Environmental Report

Ellerth Windpark Project

In the Matter of the Application of Ellerth Wind LLC
for a Certificate of Need for an up to 98.9 MW
Large Wind Energy Conversion System in Marshall County

PUC Docket No. IP-6855/CN-11-112

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Responsible Governmental Unit	Project Proposer
Minnesota Department of Commerce	**Ellerth Wind LLC**
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Abstract

On May 27, 2011, Ellerth Wind LLC, filed a Certificate of Need application with the Minnesota Public Utilities Commission for the Ellerth Windpark. The Applicant is proposing to construct up to a 98.9 megawatt large wind energy conversion system in Marshall County.

The proposed Project is a large energy facility as defined by Minn. Statute 216B.2421. Such a facility requires a certificate of need from the Commission (Minn. Statute 216B.243). As part of the application review, the Department of Commerce (DOC) must prepare an Environmental Report for the Project (Minn. Rules 7849.1200).

DOC Energy Facility Permitting (EFP) staff is responsible for preparing the Environmental Report. This Environmental Report has been prepared as per Minnesota Rules 7849.1100-2100, and is part of the record which the Commission will consider in making a decision on a certificate of need for the project.

Information about the Commission's certificate of need process can be obtained by contacting Brett Eknes, Minnesota Public Utilities Commission, 121 7th Place E., Suite 350, Saint Paul, MN 55100, phone: (651) 201-2236, email: brett.eknes@state.mn.us.

The official record for the certificate of need for this Project can be found on the eDockets system at: https://www.eDockets.state.mn.us/EFiling/search.jsp; search on the year "**11**" and number "**112**".

Information about this Project can be found on the Commission's energy facilities permitting website: http://mn.gov/commerce/energy facilities/Docket.html?Id=32308, or obtained by contacting Larry B. Hartman, Energy Facility Permitting, 85 7th Place East, Suite 500, St. Paul, Minnesota 55100, phone: (651) 296-5089, email: larry.hartman@state.mn.us.

Preparer: Larry B. Hartman

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Acronyms, Abbreviations and Definitions

ALJ	Administrative Law Judge
BMP	best management practice
Commission	Minnesota Public Utilities Commission
CN	Certificate of Need
dB	decibels
dB(A)	A-weighted sound level recorded in units of decibels
Department	Minnesota Department of Commerce
DNR	Department of Natural Resources
EFP	Department of Commerce Energy Facilities Permitting
EMF	electromagnetic field
EPA	United States Environmental Protection Agency
ERP	Department of Commerce Energy Regulatory and Planning
FAA	Federal Aviation Administration
GPS	Global Positioning System
HAP	Hazardous Air Pollutant
HVTL	high voltage transmission line
kV	kilovolt
kWh	Kilowatt hour
LIDAR	Light Detection and Ranging
LWECS	Large Wind Energy Conversion System
MISO	Midwest Independent System Operator
MnDOT	Minnesota Department of Transportation
MPCA	Minnesota Pollution Control Agency
MW	Mega Watt
NAC	noise area classification
NEV	Neutral-to-Earth Voltage
NPDES	National Pollutant Discharge Elimination System
NTIA	National Telecommunications and Information Administration
NWI	National Wetland Inventory
ppm	parts per million
SODAR	Sonic Detection and Ranging
SWPPP	Stormwater Pollution Prevention Plan
USACE	United States Corp of Engineers
USFWS	United States Fish and Wildlife Service
VOC	Volatile Organic Compound
WMA	Wildlife Management Area
WPA	Waterfowl Production Area

1 Introduction

On May 27, 2011, Ellerth Wind LLC, a wholly owned subsidiary of TCI Renewables Limited (Applicant or EW), filed a Certificate of Need (CN) application with the Minnesota Public Utilities Commission (Commission) for the Ellerth Windpark Project (Project). The Applicant is proposing to construct up to a 98.9 megawatt (MW) large wind energy conversion system (LWECS) and associated facilities in Marshall County.

Project Overview

The Project consists of wind turbines and associated facilities, which include access roads, electrical collection lines (approximately 38 miles), communication lines, turbine access roads (approximately 19 miles), transformers, tower foundations, meteorological towers, an operations and maintenance building and a project substation to connect the project to an existing Otter Tail Power Company 115 kilovolt (kV) transmission line located within the project site. Ellerth Wind currently anticipates that the project would consist of 43 to 61 turbines ranging in size from 1.6 to 2.3 Megawatts that would yield a total nameplate capacity of up to 98.9 MW.

The Project site is located west of the towns of Newfolden and north of Viking in Marshall County, in northwestern Minnesota (Map 1: Project Vicinity and Project Area.). Most of the Project Area is located west of State Highway (SH) 59 and east of SH 75. The project will be located within six townships including Wright, West Valley, Foldahl, Marsh Grove, Comstock and Viking. Ellerth Wind currently has approximately 19,000 acres of land under lease for the Ellerth Windpark Project, and the total project study area encompasses approximately 34,000 acres.

As an independent power producer, Ellerth Wind plans to sell the power generated by the project to one or more utilities to satisfy the Renewable Energy Standards defined in Minnesota Statutes, Section 216B. 1691. Accordingly, alternatives examined in this Environmental Report (ER) are limited to technologies that support Minnesota's Renewable Energy Standards objective. These alternatives include: (1) a generic 98.9 MW wind generation project sited elsewhere in Minnesota, (2) a 38.5 MW biomass plant, and (3) the “no build” option.

Organization and Content of this Document

This Environmental Report is organized into the following seven sections:

Section 1: Introduction
Section 2: Regulatory Framework
Section 3: Description of the Proposed Project
Section 4: Description of Project Alternatives
Section 5: Environmental and Human
Section 6: Availability and Feasibility of Alternatives
Section 7: Permits

Sections three through six discuss the project, alternatives, associated impacts and mitigation.

Sources of Information

Information for this report is drawn from multiple sources and cited throughout. The primary source documents used are the two applications submitted by Ellerth Wind LLC, to the Commission:

Application for Certificate of Need, 98.9 MW Ellerth Wind Project, May 27, 2011[1]

Application for Site Permit, 98.9 Ellerth Wind Project, November 4, 2011.[2]

Information from other reports issued by the Minnesota Environmental Quality Board and Minnesota Department of Commerce, and other Minnesota and Federal agencies has been incorporated as applicable.

[1] Application for Certificate of Need, Ellerth Wind Project, May 27, 2011, [hereafter CN Application or CN]. See eDockets 11-112, document id # 20115-63031-01.
[2] Application for Site Permit, Ellerth Wind Project (Site Permit Application or SPA), November 4, 2011. See eDockets 11-608, document id # 201111-68116-01 through 201111-68116-05.

2 Regulatory Framework

The project is a large wind energy conversion system as defined in the Wind Siting Act (Minn. Stat. 216F). Upon completion, the project would produce up to 98.9 MW of power, meeting the definition of a large energy facility per Minnesota Statutes section 216B.2421.

In accordance with Minnesota Statutes section 216B.243, no large energy facility may be sited or constructed in Minnesota without issuance of a Certificate of Need by the Minnesota Public Utilities Commission. Accordingly, on May 27, 2011, the applicant submitted a Certificate of Need application to the Commission. On August 24, 2011 2, 2011, the Commission issued an order accepting the CN application as complete and authorizing an informal review process.

The informal review process is designed to develop a record upon which a CN decision is made, including: (1) a notice and comment period, (2) analysis by the Department of Commerce (DOC) Energy Regulation and Planning staff, (3) environmental review by DOC Energy Facility Permitting (EFP) staff, and (4) a public hearing conducted by an administrative law judge (ALJ). Based on the ALJ's hearing report and entire record, Commission staff will make a recommendation to the Commission on issuance of the certificate of need. The Commission is the final decision-making body.

2.1 Environmental Report

Pursuant to Minnesota Rule 7849.1200, the analysis provided by EFP staff takes the form of an Environmental Report. The ER provides an analysis of potential environmental and human impacts of the project, as well as alternatives to the project. To develop the ER, EFP staff is required to conduct at least one public meeting in the proposed project area. The purpose of the meeting is to advise the public of the project and to solicit public input into the scope of the ER. A scoping decision is a determination of what needs to be assessed in the ER to fully inform decision-makers and the public about the possible impacts and potential alternatives of the project.

Based on the scoping comments received and the rules governing the scope of an ER (Minn. Rule 7849.1500), the Department of Commerce Deputy Commissioner issued a scoping decision on December 22, 2011 (Appendix A). This Environmental Report has been developed in accordance with the scoping decision.

2.2 Public Participation

EFP staff held a public information and scoping meeting on November 7, 2011, in Newfolden to receive comments on the scope of the Environmental Report. Approximately 90 persons attended the meeting, with several people commenting. An opportunity for public comment remained open through November 30, 2011. Several written comments were received before the close of the comment period. No comments on alternatives to the proposed project were submitted during the comment period.

Topics raised at the public meeting or in written comments were potential impacts to existing road infrastructure, habitat, natural environmental features, native prairie, birds, bats, eagles, holdover areas in the project vicinity used by sandhill cranes during their migration, visual impacts, shadow flicker, noise, property values, local tax implications, impacts on farm land, splitting of agricultural fields, soil erosion, water quality, aviation and aerial crop applications, ice throw, electronic interference and decommissioning.

The Commission relies on public participation for the development of a thorough record for the project for both the Certificate of Need and Site Permit processes. People are assured state-issued notices for project events by placing their name on the appropriate EFP Project contact list. Interested persons can sign up for the Ellerth Windpark Project mailing list online at: http://mn.gov/commerce/energyfacilities/Docket.html?Id=32308.

People may also join the project mailing list by contacting EFP State Permit Manger Larry Hartman, phone: (651) 296-5089, email: larry.hartman@state.mn.us.

A public hearing conducted by an ALJ will be held in the project area to further develop the record for a Commission decision. This ER will be introduced into the record by EFP staff.

2.3 Permitting Authority and Additional Permits

Site Permit

In addition to the Certificate of Need, the proposed project requires a Site Permit (Minn. Statute 216F.04). The Site Permit is issued by the Commission and is being considered in a separate docket (WS-11-608). A Site Permit authorizes the siting and construction of the project and cannot be issued before a certificate of need has been issued for the project (Minn. Statute 216B.243).

Additional Permits

In addition to approvals issued by the Commission, the project will require permits and approvals from federal agencies, additional state agencies, and local governments. These permits are identified in Section 7 of this ER.

3 Description of the Proposed Project

Ellerth Wind LLC, a Delaware limited liability company and a wholly owned subsidiary of TCI Renewables Ltd., a company registered in England with North American offices in Montreal, Canada, is responsible for the oversight and management of the project, along with construction, operations and maintenance.

3.1 Project Description

Ellerth Wind (EW) has not made a final selection of wind turbine generators for the project. The EW site permit application identifies three turbine models to span the spectrum of typical turbine models in the 1.6 to 2.3 MW range (General Electric [GE] 1.6 MW, Vestas 1.8 MW V90, and the Siemens 2.3 MW SWT-101 turbines). Table 1, provides additional information on the turbine models being considered. Other associated project facilities include gravel access roads, tower foundations, an electrical collection system, fiber optic communication cables, transformers, meteorological towers, a project substation, and an Operations and Maintenance (O&M) building.[3]

Ellerth Wind, in its site permit application, identified a preliminary site layout that represents the largest number of turbines to be considered and includes 61 turbines along with 9 alternates and is based on the GE 1.6 MW turbine model. A preliminary turbine layout is depicted on Map 2.

Should one of the other turbine models be chosen, the number of turbine locations will be reduced to 54 for the Vestas 1.8 MW V90 turbine and 43 for the Siemens 2.3 MW SWT-101 turbine to meet the nameplate threshold of 98.9 MW. Locations to be dropped will be determined by potential environmental constraints, wind resource considerations, plant optimization and/or construction design optimization. Preliminary turbine locations are subject to relocation based on site permit conditions or other permitting requirements.[4]

Table 1. Wind Turbine Specifications[5]

Characteristics	Turbine Model		
	GE 1.6 MW	Vestas 1.8 MW	Siemens 2.3 MW
Nameplate capacity	1,600 kW (1.6 MW)	1,800 kW (1.8 MW)	2,300 kW (2.3 MW)
Hub height	80 m (262.5 ft) 100 m (328.1 ft)	80 m (262.5 ft) 95 m (311.7 ft)	80 m (262.5 ft) 100 m (328.1 ft)
Rotor diameter	100 m (328.1 ft)	90 m (295 ft)	101 m (331 ft)
Total height[1]	130 m – 150 m	125 m – 140 m (410.1 ft – 459.3 ft)	130.5 m – 150.5 m

[3] Source: Ellerth Wind Site Permit Application (SPA), November 4, 2011, at p.5-6.
[4] Id. at p. 5- 6.
[5] Id. at p. 6.

	(426.5 ft – 492.1 ft)		(428.1 ft – 493.8 ft)
Cut-in wind speed[2]	3 m per second (m/s) (6.7 mph)	4 m/s (8.9 mph)	4 m/s (8.9 mph)
Rated capacity wind speed[3]	12 m/s (26.8 mph)	12 m/s (26.8 mph)	12-13 m/s (26.8 to 29.1 mph)
Cut-out wind speed[4]	25 m/s (55.9 mph)	25 m/s (55.9 mph)	25 m/s (55.9 mph)
Rotor speed	9.75 to 16.2 rpm	9.0 to 14.9 rpm	6 to 16 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 at which turbine shuts down operation

The towers are conical tubular steel with a hub height of between 80 meters (262.5 ft) and 100 m (328.1 ft). The turbine towers, where the nacelle is mounted, consist of three to five sections manufactured from certified steel plates. Welds are made in automatically controlled power welding machines and ultrasonically inspected during manufacturing per American National Standards Institute specifications. All surfaces are sandblasted and multi-layer coated for protection against corrosion. Access to the turbine is through a lockable steel door at the base of the tower. [6]

The turbines would be mounted on steel towers manufactured according to ANSI (American National Standards Institute) and IEC (International Electro technical Commission) standards. Access to the tower, which would include an elevator and a ladder with a man-lift, would be through a locked door in the base of the tower. The turbines would include a Condition Monitoring and Predictive Maintenance system to help identify technical problems and reduce the down-time for individual turbines.[7]

Power would be collected through either underground or overhead power collection system, which would aggregate power at a project substation to be built as part of the project. The substation would connect to an Otter Tail Power Company 115 kV transmission line within the project site.[8]

A supervisory control and data acquisition (SCADA) system would be installed to monitor turbine availability and conditions. This system would alert personnel of faults and allow remote operation of turbines. It would also record turbine performance and assist with utility-shutdown needs.

Ellerth Wind has installed two temporary 196.9 ft (60 m) meteorological towers within the Project Area that were installed in May 2008 and June 2010. It is anticipated that the site will include between one and three permanent 328.1 ft (100 m) meteorological towers to house anemometers and related instruments to monitor project meteorological conditions. The locations of these permanent meteorological towers have not been determined at this time but will be located within the Project

[6] Site Permit Application, at p. 6.
[7] Id. at p. 6.
[8] Id. at 7.

Area. Meteorological tower site selection is based upon coordination with the final turbine locations to ensure proper operation of the wind assessment equipment. [9]

The project may require up to approximately 17.8 miles of permanent access roads that will be approximately 16 ft (4.88 m) wide and low profile to allow cross-travel by farm equipment.[10]

An O&M facility will be constructed within or near the Project Area and will provide access and storage for project maintenance and operations. This facility will be permitted locally at a location to be determined. The buildings typically used for this purpose are 3,000 to 5,000 square ft and house the equipment to operate and maintain the wind farm. The parking lot adjacent to the building is typically 3,000 square ft.[11]

3.2 Project Location

The Project Area is located west of the town of Newfolden in Marshall County, Minnesota (Map 1). Table 2 identifies the townships and sections in which the project is located. This is the area where project facilities will be developed (including turbines, electrical collection lines, project substation, etc.) will hereafter be referred to as the "Project Area".

The Project Area encompasses approximately 33,709 acres of mostly agricultural land. Ellerth Wind has secured agreements with landowners over approximately 18, 870, representing approximately 56 % of lands within the Project Area. The Project Area will allow siting flexibility in the event proposed turbine locations prove unsuitable while also providing sufficient buffers and setbacks required to minimize impacts on environmental and human impacts.

Table 2. Project Location[12]

County	Township Name	Township	Range	Section
Marshall	Wright	157N	46W	E1/2 SE1/4 36
Marshall	West Valley	157N	45W	S1/2 30, 31-35
Marshall	Foldahl	156N	46W	1, 2, 11-13, 24, 25, 36
Marshall	Marsh Grove	156N	45W	1-13, 19-23, 26-35
Marshall	Comstock	155N	46W	1
Marshall	Viking	155N	45W	2-6

[9] Id. at p. 8.
[10] Id. at 8-9
[11] Id. at 8
[12] Id. at 3

3.3 Project Cost and Schedule

The total project-installed capital costs are estimated to be between approximately $195 and $215 million, including wind turbines, associated electrical and communication systems, and roads. Ongoing operations and maintenance costs and administrative costs are estimated to be approximately $4 to 6 million per year, including royalties to landowners for wind easement rights and production taxes.[13]

Permanent financing will be provided with the Applicant's internal funds or a combination of internal funds and third-party sources of debt and equity capital. It is anticipated that permanent financing will be secured through a long term power purchase agreement or through a power hedge mechanism.[14]

Several variables will affect the project schedule; however, once construction starts it will take approximately 6 to 8 months to complete.

[13] Id. at p. 86
[14] Id. at p. 86.

4 Description of Project Alternatives

Minn. Rule 7849.1200 requires the Commission to consider alternatives to the proposed project. In addition to evaluating alternatives and their impacts, a no build option must also be evaluated. This section provides a discussion of alternate power sources to the Ellerth Windpark Project.

The alternatives considered would generate energy equivalent to that of the proposed project and provide renewable, low, or zero carbon emission energy. Typically, alternatives to the project would include generation facilities of all types, including plants that use coal, natural gas, fuel oil, or similar non-renewable fuels. Alternatives would also include constructing transmission facilities (to import energy) in lieu of generation. However, the proposed project is intended to produce renewable energy in furtherance of Minnesota's renewable energy standard. Accordingly, alternatives considered here are technologies eligible to be counted toward these objectives.[15]

Alternatives evaluated include: (1) a 98.9 MW LWECS sited elsewhere in Minnesota, (2) a 38.5 MW biomass plant, and (3) a "no build" alternative.

4.1 98.9 MW LWECS

An alternative to the proposed project, which would utilize an eligible renewable energy (wind), is a LWECS sited elsewhere in Minnesota. Such a project could, theoretically, be a 98.9 MW project or a combination of smaller dispersed projects. The analysis in this ER will attempt to describe differences in the impacts associated with a generic 98.9 MW wind project sited in Minnesota and the Ellerth Windpark Project, sited in Marshall County.

4.2 38.5 MW Biomass Plant

One alternative renewable energy source to the proposed project would be a biomass plant of equivalent electricity generation as the proposed project. Biomass is any organic matter that is available on a renewable or recurring basis. It includes all plants and plant derived materials, including agricultural crops and trees, wood and wood residues, grasses, aquatic plants, animal manure, municipal residues, and other residue materials. Plants (on land or in water) use the light energy from the sun to convert water and carbon dioxide to carbohydrates, fats, and proteins along with small amounts of minerals.[16] Combustible gases from landfills or anaerobic digestion of waste material is referred to as biogas.

Solid biomass can be burned like coal to produce steam. It can also be gasified and burned like natural gas. Various forms of biomass are utilized in Minnesota. The St. Paul District Energy, a combined heat and power facility in downtown St. Paul, is fueled primarily by woody biomass and has an electric generation capacity of 25 MW. Other biomass plants in Minnesota, such as Fibrominn, utilize turkey litter or combinations of woody biomass and agricultural biomass, as with the Laurentian Energy Authority in Hibbing and Virginia.

[15] Minn. Statute 216B.1691, Subd. 1. Eligible energy technologies include technologies that generate electricity from solar, wind, hydroelectric, hydrogen, or biomass.
[16] Oak Ridge National Laboratory's Biomass Energy Notebook, http://cta.ornl.gov/bedb/introduction/Biomass_Overview.shtml

The biomass alternative considered in this ER would likely burn a combination of woody and agricultural biomass, such as corn stover, with natural gas as a backup fuel. A similar plant, the 38.5 MW NGPP Minnesota Biomass, LLC, electric generation facility, has undergone environmental review in Minnesota (2003) and provides data on potential impacts.[17] The Ellerth Windpark Project would have a capacity of 98.9 MW, with an estimated capacity factor of 37 to 41 percent.[18] The 38.5 MW biomass alternative examined in this ER provides energy generation that is roughly equivalent to the proposed project.[19]

4.3 No Build Alternative

The no build alternative means that no wind project is constructed. The analysis for this alternative will consider the potential benefits and drawbacks of not constructing the proposed project.

[17] EQB Docket No. 03-67-EAW-NGP Biomass [hereafter Minnesota Biomass EAW]; see http://mn.gov/commerce/energyfacilities/Docket.html?Id=4452

[18] Site Permit Application at p. 88.

[19] The biomass alternative, because it has natural gas backup, is assumed for analysis purposes to have a capacity factor of 1.0. Scheduled and unscheduled maintenance would make the effective capacity factor slightly less than 1.0.

5 Environmental and Human Impacts

Construction and operation of large energy facilities can result in environmental and human impacts. Many of the impacts can be mitigated through siting and through use of best management practices. This section discusses the potential environmental and human impacts of the Ellerth Windpark Project and project alternatives. The alternatives include: (1) a 98.9 MW wind energy conversion system sited elsewhere in Minnesota, (2) a 38.5 MW biomass plant. The potential impacts of the no build alternative are discussed in Section 5. Additionally, this section provides mitigation strategies for potential impacts.

5.1 Air Quality

Electric generation facilities have the potential to emit air pollutants during construction and operation. Minnesota Rule 7849.1500 requires this ER to examine certain air quality emissions.

5.1.1 Criteria Pollutants

Minnesota Rule 7849.1500 requires this ER to examine emissions of the following pollutants: sulfur dioxide (SO_2), nitrogen oxides (NO_x), carbon dioxide (CO_2), mercury (Hg), and particulate matter (PM). These common pollutants (other than mercury) are known as criteria pollutants.[20] Each of these pollutants is known to cause environmental health impacts. Sulfur oxides (SO_x) cause acid rain and human respiratory illness.[21] Nitrous oxides (NO_x) are greenhouse gases that cause ozone and related respiratory illnesses.[22] Carbon dioxide (CO_2) is a greenhouse gas that contributes to climate change and associated impacts.[23] Mercury can cause impaired neurological development in children.[24] Inhalation of particulate matter causes and contributes to human respiratory illness.[25]

Ellerth Windpark Project

With the exception of fugitive dust created during construction of the project, the Ellerth Windpark Project would emit no criteria pollutants during operation. A minimal amount of these pollutants would be produced during construction, largely due to the operation of heavy machinery and equipment. Overhead transmission lines, under certain conditions, produce limited amounts of ozone and nitrogen oxide emissions. Emissions of these pollutants would be minimal.

