Environmental Report

Prairie Rose Wind Project

In the Matter of the Application of Prairie Rose Wind, LLC, for a
Certificate of Need for an up to 101 MW Large Wind Energy Conversion System
in Rock and Pipestone Counties

PUC Docket No. IP-6838/CN-10-80

Energy Facilities Permitting
85 7th Place East, Suite 500
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November 2010

Responsible Governmental Unit	Project Proposer
Minnesota Office of Energy Security	**Prairie Rose Wind, LLC**
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Abstract

On May 13, 2010, Prairie Rose Wind, LLC filed a Certificate of Need application with the Minnesota Public Utilities Commission for the Prairie Rose Wind Farm. The Applicant is proposing to construct an up to 101 megawatt large wind energy conversion system in Rock and Pipestone counties.

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 Office of Energy Security must prepare an environmental report for the project (Minn. Rules 7849.1200).

OES Energy Facility Permitting 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 Bret Eknes, Minnesota Public Utilities Commission, 121 7th Place E., Suite 350, Saint Paul, MN 55101, phone: (651) 201-2257, email: bret.eknes@state.mn.us.

Information about this project can be found on the Commission's energy facilities permitting website: www.energyfacilities.puc.state.mn.us/Docket.html?Id=28286, or obtained by contacting David Birkholz, Office of Energy Security, 85 7th Place East, Suite 500, St. Paul, Minnesota 55101, phone: (651) 296-2878, email: david.birkholz@state.mn.us.

The 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 "**10"** and number "**80**".

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Appendix A. Environmental Scoping Decision

1 Introduction

On May 13, 2010, Prairie Rose Wind, LLC (Applicant), filed a Certificate of Need (CN) application with the Minnesota Public Utilities Commission (Commission) for the Prairie Rose Wind Farm (Project). The applicant is proposing to construct a 101 megawatt (MW) large wind energy conversion system in Rock and Pipestone counties, Minnesota.

Project Overview
The project would consist of up to 137 wind turbines, transformers, collection lines, a 24 mile 115 kV transmission line, one project substation, access roads, an operation and maintenance facility, and two permanent meteorological towers.

The project area is located in Rock and Pipestone counties in southwest Minnesota about six miles northwest of the city of Luverne and about one mile west of Hardwick (Map 1: Project Area). It comprises approximately 32,445 acres (50.7 square miles), most of which is agricultural land. Electricity from the project would be collected and transmitted to the project substation via 34.5 kilovolt (kV) electric lines. The project would connect to the electrical transmission grid at the Split Rock Substation near Brandon, South Dakota.

As an independent power producer, Prairie Rose 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 101 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 eight sections:

Section 1: Introduction
Section 2: Regulatory Framework
Section 3: Description of the Proposed Project
Section 4: Project Alternatives
Section 5: The No build alternative
Section 6: Potential Human and Environmental Impacts of the Project and Alternatives
Section 7: Availability and Feasibility of Alternatives
Section 8: Additional Permits

Sections three through seven 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 applications submitted by Prairie Rose Wind, LLC, to the Commission:

Application for Certificate of Need, 101 MW Prairie Rose Wind Project, May 13, 2010[1]
Application for Site Permit, 101 MW Prairie Rose Wind Farm, May 13, 2010.[2]

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

[1] Application for Certificate of Need, 101 MW Prairie Rose Wind Project, May 13, 2010 [hereafter CN Application]
[2] Application for Site Permit, 101 MW Prairie Rose Wind Farm, May 13, 2010 [hereafter Site Permit Application].

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 101 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 13, 2010, the applicant submitted a Certificate of Need application to the Commission. On July 19, 2010, the Commission issued an order accepting the 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 Office of Energy Security (OES) Energy Regulation and Planning (ERP) staff, (3) environmental review by OES 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 human and environmental 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 "scope" 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.

EFP staff held a public information and scoping meeting on July 19, 2010, in Jasper, Minnesota. Approximately 80 people attended the meeting. A public comment period followed the meeting; closing on August 17, 2010. Ten comments were received from the public as well as comments from the Minnesota Department of Transportation (Mn/DOT) and the Minnesota Department of Natural Resources (MDNR). Public comments ranged from concerns over turbine setbacks, noise (and associated impacts to livestock), impacts to local roads, and benefits to local communities (jobs and tax revenues). Mn/DOT expressed concerns about possible impacts to the "King of Trails" scenic byway along Hwy 75, transportation of oversized materials and equipment on public roads, and acquiring local permits for using road rights-of-way. MDNR expressed concerns regarding impacts to native prairie and loss of habitat for threatened and endangered species in the project area.

