5 Suzlon S88 2.1 MW turbines. Based on a meteorological report conducted for the Project site, a net capacity factor of between 35 to 37% is expected, which develops a projected average annual output of between approximately 32,201,000 and 34,113,000 kilowatt hours (kWh). This amount of power is sufficient to supply approximately 2,900 to 3,100 homes. As is the case with all wind projects, net generation will be dependent on final design, site-specific features, and equipment.

2.3 Wind Characteristics in Project Area

The NUPUC installed a 60 meter (m) meteorological tower at the Project site that has been in service since November 24, 2008. As part of the original feasibility study conducted in 2007, the NUPUC contracted with WindLogics® to prepare a Wind Resource Analysis of the NUPUC Project site. This analysis is attached as Appendix A-1. The Project was evaluated by WindLogics® based on its proprietary 12 month modeling process. The WindLogics® modeling process used their database archive consisting of 55 years of worldwide weather data and 6 years of North American atmospheric data information covering the entire Project site to perform a comprehensive analysis report for 1 virtual tower located within the Project site. From the results of the WindLogics® modeling analysis, the NUPUC Project site was projected to expect a normalized average annual wind speed at 80 m of 7.75 meters per second (m/s) (17.3 miles per hour [mph]), as shown in Appendix A-1, Section 1A. The first 3 full months of data indicate wind resources near that anticipated by the WindLogics® meteorological model.

The WindLogics® analysis (Appendix A-1) estimated an average December wind speed of 8.18 m/s (18.3 mph) at 80 m. The average December 2008 wind speed recorded at the NUPUC on-site meteorological tower at 58 m was 7.93 m/s (17.7 mph) for the month (Appendix A-2). Using the data from the 58 m and the 45 m anemometer of 7.59 m/s (16.9 mph), a wind speed of 8.50 m/s (19.0 mph) can be extrapolated at 80 m.

The WindLogics® analysis (Appendix A-1) estimated a normalized average January wind speed of 8.38 m/s (18.7 mph) at 80 m. The January 2009 average wind speed at 58 m was 7.30 m/s (16.3 mph) for the month (Appendix A-2). Using the data from the 58 m and 45 m anemometer of 6.93 m/s (15.5 mph), a wind speed of 7.93 m/s (17.7 mph) can be extrapolated at 80 m.

The WindLogics® analysis (Appendix A-1) estimated a normalized average February wind speed of 8.01 m/s (17.9 mph) at 80 m. The February 2009 average wind speed at 58 m was 7.67 m/s (17.1 mph) for the month (Appendix A-2). Using the data from the 58 m and 45 m anemometer of 7.33 m/s (16.4 mph), a wind speed of 8.24 m/s (18.4 mph) can be extrapolated at 80 m.

In addition to the on-site data currently being collected, the NUPUC has obtained wind data from 2 additional sources. The NUPUC purchased and contracted with WindLogics® to perform a data quality review summary report of the wind data from the Sibley meteorological tower located 7 miles north of the NUPUC Project site. This data comprises 1 year of monitoring compiled on a 60 m tower. The WindLogics® data quality review analysis, attached as Appendix A-3, indicates an average annual hub height wind speed of approximately 8.3 m/s (18.6 mph).

2.3.1 Interannual Variation

As indicated above, from the WindLogics® Wind Resource Analysis, the expected annual average wind speed at the Project site is approximately 8.3 m/s at an 80 m hub height (18.6 mph at 262 feet). The Minnesota Wind Resource Analysis Program (WRAP) 7 years of data from the 70 m Mountain Lake meteorological tower near Darfur, has an expected average wind speed of 7.3 m/s (16.3 mph) at a 70 m and would yield a wind speed of 8.0 m/s (17.9 mph) that can be extrapolated at 80 m. The Mountain Lake meteorological tower is located within 50 miles of the NUPUC Project site and is the only tower officially reported with at least 7 years of continuous 70 m wind speed data as shown in Appendix A-4.

2.3.2 Seasonal Variation

Data collection from the NUPUC on-site meteorological tower is ongoing; therefore the seasonal variation of the predicted monthly average wind speeds for the Project site at a hub height of 80 m (262 feet) is being developed. The meteorological tower recorded the highest wind speed in December of 8.51 m/s (19.0 mph).

The NUPUC Project site wind speeds are consistent with the characteristics of other wind resources within Minnesota, which are generally highest in the fall, winter, and spring months. Wind speed decreases during the late spring and summer months (May through August).

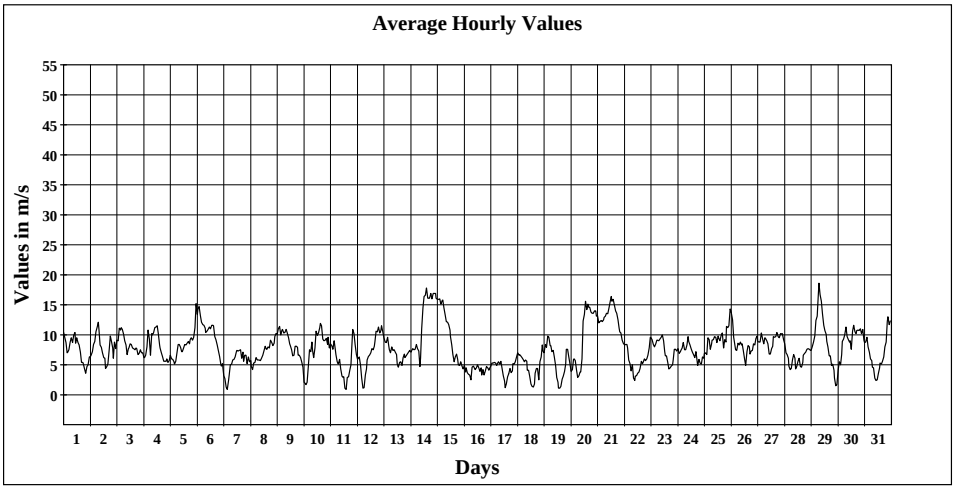
2.3.3 Diurnal Conditions

Three months of information, December 2008, January 2009, and February 2009, have been recorded by the NUPUC on-site 60 m meteorological tower and provided a sampling of the diurnal variation of wind speed at the Project site. Representation of the variability of wind speed over the course of a 24-hour period is presented in Graphics 2-1, 2-2, and 2-3 on the following pages. The meteorological tower wind summary report for December, January, and February are included as Appendix A-2. The conditions encountered indicate increasing wind speed in the afternoon hours as the temperature reaches daytime highs. The range of wind speed has been recorded at 6 m/s (13.4 mph) in the morning to a high in excess of 17 m/s (38 mph). The average wind velocity at 58 m for December 2008 was 7.8 m/s (17.4 mph); January 2009 was 7.2 m/s (16.1 mph); and February 2009 was 7.6 m/s (17.0 mph). The maximum 58 m wind speed recorded was in December 2008 at 19.5 m/s (43.6 mph). Wind speeds at high levels tend to decrease in the morning because of the warming effects of the sun on the earth, resulting in a mixing of winds.

Site Information:
Project: A3-1
Location:
Elevation: 307 m

Sensor on channel 1:
NRG #40 Anem, m/s
Height: 58
Serial #: 54079

December 2008
Hourly Averages Graph Ch 1
SITE 5643
New Ulm Wind Farm



Average Value: 7.8

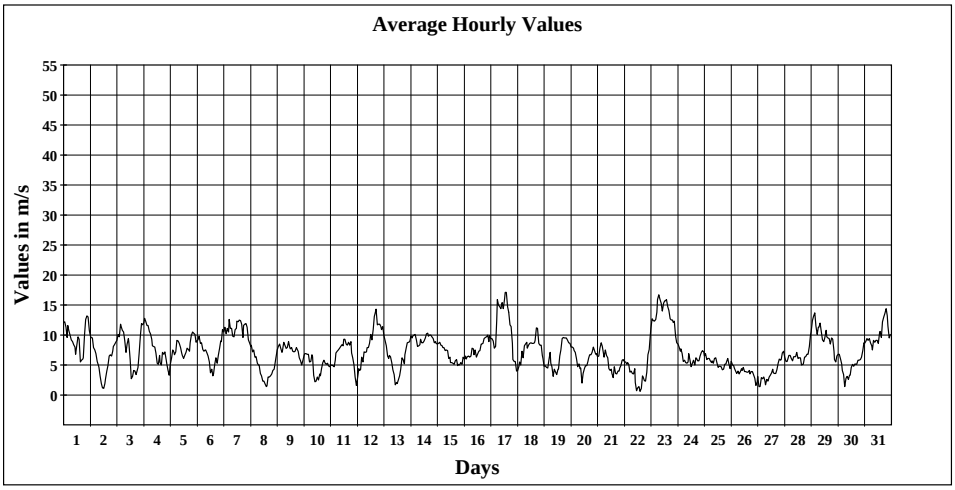
Generated Thursday, February 05, 2009 Total 10-minute intervals: 4464 Intervals used in calculations: 4464 Percent data used: 100 NRG Systems SDR Version 5.10

Graphic 2-1 - December 2008 Diurnal Variation

Site Information:
Project: A3-1
Location:
Elevation: 307 m

Sensor on channel 1:
NRG #40 Anem, m/s
Height: 58
Serial #: 54079

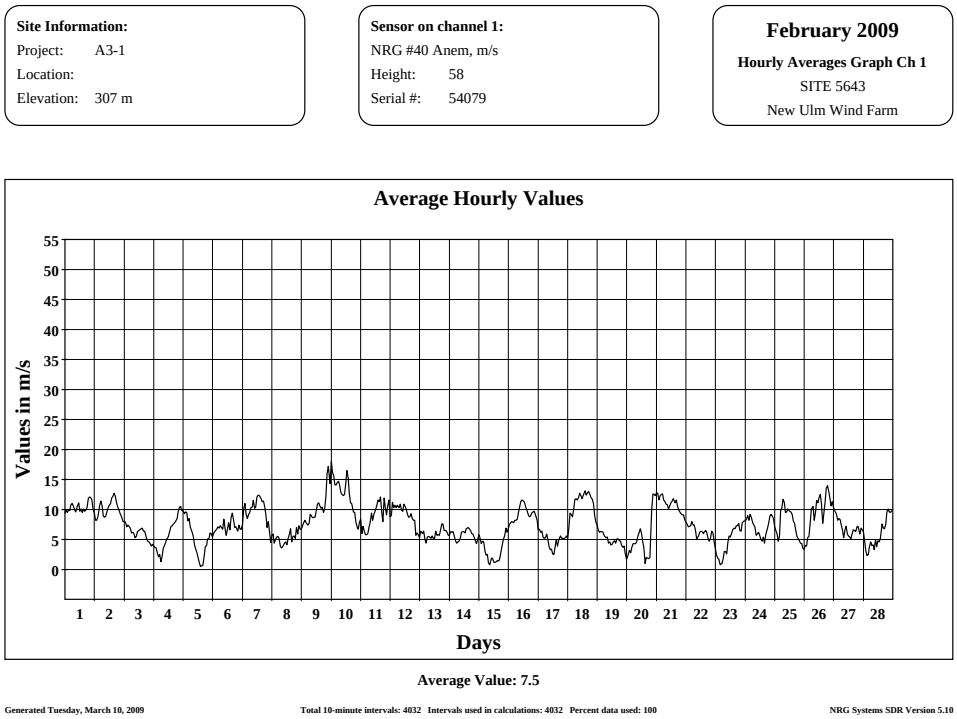
January 2009
Hourly Averages Graph Ch 1
SITE 5643
New Ulm Wind Farm



Average Value: 7.2

Generated Thursday, February 05, 2009 Total 10-minute intervals: 4464 Intervals used in calculations: 4464 Percent data used: 100 NRG Systems SDR Version 5.10

Graphic 2-2 - January 2009 Diurnal Variation



Graphic 2-3 - February 2009 Diurnal Variation

2.3.4 Atmospheric Stability

Atmospheric stability data has not been compiled for the NUPUC Project site as these inputs are not normally collected with on-site equipment. However, the atmospheric stability is expected to be “moderately stable” at the Project site since this is typical of the stability conditions for the open and relatively flat terrain such as the farmland of the NUPUC Project site. Also, in the southeastern Minnesota region winds do not vary significantly and are found to be relatively stable. Storm events can occur in the area, although their intensity, frequency, and duration are not unusual. Jet stream patterns have some effects during the winter months as they dip into south-eastern Minnesota. Winter and early spring months often have vigorous winds due to the progression of jet stream weather systems moving through the region. Wind farms have successfully operated in similar environments.

2.3.5 Hub Height Turbulence

The turbulence intensity (TI) is measured using the standard deviation of wind speeds divided by the mean wind speed for the period of time. Durability of turbines is sometimes predicted using the TI factor and turbine manufacturers may request TI for a site. In general, the TI for southeast Minnesota is anticipated to be low. The December 2008, January 2009, and February 2009 data for the NUPUC Project site indicates an average TI value of 0.08 as presented in Graphics 2-7, 2-8, and 2-9 on the following pages. The peripheral numbers of the wind roses (see Section 2.3.10) represents the TI calculated intensity values for each of the wind compass segment measurements.

2.3.6 Extreme Wind Conditions

Extreme wind speeds, as is the case in every county within the Midwest, may occur with winds from any of the prevailing directions and may happen during any season. The possibility of tornadoes and thunderstorms exists in the Project area. Wind speeds in the 100+ mph (45+ m/s) ranges can occur in a tornado, however the turbines have a automatic operational control shut-down for wind speeds beyond 45 to 55 mph (20 to 25 m/s) depending on turbine manufacturer. The breaking process is accomplished by feathering the blades out of the wind to reduce lift and slow the rotation. After a time delay, the mechanical breaking system is actuated to implement a safe and controlled shut-down.

2.3.7 Wind Variation with Height

Wind shear (alpha) is the measure of the change in wind speed with height above the ground. Wind shear values for alpha usually are in the range of 0.14 to 0.3.

Analyses of the wind shear data show significant variation, depending on season, direction, and time of day. Based upon WindLogics® Data Quality Review of the Sibley meteorological tower data (Appendix A-3, Table 3) the average wind shear for the 80 m alpha was 0.224 with an associated wind speed of 8.32 m/s (18.6 mph).

2.3.8 Speed Frequency Distribution Wind Variation

Graphics 2-4, 2-5, and 2-6 represent 3 months of the NUPUC on-site meteorological tower data collected to date and shows the normalized average wind speed frequency distribution for December 2008, January 2009, and February 2009. The normalized average wind speed frequency distribution is utilized to calculate the overall gross energy production based upon the wind turbine's power curve.

2.3.9 Spatial Wind Variation

The Project site is anticipated to have little wind variation existing within the Project boundaries due to the similarity of land cover of the area which is mostly farmland and void of any significant standing tree cover.

2.3.10 Wind Rose

A wind rose is a graphic tool used by meteorologists to depict a view of how wind speed and direction are typically distributed at a particular location. Wind rose, as recorded by the NUPUC meteorological tower (Graphics 2-7, 2-8, and 2-9 on the following pages) present wind direction and velocity over the course of past 3 months (December 2008 , January 2009, and February 2009). These graphics indicate that the prevailing wind for December is from the west and with strong January and February winds recorded from the northwest. The graphics also present wind energy and frequency correlated to wind direction. The December average wind speed for the prevailing west direction is 7.93 m/s (17.7 mph). The January and

February average wind speed from the prevailing northwest direction is 7.3 m/s (16.3 mph) and 7.6 m/s (17.2 mph), respectively. The December average wind speed for the prevailing west direction is 7.93 m/s (17.7 mph). The December wind is oriented from the west direction most of the time with a secondary component from the northwest of near equal energy strength. The January and February average wind speed from the prevailing northwest direction were 7.3 m/s (16.3 mph) and 7.6 m/s (17.0 mph), respectively.

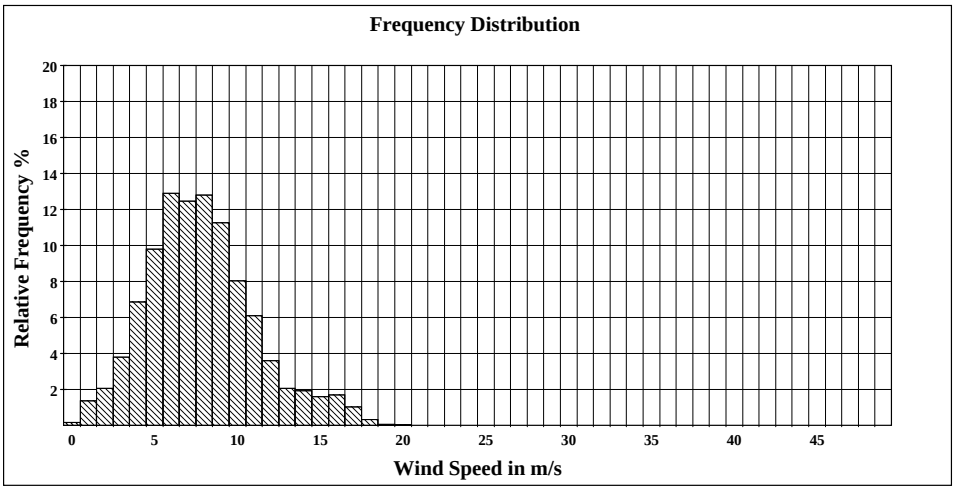
2.4 Other Meteorological Conditions at Proposed Site

Extreme weather conditions in the Project area are occasional and include hail, ice storms, lightening, tornados, and severe thunderstorms. Due to the low frequency and short duration of these conditions, minimal effects are expected on turbine performance. Typical weather conditions for Nicollet County are for a temperature of 71° Fahrenheit (F) in the summer months and 19° F in the winter months. Average precipitation at the 2 nearest measuring stations for which recorded information is available indicates 29.85 inches of precipitation annually at New Ulm, Minnesota (5 miles from the Project site) and 29.19 inches of precipitation annually at St. Peter, Minnesota (25 miles from the Project site).