Dust and emissions associated with the construction of the project would be similar to large scale outdoor construction activities such as road work and residential areas. The project area includes multiple construction "sites" in the form of individual turbines and a network of access roads. Dust from construction traffic can be controlled using standard construction practices such as watering of exposed surfaces, covering of disturbed areas, and reduced speed limits on site. Once project construction is completed, air and dust emissions related to vehicular traffic would be reduced. Limited emissions would be associated with routine maintenance and repairs.

[20] What Are the Six Common Air Pollutants?, http://www.epa.gov/air/urbanair/.
[21] Health and Environmental Impacts of SO_2, http://www.epa.gov/air/urbanair/so2/.
[22] Health and Environmental Impacts of NO_x, http://www.epa.gov/air/nitrogenoxides/.
[23] Climate Change 2007: Synthesis Report, Summary for Policymakers, An Assessment of the Intergovernmental Panel on Climate Change (IPCC), http://www.ipcc.ch/.
[24] Health Effects, http://www.epa.gov/mercury/effects.htm.
[25] Health and Environment, http://www.epa.gov/air/particlepollution/health.html.

Generic 98.9 MW LWECS

A generic 98.9 MW LWECS would emit no criteria pollutants during operation, and would have ancillary emissions (construction, transmission line) similar to those from the Ellerth Windpark Project.

38.5 MW Biomass Plant

A 38.5 MW biomass plant would emit criteria pollutants. These pollutants are based on a plant similar to the NGPP Minnesota Biomass plant (see Section 4.2). Each of these pollutants is known to cause environmental health impacts. Sulfur oxides (SO_x) cause acid rain and human respiratory illness.[26] Nitrous oxides (NO_x) are greenhouse gases that cause ozone and related respiratory illnesses.[27] Carbon dioxide (CO_2) is a greenhouse gas that contributes to climate change and associated impacts.[28] Mercury can cause impaired neurological development in children.[29] Inhalation of particulate matter causes and contributes to human respiratory illness.[30] Table 3 provides potential emission rates and annual emissions of criteria pollutants associated with a 38.5 MW biomass plant.[31]

Table 3. Estimated Criteria Pollutants for a 38.5 MW Biomass Plant

Pollutant	**Emissions Rate** (lbs/kWh)	**Annual Emissions** (tons/year)
Sulfur Dioxide (SO_2)	3.46 E-04	58.3
Nitrogen Oxides (NO_x)	1.98 E-03	333.9
Carbon Dioxide (CO_2)	0.66[32]	1.11 E05[33]
Mercury (Hg)	1.19 E-08	2.00 E-03
Particulate Matter (PM)	7.18 E-04	121.1

lbs/kWh = pounds per kilowatt-hour

Because these pollutants are diffused into the global atmosphere, regional impacts are difficult to quantify. However, impacts due to particulate matter and ground-level ozone can be localized. Particulate matter and ozone are the pollutants of most concern in Minnesota and are tracked

[26] Health and Environmental Impacts of SO_2, http://www.epa.gov/air/urbanair/so2/.
[27] Health and Environmental Impacts of NO_x, http://www.epa.gov/air/nitrogenoxides/.
[28] Climate Change 2007: Synthesis Report, Summary for Policymakers, An Assessment of the Intergovernmental Panel on Climate Change (IPCC), http://www.ipcc.ch/.
[29] Health Effects, http://www.epa.gov/mercury/effects.htm.
[30] Health and Environment, http://www.epa.gov/air/particlepollution/health.html.
[31] Adapted from Minnesota Biomass EAW, http://energyfacilities.puc.state.mn.us/Docket.html?Id=4452.
[32] AP-42, Fifth Edition, Volume 1, Chapter 1 External Combustion Sources, Section 1.6 Wood Residue Combustion in Boilers, http://www.epa.gov/ttn/chief/ap42/ch01/final/c01s06.pdf.
[33] Because the plant is fired with biomass (excepting natural gas backup) net carbon dioxide emissions from the plant would be minimal. Carbon dioxide released from the plant would be integrated into new biomass materials which, in time, would be harvested and used to fire the plant. There would be carbon dioxide emissions related to transport of biomass and plant operations.

regionally by the Minnesota Pollution Control Agency (MPCA). Because the plant would primarily utilize biomass for generation, net impacts from carbon dioxide would be minimal. Carbon dioxide released by the biomass plant would be utilized by living plants, which in time, would serve as fuel. The plant would operate as a largely closed carbon dioxide loop. However, fuels used to collect and transport biomass would likely not be carbon neutral and would create carbon dioxide emissions.

Mercury exists throughout the environment; however, the primary source of mercury in air emission is coal, i.e., the burning of coal in a coal-fired power plant. The biomass plant considered here would use biomass as a primary fuel and natural gas as a backup fuel. Thus, emissions of mercury, and related impacts, would be minimal.

Emissions of some criteria air pollutants can be mitigated through control technologies. Nitrous oxides emissions could be reduced by approximately 75 percent through use of a selective non-catalytic reduction system on the biomass boiler.[34] Particulate matter emissions could be reduced by 90 percent with add-on devices such as a multi-cyclone and dust collector.[35]

In addition to the use of control equipment to mitigate pollutant impacts, a best available control technology (BACT) analysis could be conducted. The BACT analysis is a requirement of new facilities under federal new source review prevention of significant deterioration (PSD). A BACT analysis and implementation could limit emissions from the plant to less than those presented in Table 3.

No Build Alternative

Under the No-Build Alternative no project would be built and no criteria pollutants would be emitted.

5.1.2 Hazardous Air Pollutants and Volatile Organic Compounds

Electric generation facilities have the potential to emit air pollutants during construction and operation. Minnesota Rule 7849.1500 requires this ER to examine emissions of hazardous air pollutants (HAP) and volatile organic compounds (VOC). These classes of pollutants are known or suspected of causing cancer and other serious health effects.[36]

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The Ellerth Windpark Project would not emit HAPs or VOCs during operation. Petroleum-based fluids used in the operation of wind turbines such as gear box oil, hydraulic fluid, and gear grease, have a low vapor pressure and any release of VOCs would be minimal.

Generic 98.9 MW LWECS

A generic 98.9 MW LWECS would not emit HAPs and VOCs emissions during operation.

38.5 MW Biomass Plant

A 38.5 MW biomass plant would emit HAPs and VOCs. The amounts of these pollutants are based on a plant similar to the NGPP Minnesota Biomass plant. Because these pollutants are diffused into the

[34] Minnesota Biomass EAW.
[35] Id.
[36] About Air Toxics, http://www.epa.gov/ttn/atw/allabout.html;

global atmosphere, regional impacts are difficult to quantify. The only area in Minnesota with a cancer risk due to HAPs greater than 100 in a million is the Minneapolis - Saint Paul metro area.[37] The emissions from the biomass plant would be relatively small compared with other sources. Table 4 lists the potential emission rate and annual emissions of hazardous air pollutants and volatile organic compounds associated with a 38.5 MW biomass plant. [38]

Table 4. Estimated HAP and VOC Emissions at a 38.5 MW Biomass Plant

Pollutant	**Emission Rate** (lbs/kWh)	**Annual Emissions** (tons/year)
Hazardous Air Pollutants (HAPs)	1.80 E-04	30.4
Volatile Organic Compounds (VOCs)	5.55 E-04	93.6

lbs/kWh = pounds per kilowatt-hour

It is possible to mitigate HAP and VOC emissions with control technologies. However, given the relatively small amounts of HAP and VOC emissions compared with the costs of control equipment, it is likely that control technologies would not be employed.

No Build Alternative

Under the No-Build Alternative no project would be built and no HAPs or VOCs would be emitted.

5.1.3 Ozone

Large electric power generating facilities, such as biomass facilities, have the potential to produce reactive organic gases, which can lead to ground-level ozone formation. Wind turbines do not produce ozone or ozone precursors. Minnesota Rules 7849.1500, subpart 2 requires that this ER address anticipated ozone formation. Ozone can cause human health risks and can also damage crops, trees, and other vegetation.[39]

Ellerth Windpark Project

The Ellerth Windpark Project would not produce ozone or ozone precursors. Thus, there would be no human or environmental impacts or mitigation related to ozone formation.

Generic 98.9 MW LWECS

A generic 98.9 MW LWECS would not produce ozone or ozone precursors.

38.5 MW Biomass Plant

A 38.5 MW biomass plant would produce ozone precursors (e.g., NO_x, VOC) that would lead to ozone formation. Impacts from ozone are localized. The State of Minnesota is designated as in attainment for

[37] Summary of Results for the 2002 National-Scale Assessment, http://www.epa.gov/ttn/atw/nata2002/risksum.html.
[38] Adapted from Minnesota Biomass EAW, http://energyfacilities.puc.state.mn.us/Docket.html?Id=4452.
[39] Ozone, http://www.epa.gov/Ozone/. Air Quality – Ozone, http://www.health.state.mn.us/divs/eh/air/ozone.htm.

ozone by the Environmental Protection Agency (EPA). Given this status, ground level ozone formation and associated impacts are anticipated to be minimal.

Ozone formation could be mitigated by mitigating ozone precursors. See discussion in Sections 5.1.1 and 5.1.2 regarding nitrous oxides (NO_X) and volatile organic compounds (VOC) respectively.

No Build Alternative

Under the No-Build Alternative no project would be built and no ozone would be produced

5.2 Water Appropriations

Large electric power generating facilities may require water for operations. This section discusses potential water appropriation impacts from such facilities. Minnesota Rules 7849.1500, subpart 2 requires that this ER address anticipated water appropriations. A discussion of ground water occurs in Section 5.5.3, and surface water occurs in Section 5.5.4.

Ellerth Windpark Project

The proposed project would require water appropriations for potable and sanitary water for the operations and maintenance facility. Depending upon the location of the operations and maintenance facility, water would be supplied through the existing rural water supply or a single domestic-sized well. This amount of water used would be roughly equivalent to the amount consumed by a residence or farmstead in the area, and would likely not require mitigation. Because of the minimal water appropriation, mitigation is not discussed.

Generic 98.9 MW LWECS

A generic 98.9 MW LWECS would have water appropriations similar to the Ellerth Windpark Project.

38.5 MW Biomass Plant

A 38.5 MW biomass plant would require water appropriations for energy production (process water) and sanitation. Process water could come from a well; however, a municipal water source may also be required. For some aspects of the process, such as in the cooling tower, effluent water from a wastewater treatment facility could be used. The sources of water would depend on the type and availability of water sources near the facility location.

The required quantity of water would be dependent on plant design and water quality. Functions within the plant that require water include cooling, sanitation, washing and separations. The average anticipated water use would be approximately 1,275 gallons per minute. If a source of effluent wastewater were available, the appropriation of well or municipal water would be relatively lower. If the plant used only well or municipal water, the water appropriation would be higher. Based on anticipated water use, the plant would require a water appropriations permit from the Minnesota Department of Natural Resources (MDNR)[40] if using well water.

[40] Water Use Permits, http://www.dnr.state.mn.us/waters/watermgmt_section/appropriations/permits.html.

Mitigation of well water and municipal water use by the plant could be achieved through plant equipment choices and through the use of effluent water (water that has already been appropriated). If municipal water were used for the plant, modifications or an expansion of the municipal water treatment plant may be required to accommodate the increase in demand.

No Build Alternative

Under the No-Build Alternative no project would be built and no water would be appropriated.

5.3 Wastewater

Large electric generation facilities have the potential to generate significant amounts of wastewater. This section discusses potential impacts from wastewater generation. Minnesota Rules 7849.1500, subpart 2 requires that this ER address anticipated wastewater streams and discharge.

Ellerth Windpark Project

The proposed project does not create wastewater during the generation of electricity. However, wastewater would be created by the operation and maintenance (O&M) building. This wastewater would likely be discharged into a septic system associated with the building. The potential impacts of this wastewater and septic system are anticipated to be minimal. Mitigation of the impacts, beyond a properly functioning septic system, is not anticipated.

Generic 98.9 MW LWECS

A generic 98.9 MW LWECS would have wastewater impacts similar to the Ellerth Windpark Project.

38.5 MW Biomass Plant

A 38.5 MW biomass plant would have process and sanitary wastewater discharges. The amount of wastewater discharge would depend on the water sources used for the plant. If well and municipal water are used, anticipated average wastewater discharge would be approximately 1,275 million gallons per year. If effluent water is also utilized, wastewater discharge could decrease to approximately 310 million gallons per year.

Wastewater impacts could be mitigated by processing. The most likely scenario is transference of the wastewater to a municipal sewage system for treatment and release. Wastewater could be held or pre-treated at the biomass plant. Holding could reduce discharges through evaporation. However, holding introduces risks related to keeping wastewater stored away from surface and ground waters.

No Build Alternative

Under the No-Build Alternative no project would be built and there would be no water discharge.

5.4 Solid and Hazardous Wastes

Large electric generation facilities have the potential to generate solid and hazardous wastes. If not properly stored and disposed of solid and hazardous wastes can contaminate surface and ground waters. This contamination has the potential to cause human health impacts. This section discusses potential impacts from such wastes. Minnesota Rules 7849.1500, subpart 2 requires that this ER address anticipated solid and hazardous wastes generated by the proposed project.

Ellerth Windpark Project

Construction of the project would generate solid wastes such as scrap wood, plastics, cardboard and wire to name a few. The project will require use of certain petroleum products as gear box oil, hydraulic fluid, and gear grease (likely less than 3 tons per year). When disposal is necessary, these materials will be recycled or otherwise stored and disposed of according to federal and state regulations. In addition, a small amount of office and maintenance materials waste will be produced at the operations and maintenance facility (likely less than 2 tons per year. These materials will also be stored, recycled and dispose of according to applicable federal, state and local regulations.[41]

Hazardous wastes would need to be handled appropriately and leaks or spills would be mitigated using appropriate clean up techniques. A listing of all potentially hazardous materials related to the Project should be maintained for the Project. It is not anticipated that the Project would require a hazardous waste license. Hazardous waste generation would likely fall below the quantity required for a very small quantity generator license (220 pounds per month).[42]

Solid and hazardous wastes, if not properly handled, can contaminate surface and ground waters. This contamination can cause human health impacts, e.g., cancer.[43]

Generic 98.9 MW LWECS

A generic 98.9 MW LWECS would have solid and hazardous waste impacts similar to the Ellerth Windpark Project.

38.5 MW Biomass Plant

A 38.5 MW biomass plant would create solid and hazardous wastes. Solid wastes would be generated during construction, e.g., scrap wood, plastics, cardboard and wire. Solid waste generated from operations would consist primarily of ash from the biomass boiler. Small amounts of hazardous wastes would be generated during operation, e.g., oils, grease, hydraulic fluids, solvents. Hazardous materials would likely be stored on site, e.g., diesel fuel.

Ash generated by the plant would be held on-site in an ash holding facility or removed to an off-site disposal facility. Storage tanks would be registered and maintained in accordance with MPCA guidelines.

No Build Alternative

Under the No-Build Alternative no project would be built and there would be no solid or hazardous waste would be produced.

[41] Certificate of Need Application at p. 35-36.
[42] Very Small Quantity Generator Hazardous Waste Collection Program, http://www.pca.state.mn.us/publications/w-hw2-50.pdf.
[43] Volatile Organic Compounds (VOCs) in Minnesota's Ground Water, http://www.pca.state.mn.us/water/groundwater/gwmap/voc-fs.pdf.

5.5 Natural Resources

Large electric generation facilities have the potential to impact natural resources, including flora, fauna, habitat, soils and water. This section discusses potential impacts to natural resources from the operation of a generation facility in the project area.

5.5.1 Ecological Setting

The Minnesota Department of Natural Resources and the U.S. Forest Service have developed an Ecological Classification System (ECS) for ecological mapping and landscape classification in Minnesota.[44] Ecological land classifications are used to identify, describe, and map progressively smaller areas of land with increasingly uniform ecological features. The Project Area is located within the Aspen Parklands subsection of the Tallgrass Aspen Parkland Province of the Minnesota Department of Natural Resources Ecological Classifications System (Map 5). The Aspen Parklands subsection is part of a low, level lake plain (Glacial Lake Agassiz) occupied by extensive forested peat lands to the east and tall grass prairie to the west. Pre-settlement vegetation consisted of a combination of aspen savanna, tallgrass prairie, wet prairie, and dry gravel prairie (on gravely beach ridges). Floodplain forests of silver maple, elm, cottonwood and ash occurred along rivers and streams. Currently, agriculture is the dominant land use in the southern half of the subsection, where the Project Area is located. In the north, extensive areas have been cleared for farming. Remnants of pre-settlement vegetation are more common and in larger blocks than many other Minnesota ecological subsections where agriculture is important.

Current land use within the Project Area is dominated by agricultural uses and a variety of other smaller uses as shown in Table 5.

Table 5. Land Cover Classes within the Project Area

Land Cover Class	Acres
Cultivated Crops	28,664.6
Deciduous Forest	1,637.1
Developed, Open Space	1,234.9
Emergent Herbaceous Wetlands	705.9
Pasture / Hay	684.7
Woody Wetlands	507.5
Developed, Low Intensity	133.4

[44] See MN DNR Ecological Classification System, http://www.dnr.state.mn.us/ecs/index.html

Land Cover Class	Acres
Shrub/Scrub	64.6
Grassland / Herbaceous	59.6
Open Water	15.7
Evergreen Forest	1.0
Total Land Cover	**33,709**

Data Source: Land Cover Class as presented in National Land Cover 2001 Dataset

Public lands surrounding the project area provide important wildlife habitat in a landscape dominated by agricultural uses, particularly for resident and migratory birds. Wildlife management areas (WMAs) are part of Minnesota's outdoor recreation system and are established to protect lands and waters that have a high potential for wildlife production, public hunting, trapping, fishing, and other compatible recreation uses.[45] Similarly, Waterfowl Production Areas (WPAs) are acquired as public land or protected through perpetual easement, as part of the U.S. Fish and Wildlife Service's (USFWS) National Wildlife Refuge System and provide habitat for a vast variety of waterfowl, shorebirds, grassland birds, plants, insects and wildlife. [46] There are no WPAs in the Project Area.

USFWS administers a program by which the USFWS holds easements on private lands that have wetlands and/or grassland habitat. Development may be restricted on lands held in a USFWS easement. According to the USFWS, no easements (conservation, wetland or grassland) are known to exist within the Project Area.

Old Mill State Park is located immediately west of the Project Area. The approximately 406.8-acre park contains Riverine forest, small areas of oak savanna, and prairie. The river valley that runs through the park acts as an access corridor for many species including beaver, white-tailed jackrabbit, snowshoe hare, and numerous bird species (DNR 2010b).[47] Table 6 identifies public lands within the vicinity of the Project Area.

Table 6. Public Lands within 10 miles of the Project Area

Resource	Approximate Location	Acres
WMAs		
New Folden WMA	Three miles east of Project Area	200

[45] DNR http://www.dnr.state.mn.us/wmas/description.html.
[46] U.S. Fish and Wildlife Service http://www.fws.gov/refuges/whm/wpa.html.
[47] Site Permit Application at p. 33.

Adolf Elseth WMA	Within north central portion of Project Area	43.8
Florian WMA	Five miles north of Project Area	1,529.2
West Valley WMA	Three miles north of Project Area	247.3
New Maine WMA	Four miles northeast of Project Area	2,667.2
Alces WMA	Four miles north of Project Area	75.1
Wright WMA	Adjacent to north western Project Area	393.7
Spruce Valley WMA	Five miles east of Project Area	80.9
East Park WMA	Six miles northeast of Project Area	10,427.4
Huntly WMA	Nine miles northeast of Project Area	6,505.6
State Parks		
Old Mill State Park	One mile west of Project Area	406.8

5.5.2 Geology and Soils

Surficial geology within the Project Area consists of mainly glaciolacustrine deposits and glacial moraine deposits from the late Wisconsin. The glaciolacustrine deposits typically found in the western portion of the Project Area are described as calcareous, very fine to coarse sand, gravelly sand, and gravel ranging from moderately well stratified to well stratified, and moderately sorted to well sorted. These deposits occur as shore and near shore deposits in beach ridges, spits, tombolos, and offshore bars and as offshore sheet deposits. The moraine deposits typically found in the eastern portion of the Project Area are described as a very calcareous clay, silty clay, clay loam, and silty clay loam clayey till. These deposits are nonstratified and nonsorted, typically with no apparent structure and may be overlain by discontinuous lake clay, silt, sand, and gravel, alluvium, swamp deposits, or peat and muck. Alluvial deposits along existing streams and along abandoned channels may also be present within the Project Area. These alluvial deposits are generally loose, poorly sorted to well-sorted, stratified fine to medium pebbly sand and/or coarse sand and gravel (Fullerton 2000).[48]

Bedrock in the Project Area consists of Archean-aged basement rocks including late Archean granite, granodiorite, granitoid intrusions, which intrude into Late Archean Supracrustal rocks that are typically mafic to intermediate volcanic and volcaniclastic, and volcaniclastic sedimentary rocks. The intruding rocks are associated with the Florian Batholith, which is located between the Middle River Fault to the north and the Argyle Fault to the south (Jirsa, 1999). Based on well information provided by the Minnesota Health Department's County Well Index, depth to bedrock is approximately 320 feet below ground surface (Minnesota Department of Health 2007).[49]

[48] Id at p. 45.
[49] Id at p. 45-46.

According to the NRCS Soil Survey Geographic Database (SSURGO), there are 13 major soil map units within the Project Area. Major soil map units are considered to be those comprising more than 500 acres of surface area within the Project Area. The largest soil series within the site is Grimstad (5,680 acres) which is a fine sandy loam, typically located on glacial lake plains and moraines. Permeability is moderate to rapid in the upper parts. Other major soils within the area include Vallers (4,932 acres), Mavie (4,932 acres), Roliss-Vallers (4,312 acres) and Strathcoma (2,996 acres). These soil series are characterized as being very deep, poorly drained soils, typically formed on till and level lake plains having a slope of zero to three percent.[50]

Ellerth Windpark Project

Impacts to geology from the project are not anticipated. Construction of the turbines, access roads, substation, and operations and maintenance facility will increase the potential for soil erosion and compaction.

All construction projects disturbing one acre or more are required to apply for a construction stormwater permit through the MPCA. Ellerth Wind will submit a National Pollutant Discharge Elimination Systems (NPDES) permit application for construction facilities to the MPCA. The application will identify Best Management Practices (BMPs to be employed during construction of the project to prevent erosion. A Stormwater Pollution Prevention Plan (SWPPP) will be developed prior to construction, and will identify BMPs such as silt fencing, management of exposed soils and revegetation plans to prevent erosion.

Generic 98.9 MW LWECS

Impacts to geology and soils from a generic 98.9 MW wind project would depend upon the specific site of the project(s). Any wind project would create the potential for soil erosion and compaction; mitigation strategies would likely be similar.

38.5 MW Biomass Project

Construction of a 38.5 MW biomass project would also increase the potential for soil erosion. As a large construction project, the developer would be required to apply for an NPDES permit and develop a SWPP for both the construction and operation components of the project. Soil compaction would be less of an issue, as the project would be used as an industrial facility and not for agriculture.

No Build Alternative

Under the No-Build Alternative no project would be built and there would be no impact to geology or soils.