The associated 24 mile 115 kV transmission line also generated a number of comments. Routing specific comments will be fully addressed in the Environmental Assessment (see Section 2.2) for the route permit (TL-10-134).

Based on the scoping comments received and the rules governing the scope of an ER (Minn. Rule 7849.1500), the Director of OES issued a scoping decision on August 30, 2010 (Appendix A). This environmental report has been developed in accordance with the scoping decision.

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.

2.2 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-10-425). 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).

Route Permit

The proposed project also requires a route permit (Minn. Statute 216E.03). The route permit is issued by the Commission and is being considered in a separate docket (TL-10-124). A route permit authorizes the routing and construction of the project's associated transmission line and cannot be issued before a certificate of need has been issued for the project.

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 discussed in Section 8.

2.3 Public Participation

The Commission relies on public participation for the development of a thorough record for the project for both the Certificate of Need and site permitting processes. People are assured state issued notices for the project by placing their name on the appropriate EFP project contact lists. Citizens can sign up for the Prairie Rose Wind Farm site permit project list online at: http://energyfacilities.puc.state.mn.us/Docket.html?Id=28286.

Citizens may also join the project mailing list by contacting EFP State Permit Manger David Birkholz, phone: (651) 296-2878, email: david.birkholz@state.mn.us.

3 Description of the Proposed Project

Prairie Rose Wind, LLC, a wholly owned subsidiary of Geronimo Wind Energy (GWE), is proposing to build an up to 101 MW Large Wind Energy Conversion System (LWECS).

3.1 Project Description

Prairie Rose Wind has not made a final selection of wind turbine generators at this time, and proposes a range of wind turbines sized from 1.6 to 2.3 MW. Associated Project facilities include gravel access roads, a step-up substation, a wind electrical collection system, an Operations and Maintenance (O&M) building, a permanent meteorological tower, and a Sonic Detection and Ranging (SODAR) unit or Light Detection and Ranging (LIDAR) unit. Currently Prairie Rose Wind is operating two temporary meteorological towers within the site.

Access roads will provide access to the wind turbines year-round. They will have a low profile design to allow easy access across them with farming equipment. The electrical collection system will consist of a group of electrical cabling (collector and feeder lines) operating at 34.5 kV. The lines will be undergrounded by trenching, plowing or where needed drilling the cables. They may be located above ground when shallow bedrock, restrictive environmental conditions, or conflicts with underground utility infrastructure are encountered.

The electricity will be delivered to the Prairie Rose substation, where it will be converted to 115 kV and then transported via a new, approximately 24 mile 115 kV line to the Split Rock Substation near Brandon, South Dakota. While the exact location has not been determined, it will be routed such that the length of the 115 kV overhead transmission line will be minimized. The transmission line will be permitted through the Commission and an application will be filed under Docket IP-6838/TL-10-134.

Prairie Rose Wind plans to begin construction of the Project in first quarter, 2011.

3.2 Project Location

The proposed site is located west of Hardwick, and south and east of Jasper in Rock and Pipestone counties, Minnesota (see Map 1). Table 1 identifies the townships and sections within the project boundary.

Table 1. Project Location

County	Township Name	Township	Range	Sections
Rock	Denver	104N	45W	2-10, 15-22, 27-34
Rock	Rose Dell	104N	46W	1-2, 11-16, 21-28, 33-36
Rock	Springwater	103N	46W	1-4, 9-12
Pipestone	Elmer	105N	45W	20, 29-34
Pipestone	Eden	105N	46W	36

The Project Boundary encompasses approximately 35,335 acres, of which approximately 23,000 acres are under site control[3]. The Project's preliminary site layouts are for up to 101 MW, based on the GE1.6 SLE MW, the Vestas V90 1.8 MW, and the Siemens 101 SWT 2.3 MW. Turbine models under consideration are compared in Table 2 below.

Table 2. Turbine Types and Specifications[4]