Site Information:
Project: A3-1
Location:
Elevation: 307 m

Sensor on channel 1:
NRG #40 Anem, m/s
Height: 58
Serial #: 54079

December 2008
Frequency Distribution Ch 1
SITE 5643
New Ulm Wind Farm



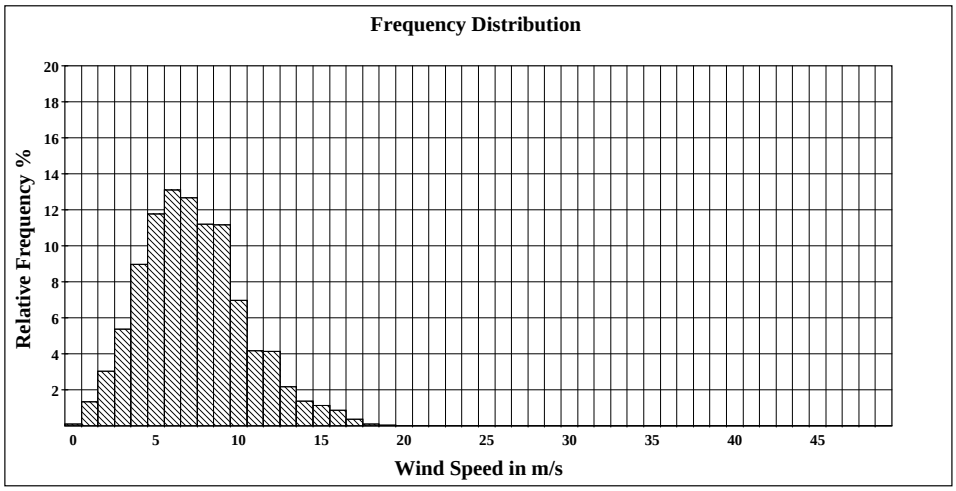
Generated Thursday, February 05, 2009 Total 10-minute intervals: 4464 Intervals used in calculations: 4464 Percent data used: 100 NRG Systems SDR Version 5.10

Graphic 2-4 - December 2008 Wind Speed Frequency Distribution

Site Information:
Project: A3-1
Location:
Elevation: 307 m

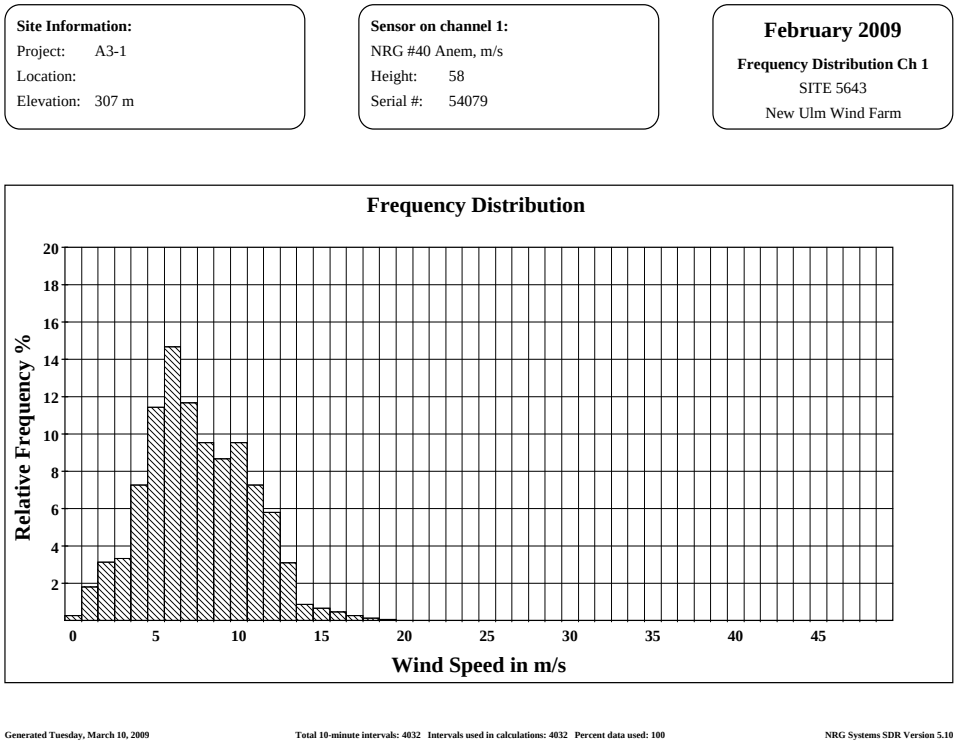
Sensor on channel 1:
NRG #40 Anem, m/s
Height: 58
Serial #: 54079

January 2009
Frequency Distribution Ch 1
SITE 5643
New Ulm Wind Farm

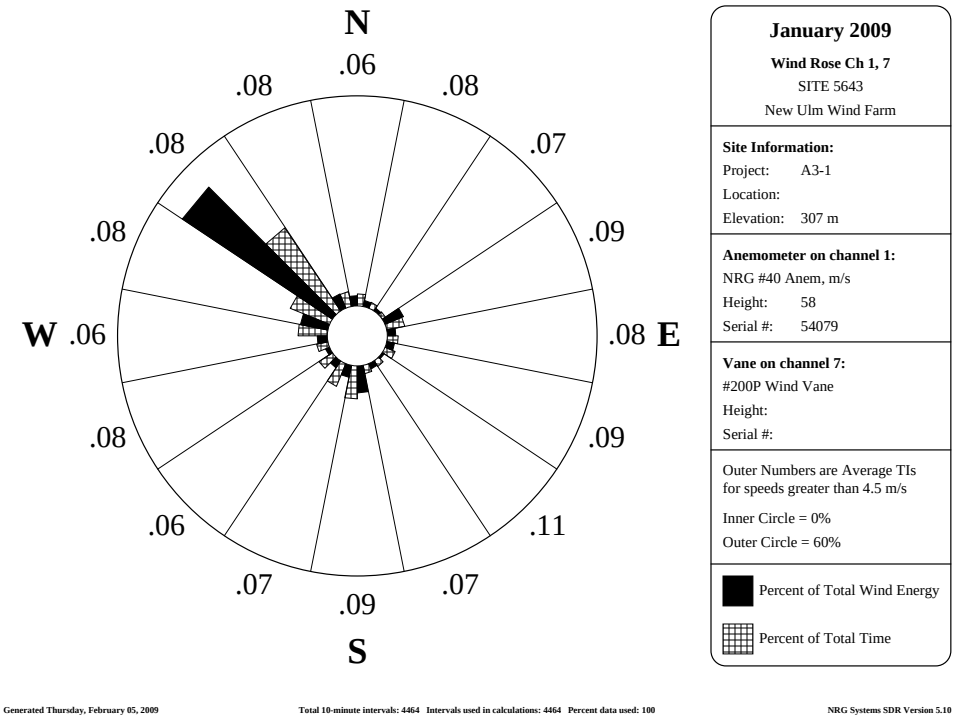


Generated Thursday, February 05, 2009 Total 10-minute intervals: 4464 Intervals used in calculations: 4464 Percent data used: 100 NRG Systems SDR Version 5.10

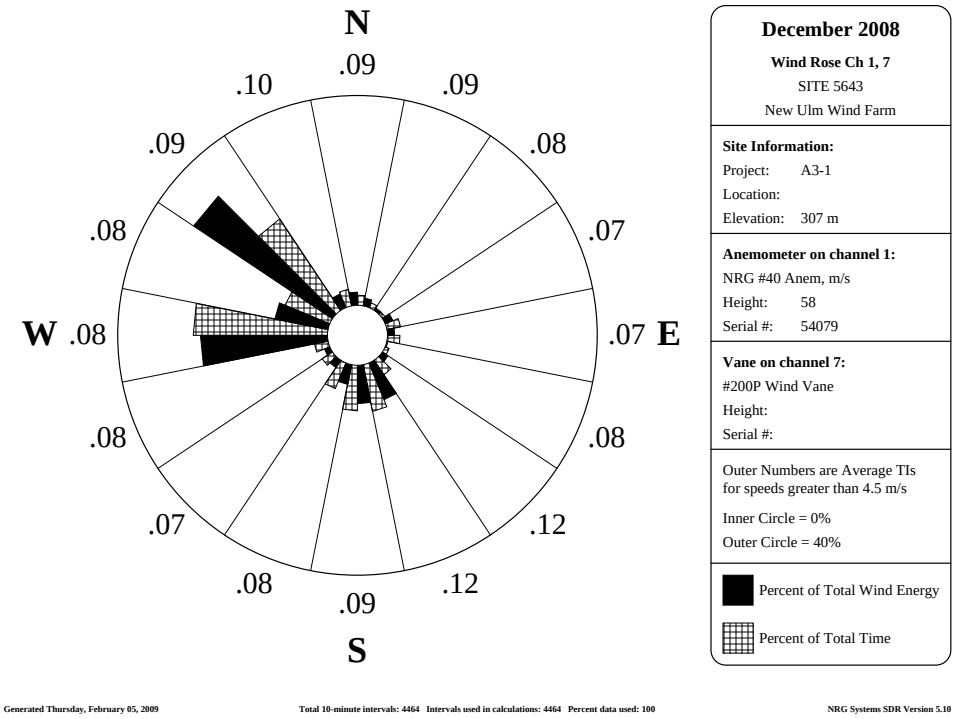
Graphic 2-5 - January 2009 Wind Speed Frequency Distribution



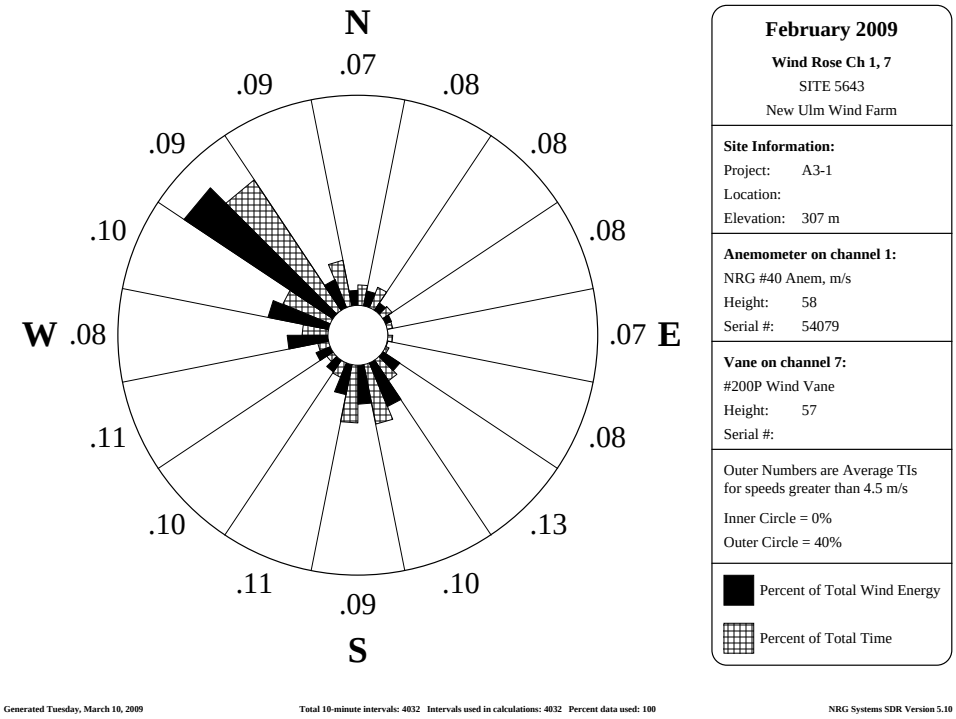
Graphic 2-6 – February 2009 Wind Speed Frequency Distribution



Graphic 2-7 - December 2008 Wind Rose – Normalized Wind Speed and Direction Occurrences



Graphic 2-8 - January 2009 Wind Rose – Normalized Wind Speed and Direction Occurrences



Graphic 2-9 - February 2009 Wind Rose – Normalized Wind Speed and Direction Occurrences

The average monthly temperatures at these nearby recording stations are presented in Table 2-2.

Table 2-2
Average Monthly Temperatures

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
St. Peter[1]	14°	19°	32°	48°	60°	69°	74°	71°	62°	50°	35°	20°
New Ulm[1]	14°	20°	32°	48°	61°	70°	74°	71°	62°	51°	34°	19°

[1]Temperatures shown in ° Fahrenheit
Source: High Plains Regional Climate Center @ http://www.hprcc.unl.edu

2.5 Location of Other Wind Turbines in General Area

Presently, there are no known wind turbine projects operating within a 20-mile radius of the proposed NUPUC Project site. However, the Sibley County Wind Project, located within 7 miles of the NUPUC Project site, was issued a State Site Permit Application on September 23, 2008 to construct a 20 MW LWECS. http://energyfacilities.puc.state.mn.us/resource.html?Id=19582.

The Sibley County Wind Project application contains 1 year of quality data gathered to support Sibley County's wind project. The data provides a strong correlation to the NUPUC Project site. In addition, the NUPUC has contracted WindLogics® to review the Sibley meteorological tower data as a supporting proxy meteorological tower for the NUPUC Project site. The WindLogics® Summary Report is included in Appendix A-2. WindLogics® has completed this assessment and concluded that the Sibley meteorological tower data reflects the conditions at the NUPUC Project site for the purpose of a virtual wind tower and wind turbine suitability analysis, but this is subject to verification that will be possible when sufficient data has been collected at the NUPUC Project site. In the interim, WindLogics® has performed the quality check on the Sibley data, and despite some data gaps related to icing conditions of the Sibley meteorological tower, WindLogics® concluded the bulk of the data is consistent with hub-height wind speed of approximately 8.3 m/s (18.6 mph), which indicates that a "moderate-to-good" wind resource was recorded during the collection time period by the Sibley meteorological tower data as a supporting proxy meteorological tower for the NUPUC Project site.

Section 3.0
Wind Rights and Setbacks

3.1 Wind Rights

The NUPUC has and continues to negotiate with local landowners in proximity to the Project site to obtain lease and easement agreements to meet Minnesota PUC setback requirements for this project. The Project boundary encompasses approximately 547 acres. As of the date of this application, the NUPUC has entered into lease and easement agreements with landowners for approximately 237 acres. Land rights required for the development of the Project will encompass the proposed Project and all associated facilities, including, but not limited to wind and buffer easements, wind turbines, access roads, underground collector lines, and a substation.

The NUPUC proposes a 5.2 rotor diameter (RD) setback from the perimeter along the prevailing wind axis (downwind spacing) and a 3.2 RD setback from the perimeter on the non-prevailing wind axis (crosswind spacing) (Figure 1-2). As required by Minnesota LWES Site Permit requirements, wind turbine towers will not be placed less than 5 RD from the perimeter of the site on the prevailing wind axis and 3 RD on the non-prevailing wind axis, without the approval of the Minnesota PUC.

3.2 Other Setback Requirements

In accordance with LWECS Site Permit requirements, the NUPUC has incorporated setbacks of at least 500 feet from inhabited (not vacant or abandoned) residences and 250 feet from public roads. The NUPUC will maintain an appropriate setback from inhabited residences to stay below the Minnesota Pollution Control Agency (MPCA) Nighttime Noise Limit of 50 on the A-weighted decibel (dBA) scale, which represents the most stringent noise requirement. To accommodate the anticipated turbines, the setback from residences will be at least 1,050 feet (see Section 5.3 for further discussion of the noise analysis). The NUPUC has established a setback that is much greater than the minimum of 500 feet (required by Minnesota PUC) to help address potential nearby resident issues and concerns. The closest residence is approximately 1,050 feet from a turbine. Table 3-1 identifies the most conservative setbacks applicable to the Project, based on using the Suzlon S88 turbines.

Table 3-1
Setback Distances for a Single Wind Turbine

Turbine Description	N-S Perimeter Setback	E-W Perimeter Setback	Occupied Residence	Wildlife Management Area	Public Roads	Wetlands
	5.2 RD	**3.2 RD**	**500 feet minimum**	**800 feet minimum**	**250 feet minimum**	**400 feet minimum**
2.1 MW Suzlon S88 Turbine with 88 m RD	**1,501 ft**	**924 feet**	**1,050 feet**	**3.5 miles**	**50 feet to nonpublic road 750 feet**	**950 feet**

Section 4.0
Project Design

This section provides a summary Project description including a description of the Project layout, turbines, electrical system, and associated facilities. Additional information addressed in this section includes Project construction, schedule, operation, and decommissioning.

4.1 Project Layout

A Project Site Plan that depicts the planned location of towers/turbines and the Project substation is presented in Figure 1-2. Turbine locations are approximate, and are subject to change during final design. The proposed electrical collector system will be located on properties leased or purchased by the NUPUC. When the MISO interconnect is approved, a newly- constructed substation will be located adjacent to the 69 kV line owned by Xcel Energy running along the south side of the Project (Figure 1-2).