5.5.3 Ground Water

Groundwater in the region is mainly supplied by surficial sand and gravel deposits. Generally, the Project Area lies over materials that do not yield significant amounts of water. Groundwater may be found in thin bands of beach ridge deposits (Reppe 2005). [51]

[50] Id at p. 42-44. Department of Agriculture. Web Soil Survey. Available online at http://websoilsurvey.nrcs.usda.gov/
[51] Id at p. 46.

Ellerth Windpark Project

Impacts to groundwater resources are not anticipated. As addressed in Section 5.2, water supply needs will be similar to those required in a residence. Applicants anticipate that, depending upon the location of the operations and maintenance facility, water requirements for the project will be met through either a well or municipal water supply.

Wind turbine locations will not impact the use of existing water wells. To comply with residential and noise setbacks turbines would be located at least 1,000 feet from homes, where most of the wells would be located. Measures would be taken to identify any nearby wells prior to construction of turbine foundations. Agencies such as the DNR, MPCA and Minnesota Department of Health will also be contacted as necessary to determine appropriate actions to protect local groundwater resources.

Generic 98.9 MW LWECS

Impacts to groundwater from a generic wind project would be similar or higher depending on site location and geological material of the project.

38.5 MW Biomass Plant

As discussed in Section 5.2, a biomass plant would be expected to require approximately 1,275 gallons per minute of water for cooling, sanitation, washing and separations. A biomass plant would be expected to have similar impacts on resources as the proposed project depending on resources on and near the project site. Siting of the biomass plant utilizing construction practices that minimize impacts to surface water would likely mitigate impacts.

No Build Alternative

Under the No-Build Alternative no project would be built and there would be no impact to groundwater.

5.5.4 Surface Waters

Potential impacts to surface waters from electric generation projects are generally related to construction activities. In the case of a biomass facility, where fuel may be stored onsite, fuel supplies need to be properly stored to prevent potential impacts to surface waters from runoff.

Ellerth Windpark Project

The Project Area is located within the Snake River Watershed of the Red River Province in northwestern Minnesota. The Public Waters Inventory (PWI) dataset identifies approximately 70.4 acres of basins within the Project Area; all of which are included within the National Wetlands Inventory (NWI) data. The PWI dataset identifies two watercourses (Snake River and Middle River) within the Project Area totaling approximately 16.4 miles; 13.9 miles of which are identified as perennial streams.[52]

During construction of the project, there is the potential for sediment to reach surface waters due to ground disturbances from vegetation clearing, excavation, grading and construction traffic.

Because construction of the project requires disturbance of more than one acre of soil, Ellerth Wind will submit a NPDES permit application for construction facilities to the MPCA. The application will identify

[52] Site Permit Application at p. 46.

Best Management Practices to be employed during construction of the project. A SWPPP will be developed prior to construction, and will identify BMPs such as silt fencing, management of exposed soils and revegetation plans to prevent erosion.

In addition to erosion control measures, fueling and lubricating for construction equipment away from waterways would ensure that fuel and lubricants do not enter waterways.

LWECS permits issued by the Commission require permits and approvals from the DNR, USFWS, and USACE for any access roads constructed across streams or drainage ways. If access roads are constructed across streams or drainage ways, roads must be designed to ensure that runoff from the upper portions of the watershed can readily flow to the lower portions of the water shed.

Generic 98.9 MW LWECS

The primary source of impacts to surface from a generic 98.9 MW wind project would be erosion and runoff during construction. Generally mitigation strategies would be similar to that of the Ellerth Windpark Project. In areas where a surface water body is identified as impaired, the SWPPP would provide detailed mitigation on how impacts to the impaired water body would be avoided.

38.5 MW Biomass Plant

Construction of a 38.5 MW biomass project would also increase the potential for soil erosion. As such a project would require disturbance of an area larger than one acre, the developer would be required to apply for an NPDES permit and develop a SWPP for both the construction and operation components of the project. Fuel stocks stored onsite would need to be properly contained and covered to minimize the potential for runoff.

No Build Alternative

Under the No-Build Alternative no project would be built and there would be no impacts to surface water.

5.5.5 Wetlands

Wetlands provide direct benefits to the environment and vary according to the type or class of wetland and the season. Wetlands serve as floodwater detentions, provide nutrient assimilation and sediment entrapment (water quality), and provide wildlife habitat. Wetlands are either protected federally under Section 404 of the Clean Water Act or by the State of Minnesota under the Wetland Conservation Act. The National Wetland Inventory (NWI) developed by the USFWS identifies wetlands based on imaging from aerial photography or digital aerial imagery. Although the NWI data has not been field verified, it provides a good start to identify potential wetland areas.

Ellerth Windpark Project

NWI data indicate that wetlands within the Project Area total approximately 778.9 acres with the mean wetland less than one acre in size. Some of the wetlands are associated with creeks and unnamed intermittent streams within the Project Area and some of the wetlands are isolated basins. [53]

[53] Site Permit Application at p. 48.

Within the Project Area there are 579.5 acres of freshwater emergent wetlands, 183.7 acres of freshwater forested shrub wetlands, and 15.5 acres of freshwater pond wetlands. [54] Table 7 identifies the National Wetland Inventory types and acreage within the project area.[55]

Table 7: NWI Wetland Type and Acreage

NWI Type	Acreage[1]
Freshwater Emergent Wetland	
PEM/SS1B	73.4
PEM/SS1Bd	20.3
PEM/SS1C	6.6
PEMA	19.8
PEMAd	138.8
PEMB	98.3
PEMBd	54.5
PEMBg	47.0
PEMBgd	10.7
PEMC	36.4
PEMCd	50.9
PEMCx	6.8
PEMF	16.0
Subtotal	579.5
Freshwater Forested/Shrub Wetland	
PFO/SS1B	28.2
PFO1A	12.1
PFO1B	21.7
PFO1C	19.5
PFO1Cd	0.7
PSS/FO1B	1.9
PSS/FO1C	3.9
PSS1/EMC	8.3
PSS1A	3.8
PSS1Ad	0.7
PSS1B	54.6
PSS1Bd	9.0
PSS1C	16.1
PSS1Cd	3.2
Subtotal	183.7
Freshwater Pond	
PUBF	1.0
PUBFx	1.5

[54] Site Permit Application at p. 48.
[55] Id at p. 49.

NWI Type	Acreage[1]
PUBG	0.9
PUBGh	0.7
PUBGx	11.4
Subtotal	15.5
Total	**778.7**

[1] Wetland acres calculated using National Wetland Inventory data.

Construction activities within wetlands could temporarily affect the function of the wetland. If project components were to be placed within wetlands, the affected wetland would be lost or converted to another type of wetland.

Wind permits issued by the Commission prohibit placement of wind turbines or associated facilities such as roads, transformers, foundations within public water wetlands. Electric collector or feeder lines may cross or be placed in public waters or public waters wetlands subject to permits and approvals the DNR, the USACE, and local units of government as implementers of the Minnesota Wetland Conservation Act.

Once a final project layout is determined, Applicants will conduct wetland delineation in areas identified for construction of turbines, roads, or other facilities associated with the project. Depending upon the results of the delineation results, project components may be shifted to avoid delineated wetlands.

Generic 98.9 MW LWECS

Because wind projects are designed to avoid wetlands to the extent possible impacts and mitigation would be expected to be similar for a generic 98.2 MW wind project.

38.5 MW Biomass Facility

It is likely that a biomass facility could be designed and located to avoid wetland impacts. If the project could not avoid wetlands, permits from the USACE, DNR, and the local county or implementor of WCA would be required depending upon jurisdiction.

No Build Alternative

Under the No-Build Alternative no project would be built and there would be no impacts to wetlands.

5.5.6 Wildlife

Wildlife in the Project Area consists of birds, mammals, fish, reptiles, amphibians, and insects, both resident and migratory, which utilize the habitat in the Project Area for foraging, breeding, and/or shelter. The resident species are representative of Minnesota game and non-game fauna that are associated with upland grass and farmlands with wetland and forested areas.[56] The proposed Project Area lies within the Mississippi Flyway, which is heavily utilized by numerous species of birds including many species of waterfowl (i.e., ducks, geese and swans), shorebirds, songbirds, and raptors during the

[56] Site Permit Application at p. 52.

spring and fall migrations. Waterfowl, raptors, shorebirds, and grassland bird species are likely to migrate through the area in the vicinity of the proposed Project on a seasonal basis.[57]

Birds

The impact of wind facilities on avian species has been relatively well documented in the United States. With the exception of some wind facilities in California, raptor fatality rates are low. Songbirds, or passerines, have the highest fatality rates, although the fatality rates of all species generally range from 1-4 birds per MW per year. [58] In the Midwest, bird fatality rates at the Top of Iowa wind farm in Iowa, estimated fatality rates between 0.3 and 0.8 birds per turbine per year.[59] This estimate is similar to results from studies in other states where fatality rates ranged between < 1 to 2.83 birds per turbine per year.[60] Studies conducted in the Buffalo Ridge region of southwestern Minnesota estimated bird fatality rates between 1.0 and 4.5 birds per turbine per year.[61] Nocturnal migrants suffered relatively more fatalities; local grassland species suffered relatively less. The studies noted that birds tend to avoid turbine towers, but utilize the surrounding habitat.

In sum, studies of bird fatalities near wind farms indicate that fatalities will occur and that they will vary with bird type (e.g., raptor, passerine) and bird use (habitat). It is unclear how fatalities from wind farms will impact avian populations at a broader scale.

Bats

Bat fatality studies indicate a broad range of fatalities across the United States as a result of wind development. Fatality rates are highest for migrating-tree roosting bat species, with the majority of fatalities occurring during the late summer and early fall migration (roughly July-October). Documented bat fatalities are highest in the eastern United States, while those in the Midwest represent a wide range of fatality rates. Post-construction fatality studies completed in Iowa, Minnesota and Wisconsin range from 1 to 9 bats/MW/year.[62] Bat studies conducted at the Buffalo Ridge, Minnesota, found an average of 1 to 3 bat fatalities/turbine/year. The highest bat fatalities were found at the Blue Sky Green Field wind facility in Wisconsin, where bat fatalities averaged 24 bats/MW/year.

It is presumed that projects in areas with similar habitat and cover types would have similar fatality rates, depending on migration patterns, known roosting and foraging areas, and hibernacula. However, bat migration routes and behavioral patterns are poorly understood and there is a lack of comparative

[57] Id at p. 57.
[58] National Wind Coordinating Collaborative. *Wind Turbine Interactions with Birds, Bats, and their Habitats: a Summary of Research Results and Priority Questions*. Spring 2010 http://www.nationalwind.org/publications/bbfactsheet.aspx?
[59] *Bird and Bat Behavior and Mortality at a Northern Iowa Windfarm*, (Jain2005). http://www.batsandwind.org/pdf/Jain_2005.pdf.
[60] Id.
[61] Avian Monitoring Studies at the Buffalo Ridge, Minnesota Wind Resource Area: Results of a 4-Year Study, http://mn.gov/commerce/energyfacilities/documents/AvianMonitoringBuffaloRidge.pdf [hereafter Buffalo Ridge Studies].
[62] National Wind Coordinating Collaborative. *Wind Turbine Interactions with Birds, Bats, and their Habitats: a Summary of Research Results and Priority Questions*. Spring 2010 http://www.nationalwind.org/publications/bbfactsheet.aspx?

studies of bat fatalities from wind facilities, making it difficult to determine fatality rates at regional levels much less at broader scales. [63]

There are seven species of bats that occur in Minnesota, all of which have the potential to occur throughout the state.[64] Two bat species are state-listed as special concern and also Species of Greatest Conservation Need (eastern pipistrelle / tricolored bat *Pipistrellus subflavus* / *Perimyotis subflavus* and northern myotis / northern long-eared bat *Myotis septentrionalis).* The northern long-eared bat is also under consideration by the by the U.S. Fish and Wildlife Service for protection under the Endangered Species Act. Two species of bats are proposed to be state-listed as special concern (little brown myotis / little brown bat *Myotis lucifugus* and big brown bat *Eptesicus fuscus).* Bats roost in trees and other structures during the day and commute to foraging sites after sunset and utilize a variety of habitats for foraging, including riparian corridors, open grasslands, and forests. [65]

Bat activity is greatest in late July through mid-August. Fatality rates of migrating bats (tree-roosting species) peak during late summer and early fall. [66] There is also a small spike in bat fatalities during the spring migration. The cumulative impacts to bat populations are unknown at this time.

Ellerth Windpark Project

The Project Area is located within the Aspen Parklands subsection (Map 5), with 85 percent of the land use in agriculture. Bird species found in the cultivated portions of the Project Area include crows, rock doves, brown-headed cowbirds, mourning doves, European starlings, American robins, barn swallows, and American goldfinches. The cultivated areas of the site also support red-tailed hawks, northern harriers and American kestrels. The Project Area has limited habitat for waterfowl, wading birds (e.g. herons and egrets) or shorebirds on scattered wetlands. Additionally, there is a colonial waterbird nesting site located within the one-mile buffer of the Project Area which is utilized by great blue herons.[67]

In the Project Area, migratory bat species include hoary bat, eastern red bat, and silver-haired bat. These species all require forested areas for either roosting or feeding, and only small areas of fragmented forest within the Project Area meet these needs. However, the species could conceivably fly through any portion of the Project Area during migration. Given the potential of these species to be found within the Project Area, some collision mortality of migratory bat species may occur as a result of project development. However, given the species' common, widespread status, population-level impacts are not anticipated as a result of project development.[68]

In evaluating the proposed Project Area, a tiered approach, based on USFWS Guidelines, was used for assessing potential impacts to wildlife. Tier 1 of the approach is a preliminary evaluation or screening of sites (landscape-level screening of possible project sites). Tier 2 includes site characterization (broad characterization of one or more potential project sites), and Tier 3 is characterized by field studies to

[63] Id.
[64] DNR http://www.dnr.state.mn.us/mammals/bats.html
[65] Kunz et al. 2011. *Ecosystem Services Provided by Bats, Annals of the New York Academy of Sciences: 1223* (2011) 1–38. http://www.caves.org/WNS/WNS%20Kunz%20April%205%20%202011.pdf
[66] National Wind Coordinating Collaborative. *Wind Turbine Interactions with Birds, Bats, and their Habitats: a Summary of Research Results and Priority Questions*. Spring 2010 http://www.nationalwind.org/publications/bbfactsheet.aspx
[67] Site Permit Application at p. 52.
[68] Id. at p. 52-53.

document site wildlife conditions and predict project impacts (site specific assessments at the proposed project site). Work at the Tier 1, 2, and 3 levels has been carried out for the proposed Ellerth Wind Project.[69]

Tier 1 was completed by Ellerth Wind as they evaluated available sites for wind development. Along with proximity to transmission interconnection, distance from airports, and willing landowners, Ellerth Wind also looked for a site that was primarily agricultural and had a reasonable buffer from publicly managed lands in an effort to reduce impacts to wildlife. [70]

Primary concerns raised in the Tier 2 analysis included the presence of state species of concern (greater prairie-chicken, least weasel, marbled godwit, Nelson's sharp-tailed sparrow, short-eared owl, upland sandpiper, yellow rail, American bittern, bald eagle, bobolink, brown thrasher, eastern meadowlark, grasshopper sparrow, marsh wren, northern harrier, rusty blackbird, sharp-tailed grouse, and white-throated sparrow), federal sensitive species (bald and golden eagles), Wildlife Management Areas, several Minnesota County Biological Survey (MCBS) sites of biological significance, RIM land, and prairie and wetland habitats scattered throughout Ellerth Project Area and vicinity. During preliminary consultation, the DNR also expressed concern about a great blue heron nesting area within the vicinity of the Ellerth Project Area. Sandhill cranes are also present in the Project Area. Such features have been identified by Ellerth Wind and setbacks have been applied in arriving at the current project layout.[71]

There are no Waterfowl Feeding and Resting Areas within the Project Area or a one-mile buffer. The Project Area contains one WMA and one RIM parcel. An additional WMA and the Old Mill State Park are within close vicinity to the Project Area. [72] Important Bird Areas are "sites that provide essential habitat for one or more species of bird, and include sites for breeding, wintering, and/or migrating birds" (National Audubon Society 2011). No Audubon Important Bird Areas have been identified in or near the Project Area.[73]

In addition to diurnal migration surveys, Ellerth Wind also conducted prairie grouse lek surveys at the Project Area. The objective of the prairie grouse lek surveys was to locate active leks, or breeding grounds, within the Project Area. Lek surveys were conducted four times within the Project Area during the period of peak prairie grouse lek attendance. A total of two active prairie grouse leks were observed within the Project: a sharp-tailed grouse lek with 11 individuals; and a greater prairie-chicken lek with six individuals. The sharp-tailed grouse is not federally or state listed; however, as noted above, the greater prairie-chicken is a Minnesota species of special concern. To date, neither sharp-tailed grouse nor greater prairie-chickens have been recorded among avian fatalities at wind energy facilities with publicly available data. [74]

A raptor nest survey of the Project Area was conducted to determine the number, distribution, and density of raptor nests and the species and density of breeding raptors within the Project Area and a 1-mile buffer on all sides of the Project Area. The Project Area and buffer were surveyed on two

[69] Id at p. 53.
[70] Id at p. 53.
[71] Id. at p. 53-54.
[72] Id. at 56
[73] Id. at 56
[74] Id. at 58

occasions: once on April 21, 2010; and once on May 18, 2010. No raptor nests were observed within the Project Area or buffer.[75]

In addition to collision mortality, however, birds at the Project Area may also be at risk of displacement due to habitat loss or change associated with the presence of the facility structures. Reduced avian use near turbines has been attributed to avoidance of turbine noise and maintenance activities and reduced habitat attractiveness. However, agriculture is the dominant land cover within the Project Area, and the impact to high quality avian habitat as a result of Project development is expected to be minimal.[76]

Impacts to ground animals are expected to be minimal and mitigation is not required.

Avian and bat fatalities would occur. While the extent of such fatalities is not known, it is likely they would be within the range seen at other large wind facilities in the Midwest: 1 to 5 birds/turbine/year and 1 to 8 bats/turbine/ per year.

Ellerth Wind proposes to minimize impact to birds and bats through turbine siting and access road location, timing of construction, and habitat avoidance. Siting turbines and roads away from bird habitat, (grasslands, riparian areas, and wetlands), identified flyways, and bat feeding area (forests, riparian corridors, and wetlands) reduces impact to avian and bat species. The project will maintain a 3 by 5 rotor diameter (RD) setback from public lands within and adjacent to the project boundary.

Operation of the wind farm will not change adjacent land uses, and a relatively small portion of the Project area will be affected by construction activities. Ellerth Wind will also implement other measures to help avoid potential impacts to wildlife in the Project Area during selection of the turbine locations and subsequent project development and operation, which includes, but is not limited to the following:[77]

- Exclude established WMAs and recreation areas from consideration for wind turbine, access road, or feeder/collector line placement;
- Avoid or minimize disturbance of individual wetlands or drainage systems during construction of the Project;
- Avoid or minimize placement of turbines in high quality native prairie tracts.
- A 1-mile buffer will be placed around the known location of the greater prairie-chicken lek, and no turbines or infrastructure will be developed in the buffer.
- Continue to coordinate with the DNR to discuss potential impacts to greater prairie-chickens and include special focus on the greater prairie-chicken in the ABPP.
- Protect existing trees and shrubs that are important to the wildlife present in the area by locating turbines on agricultural land;
- 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. To minimize erosion during and after construction, BMPs for erosion and sediment control will be utilized. These practices include temporary seeding, permanent seeding, mulching, filter strips, erosion blankets, grassed waterways, and sod stabilization;

[75] Id. at 59.
[76] Id. at 59.
[77] Id at 59-60.

- Revegetate non-cropland and pasture areas disturbed during construction or operation with an appropriate native seeding mix, in cooperation/coordination with landowners;
- Control noxious weeds in areas disturbed by the construction and operation of the project and revegetating disturbed ground with native species.

High wind conditions reduce bird and bat flight activity. Wind turbines operate in windy conditions and require a minimum wind speed ("cut-in" speed, Table 1) for operation. Impacts to birds and bats could be mitigated by employing turbines with a relatively higher cut-in speed or by using SCADA system controls to increase cut-in speed.[78] Curtailment of turbines has been found to effectively reduce bat fatalities by as much as 80 percent. [79]

Generic 98.9 MW LWECS

Because impacts to wildlife would depend upon specific site characteristics, it is difficult to assess wildlife impacts for a generic 98.9 MW LWECS located elsewhere in Minnesota. As discussed above, impacts to birds and bats are the primary concern with wind projects. Information about local bird and bat populations within Minnesota is incomplete and different geographic areas within the state provide different types of habitat and foraging areas for numerous species of birds and some species of bats.

A review of "thunderstorm" maps for the Ellerth Wind Project Area, which is in the Prairie Pothole region of Minnesota and Iowa (Map 6) indicates that the Project Area shows a moderate to high population density of grassland nesting birds (including Bobolink, Dickcissel, Grasshopper Sparrow, LeConte's Sparrow, Savannah Sparrow, and Sedgewren), whereas population density for these species is low in southwestern Minnesota. For upland nesting ducks the Project Area population density ranges from moderate to poor (Map 7).

38.5 MW Biomass Plant

A 38.5 MW biomass plant would have likely have fewer impacts on avian and bat species than the Ellerth Windpark Project. The biomass plant would be constructed on an approximately 60 acre site. This acreage would be removed from use as wildlife habitat. However, the land used for the project would likely be agricultural land; such land is relatively poorer habitat for wildlife. Impacts from operation of the plant are anticipated to be minimal. Emissions from the plant (e.g., hazardous air pollutants) could, through impacts to the environment, impact wildlife. The extent of this impact is uncertain.

No Build Alternative

Under the No-Build Alternative no project would be built and there would be no impact to wildlife.