Characteristics	GE 1.6 MW Wind Turbine	Vestas 1.8 MW Wind Turbine	Siemens 2.3 MW Wind Turbine
Hub Height	80 m (262 ft)	80 m (262 ft)	80 m (262 ft)
Rotor Diameter	77 m (253 ft)	90 m (295 ft)	101 m (331 ft)
Total Height	118.5 m (389 ft)	124 m (407 ft)	129 m (423 ft)
Cut-in Wind Speed	3.5 m/s (7.8 mph)	3.5 m/s (7.8 mph)	4 m/s (8.9 mph)
Rated Capacity Wind Speed	12 m/s (26.8 mph)	12 m/s (26.8 mph)	12 - 13 m/s (26.8 - 29.1 mph)
Cut-out Wind Speed	25 m/s (55.9 mph)	25 m/s (55.9 mph)	25 m/s (55.9 mph)
Rotor Speed	10-20 rpm	9-14.9 rpm	6 to 16 rpm
Distance to 50 dB(A) Noise Level	190 m (623 ft)	100 m (328 ft)	160 m (524 ft)
3 Rotor Diameters	231 m (759 ft)	270 m (886 ft)	303 m (994 ft)
5 Rotor Diameters	385 m (1,265 ft)	450 m (1,476 ft)	505 m (1,657 ft)

[3] According to updates from the applicant. 14,000 acres were under site control at the time of application.
[4] Source: Geronimo Wind, LLC

3.3 Project Cost and Schedule

The total Project-installed capital costs are estimated to be between $197 and $205 million, including wind turbines, associated electrical and communication systems, and roads. Ongoing operations and maintenance costs and administrative costs are estimated to be approximately $4.9 to 5.3 million per year, including royalties to landowners for wind easement rights and property taxes. The Applicant anticipates construction to begin in the first quarter of 2011 and the Project is expected to be fully operational in late 2011 or early 2012.

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 Prairie Rose Wind 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.[5]

Alternatives evaluated include: (1) a 101 MW wind generation plant (LWECS) sited elsewhere in Minnesota, (2) a 38.5 MW biomass plant, and (3) a "no build" alternative.

4.1 101 MW LWECS

An alternative to the proposed project, which would utilize an eligible renewable energy (wind), is a large wind energy conversion system (LWECS) sited elsewhere in Minnesota. Such a project could, theoretically, be a 101 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 101 MW wind project sited in Minnesota and the Prairie Rose Wind Project, sited in Rock and Pipestone counties.

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

[5] Minn. Statute 216B.1691, Subd. 1. Eligible energy technologies include technologies that generate electricity from solar, wind, hydroelectric, hydrogen, or biomass.

water and carbon dioxide to carbohydrates, fats, and proteins along with small amounts of minerals.[6] 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.

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.[7] The Prairie Rose Wind project would have a capacity of 101 MW, with an estimated capacity factor of 38 percent. The 38.5 MW biomass alternative examined in this ER provides the equivalent energy generation as the proposed project.[8]

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.

5 The No Build Alternative

Analysis of the no build alternative involves a discussion of the environmental impacts of continuing the status quo. For example, with a proposed highway project, the no build alternative would take into account the impacts associated with continuing to have traffic increase along existing roads and highways and the potential impacts on development occurring along these existing arteries. Potential impacts and benefits of the no build alternative for the Prairie Rose Wind Project are discussed here.

5.1 Impacts

At least three categories of impacts can be identified if the Prairie Rose Wind Project is not built: (1) a hampering of the state's ability to meet its renewable energy objective, (2) the loss of economic benefits in the project area, and (3) the possible negative impact of providing replacement electricity from a non-renewable energy source.

[6] From the Oak Ridge National Laboratory's Biomass Energy Notebook, http://cta.ornl.gov/bedb/introduction/Biomass_Overview.shtml

[7] EQB Docket No. 03-67-EAW-NGP Biomass [hereafter Minnesota Biomass EAW]; see http://energyfacilities.puc.state.mn.us/Docket.html?Id=4452

[8] 101 MW x 0.38 = approx. 38.5 MW. 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.

Renewable Energy Objectives

Minnesota has committed to a renewable energy objective of generating 25 percent of its electricity from eligible renewable sources by the year 2025.[9] Minnesota utilities forecast the need for 4,800 to 6,700 MW of additional renewable generation by the year 2025 to meet this objective. If the Prairie Rose Wind Project is not built, it could hinder the ability of the state to meet its renewable energy objective. There are wind resources in other parts of the state and wind farms could be placed in these areas (Map 2: Wind Resources in Minnesota). However, the wind resources of the state are finite. The wind resource in the project area is very good, and, if untapped, could hinder the state's ability to meet its renewable energy objective.

Loss of Economic Benefits

If the Prairie Rose Wind 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 $400,000-475,000 annually. The Prairie Rose Wind Project is expected to generate approximately 100 to 150 temporary construction jobs and approximately four to five permanent operational jobs.[10] These employment opportunities and their associated income would be lost if the project is not built.