4.2 Major Wind Turbine Components

Exact turbine models are subject to change to ensure the selection of a turbine that is both cost-effective and optimizes the available land and wind resources. The NUPUC is currently proposing to use either Vestas V82 or Suzlon Energy Limited S88 turbines. Table 4-1 shows specifications for these currently proposed turbine models (See Appendix B for wind turbine specifications).

Table 4-1
Wind Turbine Specifications

Characteristic	Vestas V82 Turbine	Suzlon S88 Turbine
Nameplate Capacity	1.65 MW	2.1 MW
Hub Height	80 m (262 feet)	80m (262 feet), incl. 1 m foundation
Rotor Diameter	82 m (269 feet)	88m (289 feet)
Total Height[1]	111 m (364 feet)	124 m (407 feet)
Cut-in wind speed[2]	3.5 m/s (7.8 mph)	4 m/s (8.9 mph)
Rated capacity wind speed[3]	13 m/s (29.1 mph)	14 m/s (31.3 mph)
Cut-out wind speed[4]	20 m/s (44.7 mph)	25 m/s (55.9 mph)
Maximum sustained wind speed[5]	59.5 m/s (133 mph)	59.5 m/s (133 mph)
Rotor speed	14.4 rpm	15 to 17.6 rpm

[1] Total height = the total turbine height from the ground to the tip of the blade in an upright position
[2] Cut-in wind speed = wind speed at which turbine begins operation
[3] Rated capacity wind speed = wind speed at which turbine reaches its rated capacity
[4] Cut-out wind speed = wind speed above which turbine shuts down operation
[5] Maximum sustained wind speed = wind speed up to which turbine is designed to withstand

Each tower will be erected upon a concrete foundation that can vary in design depending on the soil conditions and loadings. A control panel at the base of each turbine tower will house communication and electronic circuitry. Each turbine is electromechanically driven and is equipped with a wind direction sensor that communicates with the turbine's control system to signal when sufficient winds are present for operation. The turbines also have variable-speed control and independent blade pitch to assure aerodynamic efficiency.

The tower and blades have internal lighting and grounding protection.

Other system components will be designed and installed in accordance with the standards of high-voltage engineering practice. They will be compatible with the specified requirements of the interconnecting area transmission system as set forth by the local transmission owners, and the North American Electric Reliability Corporation (NERC) “Reliability Standards for the Bulk Electric Systems of North America”.

4.3 Project Electrical System

The turbine generators under consideration are rated at an output of 690 V or less. The electric output from each generator will be transformed to 34.5 kV via a pad mounted 690V/34.5kV transformers at the base of each turbine. Refer to Section 4.1 Project layout for a discussion of the transmission interconnection.

4.4 Associated Facilities

The individual wind turbines will each have a gravel access road that will provide year-around access from public rights-of-way. The roads will be approximately 16 feet (4.88 meters) wide and have a low profile to allow cross-travel by farm equipment. The NUPUC will locate access roads to minimize impacts to current or future agriculture. The NUPUC will continue to work with the landowners to reach agreements on the locations of the turbines, access roads, and collector system to minimize land use disruptions.

Foundations for the towers will consist of either a pad foundation of approximately 60 to 80 feet square to a depth of up to 8 or 12 feet or a Patrick and Henderson (P&H) foundation that consist of a circle of concrete approximately 15 feet in diameter to a depth of 35 feet. The specific foundation will be chosen based on soil borings conducted at each tower location. A gravel pad with a radius of 80 to 100 feet will be established at the base of each tower.

A meteorological tower was installed at the Project site on November 24, 2008 and is now collecting on-site data and will be left for data collection.

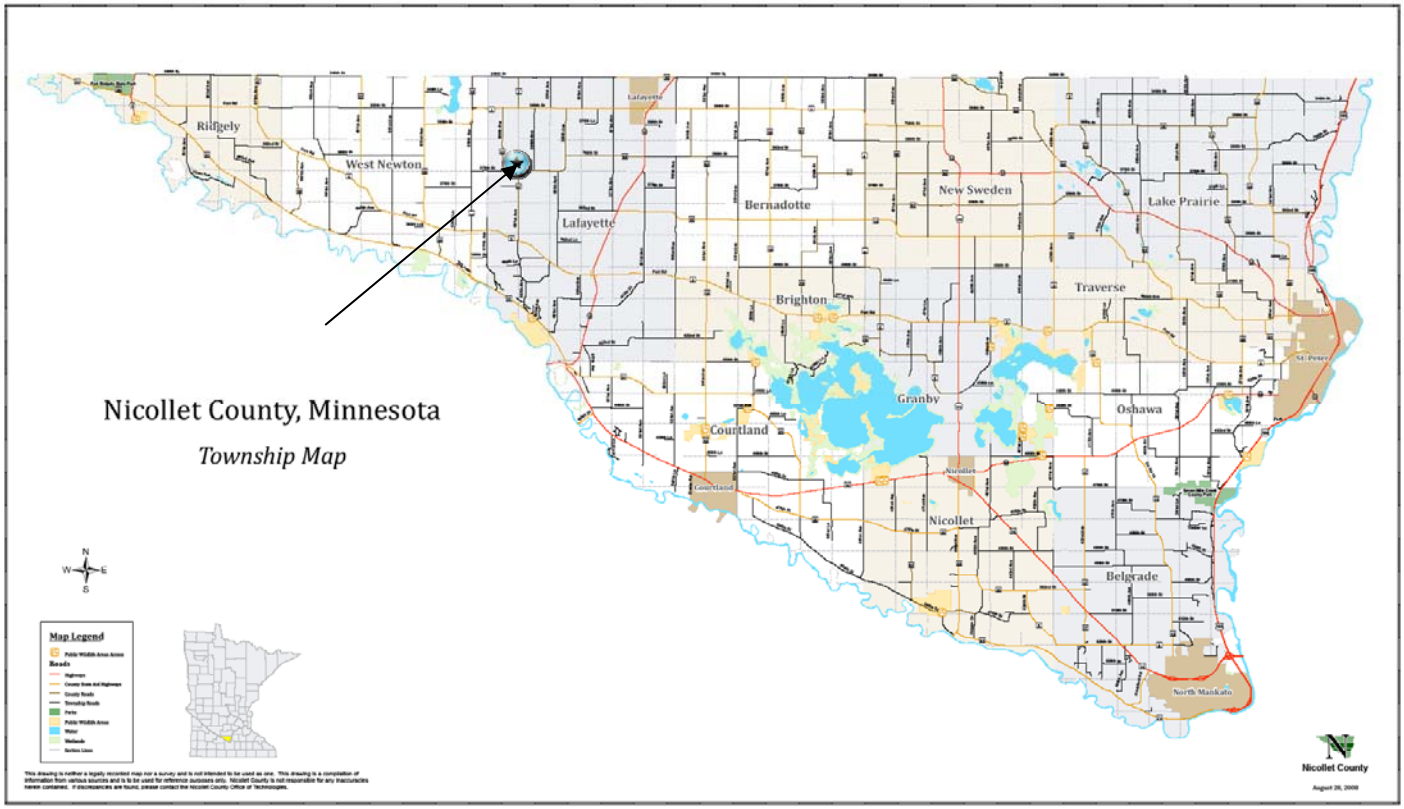
An O&M building and the switchgear will be located on the 5-acre substation area identified in Figure 1-2.

Section 5.0
Environmental Analysis

This section provides a description of the environmental conditions that exist within the Project area. Consistent with Minnesota PUC procedures on siting a LWECS and applicable portions of the Power Plant Siting Act, various exclusion and avoidance criteria were considered in the selection of the Project area.

5.1 Description of Environmental Setting

Nicollet County lies in south-central Minnesota and closely resembles an isosceles triangle with 104.6 miles of Minnesota River frontage (Graphic 5-7). Within the 280,866.22 total acres in the County, almost 245,000 acres is farmland with 24,000 acres of forested land and 12,000 acres of wetland. The County is composed of 5 cities and 13 townships. http://www.co.nicollet.mn.us/.



Source: Nicollet County Web Page http://www.co.nicollet.mn.us/

Graphic 5-7 – Project Location in Nicollet County

The Minnesota Department of Natural Resources (DNR) and the U.S. Forest Service developed an Ecological Classification System for ecological mapping and landscape classification in Minnesota. The Project site is situated within the Minnesota River Prairie Subsection. The Minnesota River Prairie is a large subsection that includes part of northwestern Iowa and spreads across southwestern Minnesota into eastern South Dakota. This subsection covers 9,321,886 acres (14,565 square miles) and comprises approximately 17% of Minnesota. This subsection consists of a band of gently rolling ground moraine about 60 miles wide. The Minnesota River occupies a broad valley that splits the subsection in half (DNR 2009a).

Loamy ground moraine (till plain) is the dominant landform, but end moraines and lake plains also occupy a significant area of this subsection. Most of this subsection is covered by 100 to 400 feet of glacial drift overlying bedrock. Cretaceous shales, sandstones, and clays are the most common kinds of bedrock present in the area. Soils are described in Section 5.13.

Pre-settlement vegetation consisted primarily of tallgrass prairie and wetlands. Forests of silver maple, elm, cottonwood, and willow grew on floodplains along the Minnesota River and other streams. Portions of the Big Stone Moraine supported dry and dry-mesic prairie (Wheeler et al. 1992). There were also dry gravel prairies on kames (Albert 1993). Today, row-crop agriculture is the predominant land use, and prairie remnants and floodplain forests are rare. Current land use consists of approximately 82% row crop, 9% pasture, 3% open area, 3% water, 2% forest/water, and 1% developed land. Population density in the subsection is about 31.7 people per square mile.

According to the DNR, impacts on water quality from intensive agricultural activities, including the use of fertilizers and pesticides, the expanding use of pattern tiling, and the ditching and draining of small wetlands are concerns in relation to wildlife habitat in this subsection. The continued loss of the small amount of remaining native upland habitat and over-intensive grazing continue to be concerns (DNR 2006).

5.2 Socioeconomic Information

5.2.1 Demographics

The Project site is located within a lightly populated rural area in west-central Minnesota. Information on demographics and housing was obtained from the U.S. Census Bureau.

In 2000, Nicollet County had a population of 29,771 and in 2007, the estimated population was 31,680 (an increase of approximately 6% from the 2000 Census). Statewide, Minnesota's population in 2000 was over 4.9 million (an increase of 12.4% from the 1990 Census), and in 2007, the estimated population was more than 5.2 million (an increase of approximately 5.8 % from the 2000 Census). Nicollet County encompasses 467 square miles, averaging 67.8 persons per square mile (U.S. Census Bureau 2000, 2007). The total number of housing units in Nicollet County in the year 2000 was 11,240, averaging 25 housing units per square mile (average reflects total area minus areas of water). The Project is located in Lafayette Township.

5.2.2 Economy

According to the Minnesota Department of Employment and Economic Development, Minnesota's per capita personal income (PCPI) was $38,751 in 2006. This is 106% of the national average PCPI. In comparison, Nicollet County's PCPI was $32,601 in 2006. This is 84% of the state average PCPI and 89% of the national average PCPI.

The economic base of Nicollet County consists primarily of management, professional, and related occupations (37.1%); sales and office occupations (25.3%); service occupations (14.9%); construction occupations (6.8%); and production, transportation, and material moving services (16 %). In comparison, the economic base of Minnesota consists primarily of management, professional, and related occupations (35.8%); sales and office occupations (26.5%); and 20.9 % in educational, health, and social services (US Census Bureau 2007). The economic base of the Project area is primarily rural agricultural crop and animal production.

5.2.3 Environmental Justice

This section identifies any minority and low-income populations that may be affected by the proposed Project.

Minority populations are persons of Hispanic or Latino origin, Blacks or African Americans, American Indians or Alaska Natives, Asians, and Native Hawaiian and other Pacific Islanders. Minority populations for 2007 are identified in Table 5-1. The Council on Environmental Quality (CEQ) identifies these groups as minority populations when either (1) the minority population of the affected area exceeds 50% or (2) the minority population percentage in the affected area is meaningfully greater than the minority population percentage in the general population or appropriate unit of geographical analysis (CEQ 1997). As shown in Table 5-1, the proposed Project is not expected to create disproportionately high or adverse human health or environmental effects on the minority population.

The two largest minority groups reported in Nicollet County in 2007 were persons of Hispanic or Latino origin (2.4%) and black persons (1.4%), followed by Asian persons (1.39%), persons reporting two or more races (0.7%), and American Indian and Alaska Native persons (0.2%). Compared to the state, Nicollet County has a minority population totaling 6.2%, whereas Minnesota's minority population totals 14.2% (US Census Bureau 2007).

According to the Department of Housing and Urban Development, low-income neighborhoods are those where more than 50% of the population has an income less than 50% of the median per capita income for the whole community. Low-income populations for 2007 are illustrated in Table 5-2.

Low-income populations are defined by environmental justice guidance by using the statistical poverty threshold of the US Census Bureau. In 2007, the poverty-weighted average threshold for a family of four was $21,203 and $10,590 for an unrelated individual (US Census Bureau 2007). The national poverty level was over 12%. For a low-income population to be classified as having meaningfully greater poverty levels, CEQ recommends a formula describing the environmental justice low-income threshold as being 10% above the national rate (or 22.7%) as applied to local poverty rates (CEQ 1997).

5.2.4 Impacts to Socioeconomics

The Project will not result in economic losses to property owners. Short-term negative impacts to socioeconomic resources will be relatively minor. Although the Project will permanently remove approximately 10 acres of agricultural land from production, the affected landowners will be compensated by the NUPUC for their loss through negotiated easements. The areas surrounding the turbines and permanent access roads will remain available for continued farming operation. The construction, operation, and maintenance of the wind project will not have an effect on the socioeconomic resources in the area.

Table 5-1
Minority Populations 2007

Minority Group	Nicollet County	State of Minnesota
Total Population	31,680	5,197,621
Percent: White persons	93.7%	85.7%
Percent Minority, composed of[1]:	**6.2%**	**14.2%**
Persons of Hispanic or Latino origin	2.4%	4.0%
American Indian and Alaska Native persons	0.2%	1.1%
Black or African American persons	1.4%	4.3%
Asian persons	1.39%	3.4%
Native Hawaiian and other Pacific Islander persons	0.01%	0.04%

Source: US Census Bureau 2007

[1] Totals may not add to % Minority because of reporting classifications and/or the value is greater than zero but less than one-half unit of measurement

Table 5-2
Low-Income Populations 2007

Jurisdiction	Percent Below Poverty Level
United States	13.0%
State of Minnesota	9.5%
Nicollet County	9.2%

Source: US Census Bureau 2007

The Project will most likely benefit the economy of the surrounding communities. In the short-term, there will likely be positive economic impacts associated with Project construction. Revenue should increase for local businesses due to increased spending from workers associated with Project construction. Additionally, temporary jobs will become available as a result of Project construction.

The proposed Project is not expected to create disproportionately high or adverse human health or environmental effects on low income populations.

5.2.5 Mitigation Measures for Socioeconomics

Socioeconomic impacts associated with the Project will be primarily positive with an influx of well paid construction workers and associated expenditures made at local businesses during Project construction. Since impacts resulting from the Project are expected to be beneficial to the community, specific mitigation is not required.

5.3 Noise

5.3.1 Description of Resources

Noise is generally defined as unwanted or excessive sound. Some land uses are considered more sensitive to intrusive noise than others due to the type of activities typically involved at the sensitive human noise receptors. Specifically, sensitive human noise receptors normally include residences, schools, libraries, religious institutions, hospitals and nursing homes, daycare centers, and other businesses.

Managing noise is complicated by the varied character and number of sources in a particular area. The ambient sound pressure level in a particular region is comprised of a variety of natural and manmade sources. Sound levels are determined by small variations in air pressure, and these pressures are referenced to a logarithmic scale in the units of decibels. Human response to sound is a function of the magnitude of pressure variations and the frequency distribution of the sound energy.

Community noise levels are measured in terms of the dBA scale, which was developed to approximate the human ear's sensitivity to certain frequencies by emphasizing the middle frequencies and de-emphasizing lower and higher frequencies. This scale best correlates the human response to sound and is commonly used as a descriptor for ambient sound levels. The threshold of human hearing is 0dBA at 1,000 hertz (Hz), while noise above 140 dBA can cause damage to hearing after just one exposure.

Table 5-3 presents typical sound levels for common conditions or activities referenced to the dBA scale.

Table 5-3
Typical Sound Levels for Common Conditions and Activities

Type of Noise	Sound Level
Rifle	163 dBA
Chainsaw; Hammer on Nail	120 dBA
Tractor	90 dBA
Construction of Wind power project	85 to 88 dBA (distance of 50 feet)
Freeway Traffic	70 dBA
Refrigerator	50 dBA
Quiet Residential Area	40 dBA
Quiet Bedroom at Night	30 dBA

Source: League for the Hard of Hearing 2006; Tipler 1991

Presently, noise in the Project area is dominated by traffic on local roads and agricultural equipment operations. Secondary noise in the area is emitted from rural residences, farmsteads, and farming-related activities. Ambient noise levels in the Project area are typical of noise levels experienced within a predominantly rural area.