5.5.7 Rare and Unique Natural Resources

The Minnesota County Biological Survey and the Minnesota Natural Heritage Information System provide information on federal and state listed species, Species of Greatest Conservation Need, and

[78] Arnett et al. April 2009. *Effectiveness of Changing Wind Turbine Cut-In Speeds to Reduce Bat Fatalities at Wind Facilities*, http://www.batsandwind.org/pdf/curtailment_2008_final_report.pdf.
[79] National Wind Coordinating Collaborative. *Wind Turbine Interactions with Birds, Bats, and their Habitats: a Summary of Research Results and Priority Questions*. Spring 2010 http://www.nationalwind.org/publications/bbfactsheet.aspx

unique or rare habitat types in Minnesota. The Minnesota County Biological Survey systematically collects, interprets, and delivers baseline data on the distribution and ecology of rare plants, rare animals, and native plant communities.[80] The Natural Heritage Information System database provides information on Minnesota's rare plants, animals, native plant communities, and other rare features. The Natural Heritage Information System is continually updated as new information becomes available, and is the most complete source of data on Minnesota's rare or otherwise significant species, native plant communities, and other natural features.[81]

Ellerth Windpark Project

Several sensitive areas have been documented within or adjacent to the Project Area. They include the Adolf Elseth, Wright and Florian WMAs and Old Mill State Park. A minimum buffer of five rotor diameters by three rotor diameters buffer around these areas will be established and subject to reevaluation as the project progresses and as more information on sensitive resources associated with the WMAs and Old Mill State Park is developed. [82]

Several "Sites of Biodiversity Significance," identified by the MCBS, are also located within the Project boundary. These sites have varying levels of native biodiversity and are ranked from "Below" to "Outstanding" based on the significance of this biodiversity. Ranking factors include the number of rare species documented within the site, the quality of native plant communities, and the size and context of the site within the landscape. Sites within the project boundary contain several state-listed plants and animals, and several rare native plant communities. Rare native plant communities within the Project Area include Dry Sand-Gravel Prairie, Aspen Woodland/Forest Complex, Prairie Rich Fen, Mesic to Wet-mesic Prairie, and Brush-Prairie, which are all vulnerable to disappearance from the state. Avoidance of and setbacks from these areas will alleviate most of the Natural Heritage concerns.[83]

Federally-Listed Species

Four bald eagles (also listed as a State Species of Special Concern) were detected during the 2010 fall avian migration surveys conducted within the Project Area. These eagles are protected by the Bald and Golden Eagle Protection Act (BGEPA).[84]

Bald eagles are common throughout Minnesota year-round, and they nest and forage near open water (Buehler 2000; MOU 2009). Some nesting and foraging habitat may be available near the Middle River in the northern portion of the Project Area. However, the four bald eagles observed during the migration surveys were observed at the southern periphery of the Project Area. In addition, no bald eagle nests were observed within the Project Area during the raptor nest survey in 2010, and no records of bald eagle nests were revealed during the NHIS query. The lack of evidence of bald eagle nesting, combined with limited foraging habitat and low observed mean use likely translate into low risk of collision mortality for bald eagles at the Project Area.[85]

[80] For more information on Minnesota County Biological Surveys, see http://www.dnr.state.mn.us/eco/mcbs/index.html
[81] For more information on the Minnesota Natural Heritage Information System Database, see http://www.dnr.state.mn.us/eco/nhnrp/nhis.html
[82] Id. at 61
[83] Id. at 61
[84] Site permit Application at p. 62.
[85] Id. at 62

State-Listed Species

A revised NHIS query conducted May 19, 2011, on the current Project boundary showed 41 recorded occurrences of special status species, plant communities or other unique natural features within a 1–mile radius of the Project Area. The 41 recorded occurrences include 12 rare species within a one-mile radius of the Project Area. Each of these species is listed in the following table. In addition, there is one recorded occurrence of a colonial waterbird nesting area (great blue heron) within the search radius. Native plant communities known to occur within the search radius include the Black Ash-Silver Maple Terrace Forest, Dry Sand-Gravel Prairie (Northern), Green Ash-Bur Oak-Elm Forest, Mesic Prairie (Northern), Prairie Rich Fen, and Wet Brush Prairie.[86]

Table 8: State and Federal Listed Species Potentially Occurring within the Project Area[87]

Species Common Name	State Status	Federal Status
Bald eagle	SPC	BGEPA
Blunt sedge	SPC	NL
Canada lynx	NL	THR
Golden eagle	NL	BGEPA
Gray ragwort	END	NL
Gray wolf	SPC	THR
Greater prairie-chicken	SPC	NL
Least weasel	SPC	NL
Louisiana broomrape	SPC	NL
Marbled godwit	SPC	NL
Nelson's sharp-tailed sparrow	SPC	NL
Northern single spike sedge	SPC	NL
Short-eared owl	SPC	NL
Small white lady's-slipper	SPC	NL
Sterile sedge	THR	NL
Yellow rail	SPC	NL

BGEPA = Protected by the Bald and Golden Eagle Protection Act
END = Endangered
NL = Not listed
SPC = Special concern
THR = Threatened

[86] Id. at 64
[87] Id. at 65

Because of the presence of grassland habitat within the Project Area, it is possible that greater prairie-chickens use the Project Area for breeding or brood rearing. The effect of wind turbines on leks and nesting prairie-chickens is currently being studied and results are not yet available. However, Pitman et al. (2005) found that lesser prairie-chicken nests are located significantly further than expected from anthropogenic features on the landscape in Kansas. Specifically, nests were located a mean of 1,385 m ±60 standard error (0.86 mi) and 1,254 m ±69 (0.78 mi) from transmission lines. Thus, if the avoidance of tall structures is shared by greater prairie-chickens, and greater prairie-chickens show avoidance of wind turbines similar to transmission lines, also a tall structure, then the effects on nesting hens associated with the lek should be reduced by establishing a 1-mile buffer.[88]

Six rare plant species are known to occur within the Project Area: blunt sedge (Carex obtusata), gray ragwort (Senecio canus), Louisiana broomrape (Orobanche ludoviciana), northern singlespike sedge (Carex scirpoidea), small white lady's-slipper (Cypripedium candidum), and sterile sedge (Carex sterilis). These species are associated primarily with prairie or wetland habitats and due to the avoidance of these habitat types during construction, impacts to these species as a result of Project development is unlikely.[89]

Species in Greatest Conservation Need

Species in Greatest Conservation Need (SGCN) are defined by the DNR as animals whose populations are rare, declining, or vulnerable to decline and are below levels desirable to ensure their long-term health and stability. While SGCN designation alone does not confer a legally protected status, the DNR recommends that impacts to SGCN species be avoided or mitigated where possible. The remaining SCGN species observed within the Project Area have the SCGN designation largely based on their Partners in Flight (PIF) priority status. The PIF Species Prioritization Scheme ranks each species of North American breeding bird based upon seven measures of conservation vulnerability. These factors include relative abundance (interspecific), size of breeding and non-breeding ranges, threats to the species in breeding and non-breeding areas, population trend, and the relative density (intraspecific) in a given planning unit compared to the maximum reached within the species' range (American Bird Conservancy 1998). Table 9 lists the SCGN species within the Project Area observed during Tier 3 studies.

Table 9: SGCN Species Observed within the Project Area[90]

Species	Observed in Project Area by Ellerth Wind Representatives	Rationale for SGCN status
American bittern	Yes	High priority in all Bird Conservation Regions Waterbird plans.
Bald eagle	Yes	MN Species of Special Concern

[88] Site Permit Application at p. 65-66.
[89] Id. at p. 66
[90] Id at 66-67

Species	Observed in Project Area by Ellerth Wind Representatives	Rationale for SGCN status
Bobolink	Yes	Highest PIF Priority in several Bird Conservation Regions
Brown thrasher	Yes	Highest PIF Priority in several Bird Conservation Regions
Eastern Meadowlark	Yes	Identified on USFWS region 3 concern list. Precipitous continental population decline, habitat imperiled.
Grasshopper sparrow	Yes	High PIF Priority in several Bird Conservation Regions
Greater prairie-chicken	Yes	MN Special Concern
Marbled godwit	Yes	MN Special Concern, High PIF priority on all Bird Conservation Regions of Shorebird Plans
Marsh wren	Yes	High PIF Priority in several Bird Conservation Regions
Northern harrier	Yes	High PIF Priority in several Bird Conservation Regions
Rusty blackbird	Yes	PIF Continental Watch List
Sharp-tailed grouse	Yes	Populations well below the range of natural variation in Minnesota. Historically was the dominant prairie Galliform.
Short-eared owl	Yes	MN Special Concern
White-throated sparrow	Yes	Highly significant regional population declines in Natural Resources Research Institute Forest Bird Monitoring

BGEPA = Protected by the Bald and Golden Eagle Protection Act
NL = Not listed
SPC = Special concern
THR = Threatened

The overall impact of the proposed Project on rare and unique resources is expected to be minimal. Operation of the wind farm will not change adjacent land uses and a relatively small portion of the Project Area will be affected by construction activities. Mitigation of potential impacts to rare and unique resources will be in the form of avoidance. The siting of turbines, access roads and other infrastructure will be carried out in a manner that avoids impacts to rare plant communities and threatened, endangered or special concern plant and animal species. As previously discussed, turbine, access road and collector line locations are expected to be primarily on agricultural cropland so as to avoid potential rare or unique natural resources.[91]

Native Prairie

Initial surveys determined that there was no native prairie within the Project Area boundaries. One native prairie bank is located adjacent to the southeastern portion of the Project Area and corresponds with an MCBS Site of Outstanding Biodiversity Significance. This site, Marsh Grove, is approximately 456 acres and is not expected to be impacted by the project.[92]

The project will be designed to avoid impacts to prairie whenever feasible. If native prairie impacts are anticipated, Ellerth Wind, with the advice of DNR, and any others shall prepare a prairie protection and management plan if necessary. Wind turbines and all associated facilities, including foundations, access roads, underground cable, and transformers shall not be placed in native prairie unless addressed in the prairie management plan.

Generic 98.9 MW LWECS

A generic 98.9 MW LWECS sited elsewhere in Minnesota would have potentially very different unique and rare natural resources depending on location. Mitigation techniques would be site specific would likely include avoidance as the primary mitigation technique.

38.5 MW Biomass Plant

A 38.5 MW biomass plant would likely have fewer impacts to rare and unique natural resources. By occupying a single location rather than being dispersed across thousands of acres, opportunities for conflict with rare and natural resources would be reduced. A biomass plant could also be sited to avoid unique habitats and would utilize construction practices that would avoid or minimize disturbances to wetlands or drainage systems.

No Build Alternative

Under the No-Build Alternative no project would be built and there would be no impact to rare natural resources.

5.6 Human and Social Environment

LWECS have the potential for effects or perceived effects on nearby residences, including impacts to human, community, and social environments. According to U.S. Census Bureau statistics, Marshall County has experienced a moderate population decline from 2000 to 2010 compared to moderate

[91] Id at 68
[92] Site Permit Application at p. 68

statewide increase. Table 10 summarizes the demographics in Marshall County and statewide demographics.[93]

Table 10. Demographic Characteristics of Marshall County

Description	Marshall County	Minnesota
Population, 2000	10,155	4,919,492
Population, 2010	9,439	5,303,925
Percent population change, 2000-2010	-7.1	7.8
Persons per square mile, 2010	5.3	66.6
Median Household Income (dollars), 2009	46,242	55,621
Percentage of Persons Below Poverty Level, 2009	9.7	10.9

5.6.1 Aesthetic Impact and Visibility Impairment

The construction of large energy facilities changes the existing aesthetic environment by introducing a large new facility or in the case of LWECS, tall towers with moving blades that have a high-tech appearance that make them stand out against the backdrop of the open, rural landscapes in which they are often sited. Additionally, due to their 400-foot height, they can be seen for long distances. This section discusses visual changes and perceptions of aesthetics of the proposed project and alternatives. Shadow flicker is discussed in Section 5.6.2. Visual impairment is not identified as an impact from wind facilities, as they do not produce emissions that may limit visibility.

Ellerth Windpark Project

The Ellerth Windpark Project would alter the current landscape through the introduction of large wind turbines. The Project would also create shadow flicker. Many factors influence how a wind energy facility is perceived. Factors may include levels of visual sensitivity of individuals, viewing conditions, visual settings, and individual ideas and experiences. Distance from a turbine(s) and activities within and near the Project area, landscape features such as hills and tree cover, as well an individual's personal feelings about wind energy technology can all contribute to how a wind energy facility is perceived. The Ellerth Windpark Project will be located in a predominantly rural agricultural area characterized by gently undulating topography, interspersed with woodlots.

Developing a method to assess aesthetics of wind projects is difficult. Current methods of assessing visual impacts include viewshed mapping, photographic simulations, and video animation.[94] All of these methods depend, to some extent, on assessing the current aesthetic resources of the project area, i.e., the aesthetics of the area before construction of a wind farm. Such assessments can be subjective; however, state and federal agencies often perform such assessments in the development of parks that have valuable aesthetic resources.

[93] Compiled from U.S. Census Bureau data, http://www.census.gov/.
[94] Visual Considerations: Public Perceptions, Regulatory Environment and Assessment Methods in the Eastern U.S., http://www.nationalwind.org/assets/blog/Allen-NWCC_2009.pdf.

Developing a method to assess aesthetics of wind projects is difficult. Current methods of assessing visual impacts include viewshed mapping, photographic simulations, and video animation.[95] All of these methods depend, to some extent, on assessing the current aesthetic resources of the project area, i.e., the aesthetics of the area before construction of a wind farm. Such assessments can be subjective; however, state and federal agencies often perform such assessments in the development of parks that have valuable aesthetic resources.

Adjacent to or within the project boundary there are trails, wildlife management areas and the Old Mill State Park (see Table 6), which provide recreational opportunities in a passively managed, "natural" landscape. Public lands provide numerous benefits, including aesthetic and visual. Recreational users would likely see turbines from these areas, potentially diminishing qualities of perceived remoteness and scenic value.

Mitigation of impacts to aesthetic and visual resources and shadow flicker is best accomplished through micro-siting of wind turbines and maintaining designated setbacks from participating and non-participating landowners. In general, siting wind projects in rural areas minimizes human impacts. Aesthetic impacts to public lands can be mitigated by siting wind Projects outside of these areas, and utilizing natural features such as topography and vegetation to reduce visual intrusions.

Setbacks from individual turbines, as embodied by Minnesota's general permit standards, mitigate visibility impacts.[96] Wind turbines must be set back from non-participating properties a minimum distance of 5 rotor diameters (RD) on the prevailing wind directions and 3 RD on the non-prevailing wind directions. Additional setbacks may be required to meet Minnesota noise standards.[97] These setbacks minimize the visibility of the wind turbines and shadow flicker. Finally, turbines are designed to be a uniform off-white color to blend in with the horizon and reduce visibility impacts.

The proposed project would not impact or otherwise impair visibility. Unlike other types of generation facilities that produce by-products and emissions that may diminish or reduce visibility, wind turbines do not produce emissions.

Lighting required by the FAA is similar to that for other tall structures in rural areas, and mitigation is not expected to be necessary.

Generic 98.9 MW LWECS

A generic 98.9 MW LWECS located elsewhere in Minnesota would have similar visual impacts and mitigation strategies. Impacts could potentially be greater if locating the project in a more populated rural area of Minnesota; and such a location would also need wind resources equivalent to or greater than those in Marshall County. Impacts could be mitigated by utilizing wind turbines capable of generating more energy. For example, a 98.9 MW project consisting of 1.6 MW turbines requires 61 turbines; a similar project consisting of 2.3 MW turbines requires 44 turbines. The larger turbines would create a larger individual "eyeprint," but the smaller number of turbines would likely create a relatively

[95] Visual Considerations: Public Perceptions, Regulatory Environment and Assessment Methods in the Eastern U.S., http://www.nationalwind.org/assets/blog/Allen-NWCC_2009.pdf.
[96] Commission Order Establishing General Permit Standards, http://energyfacilities.puc.state.mn.us/documents/19302/PUC%20Order%20Standards%20and%20Setbacks.pdf.
[97] Minnesota Rules Chapter 7030 at all residential receivers (homes). Residential noise standard NAC-1, L50 50 dBA during overnight hours.

smaller visual impact for the project. The Ellerth Windpark Project expects to use turbines that may be between 1.6 and 2.3 MW, which means the project may have up to 61 or as few as 44 turbines.

38.5 MW Biomass Plant

A 38.5 MW biomass plant would likely impact visual aesthetics in the immediate area of the facility, and in the surrounding area depending on the height of the stack plume. Shadow flicker would not be an issue due to the absence of rotating exterior parts.

A biomass plant would be industrial in nature with many buildings, conveyors, biomass piles, and a boiler stack. The building housing the boiler is likely to be at least 100 feet tall. The conveyors and biomass piles could range from 30 to 50 feet in height. Buildings, conveyors, and biomass piles would likely be lighted to allow for nighttime operation. Lighting would also be necessary for wood fuel loading/unloading points, truck scales, and vehicle parking areas.

The estimated height for the boiler stack is approximately 150 feet. Particulate matter control devices would capture most of the particulates from the boiler exhaust gas stream. Thus, the majority of the plume from the boiler stack would be water vapor. This plume may be seen during cold weather conditions, but would likely be virtually clear in warm weather. In cold weather, the plume may impair visibility. If taller than 200 feet, the boiler stack may require FAA lighting, similar to wind turbines.

Mitigation of visual impacts could be accomplished through siting of the biomass plant. The plant could be located in an industrial location allowing it to blend in with other industry and be located away from aesthetically valuable resources. However, the biomass plant would need to be located in an area where biomass is readily available in large quantities. Vegetative screening (trees, shrubs) could be used to partially block views of industrial buildings, silos, conveyors and boiler stack.

No Build Alternative

Under the No-Build Alternative no project would be built and there would be no impacts to aesthetics or visibility.

5.6.2 Shadow Flicker

Wind turbines are known to create shadow flicker. Shadow flicker is the intermittent change in light intensity due to rotating wind turbine blades casting shadows on the ground. Three conditions must be present for shadow flicker to occur: the sun must be shining with no clouds to obscure it; the rotor blades must be spinning and located between the receptor and the source; the receptor must be close enough to the turbine to be able to distinguish the shadow created by the turbine. Shadow intensity, or how “light” or “dark” a shadow appears at a specific receptor (usually a home), will vary with distance from the turbine. The closer a receptor is to a turbine, the more turbine blades block out a larger portion of the sun’s rays and shadows will be wider and darker. Receptors located farther away from a turbine experience thinner and less distinct shadows since the blades block out less sunlight. Shadow flicker is reduced or eliminated when buildings, trees, blinds, or curtains are located between the turbine and receptor.

There is not a Minnesota “light standard” that addresses potential impacts of shadow flicker, i.e. there is not a descriptive or numeric standard that would categorize a certain amount of flicker as acceptable or unacceptable. No other states have adopted such a standard. However, other countries have examined

the issue and have adopted standards. Standards depend on assumptions about how flicker impacts are to be calculated:

- Germany has proposed a standard such that shadow flicker does not exceed 30 hours/yr. or 30 minutes/day at a receptor.[98] It is unclear whether this is a worst-case scenario (e.g., clear skies every day) or an actual-case scenario (e.g., weather representative of the project area).[99]
- Belgium has adopted the German standard.[100]
- Denmark recommends a maximum of 10 hours/yr assuming actual weather conditions in the project area.[101]
- France has adopted no standard but requires shadow flicker modeling.[102]
- The Netherlands have adopted a yearly maximum of 5 hours and 40 minutes assuming clear skies.[103]
- The State of Victoria, Australia, has adopted a shadow flicker standard of 30 hours/yr.[104]

Ellerth Windpark Project

Shadow flicker would occur as a result of the proposed project. Shadows would be longest during periods near sunrise or sunset and longer in the winter than the summer. Areas most likely to experience shadow flicker would occur to the north of turbines. The number of hours per year during which shadow flicker could occur lessens as distance from the wind turbine increases, even for residences east and west of turbines. Based on preliminary turbine layouts for the three turbine models under consideration, Ellerth Wind has calculated shadow flicker impacts for homes within the Project Area in Table 11.

Based on the preliminary Ellerth Windpark turbine layouts and turbine model choices, the most shadow flicker expected on any one home is 46.7 hours in a year, or less than 1% of all daytime hours. [105] The potential for shadow flicker will continue to be considered during development, construction, and operation of the Project. A 1,000 ft (305 m) minimum setback from residences has been incorporated in turbine layout design. Although unlikely to occur, specific cases of documented excessive shadow flicker will be addressed on a case by case basis. Additional mitigation options the project may consider include visual screening such as trees, awnings, curtains or blinds, adjusting the operation and orientation of the turbine during flicker periods. Some wind turbine manufacturers being considered for the project also offer a shadow control option which monitors and mitigates this unlikely condition if controlled curtailment becomes necessary.[106]

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[98] *Spatial Planning of Wind Turbines, European Actions for Renewable Energy* (PREDAC) [hereafter Spatial Planning Report], http://www.cler.org/info/IMG/pdf/WP8_ANG_guide.pdf.
[99] Shadow Flicker Assessment – Honeywood, Final Report, p. 5, http://www.eolectric.com/assets/honeywood/pdf/en/appendix%20k.pdf.
[100] Spatial Planning Report, p. 21.
[101] Id.
[102] Id.
[103] Id.
[104] Policy and planning guidelines for development of wind energy facilities in Victoria, p. 26, http://www.sustainability.vic.gov.au/resources/documents/WindEnergyGuidelines.pdf.
[105] Site Permit Application at p. 19-20.
[106] Id at p. 21-22

Table 11: Summary of Shadow Flicker at Receptors within the Project Area

Receptor	Shadow (hours/year)		
	GE 1.6 MW (RD 100 m 328.1 ft)	Vestas 1.8 MW (RD 90 m 295.3 ft)	Siemens 2.3 MW (RD 101 m 331.4 ft)
R1	8.1	6.6	8.1
R2	29.1	18.6	29.6
R3	27.5	17.1	27.8
R4	41	28.1	40.8
R5	17.7	15.	18.7
R6	27.2	15.7	26.1
R7	10.9	8.9	10.7
R8	44.5	37.7	43.9
R9	32.8	27.3	32.5
R10	12.6	10.2	12.6
R11	8.2	6.8	8.2
R12	44.8	26.8	43.6
R13	46.7	38.5	45.6
R14	26.9	16.2	26.2
R15	19.6	12.7	17.5
R16	12.4	9.7	15.1
R17	15.2	13.9	16.3
R18	29	25.7	31
R19	14.5	11.8	14.3
R20	36.2	26.9	36.2
R21	33.4	27.7	32.7
R22	14.6	11.7	13.6
R23	9.1	7.5	9.2
R24	28.3	9.6	28.4
R25	43.6	38	45.4
R26	18.3	13.3	16.7

Generic 98.9 MW LWECS

Depending on surrounding landscape and topography, a generic 98.9 MW LWECS would have similar shadow flicker impacts and mitigation. Shadow flicker could be reduced in an area with greater variation in topography and vegetation, such as a landscape with hills and greater tree cover.

38.5 MW Biomass Plant

A biomass plant would not cause shadow flicker due to the lack of exterior moving parts that could cast alternating shadows.

No Build Alternative

Under the No-Build Alternative no project would be built and there would be no shadow flicker.

5.6.3 Project Lighting

Large electric generating facilities would generally have some type of lighting at the facility to ensure safe operation of the facility. Tall structures, such as wind turbines and emissions stacks would also require lighting to make the facility visible to airplanes.

Ellerth Windpark Project

Wind turbines, per Federal Aviation Administration (FAA) requirements and because of their height, would be lighted.[107] Generally, turbines have flashing white lights during the day and red lights during the evening. Turbine lighting would be consistent with other lighted towers on the landscape, such as communication towers.

Lighting required by the FAA is similar to that for other tall structures in rural areas, and mitigation is no expected to be necessary.

Generic 98.9 MW LWECS

A generic 98.9 MW LWECS located elsewhere in Minnesota would have lighting impacts similar to the proposed project.

38.5 MW Biomass Plant

If taller than 200 feet, the boiler stack for a 38.5 MW Biomass plant would require FAA similar to wind turbines.

No Build Alternative

Under the No-Build Alternative no project would be built and there would be no impact to project lighting.

[107] FAA Advisory Circular AC 70/7460-2K, http://rgl.faa.gov/REGULATORY_AND_GUIDANCE_LIBRARY/RGADVISORYCIRCULAR.NSF/0/22990146db0931f186256c2a00721867/$FILE/ac70-7460-2K.pdf.