Replacement with a Non-Renewable Resource

If the Prairie Rose Wind Project is not built, the electrical power it would have produced may need to be replaced, likely with a non-renewable energy resource.[11] Though the impacts associated with non-renewable sources vary, it is possible to estimate, as an example, the impact of replacing the Prairie Rose Wind Project with natural gas or, less likely, coal energy. Prairie Rose Wind Project will produce approximately 345,056 and 398,142 megawatt-hours annually (MWh/yr). However, since no non-renewable proposals are being considered in this case, we are not making that comparative analysis here.

5.2 Benefits

Benefits of not building the Prairie Rose Wind Project would include avoidance of potential human and environmental impacts associated with the project. These impacts are discussed in Section 6 of this ER.

[9] Minn. Statute 216B.1691
[10] CON Application, Section 2.3.3
[11] In 2008, non-renewable energy sources accounted for approximately 92 percent of Minnesota's electrical energy supply. Energy Policy and Conservation Report ("Quad Report"), 2008

6 Human and Environmental Impacts

This section discusses the potential human and environmental impacts of the Prairie Rose Wind project and project alternatives. The alternatives include: (1) a 101 MW wind energy conversion system (LWECS) sited elsewhere in Minnesota, and (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.

6.1 Air Quality

Electric generation facilities have the potential to emit air pollutants during construction and operation.

6.1.1 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.[12]

Prairie Rose Wind Project

The Prairie Rose Wind Project will emit no criteria pollutants during operation. A minimal amount of these pollutants will be produced during construction, largely due to the operation of heavy machinery and equipment. Transmission lines, under certain conditions, produce limited amounts of ozone and nitrogen oxide emissions. Emissions of these pollutants would be minimal.

Generic 101 MW LWECS

A generic 101 MW LWECS would emit no criteria pollutants during operation, and would have ancillary emissions (construction, transmission line) similar to those from the Prairie Rose Wind Project.

38.5 MW Biomass Plant

A 38.5 MW biomass plant would emit criteria pollutants (Table 2). 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.[13] Nitrous oxides (NO_x) are greenhouse gases that cause ozone and related respiratory illnesses.[14] Carbon dioxide (CO_2) is a greenhouse gas that contributes to climate change and associated impacts.[15] Mercury can cause impaired neurological development in children.[16] Inhalation of particulate matter causes and

[12] What Are the Six Common Air Pollutants?, http://www.epa.gov/air/urbanair/.
[13] Health and Environmental Impacts of SO_2, http://www.epa.gov/air/urbanair/so2/.
[14] Health and Environmental Impacts of NO_x, http://www.epa.gov/air/nitrogenoxides/.
[15] Climate Change 2007: Synthesis Report, Summary for Policymakers, An Assessment of the Intergovernmental Panel on Climate Change (IPCC), http://www.ipcc.ch/.
[16] Health Effects, http://www.epa.gov/mercury/effects.htm.

contributes to human respiratory illness.[17] Table 3 provides potential emission rates and annual emissions of criteria pollutants associated with a 38.5 MW biomass plant.[18]

Table 3. Criteria Pollutants

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[19]	1.11 E05[20]
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 regionally by the Minnesota Pollution Control Agency. Because the plant would primarily utilize biomass for generation, net impacts from carbon dioxide will 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.

Mitigation. 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-

[17] Health and Environment, http://www.epa.gov/air/particlepollution/health.html.
[18] Adapted from Minnesota Biomass EAW, http://energyfacilities.puc.state.mn.us/Docket.html?Id=4452.
[19] 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.
[20] 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.

catalytic reduction system on the biomass boiler.[21] Particulate matter emissions could be reduced by 90 percent with add-on devices such as a multi-cyclone and dust collector.[22]

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.

6.1.2 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.[23]

Prairie Rose Wind Project

The Prairie Rose Wind project will 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 will be minimal. Impacts from construction will be minimal and localized and would include dust due to earth moving and emissions from diesel-powered construction equipment. Air pollution emissions would not occur as a result of this project.

Mitigation

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.

Generic 101 MW LWECS

A generic 101 MW LWECS would have HAP and VOC emissions similar to the Prairie Rose Wind Project.

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 (see section 4). Because these pollutants are diffused into the 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

[21] Minnesota Biomass EAW.
[22] Id.
[23] About Air Toxics, http://www.epa.gov/ttn/atw/allabout.html;

metro area.[24] 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. [25]

Table 4. Hazardous Air Pollutants and Volatile Organic Compounds

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

Mitigation

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.

6.1.3 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.[26]

Prairie Rose Wind Project

The Prairie Rose Wind project would not produce ozone or ozone precursors. Thus, there would be no human or environmental impacts or mitigation related to ozone formation.