The Minnesota Pollution Control Agency (MCPA) has a statewide noise regulation (Minnesota Rule 7030.0050), which specifies daytime and nighttime noise levels that cannot be exceeded by any source. These standards are consistent with speech, sleep, annoyance, and hearing conservation requirements for receivers within areas grouped according to land activities by the noise area classification (NAC). The NAC for household units (including farm houses) is identified as NAC 1. NAC 2 applies primarily to retail areas, terminals, and parks. NAC 3 applies primarily to manufacturing and commercial areas.

The daytime standards provide that a sound level of 60 dBA may not be exceeded for more than 50% of the time for a 1 hour survey, and a sound level of 65 dBA may not be exceeded for more than 10% of the time for a 1 hour survey. The nighttime standards state that 50 dBA many not be exceeded for more than 50% of a 1 hour survey, and 55 dBA may not be exceeded for more than 10% of a one hour survey. Table 5-4 presents the regulated noise levels from the State of Minnesota statutes. The L50 is the noise level exceeded for 50% of the time during any measurement duration, and represents the median sound level. The L10 is the sound level exceed for 10% of the time during any measurement duration. https://www.revisor.leg.state.mn.us/rules/?id=7030.0050

5.3.2 Noise Impacts

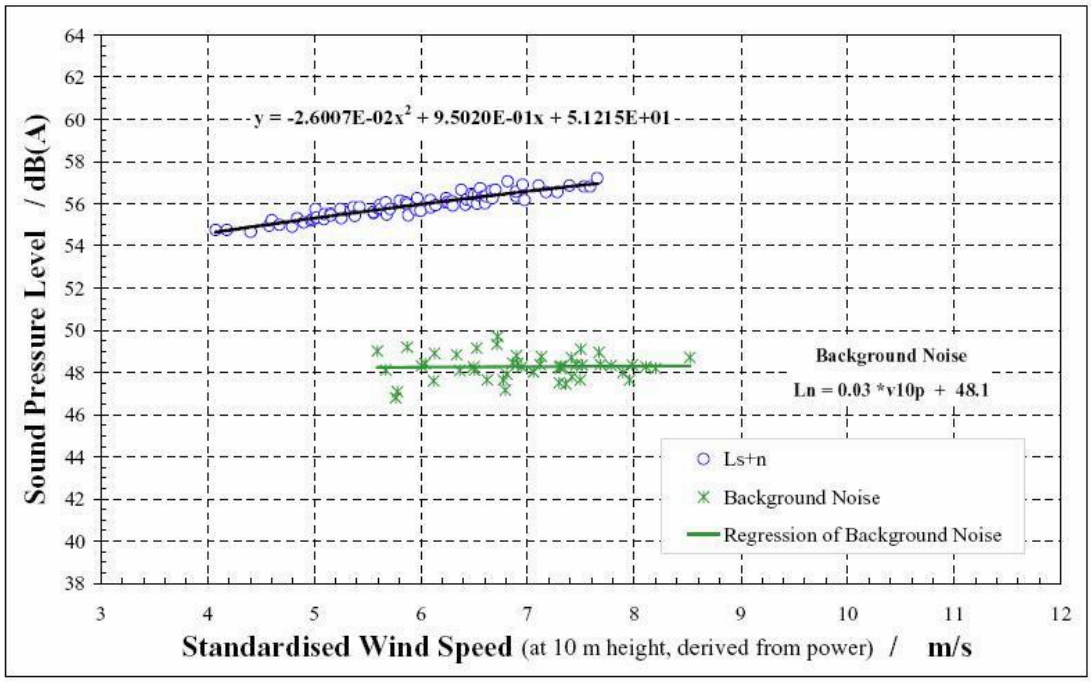
The installation of wind turbines will introduce a new noise source to the area. When in motion, wind turbines emit a perceptible sound. The level of this sound varies with the type of turbine, speed of the turbine, and the distance of the listener from the turbine. On relatively windy days, the turbines create more noise; however, the ambient natural wind noise levels tend to override the turbine noise as distance from the turbine increases.

Table 5-4
State of Minnesota Noise Standards dBA[1]

Noise Area Classification	Daytime	Daytime	Nighttime	Nighttime
	L50	L10	L50	L10
1	60	65	50	55
2	65	70	65	70
3	75	80	75	80

Source: Minnesota Rule 7030.0040
[1] A-weighted decibels.

The information shown in 5-8 is from a Deutsches Windenergie Institut study of the noise emissions of the Suzlon S88 2.1 MW wind turbine. The noise level readings and calculations are based on measurements taken at a distance of 124 meters (407 feet) from the test turbine. The NUPUC Project has established a minimum setback from occupied buildings of 1,050 feet. From the information available from actual tests of the Suzlon S88 wind turbine, it is expected that these turbines should easily meet the State noise standards. The referenced Deutsches Windenergie Institut study is available upon request.



Source: Deutsches Windenergie Institut

Graphic 5-8 - Sound Pressure Levels Measured at the WTGS Operating and Parked Versus the Standardized Wind Speed at 10 m above Ground (Fitted by a 2nd Order Regression)

In addition, information obtain from Suzlon indicates that at the wind speed of 8.0 m/s (17.9 mph), the sound level would be between 35 and 39 dBA at a distance of 1,000 feet from the turbine, well below the MPCA limit.

Operation of the Project may result in occasional audible sound within the adjacent areas under certain operational and meteorological conditions. Specifically, the Project will be audible at the closest residential areas in relation to the Project footprint when the residences are downwind, background levels are low, and wind speeds are high enough for turbine operation. Residents outside their houses and with a direct line of sight to an operating wind turbine may hear a gentle “swooshing” sound characteristic of wind turbines. Audible sound from the Project is not likely to be deemed excessive. Furthermore, sound generated within the Project area will be consistent with sound generated at similar wind energy projects that have been successfully sited throughout the United States where similar noise criteria limits exist.

The main source of audible noise from a substation is due to the operation of the transformers. Transformers produce noise whenever they are energized, and the level of the noise depends on transformer size, voltage level, and weather conditions. Substation noise is generally minimal and nearly constant with slight variation because of operating conditions (cooling fans on or off, etc.). The substation and its transformers will be designed and constructed to comply with state noise standards. The substation parcel is surrounded by rural land uses and should not have significant noise impacts on nearby receptors.

5.3.3 Mitigation Measures for Noise

Impacts to nearby residents and other potentially affected parties in terms of noise will be taken into consideration as part of the siting of the turbines. The NUPUC proposes minimum setbacks for turbines from occupied residences of 1,050 feet to avoid exceeding 50 dBA at occupied residences. The NUPUC will ensure compliance with MPCA noise standards.

The substation parcel is surrounded by rural land uses and should not have significant noise impacts on nearby receptors. The nearest noise receptors to the substation and O&M building locations are more than 250 feet away. A 5-acre parcel will be acquired to accommodate substation and O&M building. This larger parcel size will allow for a buffer area between the electrical equipment and the adjacent properties (Figure 5-1). The NUPUC also proposes to construct the O&M building between the residence and the substation to help reduce noise impacts from the substation. No additional mitigation is necessary, since there will be minimal noise impacts resulting from the substation.

5.4 Visual Resources

5.4.1 Description of Resources

The visual setting of the Project area is low-density, predominantly rural, and consists of an altered landscape with views ranging from scattered residences in an agricultural setting to roadways. Homes in the area consist of farmsteads scattered along rural county and township roadways. These structures contrast the open space character of the surrounding area.

As is the case with most of the county the topography of the Project area consists of gently rolling ground moraine and the hummocky, undulating, or hilly topography associated with stagnant ice moraine deposits and from outwash from glacial recession. Ice contact-eskar sediments occur in the Project vicinity in the form of long, narrow, sinuous ridges composed primarily of stratified sand and gravel. Based on U.S. Geological Survey (USGS) topographic mapping, elevations range from just under 1,000 feet to just over 1,030 feet above mean sea level.

Most of the area consists of cropland used for the production of corn and soybeans. The water table is high in about 62% of the soils in the county, and artificial drainage systems in the form of open ditches and tile drains were installed to enhance crop production.

5.4.2 Visual Impacts

Visual sensitivity is dependent on viewer attitudes and sensitivities, the types of activities that people are engaged in when viewing the Project area, and the distance from which the Project will be seen. Overall, higher degrees of visual sensitivity are correlated with areas where people live, are engaged in recreational outdoor pursuits, or participate in scenic or pleasure driving. Conversely, visual sensitivity is considered low to moderate in industrial or commercial areas where the scenic quality of the environment does not affect the value of the activity.

Turbines will affect the visual character of the landscape in the Project area and vicinity. However, any discussion of the aesthetics of the Project must consider the subjective nature of individual human responses. For some viewers, the Project could be perceived as a visual intrusion to the natural aesthetic value of the landscape. However, wind farms have their own aesthetic quality and visual appeal to many others. Visual impacts will be greatest for those residences located in close proximity to the Project and will be greatly reduced with increasing distances from the Project.

The proposed land use will not involve any ongoing industrial use of non-renewable resources or any emissions into the environment. Although the turbines are high-tech in appearance, they are compatible with the rural and agricultural heritage. Indeed, prior to massive rural electrification projects, windmills were the primary source of water well production and were linked to the historic notion of rural America.

The installation of the Project will minimally alter the land use and visual quality of the site and its neighborhood. Graphic 5-9, looking toward the northwest, was generated to provide an indication of what the proposed turbines will look like in the area. The topography in the vicinity of the Project is generally flat and the vegetation cover is uniformly low, making the landscape's visual appearance vulnerable to nonconforming landscape elements. The installation of 80 m tall wind turbines will introduce a vertical element to the landscape foreground. However; a transmission line and houses already exist near the Project area and have altered the landscape. The proposed Project will only minimally contribute to the visual character imposed by the existing infrastructure.

The U.S. Federal Aviation Administration (FAA) requires obstruction lighting or marking of structures over 200 feet above ground surface because they are considered obstructions to air navigation (U.S. Department of Transportation (DOT) FAA Advisory Circular 70/7460-IJ dated 11/29/95). The FAA released guidance (DOT/FAA/AC 70/7460-1K Chg2 dated 02/07) on standards for obstruction lighting for wind turbine farms. The NUPUC will use this guidance when applying to the FAA for approval of a lighting plan that will light the Project as one large obstruction versus individual structures over 200 feet in height. This will limit the number of lights required to be placed on turbines in the Project. In addition, the FAA now requires synchronized red strobe lights, further minimizing the nighttime disturbance.

Shadow flicker is caused by wind turbines as alternating changes in light intensity caused by the moving blade casts shadows on the ground and stationary objects, such as a window at a residence. The spatial relationships between a wind turbine and receptor, as well as wind direction are key factors related to shadow flicker duration. No flicker shadow will be cast when the sun is obscured by clouds or fog or when the turbine is not rotating. At distances greater than 1,000 feet between wind turbines and receptors, shadow flicker usually only occurs at sunrise or sunset when the cast shadows are of sufficient length. For situations where the rotor plane is in-line with the sun and receptor, the cast shadows will be very narrow, of low intensity, and will move quickly past the stationary receptor. When the rotor blade is perpendicular to the

sun-receptor “view line”, the cast shadow of the blades will move within a circle equal to the turbine rotor diameter.

Graphic 5-9 - Representation of the Proposed Wind Project – Looking to the Northwest

5.4.3 Mitigation Measures

Proposed mitigation measures include locating turbines in areas that are not considered visually sensitive, such as State Parks, Wildlife Management Areas (WMAs), Waterfowl Production Areas (WPAs), or wetlands; illuminating turbines to meet the minimum requirements of the FAA regulations; using existing roads for construction and maintenance where possible; and locating access roads on gentle grades to minimize erosion and visible cuts and fills. All turbines will be off-white and uniform in color to minimize the visual obtrusiveness of the Project. Given that the closest residence is 1,050 feet southwest of a turbine, flicker is unlikely to occur.

5.5 Public Services and Infrastructure

5.5.1 Description of Resources

The phrase “Public Services” generally refers to services provided by government entities to its citizens and that are used to benefit public health and safety, such as education, emergency services (fire, ambulances, and police), potable water, waste management, and utilities. The Project will be located in a sparsely populated, rural area in west-central Minnesota. There is an established transportation and utility network that provides access and necessary services to the homesteads and farms in the Project area. Many of the public services available to residents in Nicollet County are associated with the larger City of New Ulm. Outside of the city, landowners are typically serviced with privately-owned septic systems and wells. The proposed Project will facilitate provision of electrical service to the NUPUC and other utility company customers in Nicollet and Brown Counties and throughout Minnesota.

In general the existing roadway infrastructure in and around the Project area is characterized by county roads (CR) and township roads (TR) that provide access to the proposed wind turbine sites. Access to the

Project area includes 2-lane paved and gravel roads. Furthermore, many landowners use private single-lane farm roads and driveways on their property.

State Highway 15 is located 3 miles east of the Project area and provides north-south access towards New Ulm. County State Aid Highway (CSAH) 7 is located in the central portion of the Project area. CR 57 and TR 41 and 141 are located in Project vicinity (Figure 5-1).

Existing traffic volumes on the area's county highways were obtained from the Minnesota Department of Transportation (MnDOT) 2007 traffic volume maps and are documented in Table 5-5 and shown in Figure 5-2. The highest existing Annual Average Daily Traffic (AADT) near the Project area is 4,000 vehicles per day along State Highway 15. The highest existing AADT within the Project area is 60 along CSAH 7. Along the CR within the Project area, the AADT is approximately 45 vehicles per day, indicating very low traffic volumes.

Table 5-5
Existing Daily Traffic Levels within the Project Area

Roadway Description	2007 Existing Annual Daily Traffic (AADT)
State Highway 15	4,000[1]
CSAH 7	60
CR 57	45

[1] 2006 traffic volume

Highway access to the Project area is provided by State Highway 15 (which runs north-south and is located approximately 3 miles east of the Project area). State Highway 15 intersects State Highway 19 approximately 18 miles north of New Ulm, near the town of Winthrop, Minnesota.

Electrical utilities are present within the Project area, with numerous aboveground distribution lines running along roadways. Xcel Energy has a 69 kV electrical distribution line running north-south along CSAH 7 in the central portion of the Project area.

5.5.2 Impacts on Public Services and Infrastructure

This Project is expected to have minimal impact on the existing infrastructure. The following is a brief description of the impacts that may occur during the construction and operation of the Project at the proposed site.

Electrical Service: Project construction will consist of up to 5 wind turbines, a pad-mounted transformer at the base of each turbine, an underground and electrical collection system, and an electrical substation and associated O&M structure. The power will then be transmitted via an overhead transmission line to a point of interconnection at the existing Xcel power line where it will enter the grid.

Roads: Construction and operation of the Project will require the installation of new access roadways. The access roads will connect the towers to existing public rights-of-way. The NUPUC will work closely with the landowners to locate these access roads so as to minimize land-use disruptions. Construction traffic will use the existing county and state roadway system to access the Project area and deliver construction materials and personnel. Construction traffic relating to the Project will be perceptible and will add to local traffic, but this will be minimal, intermittent, and temporary. Construction is not anticipated to result in adverse traffic impacts.

Water Supply: Construction and operation of the proposed Project will not affect the area's water

supply. No abandonment of any wells is anticipated for the Project. However, in the event wells are abandoned they will be capped as required by Minnesota law. Temporary dewatering may be required during construction for specific turbine foundations and/or electrical trenches. The Project will not require the appropriation of surface water or permanent dewatering. The NUPUC will avoid impacts to any water pipelines running through the Project area.

Telephone: Construction and operation of the Project will not impact the telephone service in the Project area. Gopher One Call will be contacted prior to construction to locate and avoid all underground facilities. To the extent the Project facilities cross or otherwise affect existing telephone lines or equipment, the NUPUC will enter into agreements with service providers to avoid interference with their facilities.

Federal Communications Commission (FCC) Registered Towers: The NUPUC contracted ComSearch® to conduct a microwave beam path analysis of the Project area (Appendix C). The Project area was shown to have no conflicts with microwave beam paths. The NUPUC will not operate the Project so as to cause microwave, radio, telephone, or navigation interference contrary to FCC regulations or other law.

5.5.3 Mitigation Measures

Construction and operation of the Project will be in accordance with all associated federal, state, and local permits and laws, as well as industry construction and operation standards. Minor temporary impacts are expected on the existing infrastructure during Project construction; however, extensive mitigation measures to minimize such impacts are not anticipated to be needed.

5.6 Cultural and Archaeological Resources

5.6.1 Description of Resources

The Minnesota State Historic Preservation Office (SHPO) was contacted regarding the Project. The SHPO completed a search of the Minnesota Archaeology Inventory database and the Standing Structures Inventory database. The records search was conducted to determine if significant archeological, architectural history, or tribal resources have been documented within the proposed Project site or the vicinity.

No archaeological sites were identified in a search of the Minnesota Archaeological Inventory for the search area requested. The Historic Structure Inventory identified a historic school approximately 2,850 feet east the Project. Although the wind turbines will be visible from the school, it will not be impacted by construction or operation of the Project. The Minnesota SHPO response letter and brief report regarding Historic Property Locations is attached as Appendix D.

5.6.2 Impacts to Cultural and Archaeological Resources

Currently unidentified cultural resources could be affected directly during the construction of a wind energy facility. Construction within the turbine footprint, cable trenching, access roads, and borrow areas could impact cultural resources. The contractor(s) will be advised that if cultural and/or archaeological resources are encountered during construction activities, that work will stop immediately and SHPO will be contacted.

5.6.3 Mitigation Measures

Avoidance of cultural resource properties is always the preferred mitigation method. The NUPUC Project will not impact currently recorded sites and will stop construction if unidentified sites are encountered.