5.6.4 Noise

Large electric generation facilities generate noise. Noise can be defined as unwanted or inappropriate sound. Sound has multiple characteristics which determine whether a sound is too loud or otherwise inappropriate. Sound travels in a wave motion and produces a sound pressure level. This sound pressure level is commonly measured in decibels (dB). Sounds also consists of frequencies, e.g., the high frequency (or pitch) of a whistle. Most sounds are not a single frequency but a mixture of frequencies. Finally, sounds can be constant or intermittent. The perceived loudness of a sound depends on all of these characteristics.

A sound meter is used to measure loudness. The meter sums up the sound pressure levels for all frequencies of a sound and calculates a single loudness reading. This loudness reading is reported in decibels, with a suffix indicating the type of calculation used. For example, "dB (A)" indicates a loudness reading using an A-weighted calculation (or "scale").

The State of Minnesota has promulgated noise standards designed to ensure public health and minimize citizen exposure to inappropriate sounds. The rules for permissible noise vary according to land use, i.e., according to their noise area classification (NAC). In a residential setting, for example, noise restrictions are more stringent than in an industrial setting. Rural residential homes are considered NAC 1 (residential), while agricultural land and agricultural activities are classified as NAC 3 (industrial). The rules also distinguish between nighttime and daytime noise; less noise is permitted at night. Sound levels are not to be exceeded for 10 percent and 50 percent of the time in a one-hour survey (L_{10} and L_{50}) for each noise area classification.

Potential human impacts due to noise include hearing loss, stress, and annoyance and sleep disturbance.[108] Table 12 lists Minnesota's Noise Standards by noise area classification.

Table 12. Minnesota Noise Standards[109]

Noise Area Classification[110]	Daytime		Nighttime	
	L_{50}[111]	L_{10}	L_{50}	L_{10}
1	60	65	50	55
2	65	70	65	70
3	75	80	75	80

[108] Occupational and Community Noise, World Health Organization, http://www.who.int/mediacentre/factsheets/fs258/en/.
[109] Minnesota Rules 7030.0040, https://www.revisor.leg.state.mn.us/rules/?id=7030.0040. Standards expressed in dB (A).
[110] Minnesota Rules 7030.0050, https://www.revisor.leg.state.mn.us/rules/?id=7030.0050. The noise area classification is based on the land use activity at the location of the receiver (listener).
[111] Minnesota Rules 7030.0020, https://www.revisor.leg.state.mn.us/rules/?id=7030.0020. "L_{50}" means the sound level, expressed in dB(A), which is exceeded 50 percent of the time for a one hour survey. "L_{10}" means the sound level, expressed in dB(A), which is exceeded ten percent of the time for a one hour survey.

Ellerth Windpark Project

The operation of wind turbines would produce noise. Turbines produce mechanical noise (noise due to the gearbox and generator in the nacelle) and aerodynamic noise (noise due to wind passing over the turbine blades).[112] Perceived sound characteristics would depend on the type/size of turbine, the speed of the turbine (if turning), and the distance of the listener from the turbine.

The primary means of mitigating sound (noise) produced by wind turbines is siting. Turbines must be sited to comply with noise standards in Minnesota Rules 7030.[113] For rural residential areas in Marshall County, this means sound levels must meet an L_{50} standard of 50 dB (A). Ellerth Wind has calculated these minimum distances for the GE, Vestas and Siemens turbines to be, respectively, 181 meters (594 feet), 174 meters (571 feet), and 271 meters (889 feet).[114] Ellerth Wind proposes siting turbines at least 1,000 feet from residences unless other arrangements have been made with participating landowners. Using anticipated layouts for the three turbines under consideration, Ellerth Wind modeled anticipated noise impacts to be a maximum Leq noise level at 45 dBA, for most of the homes within the site and above 45 dBA, but below 50 dBA, for five to seven homes within the site, depending on the turbine used.[115]

Cumulative noise impacts must also be considered. That is, if there are multiple turbines in the vicinity of a residence, the standards set by Minnesota Rules 7030 must still be met. This may require additional setbacks. Setback requirements are enforced by site permits issued by the Commission for wind farms. The Commission continuously reviews public health setbacks related to wind farms to determine if they remain appropriate and reasonable.[116]

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 Ellerth Windpark 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 roadways and should not have significant noise impacts on nearby receptors.[117]

Generic 98.9 MW LWECS

A generic 98.9 MW LWECS would have noise impacts and mitigation similar to the Ellerth Windpark Project. Depending on location, surrounding vegetation, and topography, and turbine selection, impacts from noise could be more or less than those expected of the proposed Project.

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[112] Public Health Impacts of Wind Turbines, Minnesota Department of Health, May 22, 2009, http://www.health.state.mn.us/divs/eh/hazardous/topics/windturbines.pdf.
[113] Minn. Rules 7030.0040, Noise Standards, https://www.revisor.leg.state.mn.us/rules/?id=7030.0040
[114] Certificate of Need Application at p. 37.
[115] Site permit Application at p. 16.
[116] Commission Investigation into Large Wind Energy Conversion Systems Permit Conditions on Setbacks and the Minnesota Department of Health Environmental Health Division's White Paper on Public Health Impacts of Wind Turbines, CI-09-845, http://www.puc.state.mn.us/puc/energyfacilities/012254#windhealth.
[117] Certificate of Need Application at p. 36.

38.5 MW Biomass Plant

A 38.5 MW biomass plant would create noise during operation from a variety of sources including the turbine/boiler building, conveyor system, hammer mill and bale choppers, front end loaders, and idling trucks. Based on noise studies, the plant would need to be located approximately 2,100 feet from a residence to the meet the daytime L_{50} standard of 60 dB(A), and approximately 6,200 feet from a residence to meet the nighttime L_{50} standard of 50 dB(A). These are conservative estimates – they are based on maximum equipment operation and have not been adjusted for possible noise shielding.

Sound (noise) from the biomass plant could be mitigated by siting. A study would likely be required to ensure that noise standards are met for all local residents. Enclosure of heavy equipment would reduce noise impacts. Vegetative screening, planted to lessen visual impacts, would also reduce potential noise levels. Fuel windrows could provide noise attenuation. Hours of operation, e.g., for fuel delivery or heavy equipment operation could be managed to reduce noise impacts and meet daytime and nighttime standards.

No Build Alternative

Under the No-Build Alternative no project would be built and there would be no noise impact.

5.6.5 Property values

Large electric generation facilities have the potential to impact property values. Because property values are influenced by a complex interaction between factors specific to each individual piece of real estate as well as local and national market conditions, the effect of one particular project on the value of one particular property is difficult to determine.

Ellerth Windpark Project

The impacts on property values due to the project are difficult to quantify. Numerous factors influence a property's market value, including acreage, schools, parks, neighborhood characteristics and improvements. A direct influence on property value is often the status of the housing/land market at the time of sale.

The Renewable Energy Policy Project conducted a statistical analysis to determine the extent to which property values are influenced in the vicinity of wind projects.[118] Ten communities in the United States were studied within a five mile radius of a wind project. The study found that property values were not negatively impacted within the viewshed of a wind project. Lawrence Berkeley National Laboratory recently completed a nationwide study on the potential impacts of wind projects on property values.[119] Results indicate that property values near wind projects are not negatively impacted and that home buyers and sellers consider a property's scenic vista when determining a sale/purchase price.

Six counties in southern Minnesota (Dodge, Jackson, Lincoln, Martin, Mower, and Murray counties) with large wind energy conversion systems responded to a Stearns County survey asking about impacts on

[118] The Effect of Wind Development on Local Property Values, May 2003, http://www.repp.org/articles/static/1/binaries/wind_online_final.pdf.
[119] The Impact of Wind Power Projects on Residential Property Values in the United States: A Multi-Site Hedonic Analysis, December 2009, http://www1.eere.energy.gov/windandhydro/pdfs/wind_power_projects_residential_property_values.pdf.

property values as a result of wind farms.[120] To date, it appears that neither properties hosting turbines nor those adjacent to those properties in the counties listed, are negatively impacted by the presence of wind farms.[121]

Negative impacts to property value due to the proposed project are not anticipated. In unique situations it is possible that specific, individual property values may be negatively impacted. Such impacts can be mitigated by siting turbines away from residences.

Generic 98.9 MW LWECS

A generic 98.92 MW LWECS would have property value impacts similar to the Ellerth Windpark Project.

38.5 MW Biomass Plant

A 38.5 MW biomass plant would potentially negatively impact property values near the plant site and possibly along roads used to transport biomass. However, as with the Ellerth Windpark Project, impacts on property values are difficult to quantify because of the many factors that influence a property's market value. For example, if biomass for the plant were supplied by neighboring land parcels, these parcels might experience an increase in property value.

Because the plant would be sited at a single location, compared to multiple turbine locations, property value impacts could be mitigated by siting, such as in an area zoned to accommodate industrial use.

No Build Alternative

Under the No-Build Alternative no project would be built and there would be no impact to property values.

5.6.6 Local Economy

Large energy generating facilities typically generate short-term impacts to local economies through construction jobs and expenditures, such as lodging, food, and some material purchases, during the construction phase of a project. Once the project becomes operational local economies may benefit from more long-term benefits, such as jobs to operate and maintain the facility as well as property or production taxes.

Ellerth Windpark Project

Short-term and long-term economic benefits would result from the construction of the Ellerth Windpark Project. Short-term economic benefits would occur as a result of construction jobs generated by the project and additional expenditures in the local economy. Landowners with turbines or other project facilities on their land would receive an annual lease payment for the life of the project. Long-term benefits would occur through the Wind Energy Production Tax paid to local units of government.

Ellerth Wind estimate that construction of the project will require approximately 200 short-term construction jobs and approximately 6 to 10 long-term permanent jobs for operation of the project once it is built will be added to the local economy as a result of project development.[122]

[120] Stearns County Board of Commissioners Meeting, June 8, 2010.
[121] Results were based on limited data.
[122] Site Permit Application at p. 40.

The project will also pay an annual energy production tax to Marshall County and participating townships at a rate of $0.0012 per kWh produced or $1.20 per MWh of electricity produced. The annual wind energy production taxes would range from approximately $378,000 to $431,000.[123] Additionally, payments to landowners would provide income that could add to the local economy.

Generic 82 MW Wind Project

Although the beneficiaries of the project would depend upon the project location, economic benefits would be similar to those of the proposed project.

38.5 MW Biomass Plant

A biomass plant would likely pay property tax, which would benefit local government revenues, but would not pay the Wind Energy Production Tax.

No Build Alternative

If the Ellerth Windpark Project is not built, there will be a loss of economic benefits in the project area. Landowners would lose lease payments over the operational life of the project. Local governments would lose wind energy production tax revenues estimated between $378,000-431,000 annually.[124] The Ellerth Windpark Project is expected to generate approximately 200 135 temporary construction jobs and approximately six to 10 permanent operational jobs.[125] These employment opportunities and their associated income would be lost if the project is not built.

5.7 Infrastructure

A generation project of this size has to consider potential impacts to existing infrastructure, such as electric transmission, transportation and communication. Wind farms, and their associated transmission facilities, need to be integrated into existing infrastructure without causing disruption. If disruption is caused by the Ellerth Windpark Project, appropriate mitigation will be necessary.

5.7.1 Associated transmission facilities

Electrical generation facilities typically require construction of transmission facilities such as transmission lines and substations to connect to the transmission grid. This section discusses these associated transmission facilities and their potential impacts.

Transmission lines over 100 kilovolts and longer than 1,500 feet are defined as “high voltage transmission lines” and subject to regulation by the Commission.[126] Wind generation facilities also require construction of lower voltage electric infrastructure (typically 34.5 kV), referred to as feeder and collector lines. These lines collect power generated by the wind turbines and supply the project substation before connecting to the transmission grid.

Electric and magnetic fields (EMF) are invisible regions of force resulting from the presence of electricity. EMF is often raised as a concern with electric transmission facilities. Naturally occurring EMF are caused

[123] Id at p. 41
[124] Id at p. 41
[125] Id at p. 40
[126] Minn. Statute 216E.01, subdivision 4. Under Minn. Statute 216E.05, high voltage transmission lines between 100 and 200 kV may be permitted by local governments.

by the earth's weather and geomagnetic field. Man-made EMF are caused by any electrical device and found wherever people use electricity

- Electric fields are created by the electric charge (i.e., voltage) on a transmission line. Electric fields are solely dependent upon the voltage of a line (volts), not the current (amps). Electric field strength is measured in kilovolts per meter (kV/m). The strength of an electric field decreases rapidly as the distance from the source increases. Electric fields are easily shielded or weakened by most objects and materials, such as trees and buildings.

- Magnetic fields are created by the electrical current moving through a transmission line. The magnetic field strength is proportional to the electrical current (amps). Magnetic field strength is typically measured in milliGauss (mG). Similar to electric fields, the strength of a magnetic field decreases rapidly as the distance from the source increases. However, unlike electric fields, magnetic fields are not easily shielded or weakened by objects or materials.

Although EMF is often raised as a concern with electrical transmission projects, the Commission has consistently found that there is insufficient evidence to demonstrate a causal relationship between EMF exposure and human health effects.

Stray voltage is sometimes raised as an issue associated with electric transmission. Stray voltage is an extraneous voltage that appears on metal surfaces in buildings, barns and other structures, which are grounded to earth. This voltage is also called a neutral-to-earth voltage (NEV). Stray voltage is typically experienced by livestock who simultaneously come into contact with two metal objects (e.g., feeders, waterers, stalls). If there is a voltage between these objects, a small current will flow through the livestock. The fact that both objects are grounded to the same place (earth) would seem to prevent any voltage from existing between the objects. However, this is not the case – a number of factors determine whether an object is, in fact, grounded. These include wire size and length, the quality of connections, the number and resistance of ground rods, and the current being grounded.[127] Thus, stray voltage can exist at any house or farm which uses electricity, independent of whether there is a transmission line nearby.

Ellerth Windpark Project

There is currently one high voltage transmission line in the Project Area. The Otter Tail Power Company has a 115 kV transmission line running north to south through the center of the Project Area. Two 69 kV transmission lines (owned by Minnkota Power Cooperative, Inc and Otter Tail Power Company) also run east to west through the Project Area.

The electricity generated by each turbine will be stepped-up by a pad-mounted transformer at the base of each turbine or within the nacelle to power collection line voltage of 34.5 kV. The electric energy collected at the turbines will be transmitted via underground power collection lines and then passed to either an underground or overhead feeder lines to the proposed Ellerth Substation. The collection lines will occasionally require an aboveground junction box when the collection lines from separate spools need to be spliced together. Overhead feeder lines will be located parallel and adjacent to existing

[127] Stray Voltage, NDSU Extension Publication #108, http://www.ag.ndsu.edu/extension-aben/epq/files/epq108.pdf.

public road rights-of-way. Impacts of the overhead lines would be equivalent to 3 phase electrical lines, common to many rural areas in Minnesota.[128]

A preliminary layout indicates that the project will require approximately 18.84 miles of underground collection lines and approximately 19.76 miles of overhead or underground feeder lines. Alternatively, the collector and feeder lines would include approximately 38.6 miles of underground lines.[129]

The Ellerth Windpark Project would construct a Project substation and site it in proximity to an existing Otter Tail Power Company 115 kV line. The location of the Project substation would be in the southeast corner of Section 4 in Marsh Grove Township, 156N, Range 45W. No major network transmission upgrades anticipated to interconnect the Project to the grid.[130] At the proposed Ellerth substation, the power will be transformed from 34.5 kV to 115 kV via a new transformer installed as part of the project for delivery to the transmission grid. The power will be transmitted from the project substation to an existing Otter Tail Power Company 115 kV overhead transmission line through a new 115kV line of approximately 200 feet. This short 115kV line falls below the threshold for state permitting. Exact details on this short 115kV line are pending negotiations with Otter Tail Power Company.[131]

Ellerth Wind has obtained a Large Generator Interconnection Agreement (LGIA) with MISO. The interconnection specifics are detailed in the Project LGIA published on the MISO website. The proposed point of interconnection (POI) for the Project is within the northeastern portion of the Project Area. It should be noted that the Project interconnection facilities will be located adjacent to the POI.[132]

Siting the Project substation near the point of interconnection to the power grid eliminates the need for new electric transmission poles and lines and associated impacts. Construction impacts could be mitigated by minimizing the amount of land cleared for the substation. Visual impacts could be mitigated by placing collector lines underground, while aesthetic impacts from overhead feeder lines can be mitigated through design and pole placement.

The project would not create stray voltage because the project does not connect directly to residences or farms in the area and does not change on-farm electrical service. However, if a transmission line, such as the 115 kV transmission line associated with the project, parallels a distribution line the transmission line can induce additional current on the distribution lines in the immediate area of the paralleling. For distribution lines and on-farm electrical service that are properly wired and grounded, these induced currents are of no matter. However, for distribution lines and on-farm service that are not properly wired and grounded, these induced currents could create stray voltage impacts. Stray voltage sources can be reduced in three ways: reduce the current flow on the neutral system; reduce the resistance of the neutral system; or improve the grounding of the neutral system. Making good electrical connections and making sure that these connections are maintained by the proper choice of wiring materials for wet and corrosive locations will reduce the resistance of the grounded neutral system, thereby reducing NEV levels.

[128] Site permit Application at p. 7-8.
[129] Id at p. 7-8.
[130] Id at p. 7-8.
[131] Id at p. 7-8
[132] Id at p. 7.

Generic 98.9 MW LWECS

The Ellerth Windpark Project is unusual in not requiring significant additional transmission facilities. A generic 98.9 MW LWECS would generally require transmission facilities to an interconnection point. Impacts from the associated transmission lines would include impacts due to construction and operation. Construction impacts would include impacts related to land clearing and materials transport. Operation impacts would include impacts related to electromagnetic fields (EMF), noise and visibility. The primary impact would be the length and voltage of the transmission line required to interconnect the wind Project with the transmission grid. A relatively longer line or higher voltage would create greater construction and operation impacts.

38.5 MW Biomass Plant

A 38.5 MW biomass plant would have transmission facilities similar to the generic LWECS; however, an electrical collection system and Project substation would not be required. The plant would include a transformer at the plant to transform the voltage to transmission levels and a transmission line between the plant and a substation where the power would enter the grid.

Potential impacts and mitigation strategies would be similar to those for the any energy project. Again, the primary impact would be the length and voltage of the transmission line required to connect the biomass plant to the transmission grid. A relatively longer line or higher voltage would increase construction and operation impacts.

No Build Alternative

Under the No-Build Alternative no project would be built and there would be no additional electric transmission lines.

5.7.2 Roads

Large electric generation facilities may impact roads during the construction phase of the project, both in terms of traffic and wear and tear on the roads. Once operational, wind projects would not be expected to impact roads. For a biomass facility, depending upon the method of fuel delivery, traffic impacts could continue once the facility becomes operational.

Ellerth Windpark Project

In general, the existing roadway infrastructure in and around the Project Area is characterized by county and township roads that generally follow section lines. Various County State Aid Highways (CSAH), County Roads (CR) s, and township roads provide access to the Project Area. Access to the Project Area also includes two-lane paved and gravel roads. Many landowners use private single-lane farm roads and driveways on their property. [133]

U.S. Highway 59 runs northwest-southeast approximately 5 miles from the eastern edge of the Project boundary. There are eight CSAHs within the Project Area: CSAH 4, 11, 14, 28, 31, 3, 37, and 38. There are two CRs within the Project Area: CR 114 and CR 115.[134]

[133] Site permit Application at p. 23.
[134] Id at p. 23.

The existing traffic volumes on the area's county highways are documented in Table 13. For purposes of comparison, the functional capacity of a two-lane paved rural highway is in excess of 5,000 vehicles per day, or Annual Average Daily Traffic (AADT). The highest existing AADT in or near the Project Area are 570 vehicles per day along CSAH 28. Along the remaining county highways, the AADTs are generally below 500 vehicles per day (MnDOT 2003).[135]

Table 13. Existing Traffic Volumes within the Project Area

Roadway	Existing Annual Average Daily Traffic (AADT)
CSAH 4	495
CSAH 11	210
CSAH 14	70
CSAH 28	570
CSAH 31	40
CSAH 37	20
CSAH 38	85
CR 114	10
CR 115	70

Construction of the proposed project would increase traffic slightly during construction. Additionally, there would be impacts to local roads. Depending on final turbine location and established haul routes, intersections may be temporarily widened to accommodate oversize loads. Any improvements to existing roads would consist of re-grading and filling of gravel surfaces. No additional asphalt or other paving is anticipated. Any temporary modifications to the existing road system would be restored following construction.

Permanent turbine access roads will be constructed along turbine strings. Constructing the Ellerth Windpark Project will require approximately 17.8 miles of gravel access roads, depending on the size of turbine selected and final design. The access roads will be between towers and one road will be required for each tower string. Proposed access roads will be approximately 16 feet wide and low profile to allow cross-travel by farm equipment. All roads will include appropriate drainage and culverts. In addition, during operation of the project, the access roads will be used by operation and maintenance

[135] Id at p. 23.

crews while inspecting and servicing the wind turbines. Ellerth Wind will work closely with the landowners to locate these access roads 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.[136]

To facilitate crane movement and equipment delivery, temporary roads would be approximately 23 to 40 feet in width. In addition, turbine assembly will require a 40-ft-by-120-ft gravel crane pad extending from the access road to the turbine foundation which will be graded to a minimum of one percent, and an approximate 260-ft-by-260-ft to 335-ft-by-335-ft area for component lay down and rotor assembly centered close to the turbine foundation which will be graded to a minimum of five percent. After construction, the temporary construction areas adjacent to the turbine pad and access road will be restored. The site will be graded to natural contours, soil will be loosened if needed, repairs to tiling will be done where needed, and the site will be seeded if needed. Once construction is completed, the access roads will be re-graded, filled, and dressed as needed with class-5 gravel to a permanent width of approximately 16 feet to support the size and weight of maintenance vehicles.[137]

During the construction phase, several types of light, medium, and heavy-duty construction vehicles will travel to and from the Project Area, as well as private vehicles used by the construction personnel. Ellerth Wind estimates that there will be approximately 75 large truck trips per day and up to approximately 175 small-vehicle (pickups and automobiles) trips per day in the area during peak construction periods. That volume will occur during the peak time when the majority of the foundation and tower assembly is taking place. At the completion of each construction phase, this equipment will be removed from the Project Area or reduced in number. Prior to construction, the Ellerth Wind will coordinate with local jurisdictions (county and township) in order to obtain the necessary road access and over width/overweight permits. Traffic control measures and coordination with local authorities will be implemented to ensure public health and safety is protected with respect to this Project. Construction is not anticipated to result in adverse traffic impacts. Operation and maintenance activities will not noticeably increase traffic in the Project Area.[138]

Generic 98.9 MW LWECS

Impacts would be similar to those of the proposed project. Depending on location, impacts could be greater on road systems, particularly on roads with higher daily use. Mitigation would be similar and permittees would be required to make arrangements with state and local road authorities for repair of roads used during project construction.

38.5 MW Biomass Plant

A 38.5 MW Biomass plant would also impact road systems. Impacts during construction would include increased traffic and an increase in use by heavy equipment. For the lifetime of the Project, fuel (biomass) would be delivered to the facility. The fuel handling and receiving operations are expected to be truck-traffic (typically multi-axle and/or semi-combination vehicles) operating on a 24-hour per day, 7-day per week basis. The frequency of trucks is dependent on the demand of materials and the available payload of each specific vehicle. An average flow of three to five semi-combination vehicles per hour is anticipated. Peak fuel receiving is anticipated to occur between the hours of 6:00 AM and

[136] Id at p. 23.
[137] Id at p. 79-80
[138] Site Permit Application at p. 23.