Generic 101 MW LWECS

A generic 101 MW LWECS would have ozone formation similar to the proposed project.

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

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

Mitigation
Ozone formation could be mitigated by mitigating ozone precursors. See discussion in Sections 6.1.1 and 6.1.2 regarding nitrous oxides (NO_X) and volatile organic compounds (VOC) respectively.

6.2 Water Quality

Different generation options have different water usage and effects on the water quality.

6.2.1 Water Appropriations

Large electric power generating facilities may require water for operations. This section discusses potential water appropriation impacts from such facilities.

Prairie Rose Wind Project
The proposed project would require water appropriations for potable and sanitary water for 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.

Generic 101 MW LWECS
A generic 101 MW LWECS would have water appropriations similar to the Prairie Rose Wind 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 1275 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 MDNR[27] if using well water.

Mitigation
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

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

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.

6.2.2 Wastewater

Large electric generation facilities have the potential to generate significant amounts of wastewater. This section discusses potential impacts from wastewater generation.

Prairie Rose Wind 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 101 MW LWECS

A generic 101 MW LWECS would have wastewater impacts similar to the Prairie Rose Wind 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.

Mitigation

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.

6.2.3 Surface and Ground Waters

Surficial geology in northern Rock County and southern Pipestone County is relatively shallow, ranging from a depth of 0 to 100 feet. Bedrock in the Project area is Sioux Quartzite. Quartzite is red and purple to light gray and may be interbedded with hard red claystone (pipestone). The thickness of this bedrock may be more than 1,000 feet. Bedrock outcrops are found throughout the Project area.

Groundwater in the region is mainly supplied by surficial sand and gravel deposits and fractures within the Sioux quartzite. The project area lies atop materials that generally do not yield significant amounts of water. Sand and gravel deposits are scattered throughout in thin bands. The project area lies along a groundwater divide in the Sioux quartzite, where groundwater flows to the west, south, and east away from the center of the Project area. Water table elevations range from 1650 to 1700 feet above mean

sea level.[28] The sensitivity of these units to pollution is very high (hours to months) in the sand and gravel aquifers and moderate (year to decades) in the Sioux quartzite.

Prairie Rose Wind Project
Impacts to geologic and groundwater resources are not anticipated. Water supply needs will be quite limited. It is probable that operations and maintenance water requirements will be satisfied with either a well or rural water service. Location of wells could be limited by the local bedrock conditions.

Mitigation
Wind turbine locations will not impact the use of existing water wells. Measures would be taken to identify any nearby wells that could be impacted if blasting is required for the construction of turbine foundations. Agencies such as the MDNR, Minnesota Pollution Control Agency and Minnesota Department of Health will also be contacted as necessary to determine appropriate actions to protect local groundwater resources.

Generic 101 MW Wind Project
Impacts would be similar or reduced depending on site location and geological material of the project. Impacts would be reduced if there are no bedrock outcrops in the project area.

38.5 MW Biomass Plant
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.

6.3 Solid and Hazardous Wastes

Large electric generation facilities have the potential to generate solid and hazardous wastes. This section discusses potential impacts from such wastes.

Prairie Rose Wind
The proposed project would create solid and hazardous wastes. Solid wastes would be generated during construction including scrap wood, plastics, cardboard and wire to name a few. Small amounts of solid and hazardous wastes would be generated during operation, such as oils, grease, hydraulic fluids and solvents. Lubricants and fluids would be stored at the operation and maintenance building.

Solid and hazardous wastes, if not properly handled, can contaminate surface and ground waters. This contamination can cause human health impacts, e.g., cancer.[29]

Mitigation
Solid wastes would be disposed of according to solid waste plans in Rock and Pipestone counties. According to the Application, hazardous wastes would be handled appropriately and leaks or spills

[28] Site Application, P. 5-27.
[29] Volatile Organic Compounds (VOCs) in Minnesota's Ground Water, http://www.pca.state.mn.us/water/groundwater/gwmap/voc-fs.pdf.

would be mitigated using appropriate clean up techniques. A listing of all potentially hazardous materials related to the project will be maintained for the project. It is not anticipated that the project will 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).[30]

Generic 101 MW LWECS
A generic 101 MW LWECS would have solid and hazardous waste impacts similar to the Prairie Rose Wind.

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.

Mitigation
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.

6.4 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.

6.4.1 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.[31] Ecological land classifications are used to identify, describe, and map progressively smaller areas of land with increasingly uniform ecological features. The Prairie Rose Wind project sits in the Inner Coteau Subsection of the Prairie Parkland Province, a large province extending from Manitoba and covering much of the Midwest.[32] This subsection is west of the Buffalo Ridge and serves as the western boundary of the Coteau Moraines Subsection.