5.7 Recreational Resources

5.7.1 Description of Resources

Park and recreation areas provide opportunities for both active and passive recreation for Nicollet County residents and visitors. Nicollet County contains 2 county parks, the Seven Mile Park located approximately 25 miles southeast of the Project area and the Minnemishinona Falls Park located approximately 20 miles southeast of the Project area.

Flandrau State Park is located approximately 7.2 miles south of the Project area along the Cottonwood River. In addition, Fort Ridgely State Park is located approximately 11.7 miles northwest of the Project area along the Minnesota River.

Minnesota WMAs are managed to provide wildlife habitat, improve wildlife production, and provide public hunting and trapping opportunities. These DNR lands were acquired and developed primarily with hunting license fees. There are no WMAs within the Project area. WMAs located within 6 miles of the Project include Boesch WMA located approximately 4 miles southwest of the Project area and River Valley WMA located approximately 2.8 miles southwest of the Project area.

Scientific Natural Areas (SNAs) are areas designated to protect rare and endangered species habitat, unique plant communities, and significant geological features that possess exceptional scientific or educational values. There are no SNAs within the Project area. The Joseph A. Tauer Prairie SNA is located 14.5 miles southwest of the Project area. The Joseph A. Tauer Prairie provides opportunity for hiking, wildlife viewing, and viewing of some of Minnesota's remnant prairie (a rare and unique natural resource).

The U.S. Fish & Wildlife Service (USFWS) WPAs protect breeding, forage, shelter, and migratory habitat for waterfowl or wading birds, such as ducks, geese, herons, and egrets. WPAs provide opportunities for viewing wildlife and intact ecosystems. There are no WPAs within Nicollet County.

5.7.2 Impacts on Recreational Areas

The proposed Project is not anticipated to impact County or State parks, WMAs, SNAs, or, WPAs. The NUPUC will continue to work with the DNR, USFWS, and Nicollet County to avoid and minimize impacts to waterfowl and other natural resources (see Section 6.0 for a summary of agency contacts).

5.7.3 Mitigation Measures

Project turbines and associated facilities are not anticipated to adversely impact County or State parks, WMAs, SNAs, or, WPAs, therefore no mitigation is anticipated.

5.8 Human Health and Safety

5.8.1 Description of Resources

5.8.1.1 Air Traffic

There are no airports located in the Project vicinity. The nearest airport is the New Ulm Municipal Airport located approximately 5.5 miles southwest of the Project area. Currently, the airport has 1 runway that is 4,401 feet long. The turbines will be visible from a distance and lighted according to the 2007 revised FAA guidelines.

5.8.1.2 Electromagnetic Fields

The term electromagnetic fields (EMFs) refers to electric and magnetic fields that are present around any electrical device. Electric fields arise from voltage or electric charges and magnetic fields arise from the flow of electricity or current that travels along transmission lines, power collection (feeder) lines, substation transformers, house wiring, and electrical appliances. The intensity of the electric field is related to the current flow through the conductors (wire). There are no discernible health impacts from power lines. Wind turbine generators will be no closer than 1,050 feet from occupied residences where EMF will be at background levels.

5.8.1.3 Security

The Project is located in an area that has low population density. Construction and operation of the Project will have minimal impacts on the security and safety of the local population.

5.8.1.4 Traffic

The existing traffic volumes are discussed in detail in Section 5.5 and shown in Table 5-5 and Figure 5-1.

5.8.2 Impacts to Public Health and Safety

5.8.2.1 Air Traffic

The Project will not impact air traffic in the region because the nearest airport is approximately 5.5 miles from the Project area. The wind and meteorological towers will have lighting to comply with FAA requirements. Crop dusting is typically performed when winds are below 3 to 4 mph and the initial inertia required for turbines is 5.5 to 6 mph. Also the height of most crop dusting is less than 80 feet and when a blade is positioned at 6 o'clock, the remaining 2 blades are above this zone. In addition, the lease provisions also allow for landowners to contact the NUPUC to have the turbines idled during crop dusting activities.

The NUPUC will notify the local airports and FAA Regional Offices about the Project and new towers in the area to reduce the risk to air traffic conducting aerial spraying of cropland

5.8.2.2 Electromagnetic Fields

Electromagnetic fields likely cause no risk to humans; however, there is much research and debate pertaining to this subject. Based on the most current research on EMFs, and the distance between any turbines and transmission lines and residences, the Project is not expected to have any affects on human health and safety due to EMF.

5.8.2.3 Security

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

5.8.2.4 Traffic

It is expected that there will be approximately 10 large turbine and tower truck deliveries per wind turbine generator and up to 20 small-vehicle (pickups and automobiles) trips per day during peak construction periods. Those maximum volumes are expected during foundation and tower assembly. At the completion of each construction phase equipment will be removed from the site or reduced in number. Prior to construction, the NUPUC will coordinate with local jurisdictions (County and Township) to obtain the necessary road access and overwidth/overweight permits.

Truck access to the Project is generally secured via State Highway 15. Specific additional truck routes will be dictated by the location required for delivery. Additional operating permits will be obtained for over-sized/overweight trucks and cranes.

The operations phase of the Project will require a maintenance person to monitor the wind turbines as needed. There will be a slight increase in roadway traffic for occasional turbine and substation repair.

5.8.3 Mitigation Measures

5.8.3.1 Air Traffic

The NUPUC will mark and light the turbines to comply with applicable FAA requirements and request a notice be issued in the FAA's "Notice to Airmen".

5.8.3.2 Electromagnetic Fields

While the general consensus is that electric fields pose no risk to humans, the question of whether exposure to magnetic fields potentially can cause biological responses or even health effects continues to be the subject of research and debate. Based on the most current research on electromagnetic fields, the facilities such as those comprising the Project are not expected to have impacts to public health and safety due to EMF. The addition of the turbines, substation, and underground collectors is not expected to add significantly to the presence of EMF exposure in the vicinity. All wind turbines will be at least 1,050 feet from residences. No additional mitigation due to electromagnetic fields is necessary.

5.8.3.3 Security

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

- The Minnesota PUC requires all towers be placed at a minimum of 250 feet from public roads and at a distance required to meet the MPCA noise standards. The wind turbines will be 750 feet from public roads and a minimum of 1,050 feet from occupied residences. These distances are considered to be safe and are consistent with prior LWECS site permits.
- Security measures will be taken during the construction and operation of the Project including temporary (safety) fencing, warning signs, and locks on all equipment and wind power facilities.
- The wind turbines will be equipped with surveillance cameras and a live feed from the cameras will be continually monitored by NUPUC staff.
- Regular maintenance and inspections will address potential blade failures, minimizing the potential for blade throw.
- Turbines will be placed on solid steel enclosed tubular towers that will contain all electrical equipment with the exception of the pad-mounted transformer. The tower will only be accessible through a solid steel door that will be locked when not in use.

5.8.3.4 Traffic

No impacts to traffic are anticipated, therefore no mitigation is necessary.

5.9 Hazardous Materials

5.9.1 Description of Resources

The land within the Project area is primarily rural and used for agriculture. Potentially hazardous materials within the Project site will primarily be associated with agricultural activities. These include: petroleum products (fuels and lubricants), fertilizers, pesticides, and herbicides. Older farmsteads may also have lead-based paint, asbestos siding/shingles, discarded drain oil, and polychlorinated biphenyls (PCBs) in transformers. Trash and abandoned farm equipment/machinery dumps are common in rural settings.

A Phase I Environmental Site Assessment (ESA) for the Project is expected to be completed during the spring of 2009. The Phase I ESA will be conducted in accordance to American Society for Testing & Material (ASTM) Standard Practice E2247-08.

Three types of petroleum products are necessary for the operation of the wind turbines and include synthetic gear box oil, hydraulic fluid, and gear grease. Florescent light will be utilized in the substation and O&M building. These lights are contain mercury. Substation heating fuel oil, propane, electricity, or a combination of these will be used for building heating.

5.9.2 Impacts from Hazardous Materials

The NUPUC will make every effort to avoid all recognized environmental conditions (RECs) found in the Phase I ESA.

Turbine hydraulic oils and lubricants will be utilized within the wind turbine nacelle. During construction and maintenance, fuel, lubricants, and petroleum products for cars, trucks, and equipment; will be contained within each vehicle. Transformer oil will be contained within the transformer. Fluids will be monitored during maintenance at each turbine and transformer. A small amount of hydraulic oil, lube oil, grease, and cleaning solvent will be stored in the O&M building. When fluids are replaced, the waste products will be handled according to regulations and disposed of through an approved waste disposal firm. Spent florescent lights utilized in the substation and O&M building are a potential source of mercury and will be collected for proper disposal at a recycling center or in an approved disposal facility.

5.9.3 Mitigation Measures

Because there are no proposed impacts to hazardous waste sites, no mitigation measures are necessary. If any wastes, fluids, or pollutants are generated during any phase of the operation of the Project, they will be handled, processed, treated, and disposed of in accordance with Minnesota Rules Chapter 7045.

5.10 Effects on Land-Based Economics

5.10.1 Agriculture/Farming/Forestry/Mining

5.10.1.1 Description of Resources

Agriculture/Farming

The majority of the Project area consists of farmland and grassland. According to the 1997 Census of Agriculture, the number of farms has decreased over the past 10 years in Nicollet County. However, the average size of farms has increased from 342 acres in 1997 to 352 acres in 2002. According to the

2002 Agricultural Census, approximately 88.9% of farmland is used for crop production. Crops include corn, soybeans, and oats. Sales from these crops in 2002 were $148,335,000. Livestock sales accounted for $90,601,000 of the total sales in 2002. The top livestock inventory for Nicollet County includes turkeys, hogs, pigs, cattle, and calves.

Forestry

The proposed Project area occurs in what was historically the Minnesota River Prairie Subsection in Minnesota. The Minnesota River valley once had a continuous band of floodplain forest that extended upstream as far as Lac Qui Parle. Before settlement by people of European descent, the predominant vegetation was tallgrass prairie and wetlands. Forests of silver maple, elm, cottonwood, and willow grew on floodplains along the Minnesota River and other streams. None of these areas are economically significant production areas.

Mining

According to MnDOT county pit maps for Nicollet County, there are no active or inactive aggregate pits or rock quarries within 2 miles of the Project area. However, according to the USGS 7.5 Lafayette Quadrangle topographic map, there is a sand pit depicted in close proximity to one wind turbine location and a gravel pit depicted in close proximity to a second wind turbine location. During a site visit it was determined that neither the sand pit nor gravel pit is currently in operation. These areas are currently used for row crops.

5.10.2 Impacts to Land-based Economics

5.10.2.1 Agriculture/Farming

Specific impacts to agricultural lands will be determined once turbine and road placement has been finalized. Most of the soil within the Project area is considered prime farmland. The loss of agricultural land to the construction of the Project will reduce the amount of land that can be cultivated. Approximately 10 acres of land will be converted to nonagricultural land use; approximately 5 acres for wind turbine installation and 5 acres for the O&M building and substation. Based on this, the Project is not expected to significantly alter crop production in Nicollet County. The proposed Project will minimize agricultural impacts.

All turbine and facility siting will include discussions with property owners to identify features on their property, including drainage tile, which should be avoided. Impacts to drainage tile due to Project construction and operation will be avoided where possible; however, some damage may be unavoidable. In the event that there is damage to drainage tile as a result of construction activities or operation of the LWECS, the tile will be repaired.

5.10.2.2 Forestry

The proposed Project will not affect forest production resources.

5.10.2.3 Mining

Negative impacts to mining are not anticipated. A small gravel pit is mapped on the Franta property adjacent to one turbine site. A small sand pit is mapped to the northwest of the proposed turbine site on the Klossner property. These were small pits and are no longer active, thus the Project avoids impacts to mining operations.

5.10.3 Mitigation Measures

5.10.3.1 Agricultural/Farming

The wind turbines and access roads will be located so that most of the productive farmland will remain in active crop production. Only land immediately necessary for the turbine, substation/switching station, O&M building, and access roads will be taken out of crop production. Once the turbines are constructed, all

land surrounding the turbines and access roads may still be farmed. The NUPUC has agreements in place to compensate landowners for crop damage and soil compaction that occurs during project construction.

In the event there is damage to drainage tile as a result of construction activities or operation of the LWECS, the NUPUC will work with affected property owners to repair the damaged drainage tile in accordance with an agreement between the Project owner and the owner of the damaged drainage tile.

5.10.3.2 Forestry

No impacts are anticipated; therefore no mitigation will be necessary.

5.10.3.3 Mining

Turbines and associated facilities will not be located within active sand and gravel operations, therefore no mitigation is necessary.

5.11 Tourism and Community Benefits

5.11.1 Description of Resources

Much of the tourism in this region is associated with either the City of New Ulm or the Minnesota River valley. There are many cultural attractions and historic sites in New Ulm including Hermann Monument, Glockenspiel, Harkin Store, Museum, Wanda Gag Home, John Lind Mansion, Minnesota Music Hall of Fame, and Schell's Brewery. The City of New Ulm also attracts visitors to its 4 popular festivals: Oktoberfest, Bavarian Blast, Bockfest, and Fasching.

In addition, 2 state parks are located in this area of the Minnesota River Valley including: Fort Ridgely State Park and Flandrau State Park.

Wind development in Minnesota is becoming a minor tourism attraction, bringing more visitors to the community. Increased visits and economic activity relating to wind development may have a minor benefit the community by increasing revenue related to tourism.

5.11.2 Impacts for Tourism and Community Benefits

The proposed Project is not anticipated to negatively impact tourism.

5.11.3 Mitigation Measures

The proposed Project is not anticipated to negatively impact tourism; therefore no mitigation is necessary.

5.12 Topography

5.12.1 Description of Resources

The topography of the Project area consists of gently rolling ground moraine and the hummocky, undulating, or hilly topography associated with stagnant ice moraine deposits. Ice contact-eskar sediments occur in the Project vicinity in the form of long, narrow, sinuous ridges composed primarily of stratified sand and gravel. Based on USGS topographic mapping, elevations range from just under 1,000 to just over 1,030 feet above mean sea level.

5.12.2 Impacts on Topography

The topography of the Project area makes it conducive to wind turbine use. The Project will not require substantial excavation or fill. Local soil disturbance and excavation to install structures will be required; however, there will be no impacts to topography on a regional scale. Any areas where soil is disturbed or excavation is required will be restored to pre-existing conditions to the extent practicable.

5.12.3 Mitigation Measures

No impacts are anticipated; therefore no mitigation is necessary.

5.13 Soils

5.13.1 Description of Resources

Soils within the area consist of well to moderately well drained loamy soils formed in the gray calcareous till of the Des Moines lobe. Some soils are clayey and sandy with gravelly soils are preset locally, but account for only a small percentage of soils in the Minnesota River Prairie subsection. Most of the soils in the Subsection are Udolls and Aquolls on relatively level topography, generally with 15 feet or less of local relief. Dry prairie soils (primarily Ustolls) are also present on level to gently rolling topography and occupy convex knobs on the landscape. Soils mapped in current easement areas that could potentially be disturbed during construction consist of:

- Canisteo-Glencoe, depressional complex soils with 0 to 2% slopes:
    - Canisteo component commonly forms on moraines, parent material consists of till, soil is poorly drained and meets hydric (wetland soil) criteria
    - Glencoe component commonly forms in depressions on moraines, parent material consists of till, soil is very poorly drained and meets hydric criteria
- Canisteo clay loam, 0 to 2% slopes, commonly forms on depressions or flats on moraines, parent material consists of fine loamy till, soil is poorly drained and meets hydric criteria:
- Clarion-Storden complex soils, ranging from 2 to 12% slopes:
    - Clarion component commonly forms on hills on moraines, parent material consists of fine loamy till, soil is well drained
    - Storden component commonly forms on moraines or hills on moraines, parent material consists of fine-loamy till, soil is well drained
- Clarion-Storden-Hawick complex soils, ranging from 2 to 12% slopes:
    - Clarion component commonly forms on hills on moraines, parent material consists of fine loamy till, soil is well drained
    - Hawick component , commonly forms on hills on moraines, parent material consist of sandy and gravelly outwash and is excessively drained
    - Storden component commonly forms on moraines or hills on moraines, parent material consists of fine-loamy till and is well drained

- Clarion loam, 2 to 6% slopes, commonly forms on moraines, parent material consists of fine loamy till, soil is well-drained

- Harps clay loam, 0 to 2% slopes, commonly forms on depressions on moraines, parent material consists of fine-loamy till, soil is poorly drained

- Delta clay loam, 1 to 3% slopes, commonly forms on drainageways or swales on moraines, parent material consists of fine loamy till, soil is poorly drained

- Webster clay loam, 0 to 2% slopes, commonly forms on moraines or swales on moraines, parent material consists of till, soil is poorly drained

- Glencoe clay loam, depressional, 0 to 1% slopes, commonly forms on depressions on moraines, parent material consists of till, soil is very poorly drained, soil meets hydric criteria

- Nicollet clay loam, 1 to 3% slopes, commonly forms on moraines, parent material consist of till, soil is somewhat poorly drained

- Klossner Muck, depressional, 0 to 1% slopes, commonly forms on depressions on moraines, parent material consists of herbaceous organic material over loamy till, very poorly drained, frequently ponded, and meets hydric criteria

5.13.2 Impacts on Soils

Surface soils will be disturbed in the immediate area of Project construction by site clearing, grading, and excavation activities at structure and access road locations, as well as during transport of construction materials and machinery. This disturbance will be minimal and is generally less invasive than typical agricultural practices such as plowing and tilling. Outside of the structure locations, no permanent impacts to soil are anticipated resulting from the construction of the turbines and associated facilities.