5:00 PM. The origin of loaded trucks and destination of empty trucks depends upon the location of the fuel source.

No Build Alternative

Under the No-Build Alternative no project would be built, no roads would be constructed, and there would be no impact from construction traffic.

5.7.3 Communication Systems

Large electric generation facilities have the potential to impact electronic communications (radio, television, telephone, cell phone, and microwave). This section discusses potential impacts on communications due to the operation of a large generation facility in the Project Area.

Ellerth Windpark Project

Wind turbines can cause interference with electronic communications by obstructing the reception of communication signals. Wind turbines do not impact digital signals (e.g., digital television, internet, cell phones), unless the turbines directly obstruct the signal, such as being located in the line-of-sight. Analog signals (e.g., AM and FM radio, microwaves) can be interfered with by direct obstruction and by indirect signal interference, resulting in ghosting of television pictures or signal fading.

Land mobile and radio facilities are wireless communication systems intended for use by users in vehicles, such as those used by emergency first responder organizations, public works organizations, or companies with large vehicle fleets or numerous field staff. FM radio is not impacted by wind turbines or transmission facilities; AM radio can be impacted near transmission facilities, e.g., signal fading underneath a transmission line.

Microwave Beam Paths

Wind turbines can interfere with microwave paths by blocking or partially blocking the line-of-sight path between microwave transmitters and receivers. In order to avoid microwave interference Ellerth Wind completed an internal evaluation of licensed non-federal government microwave beam paths in the vicinity of the Project Area and also requested a GeoPlanner report from Comsearch (See SPA, Appendix C).[139] . These evaluations determined that a single active beam path exists within the Project vicinity and a setback of 200 m (656 ft) was applied around each beam path to ensure the Worst Case Fresnel Zone would not be encroached on by any portion of the turbine infrastructure including blades.

Additionally, through discussions with operators active in the vicinity of the Project Area, an additional beam path operated by Unicel was identified and buffered by 150 m (492 ft) to ensure service was not disrupted.[140]

Ellerth Wind also reviewed anticipated microwave beam paths in Marshall County and identified an anticipated Minnesota Department of Transportation (MnDOT) tower network in the vicinity of the Project Area. Ellerth Wind contacted MnDOT about the tower network and received a letter from

[139] Site Permit Application at p. 25 and Appendix C.
[140] Id at p. 25.

MnDOT dated September 27, 2011 stating that there will not be any towers within the Project Area and the Project will have no adverse affect on MnDOT's microwave beam paths (See SPA, Appendix A).[141]

Radar

The federal government has a large number of departments and agencies that operate a set of communication systems that are not part of any public databases. The National Telecommunications and Information Administration (NTIA) coordinate government communication systems for all departments and agencies.[142] Construction and operation of the proposed wind project would still need to be in accordance with all associated federal and state permits and laws, as well as industry construction and operation standards. Due to the impacts expected, mitigation measures are not anticipated.

Telephone Service

Telephone service in the area is provided to farmsteads, rural residences and businesses by Frontier Communications, Wikstrom Telephone Company, and Polar Communications. Construction and operation of the proposed wind farm is not expected to impact telephone service to the Project Area. Prior to construction, a utility locate service will be contacted to locate underground facilities so they can be avoided. Ellerth Wind will coordinate collector line placement with local telecommunications providers and avoid installing collection lines parallel or in close proximity to existing copper telephone lines if concerns exist regarding the possibility of magnetic field interaction and telephone circuit noise. Ellerth Wind will comply with and satisfy all Institute of Electrical and Electronics Engineers, Inc. (IEEE) standards applicable to this Project including, but not limited to, IEEE 776 [Recommended Practice for Inductive Coordination of Electric Supply and Communication Lines], IEEE 519 [Harmonic Specifications], IEEE 367 [Recommended Practice for Determining the Electric Power Station Ground Potential Rise and Induced Voltage from a Power Fault], and IEEE 820 [Standard Telephone Loop Performance Characteristics] provided the telephone service provider(s) have complied with any obligations imposed on the provider(s) pursuant to these standards. At this time, no impacts are anticipated to telephone service, however to the extent project facilities cross or otherwise affect existing telephone lines or equipment, Ellerth Wind will enter into agreements with service providers to avoid interference with their facilities.[143]

Construction and operation of the proposed wind farm is not expected to impact telephone service in the Project area. Gopher One Call would be contacted prior to construction to locate and avoid all underground facilities. To the extent project facilities cross or otherwise affect existing telephone lines or equipment, Ellerth Wind will enter into agreements with service providers to avoid interference with their facilities.[144]

GPS

Global positioning systems (GPS) use satellite signals to determine locations on the earth's surface and are commonly used to guide agricultural operations. Because GPS uses multiple digital satellite signals, interference with the signals or subsequent uses is not anticipated. Obstruction of any one satellite

[141] Id at p. 25.
[142] For more information on the National Telecommunications and Information Administration, see http://www.ntia.doc.gov/about.html.
[143] Site Permit Application at p. 24-25.
[144] Id at p. 25.

signal would require direct line-of-sight obstruction due to a wind turbine. Such an obstruction would be temporary (i.e., there is concurrent GPS receiver movement, satellite movement, and wind turbine blade movement such that the obstruction would be resolved).

AM/FM Facilities

Ellerth Wind undertook a search of all AM & FM broadcast stations within the vicinity of the project and requested an AM/FM Radio report from Comsearch. (See Site permit Application, Appendix C). Within a 30km (18.6 mile) radius of the turbine locations, 7 FM records and 1 AM record were identified. The closest FM and AM records are over 16 miles from the nearest turbine.[145]

According to the Comsearch AM/FM Report, FM stations' coverage when they are at distances greater than 4 km (2.5 miles) from wind turbines are not subject to degradation. As long as all wind turbines in the Project are not located closer than 4 km (2.5 miles) from the FM stations' antennas, signal degradation should not occur. As a result no FM interference is expected.[146]

According to the Comsearch AM/FM Report, the potential for interference with AM broadcast coverage attributable to wind farms is only anticipated when broadcast stations with directive antennas are within 3.2 km (2 miles) of turbine towers and broadcast stations with non-directive antennas are within 0.8 km (0.5 miles). As a result no AM interference is expected.[147]

Fixed Land Mobile Stations

Land mobile sites are typically unaffected by the presence of wind turbines as the frequencies of operation for these services have characteristics that allow the signal to propagate through wind turbines. As a result, change in their coverage associated with wind turbine installation is not expected. In the unlikely event a land mobile licensee believes their coverage has been compromised by the presence of the project, there are options to improve signal coverage through optimization of a nearby base station or adding a repeater site. Utility towers, meteorological towers or even the turbine towers within the wind Project Area can serve as the platform for a land mobile base station or repeater sites. Wind turbines should not adversely affect the signals of land mobile stations if the turbines are placed at least 400 meters (one-quarter mile) from these stations.[148]

Television

There is a possibility that broadcast facilities (HDTV and digital television) would be impacted by the proposed project. Outdoor antennas pointed through the turbine area, "rabbit ear" antennas, or older HDTV receivers would be more likely to experience signal disruption (in the form of pixilation or "freezing" of a picture). Interference would be more likely to occur where there is direct interference with digital broadcast paths of local television stations.

According to a report from Comsearch, there are 13 database records within 65 km (40 miles) of the Project Area. Of these 13 records, six are currently licensed and operating, two of which are low-power TV stations or translators. Translators receive signals from distant broadcasters and rebroadcast the signal to local audiences. The four full-power stations (KBRR, KGFE, KCGE, and KCPM) are located

[145] Id at p. 25-26.
[146] Id at p. 25-26
[147] Id at p. 25-26
[148] Id at p. 26.

southwest of the project area; the nearest being located approximately 21.1 miles south-southwest of the nearest turbine, and approximately 1.5 miles east of the intersection of County Highway 19 and Highway 75, near Euclid, Minnesota. The remaining full-power station is located approximately 32 miles southwest of the nearest turbine, approximately 1 mile north of East Grand Forks, Minnesota. [149]

According to the Comsearch report, the four full-power digital stations may have disrupted reception in and around the Project, particularly those on the opposite side of the wind turbines from the broadcast stations (i.e. north and northeast). However, based on the low number of local TV channels available, off-air television stations may not be the primary mode of TV service, and direct broadcast satellite may be the dominate delivery mode of TV service in the surrounding communities.[150]

Construction and operation of the proposed wind farm will be designed to avoid adverse impact to telephone, television, internet, or cellular phone service. To the extent project facilities are installed in proximity to existing telephone lines or communication equipment, Ellerth Wind will closely coordinate with the applicable service providers to avoid interference with such facilities. Should inadvertent impacts to these systems arise after construction, Ellerth Wind the Applicant will work with affected residents to determine the cause of interference and, where necessary, reestablish acceptable reception in a timely fashion.[151]

Satellite, cable service or receiver upgrades would mitigate negative impacts on broadcast facilities if impacts cannot be avoided through turbine placement. Establishment of a program to respond to interference complaints would help determine necessary mitigation efforts.

LWECS site permits issued by the Commission typically require the Permittee to design a plan for conducting an assessment of television signal reception and microwave signal patterns in the project area. The assessment would provide data that can be used in the future to determine whether the turbines and associated facilities are the cause of disruption or interference of television reception or microwave patterns in the event residents should complain about such disruption or interference after the turbines are placed in operation.

Generic 98.9 MW LWECS

A generic 98.9 MW LWECS would have communications impacts similar to the Ellerth Windpark Project depending on a variety of factors such as the proximity of homes in relation to the project, number of turbines, and the number of communication facilities and types in the area.

38.5 MW Biomass Plant

A 38.5 MW biomass plant would have fewer or no impacts on communications than the proposed Project. A biomass plant would be shorter than the Project's wind turbines and sited in one location.

No Build Alternative

Under the No-Build Alternative no project would be built and there would be no impact to communication systems.

[149] Id at p. 26
[150] Id at p. 27
[151] Id at p. 27

5.8 Fuel Availability

Large electric power generating facilities require some type of fuel. Depending upon the amount and type of fuel required and the location of the fuel relative to the proposed project, the project can create impacts related to harvesting and delivery of the fuel. This section discusses the availability of fuel for the proposed project and alternatives.

Ellerth Windpark Project

The Ellerth Windpark Project relies on wind, a renewable energy source, to generate electricity. Wind turbine blades extract kinetic energy as the wind passes through the blades and creates turbulence downstream. To operate effectively, turbines must be setback from other turbines to compensate for this turbulence known as wake loss.[152]

Wind capacity varies across Minnesota. Extensive wind measurements have been taken and analyzed by the Minnesota Department of Commerce.[153] As shown in Map 3, this data suggests, and coupled with local site data collected that the mean annual wind speeds at 80 meters (262.5 feet) at 7.1 to 7.6 meters per second (mps) (15.8 to 17 mph).[154] Power generation by the project depends not only on wind speed (how much energy it contains), but also the frequency of attaining optimal wind speeds. Wind turbines generate power only when the wind is blowing.[155] This frequency is expressed as capacity factor, which is expressed as how much power the turbine generates compared to how much it could generate if it was operating all the time. Capacity factors of 35 to 40 percent are common in Minnesota for large wind energy conversion systems. The Ellerth Windpark Project is estimated to have a capacity factor in this range.[156]

Generic 98.9 MW LWECS

A generic 98.9 MW LWECS would utilize the wind resources as the proposed project. To be economically feasible, a 98.9 MW LWECS sited elsewhere in Minnesota would need to be sited in area with sufficient wind resources to meet generation projections. As shown in Map 3, several areas of the state have wind resources that are as good as or better than the Ellerth Windpark Project. As shown in Map 4, the highest concentration of existing wind projects in the southwestern Minnesota; related to the good wind resources, the highest concentration of wind turbines is also located in southwestern Minnesota. Because of transmission constraints, as well as advances in turbine technology, wind projects have begun to be proposed throughout the state. The availability of productive, undeveloped wind resources in Minnesota remains high.

[152] The distance between turbines necessary for effective operation is approximately 6 rotor diameters (RD) on the non-prevailing wind axis and 10 RD on the prevailing wind axis. Accordingly, Minnesota requires setbacks of 3 x 5 RD for each turbine. See, PUC Order Establishing General Permit Standards, http://energyfacilities.puc.state.mn.us/documents/19302/PUC%20Order%20Standards%20and%20Setbacks.pdf.
[153] Wind Resource Analysis Program 2002, http://www.state.mn.us/mn/externalDocs/Commerce/WRAP_Report_110702040352_WRAP2002.pdf.
[154] Site Permit Application at p. 75.
[155] See Table 1 of this ER which includes “Cut-in Wind Speeds”, i.e., the minimum wind speed necessary for the turbine to operate.
[156] Site permit Application at p. 88.

38.5 MW Biomass Plant

A combination of wood chips and agricultural biomass would be the primary fuel sources for a 38.5 MW biomass plant. A 38.5 MW biomass plant would use approximately 40,000 tons of wood, wood wastes, and agricultural biomass materials per month.

It is possible that rail could be used for delivery of fuel to the plant, depending on its location. However, the most likely method of delivery for woody and agricultural biomass fuel would be semi-trailer trucks. Trucks would likely deliver wood and agricultural biomass by loads of 20 tons or greater. The biomass facility would operate 24 hours a day, but fuel delivery would be between the hours of 6 and 6. The total number of daily truck trips is estimated to be approximately 100. The origin of the biomass trucks and the total trip length required for delivery would depend on the location of the biomass source relative to the biomass plant. A back-up fuel source would be required for the biomass plant, to assist with plant start-up and to sustain the plant temporarily when the biomass fuel supplies are low. Natural gas would be used as a backup fuel. The construction of a natural gas pipeline would be required to deliver the natural gas to the biomass plant.

Potential impacts to the environment related to fuel for a biomass plant include possible degradation of the environment due to biomass removal (increased soil erosion and productivity due to removal of agricultural biomass and loss of wildlife habitat), air pollution due to biomass transport, and the impacts associated with building a natural gas pipeline.

Impacts related to harvesting for a biomass plant could be mitigated by using guidelines for biomass harvesting. [157] These guidelines minimize impacts to natural resources. Siting the plant in a location that reduces biomass transportation would reduce the impacts to air quality associated with ground transportation. The Minnesota Forest Resource Council has developed woody biomass harvest guidelines that reduce impacts to wildlife habitat.[158] If harvesting guidelines are used to mitigate impacts to natural resources and wildlife, suppliers of biomass fuels would need to follow biomass harvest guidelines.

5.9 Agriculture

Large generation facilities in agricultural areas may have impacts on cropland and livestock.

5.9.1 Cropland

Wind farms placed in cultivated areas do take a limited amount of acreage out of production. However, crop and wind farming are generally compatible uses.

The U.S. Department of Agriculture (USDA) NRCS identifies prime farmland as the land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pasture land, forestland, or other land. Important farmlands consist of prime farmland, unique farmland, and farmland of statewide or local importance. Based on Soil Survey Geographic Database (SSURGO) soils data, 22% of the Project Area is

[157] See Minnesota DNR Guidelines for Woody Biomass, 2007. http://www.dnr.state.mn.us/forestry/um/biomass/index.html
[158] Forest Biomass and Biofuels Harvest, http://www.frc.state.mn.us/initiatives_policy_biofuels.html.

identified as prime farmland, 27 % as farmland of statewide importance, and 38% would be prime farmland if drained.

According to the Natural Resource Conservation Service (NCRS), there are approximately 11,700 acres of land enrolled in Conservation Reserve Program (CRP) within the Project Area. Approximately 2,026 acres of CRP land under contract expired in 2011 and approximately 3,280 acres will expire in 2012.[159] CRP land is typically covered by brome grasses, orchard grasses, and alfalfa.[160]

Ellerth Windpark Project

Approximately 85 percent of the Project Area (28,644.6 acres) has been classified in the National Land Cover 2001 Dataset (NLCD) as cultivated farmland. According to the 2007 agricultural census, the top crop items (acres) within Marshall County are wheat, soybeans, sugar beets, barley and sunflower seeds and top livestock inventory include cattle and calves.[161] Approximately 86 to 122 acres of farmland would be removed from agricultural production. This includes the construction of access roads, turbine pads, the project substation and the operations and maintenance facility.[162] Farmland preservation programs such as the federal Conservation Reserve Program (CRP) and Minnesota's Reinvest in Minnesota (RIM) provide land preservation and provide a small income for participating landowners. Wind development is allowed on CRP lands with adequate consultation with state and federal agencies.

Specific impacts to agricultural lands will be determined once turbine and road placement and substation/O&M facility locations have been finalized. The loss of agricultural land to the construction of the wind farm will reduce the amount of land that can be cultivated. Only a very small portion of the Project Area will be converted to non-agricultural land use, and this will not significantly alter crop production in the Project Area or Marshall County. To the extent practicable, temporary staging areas will be placed in previously disturbed locations to minimize the impact to agricultural production.[163]

Turbine and facility siting will include discussions with property owners to identify features on their property, including drain tile, which should be avoided. Impacts to drain tile due to project construction and operation are not anticipated. However, in the event that there is damage to drain tile as a result of construction activities or operation of the LWECS, the tile will be repaired according to the agreement between Ellerth Wind and the owner of any damaged tile.[164]

Generic 98.9 MW Wind Farm

Impacts to farming at a generic wind farm would be similar to those of the proposed Project.

38.5 Biomass Plant

Impacts to farming from a biomass plant would be minimal. It is likely that such a facility would not remove land from agricultural production and no mitigation would be necessary.

[159] Site Permit Application at p. 12
[160] Id. at p. 50.
[161] Site Permit Application at p. 36- 37.
[162] Id at p. 37.
[163] Id at p. 38-39.
[164] Id at p. 38-39

No Build Alternative

Under the No-Build Alternative no project would be built and there would be no impact to cropland.

5.9.2 Livestock

Large electric generation facilities have the potential to impact domesticated animals and livestock indirectly through environmental impacts. This section discusses potential impacts to livestock due to the operation of a generation facility in the Project area

Livestock health depends on ecosystem health (clean water, fresh air, healthy soils and crops). Generation facilities that impair ecosystem functions can also negatively impact livestock health, such as through emissions of hazardous air pollutants or through the contamination of water systems. Potential ecosystem impacts due to generation facilities are discussed elsewhere in this report (Sections 5.1 and 5.2 discussing air pollutants).

Other potential impacts to livestock health include annoyance or stress. Stress may result from a variety of impacts related to generation facility operations, such as lights, noise, and stray voltage. Impacts from noise and shadow flicker are discussed in Section 5.5.

The primary concern with stray voltage has been its potential effect on farm animals that are Confined in areas where electrical distribution systems supply the farm. A great deal of research on the effects of stray voltage (Neutral to Earth Voltage or NEV) on dairy cows has been conducted over the past 40 years. A comprehensive review of this research is presented in a report to the Ontario Energy Board (Literature Review and Synthesis of Research Findings on the Impact of Stray Voltage on Farm Operations, 2008, Prepared by Douglas J. Reinemann, Ph.D.). [165]

Ellerth Windpark Project

Livestock in and adjacent to the project area would be exposed to noise and shadow flicker created by wind turbines. Exposure levels would depend on factors such as grazing, housing, and the distance between livestock and the turbines. Health impacts from turbine noise and shadow flicker are uncertain. Information about impacts to livestock is anecdotal and indicates that livestock are not impacted by turbine operations. Animals do graze near, under, and up to turbine towers.

The electrical collection system proposed for the Ellerth Windpark is designed to be “a separately derived system” as defined in the National Electric Code. The system would have no direct electrical connection (including grounded circuit conductors) to conductors originating in another system. The wind farm collection system would have its own substation and transformers. The Project does envision connection to the grid via a short new 115 kV line interconnect to existing 115 kV Otter Tail Power Company transmission line.

Because of the type of transformers used at each turbine and the design of the collection system, there are no ground currents in the collection system, whether the system is operating at zero generation or maximum generation. Therefore, under normal operating conditions, the grounding for the wind farm collection system has no current with which to create stray voltage.

[165] See eDockets 08-1233 (Doc. Id. 201010-55392-01).

Mitigation of potential stray voltage impacts would include that all safety requirements are met during the construction and operation of the project. There are a number of strategies for mitigating stray voltage, including improving grounding. [166] Making good electrical connections and choosing proper wiring materials for wet and corrosive locations will also improve grounding.

Generic 98.9 MW LWECS

A generic 98.9 MW LWECS located elsewhere in Minnesota would have impacts to livestock similar to the Ellerth Windpark Project.

38.5 MW Biomass Plant

A 38.5 MW biomass plant would have fewer impacts to livestock than those of the proposed Project. Biomass plant operations would create noise and lighting that could impact livestock health. The biomass plant could have an associated transmission line that produced stray or induced voltage. However, the plant could be sited away from livestock operations to minimize health impacts. The biomass plant would be a concentrated impact that can be sited away from livestock. Wind turbines represent a diffuse impact that exists within landscapes utilized by livestock.

No Build Alternative

Under the No-Build Alternative no project would be built and there would be no impact to livestock.

[166] Id. See also, Stray Voltage, Public Service Commission of Wisconsin, http://psc.wi.gov/utilityinfo/electric/strayvoltage.htm.

6 Availability and Feasibility of Alternatives

Having analyzed comparative impacts of alternatives, an Environmental Report is required to offer an assessment of the availability and feasibility of those alternatives (Minn. Rule 7849.1500 subp. 1F). This section describes the feasibility and availability of alternatives in the Ellerth Windpark Project Application.

6.1 Ellerth Windpark Project

The proposed project is feasible and available to be implemented. Wind resources in the project area are good and the facility study of the project that is required for MISO interconnection has been completed and has identified relatively minor transmission upgrades as necessary for interconnection.

6.2 Generic 98.9 MW LWECS

An alternative to the proposed Ellerth Windpark Project in Marshall County is a large energy conversion system sited elsewhere in Minnesota. Such a project could be a 98.9 MW project or a combination of smaller dispersed projects. There are wind resources in other parts of the state and wind farms could be placed in these **areas (Map 3.** Wind Resources in Minnesota). At the time this report was prepared, several other projects, ranging in size from 20 MW to 300 MW, with a total nameplate capacity of over 1100 MW have valid LWECS site permits but have not yet commenced construction or filed pre-construction documents. In addition to wind resource availability, access to transmission interconnection is also important for a project to be viable; transmission access has been a constraint in the development of wind energy in Minnesota.

6.3 38.5 MW biomass plant

A 38.5 MW biomass plant is feasible but not likely available. Currently there is a 55 MW biomass plant using turkey litter as a fuel source operating in Benson, Minnesota. Many factors could limit the availability of a 38.5 MW biomass plant, including equipment, financing, and consistently available biomass fuels.

6.4 No-build alternative

The no build alternative is feasible and available.