The Inner Coteau subsection is located in the extreme southwest corner of Minnesota and includes parts of southeastern South Dakota and northwestern Iowa. This subsection contains some excellent tracts of remaining native prairie interspersed with wetlands and streams, which provide habitat for a variety of species. Fire and grazing by bison and elk was essential to maintaining prairie communities and preventing trees and shrubs from establishing. Today, agriculture is the predominant land use and its

[30] Very Small Quantity Generator Hazardous Waste Collection Program, http://www.pca.state.mn.us/publications/w-hw2-50.pdf.
[31] See MN DNR Ecologcial Classification System, http://www.dnr.state.mn.us/ecs/index.html
[32] See MN DNR Coteau Morraines Subsection Profile, http://files.dnr.state.mn.us/assistance/nrplanning/bigpicture/cwcs/profiles/coteau_moraines.pdf

expansion and intensification have resulted in water quality and water quantity concerns. Gravel and boulder mining occur in this subsection, and large-scale wind-power production is expanding dramatically. Many of the remaining prairie-grassland complexes are in private ownership and have been used for grazing. Wetland protection and restoration are important conservation issues.

Land use within the project area is primarily agricultural, with cultivated lands making up approximately 76 percent of the total land cover, and grasslands approximately 23 percent. All other cover types (water, wetland, forest) make up less than 1 percent. Only 1 percent of the total land cover is developed. [33]

6.4.2 Soils

Mollisols are the dominant soil order in the area and are important agricultural soils.[34] They are common in grassland ecosystems and are characterized by a thick, dark surface horizon formed by the addition of organic material over a long period. Soils in the area are generally loamy and well drained, with areas of exposed bedrock found throughout the project area.

6.4.3 Wetlands and Waterways

The project area is located in the Big Sioux-Pipestone Watershed and the Rock River Watershed.[35] All streams within the project area are mapped as intermittent or perennial in nature, many functioning as drainage swales for agricultural fields.

Wetlands within the project area are few, scattered, and relatively small (less than one acre in size). [36] Within the project area, the total number of National Wetlands Inventory wetlands is 172.6 acres: 142.2 acres of freshwater emergent wetlands, 22.9 acres of freshwater pond wetlands, and 7.5 acres of riverine wetlands. Table 5 identifies the National Wetland Inventory types and acreage within the project area.[37]

[33] Id.
[34] Site Permit Application, Section 5.13.
[35] Application, P. 5-28
[36] Site Application, Section 5.16.
[37] Wetland acreage calculated using USFWS NWI data, Site Application, section 5.16.

Table 5. National Wetland Inventory Types

NWI Type	Acres
Freshwater Emergent Wetland	
PEM/FO1C	0.7
PEMA	26.3
PEMAd	5.9
PEMC	77
PEMCd	20.3
PEMF	12
Freshwater Pond	
PUBF	1.2
PUBFx	0.3
PUBGx	21.4
Riverine	
R2UBGx	7.5
Total	**172.6**

6.4.4 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 forage, breeding and shelter. The resident species are representative of game and non-game fauna in southwestern Minnesota. There are few wetlands and forest in this landscape; however, small groves of trees and wooded shelterbelts are common features of farmsteads in the area. The majority of migratory wildlife species are birds including waterfowl, raptors and songbirds.

Thirty one wildlife species are found in the southwest region of Minnesota.[38] These species use the grasslands, farm woodlots, wetlands and other areas for food and cover. Mammals common to this landscape include opossum, skunk, squirrels, rodents, rabbits, deer, fox and other carnivores, and deer.[39] Reptiles and amphibians are associated with wetlands, waterways and forested areas. Reptiles and amphibians include snakes, turtles and frogs. Blanding's Turtle, a state-listed threatened species, is known to occur near the project area. The Topeka shiner, a federally-listed endangered and state-listed special concern species of minnow, is also found in the area. Several species of birds and bats are also known to occur in this landscape, including grassland birds, migratory birds, raptors, and waterfowl. Birds and bats are discussed below.

Studies have shown that placement of turbines and auxiliary structures can result in decreased densities of songbirds and other species. Species of grassland birds, such as various grouse species, are particularly susceptible to displacement due to their high site fidelity. [40] The potential for habitat

[38] Site Characterization Study, Section 6.2.
[39] Site Permit Application, Section 5.18.
[40] National Wind Coordinating Committee, Spring 2010.

avoidance by wildlife in response to wind turbines and associated infrastructure is highly variable depending on the species under consideration, seasonal and annual variation in weather and migration patterns, and local and individual behavior patterns.