5.13.3 Mitigation Measures

The NUPUC will attempt to utilize areas already disturbed, in this case by agricultural activities, where possible. Where disturbance and excavation cannot be avoided entirely, it will be minimized by using Best Management Practices (BMPs). The BMPs are implemented during construction to protect topsoil and adjacent resources and to minimize soil erosion. Soil compaction will be treated and restored through tillage operations. In addition, the placement of wind turbines and access roads will be planned so that the removal of prime farmland from active farming will be minimized.

5.14 Geologic Resources

5.14.1 Description of Resources

5.14.1.1 Bedrock

Most of the Minnesota River Prairie Subsection that falls within Nicollet County is covered by 100 to 400 feet of glacial drift overlying bedrock that consists of cretaceous shales, sandstones, and clays (Morey 2000).

Five major bedrock formations are exposed or are the uppermost bedrock unit underlying glacial drift in the County:

- Granitic gneisses (Precambrian age)
- Sioux Quartzite (Precambrian age)
- St. Lawrence Formation (limestone and dolomite of Cambrian age)
- Jordan Sandstone (Cambrian age)
- Clay/kaolin clay deposits (Cretaceous age)

Bedrock mapping indicates that the Cretaceous age clay/kaolin clay deposits lie beneath thick glacial deposits (>200 feet) at the Project site.

5.14.1.2 Surficial Deposits

Quaternary deposits were deposited from 2.5 million years ago to present by continental glaciers that advanced across most of Minnesota. These glaciers carried eroded bedrock and unconsolidated surficial materials and deposited them in Nicollet County and other areas. As the glaciers melted, large outwash streams were formed that carried away the silt and clay, and deposited the coarser sand and gravel material (outwash) in landforms such as channels and fans. The remaining unsorted material that was incorporated in the ice was deposited as till. At least 3 different glacial advances and retreats occurred in Nicollet County, which left behind 3 very different landscapes.

Extensive sand and gravel terraces found next to the Minnesota River were deposited a few thousand years later by Glacial River Warren that was a very large outlet channel from Glacial Lake Agassiz. After all of the glacial activity ceased and the ice melted, modern day sediments, such as flood plains, alluvial fans, and colluvium began be deposited. These sediments continue to be deposited today as a result of recent geological processes.

The Project area contains gently rolling ground moraine sediments in the form of unsorted clay, silt, sand, gravel, cobbles, and boulders deposited as the ice gradually melted. It left behind large, thick, unsorted subglacial till. This till unit occasionally contains small, thin, discontinuous layers and lenses of sand, gravel, and washed till. This till unit is present throughout Nicollet County.

The Project area also contains stagnant ice moraine sediments consisting of unsorted clay, silt, sand, gravel, cobbles, and boulders. As the glacier retreated, large chunks of ice broke off and began to melt. This random melting of ice and deposition of material produced a very hummocky, undulating, or hilly topography. This hummocky topography probably relates to the last lobe of ice to cover this area. This till unit is present in most of the north-central portion of the county.

The Project area also contains collapse channel sediments that consist of discontinuous and patchy, fine to coarse sand and gravel sediment, with channel walls composed of till. Thin sand and gravel sediment is all that remains of large outwash channels where meltwater running on top of ice sheets once carried massive amounts of sand, gravel, and finer sediments. This sediment has been removed from the channels and is often deposited as alluvial fans at the ends of these channels. All that remains today is collapsed till with small remnant of sand and gravel. The collapsed channels can be observed at several locations throughout the county. Mixed till and poorly sorted sand and gravel stagnant ice contact ridges are present in the area. Channel scarps or outwash channel boundaries occur.

Ice contact-eskar sediments occur in the Project vicinity consisting of stratified silt, sand, coarse sand, and gravel, with occasional clay and washed till sediments. These eskers form long, narrow, sinuous ridges composed of stratified sand and gravel, but include areas of non-stratified sands and gravels that were part of ice blocks incorporated into the eskers that later melted in place. Eskars are interpreted to have been

formed by streams flowing below the stagnant glacier between ice walls or in ice tunnels (Ellingson 2000).

5.14.1.3 Aggregate Potential

Aggregate potential in the area is mapped as limited potential for aggregate deposits meaning that the area includes glacial features such as collapsed glaciofluvial channels, till plans, and moraines; small alluvial features such as flood plains and streams; and colluvial deposits. The probability that a potential aggregate deposit exists within this unit is very low to moderate. The aggregate deposits that do occur are moderate to very small in areal extent with sand and some gravel thickness of less than 20 feet with up to 1,000 feet of overburden. This map unit also contains bedrock units with an overburden thickness of greater than 20 feet.

The area also contains areas mapped as less desirable sand and gravel deposits consisting of glaciofluvial features such as fans, eskers, outwash channel, ridges, and small terraces, as well as other features such as alluvial flood plans and streams. These deposits are moderately small to large in areal extent and consist of sand and fine sand with thicknesses ranging from 0 to 20 feet with overburden thicknesses between 0 and 20 feet. The probability that a potential sand and gravel deposit exists within this unit is moderately low to high. The textural characteristics of these deposits are very poor to good with the quality ranging from moderately poor to good.

Sand and gravel pits that may be active, inactive, depleted, or reclaimed are mapped in the area. They are typically less that a few acres in size. In particular, the USGS topographic map of the area show a former, currently inactive, gravel pit next to one turbine location and a former sand pit 1,000 feet from another turbine location (Ellingson 2000).

5.14.2 Impacts to Geology

The Project will not require subatantial excavation, and minimal grading is anticipated to be required to construct the facilities. In general, surficial deposits are mapped as occurring more than 200 feet below the ground surface, as a result impacts to bedrock are not anticipated (Van Voast, et.al.1972). The proposed Project will not impact the geologic resources of the Project area.

5.14.3 Mitigation Measures

No impacts to geological resources are anticipated; therefore no mitigation is necessary

5.15 Groundwater Resources

5.15.1 Description of Groundwater Resources

The highest yields in the area are from wells in beds of sand and gravel within glacial till. The aquifers are commonly thin and discontinuous, but provide water supplies adequate for most used. Saturated thickness of the glacial drift varies from less than 100 feet to more than 400 feet. Typically water users rely on obtaining water supplies from sedimentary and crystalline (decomposed granite) rocks only where the sand and gravel deposits in the overlying glacial drift are thin. Cretaceous-aged sandstone aquifers are present over most of the area, but yields in many locations are not satisfactory. Depth to the shallowest supplies of suitable quantity and quality mapped for the area indicate that suitable supplies may be 200 or more feet below ground surface.

Domestic and stock wells in the area report yields of more than 10 gallons per minute from glacial deposits and have specific capacities greater than about 1 gallon per minute per foot of drawdown. Yields and

specific capacities for municipal and industrial wells are many times greater because aquifers are generally located by test drilling and wells are constructed for high yields and developed for maximum efficiency.

The water table is mapped at 1,000 to 1,025 feet mean sea level (msl) and the flow is generally to the southwest toward the Minnesota River.

5.15.2 Impacts to Groundwater Resources

Permanent impacts to groundwater resources will not occur as a result of the Project. No impacts to the aquifer are expected due to construction. The NUPUC will maintain sound water and soil conservation practices during construction and operation of the proposed Project to protect adjacent water resources and minimize soil erosion. The Project will not impact municipal or private water sources in the Project area.

5.15.3 Mitigation Measures

The Project is not expected to result in impacts to groundwater quality, therefore no mitigation is necessary.

5.16 Surface Water and Floodplain Resources

5.16.1 Description of Resources

5.16.1.1 Surface/Public Waters

The Department of the Army, acting through the U.S. Army Corps of Engineers (USACE), has authority over the Waters of the U.S. (WOUS) under Section 404 of the Clean Water Act (CWA) and Sections 9 and 10 of the Rivers and Harbors Act of 1899 (RHA).

Public waters are water basins and watercourses in Minnesota with significant recreational or natural resource value as defined by Minnesota Statute 103G.005. The DNR has regulatory jurisdiction over these waters. The major watershed in the County is the Minnesota River Watershed. This watershed drains the entire County.

The Minnesota Public Waters Inventory (PWI) data indicates the County Ditch 85 is a primary tributary to the Minnesota River and is passes through the extreme southwest corner of the Project area (Figure 5-2).

The Nicollet County ditch inventory was utilized to determine County ditches located within the Project area (Figure 5-2). Nicollet County Ditch Numbers 80 and 85 are located within the Project area.

5.16.1.2 Water Quality

The MPCA oversees water quality studies and regulations in Minnesota. The Minnesota River is the only major water resource within the vicinity of the Project area and has been judged impaired by the MPCA. Pollution sources include sediment, feedlots, agricultural chemicals, urban runoff, animal holding areas, and septic systems.

5.16.1.3 Floodplains

Floodplains are low-lying areas that are subject to periodic inundation due to heavy rains or snow melt. Federal Emergency Management Agency (FEMA) data was reviewed to determine whether 100-year or 500-year floodplains are present in the proposed Project area. Mapped floodplains were identified within Nicollet County, and no FEMA 100-year or 500-year floodplains are located within the Project area.

5.16.2 Impacts to Surface Water and Floodplain Resources

5.16.2.1 Surface/Public Waters

Impacts to surface water are not likely to occur to public waters basins or county ditches as a result of the Project.

5.16.2.2 Water Quality

There is a possibility of sediment reaching surface waters when the ground is disturbed by excavation, grading, and construction traffic. During construction erosion control measures will be implemented and once the Project is complete, disturbed areas will be restored with impervious surfaces or planted with crops or grass, and there will be little sediment runoff.

5.16.2.3 Floodplains

The Project area is located north of the Minnesota River floodplain area and not anticipated to impact the FEMA 100-year or 500-year floodplains.

5.16.3 Mitigation Measures

The Project will not affect WOUS, Minnesota Public Waters, or County ditches. In addition, the NUPUC will apply for all necessary permits prior to construction. The NUPUC will maintain sound water and soil conservation practices during construction and operation of the proposed Project to protect adjacent water resources and minimize soil erosion. A Storm Water Pollution Prevention Plan (SWPPP) will be prepared and implemented during construction as required by National Pollution Discharge Elimination System (NPDES) permitting. The Project will use BMPs to ensure the proposed Project has no permanent water quality impacts.

5.17 Wetlands

5.17.1 Description of Resources

Wetlands and riparian areas are important resources, in part because they provide habitat for both resident and migratory wildlife. Wetlands have many distinguishing features, the most notable of which are the presence of standing water or saturation within 12 inches of the surface, unique wetland soils, and vegetation adapted to or tolerant of saturated soils. There are many definitions and terms describing wetlands. The legal definition of a wetland, as outlined in the 1987 USACE Wetlands Delineation Manual (Wetland Training Institute, Inc 1995), is given as follows:

> The term “wetlands” means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas (33CFR328.3(b); 1984).

Numerous Federal, State, and local laws currently regulate activities in wetlands. The principal laws in Minnesota affecting wetlands and streams are Sections 404 and 401 of the CWA, the public waters laws administered by the DNR, and the Minnesota Wetlands Conservation Act (WCA). Section 404 (regulation of discharge of dredge/fill materials into wetlands) is implemented by USACE. The public waters laws regulate work in public waters, including wetlands listed on the DNR inventory of protected waters and wetlands. The Minnesota WCA was first passed in 1991. The local government unit (LGU) has the primary responsibility

for administration of the WCA and for making key determinations to wetlands. Generally, the LGU is the local watershed or County. The Nicollet County Soil and Water Conservation District (SWCD) is the identified LGU for the proposed Project area. In many instances multiple jurisdictions overlap the same wetland feature.

The National Wetland Inventory (NWI) database indicates the general location of wetlands based on changes in vegetation patterns as observed from aerial photography. NWI mapping indicates no wetlands are present within the Project area (Figure 5-2). During a site visit the Project area was observed to be primarily agricultural land.

5.17.2 Impacts for Wetlands

Impacts to wetlands are not anticipated.

5.17.3 Mitigation Measures

Wetlands will be avoided during the design and construction phase of the Project. If wetland impacts cannot be avoided, the NUPUC will submit a pre-construction notification to the Federal, State, and local jurisdictions. If necessary, the NUPUC will submit Section 404 and Minnesota WCA permit applications to the USACE and the LGU prior to construction.

5.18 Vegetation

5.18.1 Description of Resources

Land cover information was acquired from Minnesota Land Management Information Center (LMIC 1999) that was derived through aerial photographs, USGS GAP land cover data, the USFWS NWI field maps, and Landsat satellite images. According to these resources and site reconnaissance, the Project area is comprised primarily of cultivated lands and rural residential and farmstead properties. Tree cover within the Project site is minimal and is concentrated around the rural farmsteads. The removal of trees, groves of trees, and or native prairie is not anticipated.

5.18.2 Impacts to Vegetation

It is anticipated that approximately 10 acres of the Project site will be permanently affected by Project facilities. The vegetation will be permanently removed and replaced by wind turbines, access roads, and transformers. Additional areas may also be temporarily disturbed for underground collector lines and SCADA lines during construction. Temporarily disturbed agricultural areas will be restored to pre-project condition and will continue to be farmed.

5.18.3 Mitigation Measures

The following measures will be used to avoid and minimize potential impacts to the vegetation of the Project area during siting, construction, and operation:

Best management practices will be used during the construction and operation of the Project to protect topsoil and adjacent resources and to minimize soil erosion. Practices typically include containing excavated material, protecting exposed soil and stabilizing restored material, revegetating non-cropland and range areas with wildlife conservation species and, wherever feasible, planting native tall grass prairie species.

5.19 Wildlife Resource

5.19.1 Description of Resources

The wildlife found in the Project area is typical of that found in agriculture-related habitats. The resident species are representative of Minnesota game and non-game wildlife that are associated with roadside ditches, fencerows, wetlands, and areas of non-maintained grasses and shrubs. The projected turbine sites, currently cropland, and roads are lacking in cover vegetation for wildlife, therefore it is anticipated that wind farm development will have minimal impact on any resident wildlife. Operation of the wind farm will not change the existing land use.

5.19.1.1 Birds and Bats

Based on the history of existing wind power projects in the United States, the primary impact of concern to wildlife will be to avian and bat populations. Birds and bats have been documented to occasionally collide with wind turbines at other sites. This same potential exists in the NUPUC Project site. The immediate vicinity consists of cropland with trees limited to farmsteads. There are no wildlife habitat areas in close proximity to the Project area. The nearest wildlife habitat area is Clear Lake, which is located approximately 3 miles northwest of the Project area.

5.19.1.2 Fish and Mammals

Both small and large game are present within the general area of the proposed Project, including deer, rabbits, and ground rodents. The 2 County ditches (80 and 85) within the Project area will not be impacted by the Project. Therefore, fish and other aquatic species will not be impacted. The Project area occurs almost entirely within cultivated lands that provides only minimal habitat for the mammals located in the Project area. Therefore, the wind farm is not expected to affect mammal numbers or habitat.

5.19.2 Impacts to Wildlife

It is anticipated that the Project impacts on wildlife will be minimal.

5.19.3 Mitigation Measures

The NUPUC will implement the following avoidance and minimization measures to the extent practicable, to help avoid potential impacts to wildlife in the Project area:

- Avoid or minimize disturbance of iwetlands or drainage systems during construction of the Project.
- Protect existing trees and shrubs that are important to the wildlife present in the area.
- Maintain sound water and soil conservation practices during construction and operation of the Project to protect topsoil and adjacent resources and to minimize soil erosion. Best management practices to control erosion will be applied as appropriate to minimize erosion during and after construction. These practices typically include temporary seeding permanent seeding, mulching, filter strips, erosion blankets, grassed waterways, and sod stabilization.
- Minimally provide turbine lighting to meet FAA requirements.
- Revegetate non-cropland areas disturbed during construction or operation with an appropriate seeding mix.

- Inspect and control noxious weeds in areas disturbed by the construction and operation of the Project.

5.20 Rare and Unique Natural Resources

5.20.1 Description of Resources

A coordination letter was sent to the DNR Natural Heritage and Nongame Research Program. A copy of the response letter dated February 12, 2008 is located in Appendix D. In their database review to determine if rare species or other significant natural features occur within an approximate 1-mile radius of the proposed Project, DNR staff noted that no rare features have been documented within the search area.

A coordination letter was sent to the USFWS. A copy of the response email dated April 10, 2009 is located in Appendix D. The response from the USFWS indicated that there are no records of any federally listed or proposed species and/or designated or proposed critical habitat within the action area of the proposed project.

5.20.2 Impacts to Rare and Unique Resources

No federal and/or state listed species and rare or sensitive habitats were identified within the Project area. Therefore, no impacts are anticipated.

5.20.3 Mitigation Measures

No federal and/or state listed species and rare or sensitive habitats were identified within the Project area. Therefore, mitigation measures are not required. See discussion in Section 5.19.3.

Erosion and sediment control practices will be implemented and maintained for any work conducted near the river or stream areas. As described previously, sound water and soil conservation practices will be maintained during construction and the operation of the Project to protect topsoil and adjacent water resources and minimize soil erosion.