The project has been proposed to meet growing electric demand in Minnesota and growing demand for additional renewable resources in Minnesota and neighboring states.[167] Minnesota has committed to a renewable energy objective of generating 25 percent of its electricity from eligible renewable sources by the year 2025.[168] Minnesota utilities forecast the need for approximately 2700 MW of renewable generation by 2016 and 3,200 MW of additional renewable generation by the year 2025 to meet this objective.[169] In addition to Minnesota's renewable energy objective, there is a regional need and desire for wind energy. As noted in the discussion of a generic 98.2 MW wind facility, several other projects with a combined nameplate capacity of over 1100 MW have valid LWECS site permits but have not yet

[167] CN Application at p. 5
[168] Minn. Statute 216B.1691
[169] Department comments on CN, February 1, 2012, eDocket number 20122-70928-01

commenced construction or filed pre-construction documents. It is not clear what the effect of a no-build alternative would be on meeting Minnesota and regional demand for electric power, and for renewable generation in particular.

7 Permits

The Ellerth Windpark Project will require permits and approvals from entities other than the Minnesota Public Utilities Commission. Federal, state, and local permits or approvals that have been identified for construction and operation of the proposed project are listed in the following table.

Table 15: Potential Required Permits and Approvals

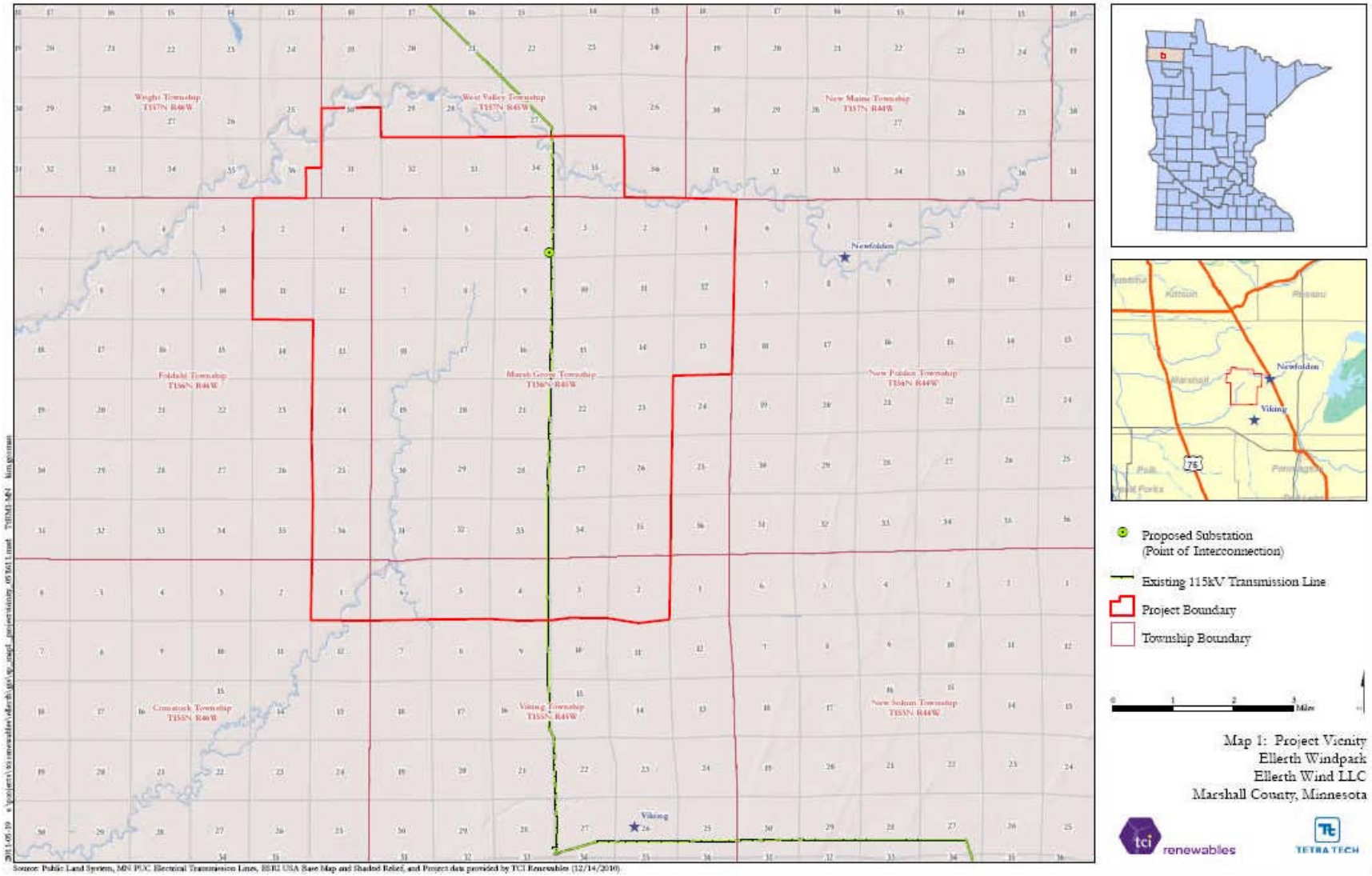
Regulatory Authority	Statute	Permit/ Approval	Description	Trigger	Application Timeline	Website
Federal Aviation Administration (FAA)	49 USC 44718	Notice of Proposed Construction (Form 7461-1) Hazard Determination	Notifies FAA of proposed structures that might affect navigable airspace. Form requires proposed markings and lighting. FAA must review possible impacts to air safety and navigation, as well as the potential for adverse effects on radar systems.	All turbines/ structures over 200 feet tall; and/or turbines/ structures less than 200 feet tall near an airport.	Submit notice at least 30 days prior to anticipated start of construction or before the application for construction permit is filed.	http://www.faa.gov/
United State Army Corps of Engineers (USACE)	Clean Water Act	Section 404 Permit	Required for the discharge of dredged or fill material into waters of U.S. Minimal levels of fill may be covered under existing General Permits/Letters of Permission	Presence of waters of the U.S.	Dependent on level of fill and type of permit required (individual vs. Letter of Permission)	http://www.usace.army.mil/
Minnesota Public Utilities Commission	Pursuant to Minnesota Statute §216F.08	LWECS Site Permit	Application required for facilities with nameplate capacity greater than 5 MW	Generation of greater than 5 MW of power.	180 days prior to construction (minimum).	https://www.revisor.mn.gov/statutes/?id=216F
Minnesota Public Utilities Commission	Minnesota Statutes §§216B.2421 and 216B.243 subd. 2, and Minnesota Rules Chapter 7849	Certificate of Need	Needed for a large energy project and HVTL in Minnesota. Commission determines basic types of facility to be constructed, size of facility, and the time of the facility	Project nameplate is greater than 50 MW.	Notice of intent must be filed 3 months prior to application. Following the filing, application process generally takes one year.	https://www.revisor.mn.gov/statutes/?id=7849
Minnesota Pollution Control Agency	Clean Water Act	Section 401 Certification	Verify that project construction would comply with state water quality standards.	Wetland impacts proposed that do not qualify for Section 404 GP/LOP.	Prior to construction activities.	http://www.pca.state.mn.us/water/401.html

Regulatory Authority	Statute	Permit/ Approval	Description	Trigger	Application Timeline	Website
Minnesota Pollution Control Agency	National Pollutant Discharge Elimination System Act	General Permit (Construction)	For stormwater discharges from construction activities.	Grading of more than 1 acre.	Permit to be filed prior to construction with a SWPPP.	http://www.pca.state.mn.us/publications/wq-strm2-05.pdf
Minnesota Pollution Control Agency	Minnesota Hazardous Waste Rules Chapter 7045	Very Small Quantity Generator of Hazardous Waste License	For discharge of hazardous waste.	Generate 220 pounds or less per month hazardous waste	Apply annually.	http://www.pca.state.mn.us/publications/w-hw7-09.pdf
Minnesota Department of Health	Minnesota Statutes, Chapter 103I	Well Construction Notification Fee	For construction of new water-supply wells	Construction of well for O&M building	Prior to construction	http://www.health.state.mn.us/divs/eh/wells/ruleshandbook/permits.pdf
Minnesota Department of Natural Resources	Minnesota Statute Chapter 84.415.	License to Cross Public Land and Water	For siting facilities on, or crossing over, any State administered Public Lands or Waters	Siting facilities on, or crossing over, any State administered Public Lands or Waters	Prior to impact. Process takes 60 to 90 days.	http://www.dnr.state.mn.us/waters/watermgmt_section/pwpermits/applications.html
Minnesota Department of Natural Resources	Minnesota Statute Chapter 84.415.	Permit to Work in Public Waters	For work affecting the course, current, or cross-section of a lake, wetland, river or stream	Course, current, or cross-section of a lake, wetland, river or stream affected	Prior to impact.	http://www.dnr.state.mn.us/waters/watermgmt_section/pwpermits/applications.html
Minnesota Board of Water and Soil Resources	Wetland Conservation Act (WCA)	WCA Approval	For wetland impacts. Ranges from an exemption for small or temporary impacts to a permit and mitigation for greater impacts	Impacts to any wetland in the state.	Permit application process takes up to 60 days.	http://www.bwsr.state.mn.us/wetlands/forms/form03_B.pdf
Minnesota Department of Transportation	Minnesota Statute 505, Minnesota Rules	Access Driveway Permit	Required to provide driveway access to state-owned right of way.	Project requires change in access to or from state right of way or	Prior to construction; process takes 30 days.	http://www.dot.state.mn.us/utility/

Regulatory Authority	Statute	Permit/ Approval	Description	Trigger	Application Timeline	Website
	8810.0050			change in use of property.		
Minnesota Department of Transportation	Minnesota Statute 161.45, Minnesota Rules 8810.3100-8810.3600	Utility Permit on Trunk Highway Right of Way	Required to install utilities within state owned right of way.	Project requires use of state right of way for utility route or crossing.	Prior to construction. Process takes 4 to 6 weeks	http://www.dot.state.mn.us/utility/
Minnesota Department of Transportation	Minnesota Statute 169.862	Wind Energy Transportation Oversize and/or Overweight Permit	Required to transport oversize loads on state maintained roads.	Project construction requires oversize/ overweight truck loads.	Permit required prior to construction.	http://www.dot.state.mn.us/cvo/oversize/oversize.html
Minnesota Department of Transportation	Minnesota Statute 360.83	Tall Structure Permit	Required for wind turbines and other tall structures	Structure more than 200 feet above ground level within 3 miles of an airport and increasing by 100 feet for each additional mile out to 6 miles and 500 feet	Review takes approximately 2 weeks; submittal must include FAA Aeronautical Study Determination	http://www.dot.state.mn.us/aero/avoffice/tallt owers.html
Marshall County	County Regulations	Land Alteration Permit	Permits in floodplain and shoreland areas are required for specific grading, filling and other land alteration activities.	Project construction requires permitted activities in floodplain and shoreland areas.	Prior to construction.	http://www.co.marshall.mn.us/marshallcounty/departments/waterandland.htm#permitreq
Marshall County	County	Building Permit	Required for placement of	Project	Prior to	http://www.co.marshall

Regulatory Authority	Statute	Permit/ Approval	Description	Trigger	Application Timeline	Website
	Regulations		roads, driveways, and parking areas and specific grading, filling, and other land alteration activities.	construction requires permitted activities in floodplain and shoreland areas.	construction	.mn.us/marshallcounty/departments/waterandland.htm#permitreq
Marshall County	County Regulations	Conditional Use Permit	Required for development that would not be appropriate generally but may be allowed with appropriate restrictions	Project requires land use outside of normal zoning ordinance specifications	Prior to construction	http://www.co.marshall.mn.us/marshallcounty/departments/waterandland.htm#permitreq
Marsh Grove Township	Township Regulations		N/A	N/A	N/A	N/A
Foldahl Township	Township Regulations		N/A	N/A	N/A	N/A
West Valley Township	Township Regulations		N/A	N/A	N/A	N/A
Wright Township	Township Regulations		N/A	N/A	N/A	N/A
Viking Township	Township Regulations		N/A	N/A	N/A	N/A
Comstock Township	Township Regulations		N/A	N/A	N/A	N/A

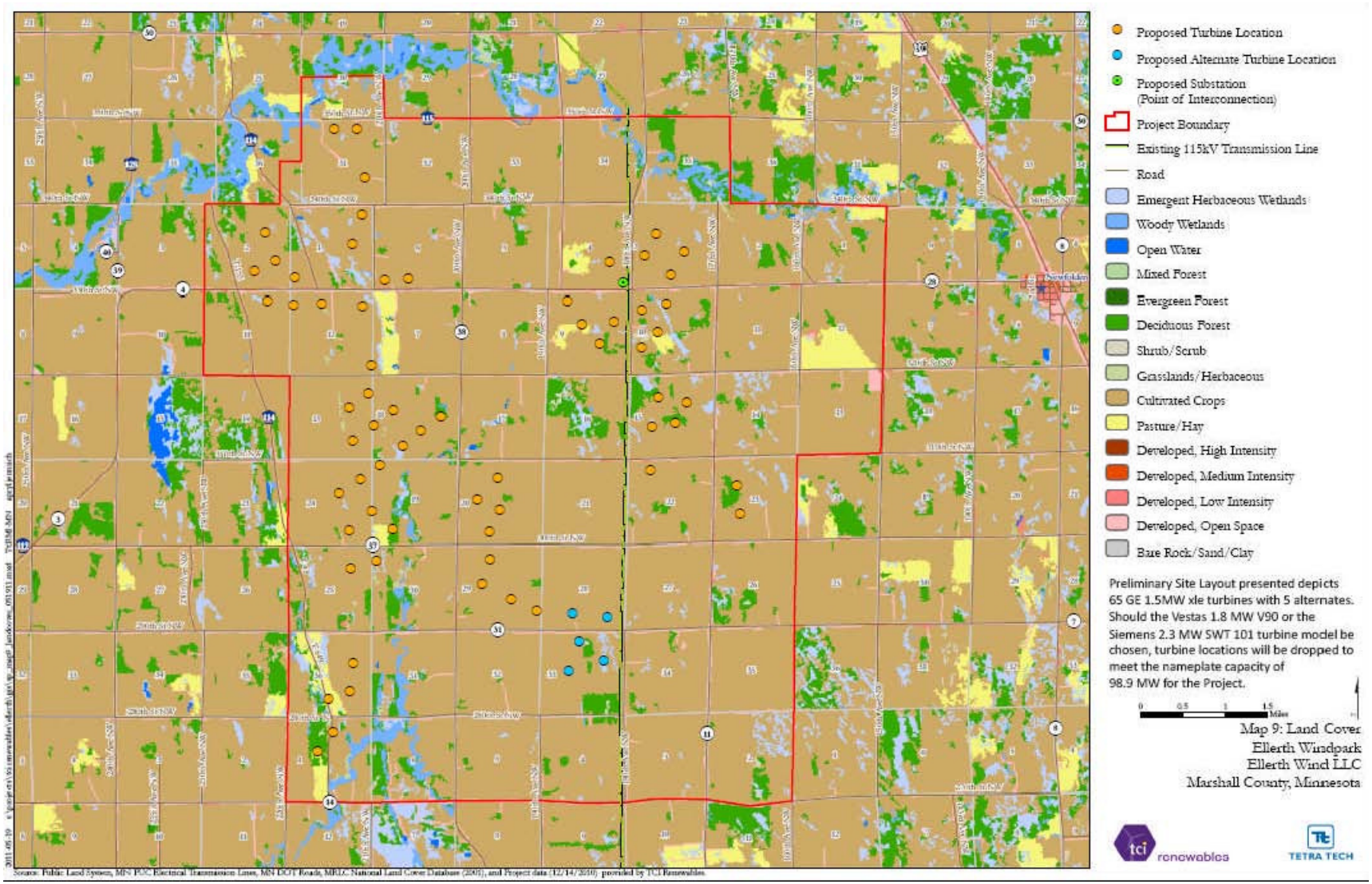
Map 1. Project Vicinity and Project Area



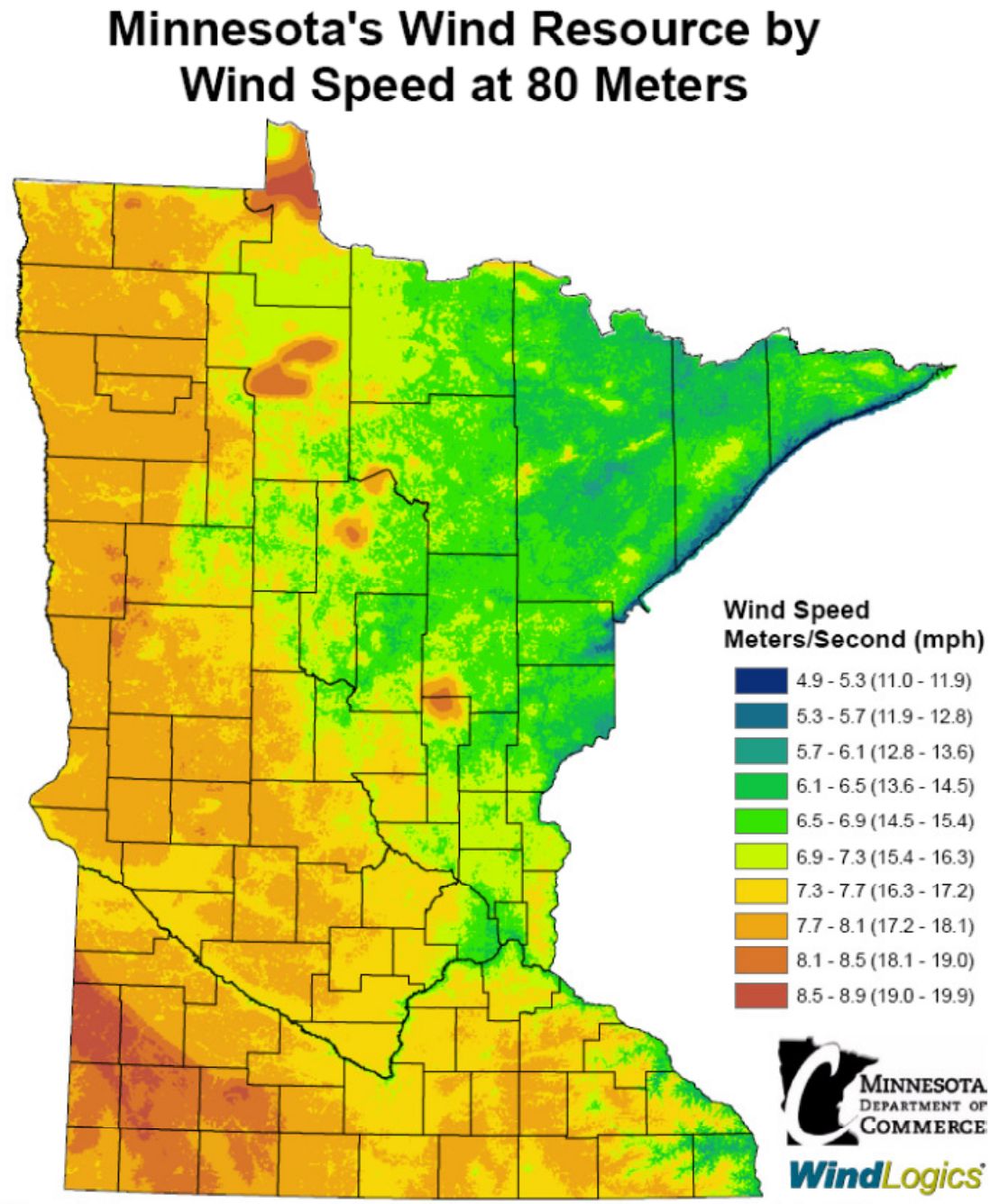
Map 1: Project Vicinity
Ellerth Windpark
Ellerth Wind LLC
Marshall County, Minnesota