Public lands surrounding the project area provide important wildlife habitat in a landscape dominated by agricultural uses, particularly for resident and migratory birds. Touch the Sky National Wildlife Refuge includes remnant and restored tall grass prairie, a rare and declining habitat type in Minnesota. Public lands and other conserved lands, such as The Nature Conservancy lands, form key corridors along Buffalo Ridge. [41]

Table 6. Public Lands within Five Miles of the Project

Name	Type	Distance from Project Boundary (mi)	Acres
Poplar Creek WMA	Wildlife Management Area	1	66
Jasper WMA	Wildlife Management Area	2	75
Eden WMA	Wildlife Management Area	2.5	151
Little Beaver Creek WMA	Wildlife Management Area	2.5	55
Springwater WMA	Wildlife Management Area	3.5	122
Ringneck Ridge WMA	Wildlife Management Area	4.5	78
Touch the Sky NWR	National Wildlife Refuge	0.5	806
Split Rock State Park	State Park	2.5	519
Blue Mounds State Park	State Park	2.5	1,205
Total Acres			**3,077**

Birds

Studies have been conducted throughout the Midwest in an attempt to quantify bird and bat mortality due to wind turbines. A study of bird fatality rates at a wind farm in Iowa resulted in estimated fatality rates between 0.3 and 0.8 birds per turbine per year.[42] 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.[43] Studies conducted in the Buffalo Ridge region of southwestern Minnesota resulted in estimated bird fatality

[41] Tomorrow's Habitat for the Wild and Rare, Minnesota DNR, 2006.
[42] Bird and Bat Behavior and Mortality at a Northern Iowa Windfarm, (Jain2005). http://www.batsandwind.org/pdf/Jain_2005.pdf.
[43] Id.

rates between 1.0 and 4.5 birds per turbine per year.[44] 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 will impact avian populations at a broader scale.

Bats

Recent studies indicate a broad range in the number of bat fatalities across the U S as a result of wind development, with the highest fatalities occurring in the eastern U.S. In the Midwest, post-construction studies completed in Iowa, Minnesota and Wisconsin confirm a wide range of fatality rates. The highest bat fatalities were found at the 145 MW Blue Sky Green Field wind facility in Wisconsin, with bat fatalities at 40 bats/turbine/year. Fatalities range from 1 to 8 bats/turbine/year across most of the upper Midwest. Avian and bat studies conducted at the Buffalo Ridge, Minnesota, found an average of 1-3 bat fatalities/turbine/year. Projects in areas with similar habitat and cover types would likely have similar fatality rates, depending on migration patterns, known resting and foraging areas, and potential for bat hibernacula.

There are seven species of bats that occur in Minnesota and five of the seven species have potential to occur in the project area.[45] Bats typically utilize forests, riparian corridors, and wetlands as feeding habitat due to higher nocturnal insect densities. The Iowa wind farm study estimated bat fatality rates between 6 and 9 bats per turbine per year.[46] A Buffalo Ridge study estimated bat fatality rates at 2.2 bats per turbine per year.[47]

Given the high proportion of agricultural land and extremely low amounts of forested areas in the project area, tree-roosting bat habitat would appear to be limited.[48] 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. [49] There is also a small spike in bat fatalities during the spring migration. Bat fatality rates would likely be within the 1-8/bats/turbine/year range based on existing data, but could be higher. It is unknown whether this number of fatalities significantly impacts bat populations.

[44] Avian Monitoring Studies at the Buffalo Ridge, Minnesota Wind Resource Area: Results of a 4-Year Study, http://energyfacilities.puc.state.mn.us/documents/AvianMonitoringBuffaloRidge.pdf [hereafter Buffalo Ridge Studies].
[45] Site Application, Section 5.18.
[46] Bird and Bat Behavior and Mortality at a Northern Iowa Windfarm, Jain, 2005 http://www.batsandwind.org/pdf/Jain_2005.pdf.
[47] Bat Interactions with Wind Turbines at the Buffalo Ridge, Minnesota Wind Resource Area, November 2003, http://my.epri.com/portal/server.pt?space=CommunityPage&cached=true&parentname=ObjMgr&parentid=2&control=SetCommunity&CommunityID=404&RaiseDocID=000000000001009178&RaiseDocType=Abstract_id.
[48] Prairie Rose Wind Project Ecological Risk Assessment, October 2009.
[49] National Wind Coordinating Committee, Spring 2010.