Section 6.0
Project Construction

6.1 Construction Activities

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

- Ordering necessary components including towers, nacelles, blades, foundations, transformers, cables, substation equipment, O&M building materials, etc.
- Final micro-siting of the turbines
- Completing survey to establish locations of structures and roadways
- Completing soil borings, testing and analysis for proper foundation design
- Completing construction of access roads, to be used for construction and maintenance
- Completing construction of tower foundations
- Trenching for underground collection and SCADA cables
- Designing and constructing Project substation and O&M building
- Installing underground cables and pad-mounted transformers (if turbine transformer is not included in the turbine nacelle)
- Placing tower and wind turbine setting
- Site restoration and reclamation as needed
- Completing acceptance testing of facility
- Commencing of commercial operation

Geotechnical investigations for the Project will be contracted through a Geotechnical firm. This firm will complete the soil borings necessary for the Project. American Engineering & Testing has been contracted to complete boring and testing for the 3 initial turbine sites and the substation. The NUPUC will retain an Engineer of Record to complete the design of the foundations.

Several independent contractors will be solicited to conduct the erection of the turbines on site. These companies may include the foundation construction, in tower wiring, erection of the tower and nacelle, and assist in the commissioning of the turbine in their scope of work for the Project. A competitive bid process will be used to determine this at a later time. The commissioning will be a part of the scope of the tower installation team. This team will work closely with the manufacturer to complete the turbines and place them into commercial operation.

Access roads will be constructed along turbine strings or arrays. The access roads will be sited in consultation with local landowners and completed in accordance with state and local requirements. They will be located to facilitate both construction (cranes) and turbine operation and maintenance. Construction of roads in areas with unstable soil will be avoided wherever possible. All roads will include appropriate drainage and culverts while still allowing for the crossing of farm equipment. The access roads will be approximately 16 feet (4.88 meters) wide and will be covered with road base designed to allow passage under inclement weather conditions. The specific turbine locations will determine the amount of roadway that will be constructed for this Project

The roads will consist of compacted native subgrade material, overlaid with geotextile fabric (if needed) and covered with gravel. To facilitate crane movement and equipment delivery, an additional 12 feet of gravel roadway will be temporarily installed on either side of the permanent roadway (40 feet total temporary road width). In addition, turbine assembly will require a 60 foot by 80 foot gravel crane pad extending from the access road to the turbine foundation which will be graded to a minimum of 1%, and an approximate 260 foot by 260 foot area for component lay down and rotor assembly centered close to the turbine foundation which will be graded to a minimum of 5%. Temporary disturbances during construction of the Project include installation of crane pads at each turbine site, temporary access roads for the cranes, temporary laydown areas around each turbine, trenching for the underground electrical collection system, and storage/stockpile area.

During the construction phase, several types of light, medium, and heavy-duty construction vehicles will travel to and from the site, as well as private vehicles used by the construction personnel. It is anticipated that there will be approximately 10 large turbine and tower truck deliveries per wind turbine generator and up to 20 small-vehicle (pickups and automobiles) trips per day during peak construction periods. Those maximum volumes are expected during foundation and tower assembly. At the completion of each construction phase equipment will be removed from the site or reduced in number. Prior to construction, the NUPUC will coordinate with local jurisdictions (county and township) to obtain the necessary road access and overwidth/overweight permits. At Project completion, land reclamation and restoration will be conducted as needed.

6.2 Construction Management

The NUPUC will have a site construction manager who will be responsible for the overall coordination among contractors. The primary civil, erection and electrical contractors will use, where possible, the services of local contractors to assist in the construction of the Project. The contractors, in coordination with local contractors, will undertake the following activities:

- Securing building, electrical, grading, road, and utility permits
- Performing detailed civil, structural, and electrical engineering
- Scheduling execution of construction activities
- Completing surveying and geotechnical investigations
- Forecasting Project labor requirements and budgeting

The primary contractors also serve as key contacts and interface for subcontractor coordination. The electrical contractor will oversee the installation of communication and power collection lines as well as the substation. The civil contractor will oversee the installation of roads and foundations, as well as the coordination of aggregate and concrete materials receiving, inventory, and distribution. The construction consists of the following tasks:

- Completing site development, including roads
- Conducting foundation excavation
- Installing concrete foundations
- Installing electrical and communications
- Assembling tower assembly and machine erecting
- Completing system testing

The contractors will be on site to handle materials purchasing, construction, construction records/documentation, and quality control. The primary contractors will select and manage their local subcontractors to complete all aspects of construction.

Throughout the construction phase, ongoing coordination will occur between the Project development and the construction teams. The NUPUC on-site manager will coordinate all aspects of the Project, including communications with local officials, citizens groups and landowners. The construction manager and the O&M staff manager will coordinate work to ensure a smooth transition from construction to Project commissioning and, finally, operation.

6.3 Foundation Design

Each wind turbines' freestanding tubular towers will be connected by anchor bolts to a concrete foundation. Geotechnical surveys, turbine tower load specifications, and cost considerations will dictate final design parameters of the foundations. The base portion of a standard foundation for a 2.1 MW turbine is an octagon approximately 40 to 60 feet in diameter and 5 feet thick (bearing approximately 7 feet below grade). The pedestal of the foundation (the top portion on which the turbine tower base rests) is approximately 16 to 17 feet in diameter and 2 to 3 feet thick. The final foundation design must meet all serviceability and strength requirements specified by the tower manufacturer.

6.4 Civil Works

Completion of the Project will require various types of civil works and physical improvements to the land. These civil works include the following:

- Improving existing access roads to the Project area
- Constructing roads adjacent to the wind turbines to allow construction and continued servicing of the wind turbines
- Clearing and grading for wind turbine tower foundation installations
- Trenching for underground cabling for connecting the individual wind turbines

- Installing an on-site feeder system for connecting wind turbine strings for delivery to the electricity collection/metering location
- Clearing and grading for pad-mount transformers and other installations
- Clearing and grading for Substation and O&M building
- Installing any site fencing and security.

Any required improvements to existing access roads will consist of re-grading and filling of the gravel surface to allow access even in inclement weather. No asphalt or other paving is anticipated. After construction, the temporary construction areas adjacent to the turbine pad and access road will be restored for crop farming. The site will be graded to natural contours, soil will be loosened if needed, and the site will be seeded if needed. Once construction is completed, the access roads will be regraded and dressed as needed.

6.5 Commissioning

The Project will be commissioned after completion of the construction phase. The Project will undergo detailed inspection and testing procedures. Inspection and testing occurs for each component of the wind turbines, as well as the communication system, meteorological system, high-voltage collection and feeder system, and the SCADA system. Once the interconnection is established, the NUPUC will commission each turbine to generate electricity after completion of inspection and testing.

Section 7.0
Project Operation and Maintenance

Each wind turbine will communicate directly with the SCADA system for purposes of performance monitoring, energy reporting, and trouble-shooting. The SCADA system also provides the overall control of the Project. The NUPUC will augment its own operation and maintenance staff as needed with appropriate contractors to service and maintain the Project.

7.1 Project Control, Management, and Service

One of the SCADA systems' primary functions is as the primary control and monitor for each turbine. The SCADA system also offers access to wind turbine generation or production data, meteorological, and communications data, as well as alarms and communication error information. Performance data and parameters for each machine (generator speed, wind speed, power output, etc) can also be viewed and machine status can be changed. There is also a snapshot facility that collects frames of operating data to aid in diagnostics and troubleshooting problems.

The primary functions of the SCADA are:

- Controlling and monitoring the Project
- Alerting operations personnel to Project site conditions requiring resolution
- Providing a user/operator interface for controlling and monitoring wind turbines
- Collecting performance data from turbines
- Monitoring field communications
- Providing information on wind turbine performance for operators and maintenance personnel
- Collecting data on wind turbine and Project site maintenance
- Serving as an information archive
- Providing spare parts inventory control
- Generating operations and maintenance reports

7.2 Maintenance Schedule

Equipment will be monitored by NUPUC operation and maintenance staff. When needed, local personnel will be dispatched to the site by the remote monitoring staff. Performance testing is done during the early months of operation to see that the Project is operating within expected parameters.

Project inspection and maintenance is performed on the following intervals:

- **First Service Inspection.** The first service inspection will take place 1 to 3 months after the turbines have been commissioned. At this inspection, particular attention is paid to tower bolt tensioning as specified by the manufacturer, and equipment lubrication, full greasing and filtering of gear oils.

- **Semi-Annual Service Inspection.** Regular service inspections commence 6 months after the first inspection. The semi-annual inspection consists of lubrication and a test of the turbine trip system.

- **Annual Service Inspection.** The yearly service inspection consists of a semi-annual inspection plus a full component check. Bolts are checked with a torque wrench. The check covers 10% of the bolts. If any bolts are found to be loose, all bolts in that assembly are tightened and the event is logged.

- **Two Years Service Inspection.** The 2 year service inspection consists of the annual inspection, plus checking and tightening of electrical terminal connectors.

- **Five Years Service Inspection.** The 5 year inspection consists of the annual inspection, an extensive inspection of the wind braking system, checking and testing of oil and grease, balance check, and tightness of terminal connectors.

In addition to the indicated inspections, the NUPUC will implement a computerized maintenance management system (CMMS). The CMMS program will be an integral part of the NUPUC's continuing program to schedule and record the historical maintenance performed on the wind turbines, as well as track the inventory of necessary spare parts and lubricants required to perform scheduled and unscheduled maintenance.

7.3 General Maintenance Duties

Maintaining field duties include performing all scheduled and unscheduled maintenance including periodic operational checks and tests, regular preventative maintenance on all turbines, related plant facilities and equipment, safety systems, controls, instruments, and machinery, including:
Maintaining the wind turbines and on the mechanical and electrical power, and communications system

- Performance on all routine inspections

- Maintaining of all oil levels and changing oil filters

- Maintaining of the control systems, all structures associated with the Project, access roads, drainage systems, and other facilities necessary for Project operation

- Maintaining of field maintenance manuals, service bulletins, revisions, and documentation for the Project

- Maintaining of all parts, price lists, and computer software

- Maintaining and operating of interconnection facilities

- Provide all labor, services, consumables, and parts required to perform scheduled and unscheduled maintenance on the Project

- Assisting as needed with avian and other wildlife studies

- Managing lubricants, solvents, and other hazardous materials as required by Local and/or State regulations, and based on the CMMS' recorded operating history
- Maintaining appropriate levels of spare parts in order to service equipment
- Obtaining all necessary equipment including the rental of industrial cranes for removal and reinstallation of turbine components
- Hiring, training, and supervising a work force necessary to meet the general maintenance requirements
- Maintaining plant installations, service roads and entrances
- Maintaining site security

7.4 Operations and Maintenance Facility

The O&M facility will be located on the 5-acre area that will also house the substation.

Section 8.0
Costs

The Project will have an ultimate nameplate capacity of up to 10.5 MW. This capacity is based on 5 - 2.1MW Suzlon S88 turbines. The final costs for the Project have not yet been confirmed. Estimates of the installed capital cost for wind Project design and construction ranges approximately $1,900 to $2,500 per KW or $23,100,000 for a 10.5 MW Project. The capital cost for Phase 1 (6.3 MW) will have a projected cost of $13,900,000. Operating costs for Phase 1 are estimated to be $280,000 per year; and at the ultimate nameplate capacity of 10.5 MW are expected to be for 5 turbines, $460,000 per year.

The actual cost of the Project will not be known until final design, procurement, construction, and contractual arrangements have been complete. Power Purchase Agreement (PPA) Applications are in place or underway.

Section 9.0
Project Schedule

A Project schedule is included in Appendix E.

9.1 Land Acquisition

The NUPUC will be responsible for all land acquisition and will obtain the necessary easements from landowners with terms equivalent to the proposed estimated Project lifecycle.

9.2 Permits

The NUPUC will be responsible for undertaking the required environmental review and will obtain the permits and licenses that are required following the issuance of the LWECS Site Permit. In some cases the contractor may be responsible for the acquisition of permit as it relates to their contract. The NUPUC may assist in the procurement of permits when such assistance is request by the contractor(s).

9.3 Procurement, Manufacture and Delivery

The NUPUC anticipates procuring the first 3 turbines (Phase 1) by October 2009. Delivery of the turbines is anticipated within 4 to 12 months of the order. The transformer for the substation will arrive within approximately 6 months after ordering. Collector system cable will arrive approximately 4 months after ordering. Once the Power Purchase Agreement and Interconnection Agreement are negotiated, financial arrangements are in place to make this portion of the wind Project move forward in an expeditious manner.

9.4 Construction

The construction manager and the principal contractors will oversee their personnel and subcontractor personnel performing Project construction. This will include construction of roads, wind turbine assembly, electrical, and communications work. The construction is expected to take approximately 6 to 12 months to complete depending upon start dates, weather and equipment deliveries.

9.5 Construction Financing

The NUPUC will be responsible for financing the pre-development, development, and construction activities and anticipates financing the cost of all activities. The project will be funded using a combination of Clean Renewable Energy Bonds (CREB's) and municipal bond financing.

9.6 Permanent Financing

Permanent financing for the entire Project will be funded with bond proceeds. The NUPUC will use CREB's and the NUPUC utility revenue bonds. The repayment of both types of bonds will be funded through utility revenues.

9.7 Expected Commercial Operation Date

The NUPUC anticipates the Project will begin commercial operation in the fourth calendar quarter of 2010. The commercial operation date is dependent on the completion of the interconnection, permitting, and other development activities.

Section 10.0
Energy Projections

The Project will have an ultimate nameplate capacity of up to 10.5 MW. This is based on 5 - 2.1 MW Suzlon S88 turbines. Based on a meteorological report conducted for the Project site a net capacity factor of between 35 and 37% is expected, which develops a projected average annual generation of between approximately 32,201,000 and 34,113,000 kWh. This amount of power is sufficient power to supply approximately 2,900 to 3,100 homes. As is the case with all wind projects, output will be dependent on final design, site-specific features, and equipment. Final energy estimates will be developed once the wind farm final design is complete.

Section 11.0
Decommissioning and Restoration

The Project decommissioning and restoration will be conducted in accordance with the requirements of Minnesota Rules part 7836.0500, subp. 13. Megawatt-scale wind turbine generators have a life expectancy of 20 years. Therefore, the NUPUC anticipates the life of the Project will be no less than 20 years. The NUPUC reserves the right to explore alternatives regarding Project decommissioning at the end of the Project Site Permit term. One option the NUPUC may explore is to re-apply for a Site Permit and continue operation of the Project.

11.1 Decommissioning and Restoration

The NUPUC will begin planning decommissioning the facility within 8 months from the time that the facility ceases to operate. Decommissioning will be completed within approximately 16 months from the time the facility ceases to operate.

The NUPUC also reserves the right to explore alternatives regarding Project decommissioning at the end of the Project Site Permit term. One such option may be to re-apply for a Site Permit and continue operation of the Project, providing energy under a new long-term contract. Retrofitting, repowering or replacing the turbines and power system with upgrades based on new technology may allow the Project to produce efficiently and successfully for many more years. Two other options that may be available for consideration are, 1) selling the wind Project major equipment components to a third party for refurbishment and placement into another wind farm for service, or 2) sell the wind project equipment for recycling at its salvage value to defray the cost of decommissioning.

11.2 Estimated Decommissioning Costs in Current Dollars

It is believed that the cost of decommissioning the wind turbines will be offset in part by the salvage value of the towers and the turbine components. The estimated decommissioning costs per turbine, provided below, were prepared using available information from a variety of credible industry sources.

The NUPUC will be responsible for the costs to decommission the Project and associated facilities. Based on estimated costs of $3,000,000 for decommissioning and an assumed salvage value of $500,000 for decommissioned equipment the salvage value of the wind Project will not exceed the costs of decommissioning. The decommissioning cost is estimated at half of the initial cost of equipment installation. Therefore the decommissioning cost is estimated at $2,500,000 in constant dollars for the total Project of 5 turbines. Because of the uncertainty surrounding future decommissioning cost and salvage values, the NUPUC will establish a sinking fund to provide for decommissioning costs at the rate of approximately $24,600 per turbine per year (or a total annual payment of $123,000 per year for five turbines), at a 3% interest rate over 20 years will accumulate a decommissioning account value of $2,460,000. The decommissioning sinking fund account will be interest bearing, and periodically throughout the 20 year term of the Project, the NUPUC will review and update the estimated cost of decommissioning and restoration for the Project. The NUPUC will make any necessary adjustments to its sinking fund deposits to cover any anticipated increases in such projected costs. This revised estimated cost of decommissioning and will then be submitted to the Minnesota PUC for review and comment.

11.3 List of Decommissioning Activities

For the Project, the decommissioning and restoration activities will adhere to the requirements set by the PUC and will be in accordance with all applicable federal, state, and local permits.

The decommissioning and restoration process comprises removal of above-ground structures; removal of below-ground structures to a depth of 48 inches; restoration of topsoil, re-vegetation and rock picking. Access roads, fencing and residual minor improvements need not be removed if the underlying landowner requests that they remain in place and this request is approved by the Minnesota PUC.

Above-ground structures include the turbines, transformers, overhead collection lines, substation, maintenance buildings, and access gates. Below-ground structures include turbine foundations, collection system conduits, and drainage structures. Access road sub-base material may be removed upon landowner request.

The process of removing structures involves evaluating and categorizing all components and materials into categories of recondition and reuse, salvage, recycling, and disposal. In the interest of increased efficiency and minimal transportation impacts, components and material may be stored on-site in a pre-approved location until the bulk of similar components or materials are ready for transport. The components and material will be transported to the appropriate facilities for reconditioning, salvage, recycling or disposal.