tci renewables
TETRA TECH

Map 2. Preliminary Project Layout



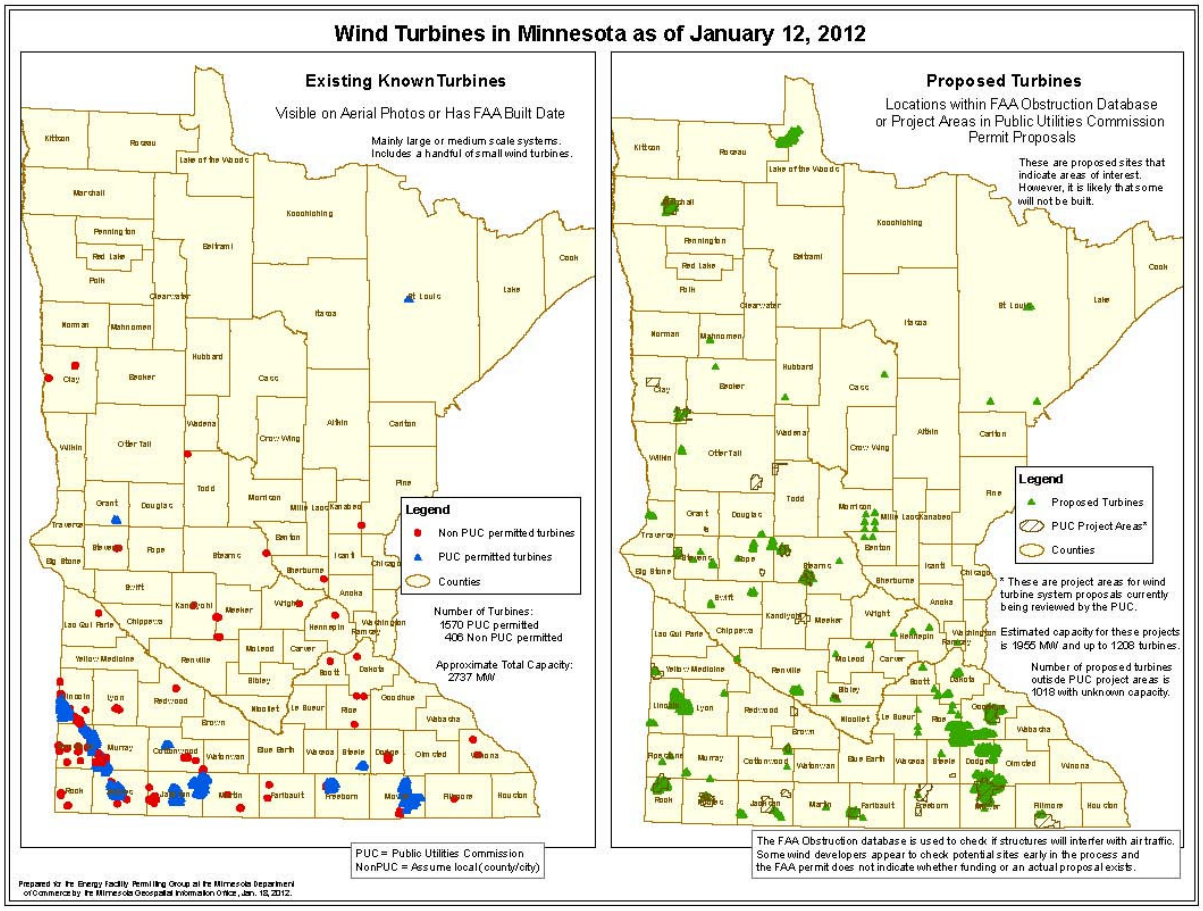
Map 3. Wind Resource



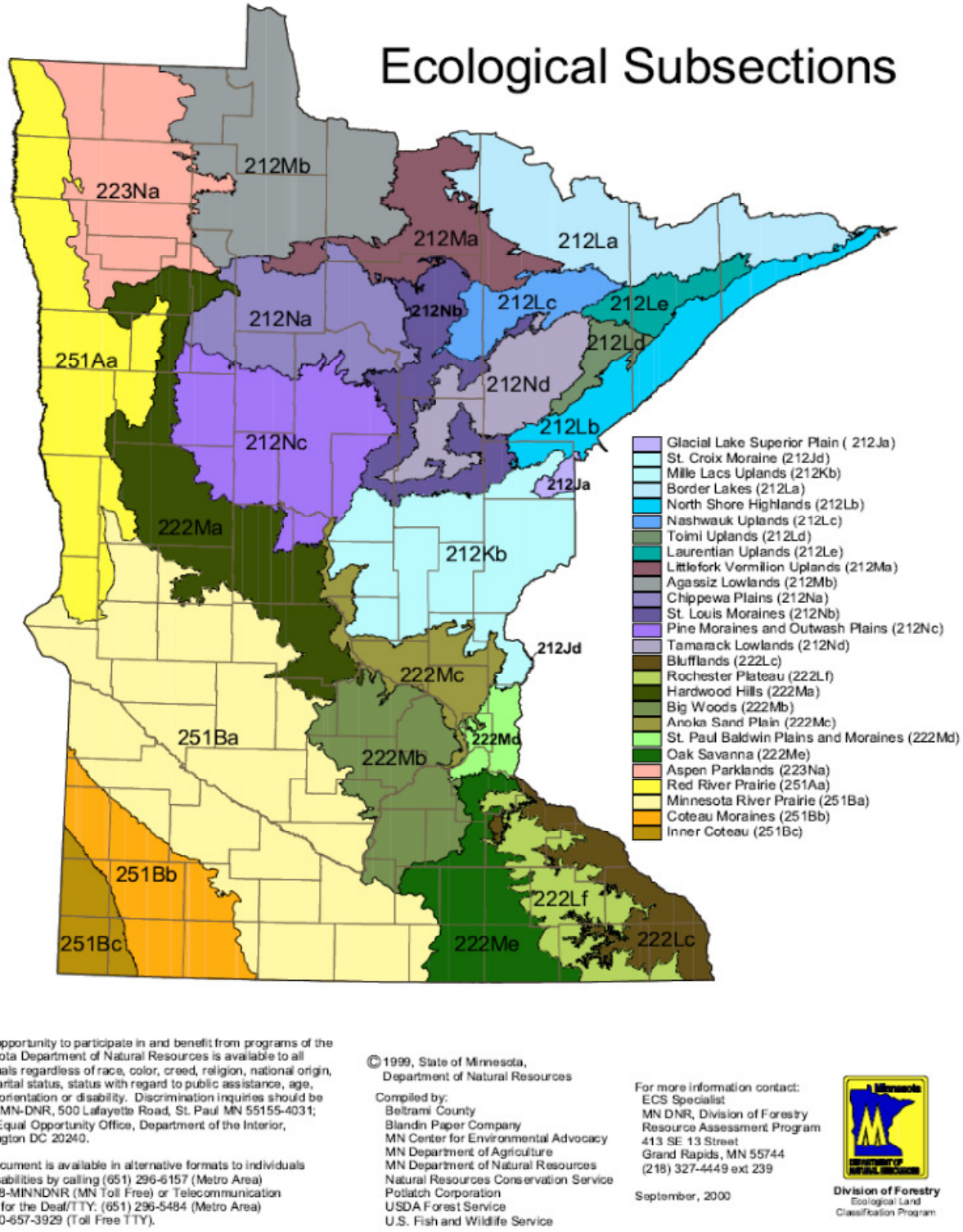
This map has been prepared under contract by WindLogics for the Department of Commerce using the best available weather data sources and the latest physics-based weather modeling technology and statistical techniques. The data that were used to develop the map have been statistically adjusted to accurately represent long-term (40 year) wind speeds over the state, thereby incorporating important decadal weather trends and cycles. Data has been averaged over a cell area 500 meters square, and within any one cell there could be features that increase or decrease the values shown on this map. This map shows the general variation of Minnesota's wind resource and should not be used to determine the performance of specific projects.

January 2006

Map 4. Wind Turbines in Minnesota



Map 5. Ecological Subsections



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MN DNR, Division of Forestry
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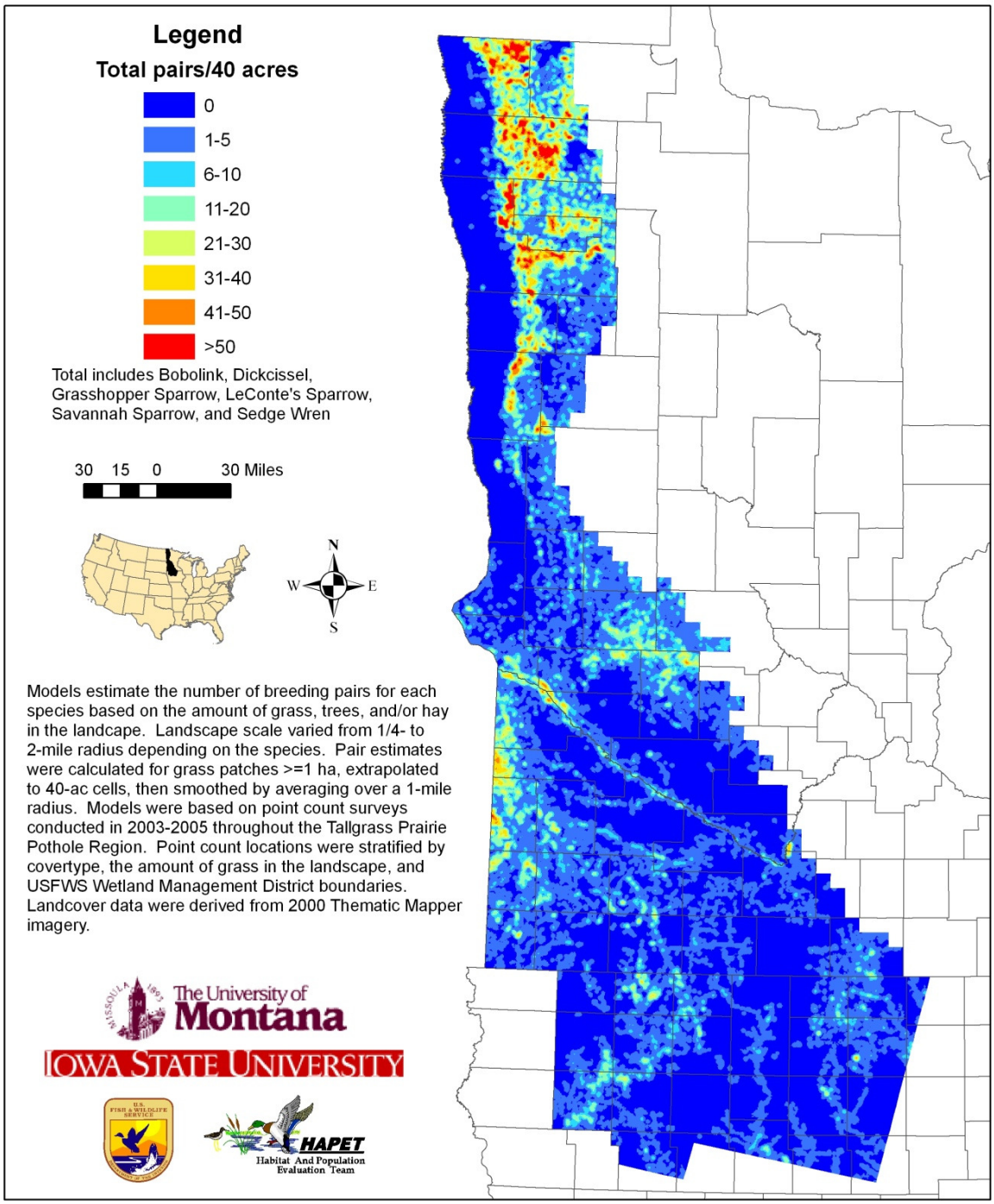
413 SE 13 Street
Grand Rapids, MN 55744
(218) 327-4449 ext 239

September, 2000

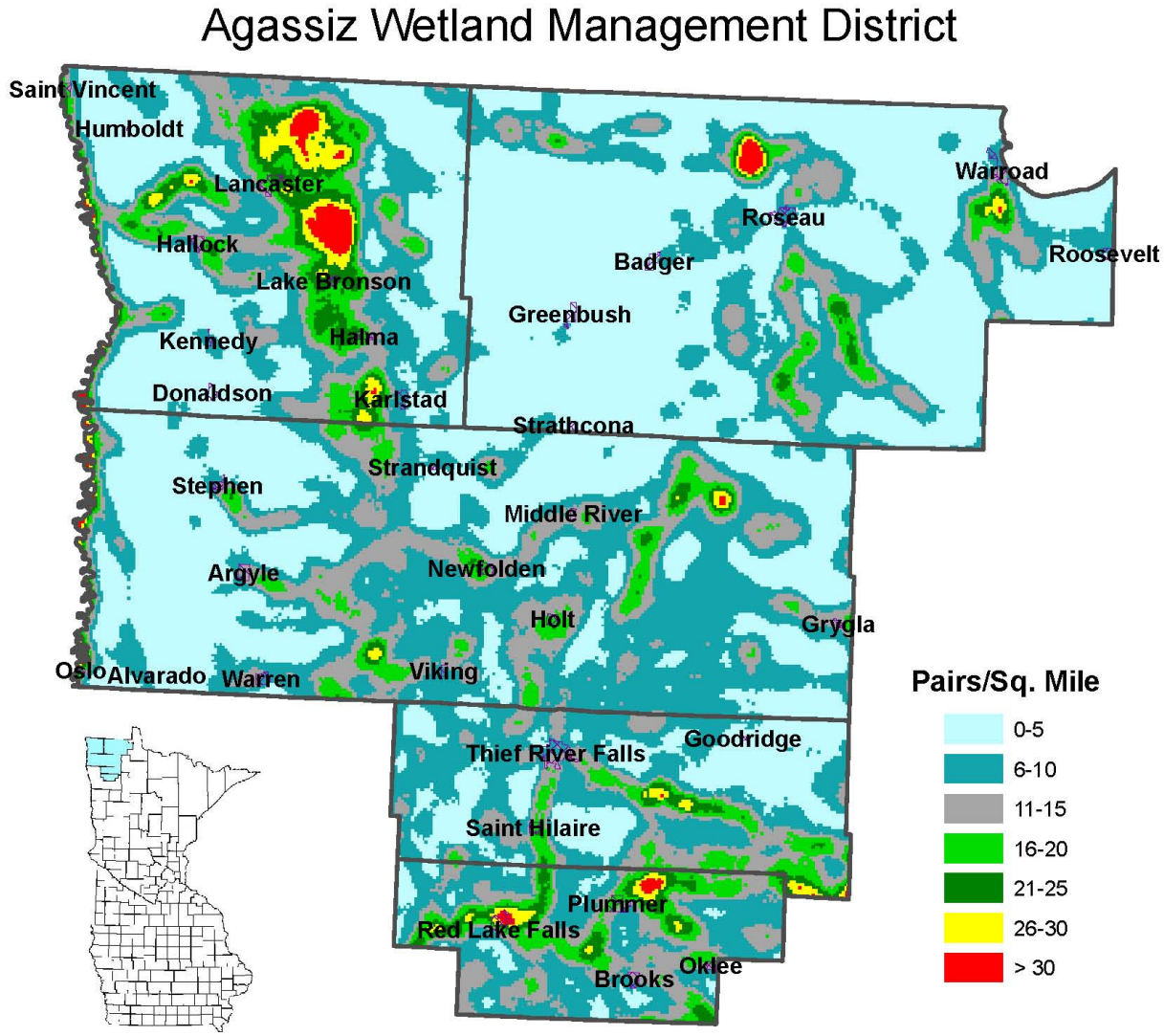
Division of Forestry
Ecological Land Classification Program

Map 6. Predicted Grassland Nesting Bird Pairs

Predicted Number of Grassland Nesting Bird Pairs in the Prairie Pothole Region of Minnesota and Iowa



Map 7. Predicted Upland Duck Nesting Area



Breeding Pair Accessibility Maps are produced from long-term 4 square mile survey data. They are commonly known as "Thunderstorm Maps" because of a perceived resemblance to a Doppler radar image of a thunderstorm. Thunderstorm maps display predictions of the number of upland nesting duck pairs (mallards, blue-winged teal, gadwall, northern pintail, and northern shoveler) that could potentially nest in the upland habitats of every 40 acre block of the Prairie Pothole Region (PPR) of Minnesota and Iowa. These predictions are based on the known maximum travel distances of hens from wetlands to their nest sites, and regressions (statistical models) created from 4 square mile survey data predicting the number of duck pairs that utilize every individual wetland in PPR during a "typical" breeding season. The primary purpose of this map is to help identify priority sites for the protection or restoration of grassland habitats for breeding waterfowl. The map identifies sites where upland management treatments would be most beneficial to nesting hens. They are also useful in identifying priority wetland complexes to be protected through acquisition of Waterfowl Production Areas and wetland and habitat easements, and areas to be enhanced by private lands wetland restorations. This map was created using Geographic Information Systems (GIS) modeling techniques by the U.S. Fish and Wildlife Service's Habitat and Population Evaluation Team (HAPET) office in Fergus Falls, Minnesota.

HAPET
Habitat And Population Evaluation Team

Appendix A. Environmental Scoping Decision

MINNESOTA DEPARTMENT OF COMMERCE

In the Matter of the Application by Ellerth Wind LLC, for a Certificate of Need for the 98.9 MW Ellerth Windpark Project in Marshall County

ENVIRONMENTAL REPORT SCOPING DECISION

PUC Docket No. IP-6855/CN-110-112

The above matter has come before the Department of Commerce for a decision on the content of the Environmental Report (ER) to be prepared in consideration of the Ellerth Wind LLC Application for a Certificate of Need (CN) for the proposed 98.9 Megawatt (MW) Ellerth Windpark in Marshall County.

A final decision on turbine selection and design has not been made, but the project will consist of turbines with a rated capacity between 1.6 and 2.3 MW in such number and combination as to yield up to 98.9 MW. Facilities associated with the project include pad mounted transformers, an electrical collection system, all weather gravel access roads, an operation and maintenance building, up to three permanent meteorological towers, a supervisory control and data acquisition for monitoring the project, and a project substation.

The Project is located in Marshall County in northwestern Minnesota. Ellerth Wind proposes to locate the Ellerth Windpark (Project) within a Project area or site of approximately 33,709 acres of mostly agricultural land in the townships of Wright (Sections E½ SE¼ 36), West Valley (S1/2 30, 31-35), Foldahl (1, 2, 11-13, 24, 25, 36), Marsh Grove (1-13, 19-23, 26-35), Comstock (1), and Viking (2-6) (see accompanying map). Ellerth Wind currently has agreements with landowners over approximately 18,870 acres of land within the Project Area.

The project requires a Certificate of Need and a Site Permit for the wind farm from the Minnesota Public Utilities Commission (Commission). The CN (CN-11-112) and the site permit (WS-11-608) are being considered by the Commission in separate dockets.

On May 27, 2011, Ellerth Wind LLC filed a certificate of need application with the Commission for the Ellerth Windpark. On August 24, 2011, the Commission issued an order accepting the application as complete and authorizing an informal review process. The proposed project is a large wind energy facility (Minn. Stat. § 216B.2421). As such, the Minnesota Department of Commerce is required to prepare an environmental report for the project (Minn. Rules 7849.1200).

A public meeting was held on November 7, 2011, in Newfolden to receive comments on the scope of the environmental report. Approximately 85 to 100 persons attended the meeting. A

public comment period followed the meeting, closing on November 30, 2011. Four written were received during the comment period.

Concerns that were raised at the public meeting or in written comments were potential impacts to existing road infrastructure, habitat, natural environmental features, native prairie, birds, bats, eagles, holdover areas in the project area used by sandhill cranes during their migration, visual impacts, shadow flicker, noise, property values, local tax implications, impacts on farm land, splitting of agricultural fields, soil erosion, water quality, aviation and aerial crop applications, ice throw, electronic interference and decommissioning.

The proposed project is intended to produce renewable energy in furtherance of Minnesota's renewable energy objectives. Accordingly, alternatives examined in the ER will be limited to "eligible energy technologies" that support these objectives (Minn. Stat. § 216B.1691). These alternatives include: (1) a generic 98.9 MW wind generation project sited elsewhere in Minnesota, (2) a 38.5 MW biomass plant, (3) a "no-build" option and (4) alternative renewable technologies. An ER provides a high level or general environmental analysis of the proposed Project and system alternatives, and reviews environmental impacts associated with named and alternative projects. It is a part of a larger Public Utilities Commission investigation of the Certificate of Need Application. The Commission in its overall review will address all the issues and alternatives required by rule.

Having reviewed the matter, consulted with the Energy Facility Permitting staff, and in accordance with Minnesota Rules 7849.1400 and 7849.1500, I hereby make the following scoping decision:

MATTERS TO BE ADDRESSED

The Environmental Report for the Ellerth Windpark will address and provide information on the following matters:

1.0 Description of the Ellerth Windpark Project

Project Description and Location
Sources of Information

2.0 Regulatory Framework

3.0 Description of Alternatives to be Evaluated

3.1 A Generic 98.9 MW Wind Project
3.2 A 38.5 MW Biomass Plant
3.3 No-build option
3.4 Alternative renewable technologies

4.0 Feasibility and Availability of Alternatives

- 4.1 Ellerth Windpark Project
- 4.2 A generic 98.9 MW wind project
- 4.3 A 38.5 MW biomass plant
- 4.4 No-build alternative
- 4.5 Alternative renewable technologies

5.0 Human and Environmental Impacts and Mitigation

- 5.1 Emissions – pollutants
- 5.2 Emissions – hazardous air pollutants
- 5.3 Aesthetic impact and visibility impairment
  - 5.3.1 Shadow flicker
  - 5.3.2 Viewshed
  - 5.3.3 Turbine lighting
- 5.4 Ozone formation
- 5.5 Fuel availability
- 5.6 Associated transmission facilities
- 5.7 Water appropriations
- 5.8 Wastewater
- 5.9 Solid and hazardous wastes
- 5.10 Noise
- 5.11 Property values
- 5.12 Communication signals
- 5.13 Wildlife and domestic animals
- 5.14 Natural Environment (topography, flora, fauna)
- 5.15 Aviation

6.0 Required Permits

ISSUES OUTSIDE OF THE ENVIRONMENTAL REPORT

The Environmental Report will not consider the following matters:

1. Impacts or mitigative measures associated with specific sites, including specific tower or road locations for the proposed Project and alternatives.

2. The negotiation and content of easement agreements by which land owners are paid for property rights, including wind rights.

3. Any alternatives not specifically described in this scoping decision.

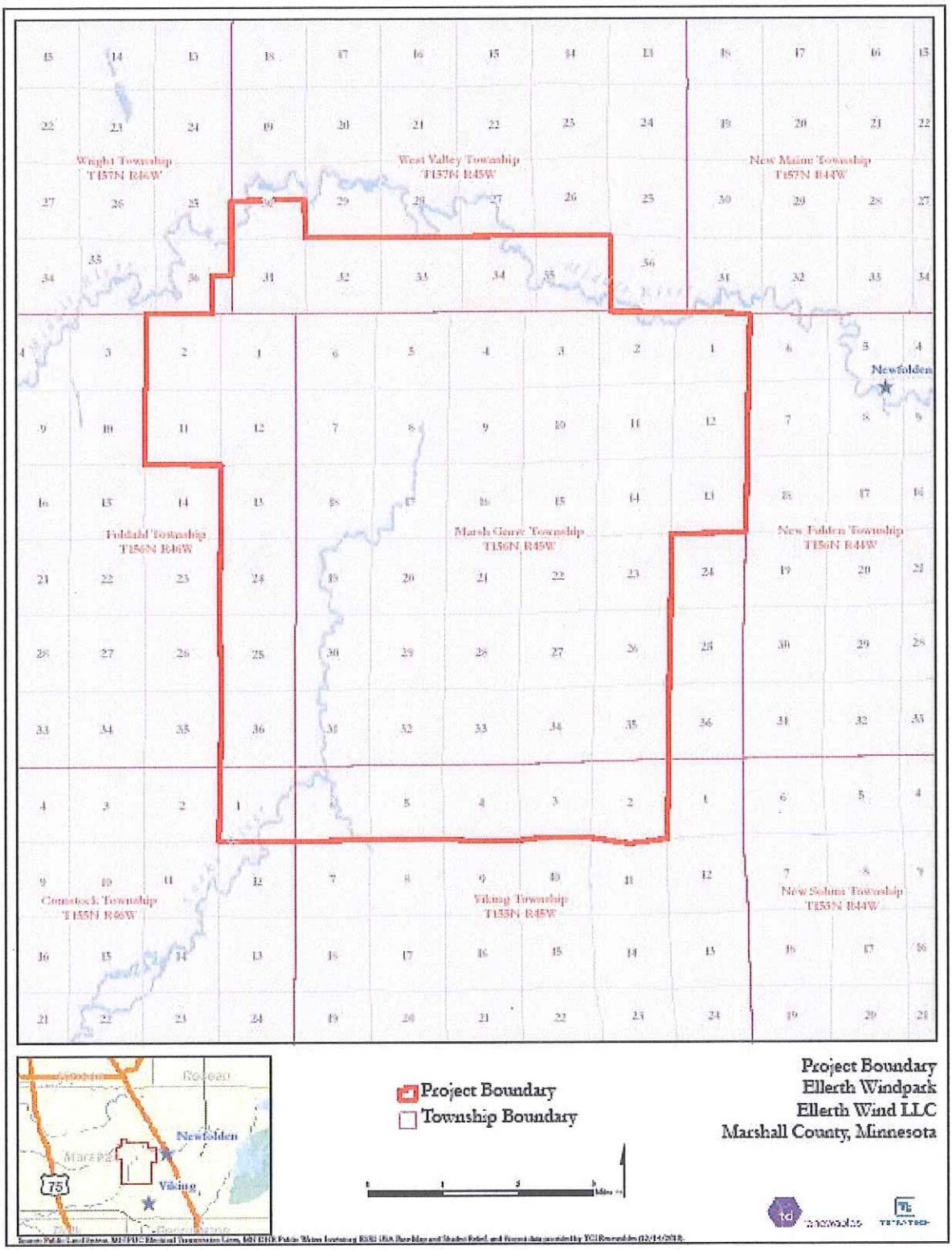
SCHEDULE

The environmental report will be completed in February 2012. A public hearing will be held in the project area before an Administrative Law Judge after the environmental report has been issued and notice served.

Signed this 22 day of December 2011

STATE OF MINNESOTA
DEPARTMENT OF COMMERCE

William Grant, Deputy Commissioner
Division of Energy Resources


Wright Township
T157N R46W
West Valley Township
T157N R45W
New Maine Township
T157N R44W
Newfolden
Foldahl Township
T156N R46W
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T156N R45W
New Folden Township
T156N R44W
Comstock Township
T155N R46W
Viking Township
T155N R45W
New Solum Township
T155N R44W
Newfolden
Viking
75
Project Boundary
Township Boundary
Project Boundary
Ellerth Windpark
Ellerth Wind LLC
Marshall County, Minnesota