11.3.1 Turbine Removal

Access roads to turbines may be widened to sufficient width to accommodate movement of appropriately sized cranes or other machinery required for the disassembly and removal of the turbines. The turbine components will be reduced to shippable dimension and transported off site for proper disposal. Control cabinets, electronic components and internal cables will be removed. The blades, hub, and nacelle will be lowered to grade for disassembly. Each tower section will be disassembled and will be lowered to the ground where they will be further disassembled into transportable sections. The blades, hub, nacelle and tower sections will either be transported for reconditioning and reuse or dissembled into salvageable, recyclable or disposable components. All debris related to construction will be removed.

11.3.2 Turbine Foundation Removal

Topsoil will be removed from an area surrounding the foundation and stored for backfill material. Turbine foundations will be excavated to a depth sufficient to remove all anchor bolts, rebar, conduits, cable and concrete to a depth of 48 inches below grade. After removal of the noted foundation materials, the hole will be filled with clean sub-grade material comparable to the immediate surrounding area. The sub-grade material will be compacted to a density similar to surrounding sub-grade material. All unexcavated areas compacted by equipment used in decommissioning shall be de-compacted in a manner to adequately restore the topsoil and sub-grade material to the proper density consistent and compatible with the surrounding area. All debris related to construction will be removed.

11.3.3 Underground Electrical Collection System

The cables and conduits contain no materials known to be harmful to the environment and will be abandoned and remain in place.

11.3.4 Overhead Collection Lines

Interconnection overhead transmission lines from the substation into the MISO grid will be removed and associated towers will be disassembled and sold for their salvage value. As an alternative to salvage, discussions will be opened with MISO for the transfer sale of the interconnection line as a means of expanding their grid network.

11.3.5 Substation and Switching Station

Disassembly of the substation and switching station, if required, will include only the areas owned by the NUPUC. Steel, conductors, switches, transformers, etc. will be reconditioned and reused, or sold as scrap, recycled or disposed of appropriately depending upon market value. Foundations and underground components will be removed to a depth of 48 inches and the excavation filled, contoured and soil stabilized. All unexcavated areas compacted by equipment used in decommissioning shall be de-compacted in a manner to adequately restore the topsoil and sub-grade material to the proper density consistent and compatible with the surrounding area. All debris related to construction will be removed.

11.3.6 Access Roads and Construction Pads

After decommissioning activities of a turbine site are completed, construction pad removal will begin. Access roads may also be removed at this time per landowner and the NUPUC preference. Gravel will be removed from access roads and construction pads and transported to a pre-approved disposal location. The disposal location will be approved by the appropriate government authority prior to the start of the decommissioning program. Geotextile fabric, if required for road construction purposes, will be recovered and hauled offsite to an appropriate disposal site. Drainage structures integrated with the access road or construction pad will be removed and backfilled with sub-grade material, the topsoil replaced and the surface contoured and stabilized.

Access security gates will remain operational until completion of decommissioning, at which time they will be removed unless the landowner requests that they remain. Ditch crossings connecting access roads to public roads will be removed unless the landowner requests that they remain. All debris related to construction will be removed.

11.3.7 Site Restoration Process Description

Topsoil will be removed prior to removal of structures from all work areas and stockpiled in a designated area. Prior to topsoil replacement, all rocks 3 inches or greater will be removed from the surface of the subsoil. The topsoil will be de-compacted to match the density and consistency of the immediate surrounding area. The topsoil will be replaced to original depth, and original surface contours reestablished where possible. Rocks 3 inches or larger will be removed from the surface of the topsoil. Any trench settling will be backfilled with imported topsoil consistent with the quality of the affected site.

Following decommissioning activities, the sub-grade material and topsoil from all areas will be de-compacted and restored to a density and depth consistent with the surrounding area or to a depth of 18 inches.

All disturbed soil surfaces will be stabilized using methods agreed upon with the landowner in order to maintain consistency with the surrounding land uses. Restoration activities may include leveling, terracing, mulching, and other necessary steps to prevent soil erosion, to ensure establishment of suitable grasses and forbs, and to control noxious weeds and pests.

Section 12.0
Agency and Public Contacts

12.1 Agency Contacts

Agency interactions for the NUPUC Project began in early 2007 with initial information requests sent to the MDNR, USFWS, and SHPO. These requests were components of a Feasibility Study that was conducted by Sargent & Lundy to guide the placement of the wind energy facility.

The details of this initial correspondence and subsequent communications with the various agencies are detailed below. Refer to Appendix D for copies of agency correspondence.

12.1.1 Minnesota Department of Natural Resources

A coordination letter was sent to the DNR Natural Heritage and Nongame Research Program. A copy of the response letter dated February 12, 2008 is located in Appendix D. In their database review to determine if rare species or other significant natural features occur within an approximate one-mile radius of the proposed Project, DNR staff noted that no rare features have been documented within the search area.

12.1.2 Minnesota State Historic Preservation Office

As described in Section 5.6 of this document, a letter was sent to State Historic Preservation Office (SHPO) on requesting their review of the Minnesota Archaeological Inventory and Historic Structures Inventory database for the Project area for previously-known resources that could potentially be impacted by the proposed Project. Our response from the Minnesota Historical Society and their brief report regarding Historic Property Locations is attached as Appendix D. No archaeological sites were identified in a search of the Minnesota Archaeological Inventory for the search area requested. However, the Historic Structure Inventory identified a school approximately 2,850 feet west the Project. The school will not be impacted by construction or operation of the Project.

12.1.3 United States Fish and Wildlife Service

A coordination letter was sent to the USFWS to identify any records of federally-listed species within the search area. A coordination letter was sent to USFWS. A copy of the response email dated April 10, 2009, is located in Appendix D. The response from the USFWS indicated that there are no records of any federally listed or proposed species and/or designated or proposed critical habitat within the action area of the proposed project.

12.1.4 Nicollet County/Township Officials

The following meetings regarding the proposed Project were held with Nicollet County and Lafayette Township:

<u>June 29, 2007</u>
The NUPUC and Sargent & Lundy staff met with Nicollet County staff in order to prepare the feasibility report and CREB applications. The NUPUC provided an introduction of the project to the Environmental

Department Director and Zoning Administrator. After reviewing the conceptual layout, County staff offered to write a letter of support for the CREB application. In additional, they indicated that the project met all of the Nicollet County WECS Ordinance requirements. A letter of support for the Project was received shortly thereafter.

September 15, 2008

The NUPUC attended the Nicollet County Planning Commission Meeting for the purpose of obtaining a conditional use permit for the installation of a meteorological tower.

September 23, 2008

The NUPUC staff attended the Nicollet County Commissioners meeting for the purpose of obtaining a conditional use permit for the installation of a meteorological tower.

February 16, 2009

The NUPUC sponsored a Residents "Listening Session" at the St. George Parish Center to present the details of the New Ulm Wind Project to interested parties and listen to their issues and concerns.

12.2 Landowners

The NUPUC has conducted the following public outreach efforts regarding the proposed Project.

March 2007

Roger Klossner stopped by the NUPUC offices. He stated that he had heard about the results of the New Ulm Integrated Resource Planning that had chosen wind energy as one of the power generation portfolio components. He indicated that he had land available and was interested in being part of a wind energy project. The NUPUC set a meeting at Roger's sites on April 9, 2007 to review the wind energy potential.

April 9, 2007.

The NUPUC Staff met with Roger Klossner at his home site in Section 5 of the Lafayette 'S' Plat. Roger indicated that he would make his land in Section 5 available for wind turbine sites. The NUPUC informed Roger that the land in Section 5 was too close to the river valley in terms of the Nicollet County bluffland setback requirement of ½ mile, was too close to the New Ulm Airport, and would likely have a limited wind resource due to the close proximity to the trees along the bluff and the relatively lower elevation of the site near the river valley.

Roger indicated that he had another farm further north in Section 20 of the Lafayette 'N' plat. The NUPUC proceeded to visit that site. The site in Section 5 appeared much better in terms of elevation and it was far enough away to meet the bluffland and airport setbacks. In addition, the Xcel 69kV Fort Ridgley to Lafayette transmission line ran directly adjacent to the property. There were also several sites within 1 mile of Rogers's Section 5 property that could be seen to have similar elevation characteristics. The NUPUC told Roger that we were pleased with the site and that we would be interested in examining the site further for wind energy purposes.

June 14, 2007

The NUPUC conducted a Garwin McNeilus wind farm tour with Brad Franta, Dianne Franta, and Rick Franta. During the visit, the NUPUC discussed the potential payment typical for wind farms and mentioned that they were willing to pay approximately $4500 per site per year based on information the NUPUC had received from other area wind farm projects.

June 28, 2007

Site visits made to the Brad Franta farm to review the preliminary siting of the New Ulm Wind Farm. Gary Gleisner, Pat Wrase, Tim Libson, and Joe Capadona met with Brad after walking the sites to insure he remained interested in the project prior to submitting the CREB applications. Brad indicated that he was

interested in moving forward.

July 31, 2007
The NUPUC Staff contacted Brad Franta to discuss the draft option and lease agreement documents that were prepared by Hugh Nierengarten.

August 8, 2007.
The NUPUC staff met with Roger Klossner to discuss: 1) Status of Project, 2) Need for Land Options and 3) Next Steps including: a) Wind anemometer tower b) Turbine procurement b) Lease agreement and c) Preliminary construction schedule.

August 9, 2007
The NUPUC staff met with Brad Franta to discuss: 1) Status of Project, 2) Need for Land Options and 3) Next Steps including: a) Wind anemometer tower b) Turbine procurement b) Lease agreement and c) Preliminary construction schedule.

August 13, 2007
The NUPUC staff met with Peter and Sandy Altmann to discuss: 1) Status of Project, 2) Need for Land Options and 3) Next Steps including: a) Wind anemometer tower b) Turbine procurement b) Lease agreement and c) Preliminary construction schedule.

October 9, 2007
The NUPUC staff met with Daniel Wendinger to discuss: 1) Status of Project, 2) Need for Land Options and 3) Next Steps including: a) Wind anemometer tower b) Turbine procurement b) Lease agreement and c) Preliminary construction schedule.

October 11, 2007
The NUPUC staff met with Ed Brown to discuss: 1) Status of Project, 2) Need for Land Options and 3) Next Steps including: a) Wind anemometer tower b) Turbine procurement b) Lease agreement and c) Preliminary construction schedule.

October 16, 2007
The NUPUC staff met with Stanley Bastian to discuss: 1) Status of Project, 2) Need for Land Options and 3) Next Steps including: a) Wind anemometer tower b) Turbine procurement b) Lease agreement and c) Preliminary construction schedule.

October 22, 2007
The NUPUC staff met with Brad and Dianne Franta to discuss lease payments.

October 24, 2007
The NUPUC staff met with Sharon Hacker to discuss: 1) Status of Project, 2) Need for Land Options and 3) Next Steps including: a) Wind anemometer tower b) Turbine procurement b) Lease agreement and c) Preliminary construction schedule.

November 2, 2007
The NUPUC staff and Sharon Hacker traveled to Dodge Center to tour the Garwin McNeilus wind farm.

September 18, 2008
The NUPUC staff met with the 3 lessors for the New Ulm Wind Project: Brad Franta, Roger Klossner, and Sharon Hacker to discuss the payment schedule for the leases and the latest information relating to the project.

Section 13.0
Identification of Required Permits and Approvals

The potential federal and state permits or approvals that have been identified as being required for the construction and operation of the Project are shown in Table 13-1.

Table 13-1
Permits and Approvals

Agency	**Type of Approval**
Federal Permits	
Federal Aviation Administration	Notice of proposed construction or alteration determination of no hazard
Federal Energy Regulatory Commission	Exempt wholesale generator status and market based rate authorization
State of Minnesota Permits	
Minnesota Public Utilities Commission	LWECS Site Permit
	Certificate of Need Determination for LWECS
Minnesota Pollution Control Agency	NPDES Permit: Construction
	License for Very Small-Quantity Generator of Hazardous Waste
Minnesota Department of Transportation	Oversize and Overweight Permit
Local Permits	
Nicollet County	Building Permits
	Driveway Permit
	Utility Permit
Townships	Road Access Permits

Section 14.0
Bibliography

Council on Environmental Quality. 1997. *Environmental Justice: Guidance under the National Environmental Policy Act.* Accessed on February 4, 2009. Available online at http://www.lm.doe.gov/env_justice/pdf/justice.pdf.

Cowardin et al. 1979. *"Classification of Wetlands and Deepwater Habitats of the U.S."* U.S. Fish and Wildlife Service Northern Prairie Wildlife Research Center. December 1979. Available at http://el.erdc.usace.army.mil/emrrp/emris/emrishelp2/cowardin_report.htm.

Ellingson, Jonathan B. 2000. *Aggregate Resources of Nicollet County, Minnesota. Plate II, Report 343. Minnesota Department of Natural Resources, Division of Lands and Minerals*

Environmental Laboratory. 1987. *Corps of Engineers Wetland Delineation Manual.* U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, MS. Technical Report Y-87-1.

High Plains Regional Climate Center. 1948-2007. *General Climate Summary for St. Peter and New Ulm, Minnesota Stations.* Accessed on February 6, 2009. Available online at: http://www.hprcc.unl.edu/.

Land Management Information Center (LMIC). 2000. *International Coalition Land Use/Land Cover, Nicollet County, Minnesota*.

Minnesota Department of Administration/State Demographic Center. 2008. *Minnesota Per Capita Income Grows Modestly between 2006 and 2007*, July 2008 OSD-08-134. http://www.demography.state.mn.us/documents/Minnesotapercapitaincomegrowsmodestlybetween2006and2007.pdf. Accessed on February 6, 2009.

Minnesota Department of Natural Resources, 2006. *Tomorrow's Habitat for the Wild and Rare: An Action Plan for Minnesota Wildlife, Comprehensive Wildlife Conservation Strategy. Division of Ecological Services, Minnesota Department of Natural Resources.*

Minnesota Department of Natural Resources. 2009a. *The Minnesota Department of Natural Resources Web Site (online). Accessed 2009-2-17 at* http://www.dnr.state.mn.us/sitetools/copyright.html

Minnesota Department of Natural Resources (DNR) Data Deli. 2009b. *GIS data for FEMA floodplain mapping, PWI inventory, NWI mapping, USDA-NRCS Soils, and other GIS data sets*. http://deli.dnr.state.mn.us/

Minnesota Department of Transportation. **2007.** *Traffic Volumes General Highway GIS Data*, Nicollet County, Minnesota. http://www.dot.state.mn.us/traffic/data/html/volumes.html. Accessed on February 9, 2009.

Minnesota Department of Transportation (Mn/DOT). Aggregate Unit. "*Nicollet County Pit Map."* http://www.dot.state.mn.us/materials/maps/copitmaps/nicollet.pdf. Retrieved February 4, 2009.

Minnesota Rules, Revisor of Statutes. Chapter 7030. *Minnesota Pollution Control Agency, Noise Pollution Control.* Accessed on February 9, 2009. Available at http://www.revisor.leg.state.mn.us/arule/7030/0040.html.

Minnesota Rules, Revisor of Statutes. Chapter 7836. *Minnesota Public Utilities Commission, Wind Siting Rules*. Accessed between October 2008 and February 10, 2009. Available at https://www.revisor.leg.state.mn.us/rules/?id=7836.

Minnesota Rules, Revisor of Statutes. Chapter 7849. *Minnesota Public Utilities Commission, Power Plants and Transmission Lines.* Accessed between October 2008 and February 10, 2009. Available at https://www.revisor.leg.state.mn.us/rules/?id=7849.

Minnesota Statutes 2008. *Minnesota Power Plant Siting Act, Sections 216B.2421, 216B.243, 216E.03, 216F.01, 216F.03.* Minnesota Revisor of Statutes.

Morey, G. B., and Meints, J. 2000. *Geologic Map of Minnesota, Bedrock Geology, State Map Series S-20,* Minnesota Geological Survey, 3rd Edition.

US Census Bureau. 2000-2007. *Nicollet County, Minnesota Fact Finder.* Accessed on February 7, 2009. Available online at http://factfinder.census.gov/home/saff/main.html?_lang=en&_ts=

U.S. Department of Agriculture, National Agriculture Statistics Service (NASS). 1997-2002. *Census of Agriculture County Profile-Clay County, Minnesota*. Accessed on February 10, 2009. http://www.nass.usda.gov/Statistics_by_State/Minnesota/index.asp#.html

U.S. Federal Aviation Administration. 1995. *Obstruction lighting.* DOT/FAA Advisory Circular 70/7460-IJ. Washington, DC.

U.S. Federal Aviation Administration. 2007. *Obstruction lighting.* DOT/FAA Advisory Circular 70/7460-IK Chg2. Washington, DC.

Van Voast, W. A, Broussard, W. L., and Wheat, D. 1972. *Water Resources of the Minnesota River-Hawk Creek Watershed, Southwestern Minnesota, Hydrologic Investigations Atlas HA-392, U.S. Geological Survey in cooperation with the Minnesota Department of Natural Resources Division of Water, Soils, and Minerals, Washington D.C.*

Wetland Training Institute, Inc. 1995. *Field Guide for Wetland Delineation;* 1987 Corps of Engineers Manual, Glenwood, NM. WTI 02-1 143pp.