Prairie Rose Wind

The project area is representative of the Inner Coteau subsection, with 76 percent of the land use in agriculture and 23 percent in grasslands.[50]

Impacts to wildlife in the project area are expected to be minimal. 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. As a condition of their site permit, Prairie Rose Wind, LLC would also submit an Avian and Bat Protection Plan for the project, which would include fatality monitoring and reporting.

Birds

The North American Breeding Bird Survey has documented 103 species of birds four miles east of the project area.[51] Three state listed species, including the Loggerhead Shrike, Forster's Tern, and Franklin's Gull, were recorded. Based on data from the Minnesota Natural Heritage Inventory System (NHIS) there are occurrences of Burrowing Owls (state-endangered), Short-eared Owls (Species of Special Concern), and the Upland Sandpiper (Species of Greatest Conservation Need).[52] Field surveys for Burrowing Owls were conducted in the project area in the summer of 2010. Burrowing Owls were not observed during field surveys.

Bats

Given the potential lack of habitat in the project area, it would be assumed that bat fatalities would be similar to those at other large wind facilities in the Midwest. Bat fatalities in the range of 1 to 8 bats/turbine/year would be expected, most of which would likely be migrating bats that commonly roost in trees.

Mitigation

Impacts to ground animals are expected to be minimal and mitigation is not required. Impacts to birds and bats could be mitigated by siting. Siting turbines away from bird habitat (grasslands, riparian areas) and bat feeding areas (forest, riparian areas) would reduce bird and bat mortalities. Birds and bats fly less in windy conditions. Wind turbines operate in windy conditions and require a minimum wind speed ("cut-in" speed, Table 1). Curtailment of turbines has been found to effectively reduce bat fatalities by as much as 80 percent. 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.[53]

Generic 101 MW LWECS

A generic 101 MW LWECS located elsewhere in Minnesota would have wildlife impacts similar to or potentially less than the Prairie Rose Wind project assuming the project is located in an area with similar cover type and habitat type. Information about local bird and bat populations within Minnesota is incomplete. Many sites provide habitat and foraging areas for numerous species of birds and some species of bats.

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[50] Site Application, Section 5.10.
[51] Site Characterization Study, Section 6.2.
[52] Site Application, Appendix A.
[53] Effectiveness of Changing Wind Turbine Cut-In Speeds to Reduce Bat Fatalities at Wind Facilities, April 2009, http://www.batsandwind.org/pdf/curtailment_2008_final_report.pdf.

38.5 MW Biomass Plant

A 38.5 MW biomass plant would have wildlife impacts similar to the Prairie Rose Wind Project, and fewer impacts on avian and bat species. 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.

6.4.5 Rare and Unique Natural Resources

The Minnesota County Biological Survey (MCBS) and the Minnesota Natural Heritage Information System (NHIS) provide information on federal and state listed species, Species of Greatest Conservation Need, and unique or rare habitat types in Minnesota. The MCBS systematically collects, interprets, and delivers baseline data on the distribution and ecology of rare plants, rare animals, and native plant communities.54 The NHIS database provides information on Minnesota's rare plants, animals, native plant communities, and other rare features. The NHIS is continually updated as new is the most complete source of data on Minnesota's rare or otherwise significant species, native plant communities, and other natural features.55

Rare and Unique natural features in and near the project area include animals, plants, and several sites of biodiversity significance. Table 7 identifies animals, plants, and unique communities within the project and within one mile of the project boundary[56]. Sites of Biodiversity Significance vary in levels of biodiversity and are ranked from "below" to "outstanding." All of the rare plant communities listed in Table 7 are vulnerable to extirpation from the state.

Table 7. Threatened or Endangered Species

Description	Status
Animals (non-game)	
Blanding's Turtle	State-Listed Threatened
Topeka Shiner	Federally Endangered, State Threatened
Burrowing Owl	State-listed Endangered
Plants	
Western Fringed Prairie Orchid	Federally Threatened, State Endangered
Rare Plant Communities	
Mesic Prairie	N/A
Crystalline Bedrock Outcrop	N/A
Basswood-Burr Oak Forest	N/A
Seepage Meadow/Carr Tussock Sedge Meadow	N/A

[54] For more information on Minnesota County Biological Surveys, see http://www.dnr.state.mn.us/eco/mcbs/index.html .
[55] For more information on the Minnesota Natural Heritage Information System Database, see http://www.dnr.state.mn.us/eco/nhnrp/nhis.html .
[56] Site Application, Section 5.19.

Prairie Rose Wind Project
The proposed project would adopt the mitigation measures outlined above to prevent potential impacts to rare and unique species occurring within the project area.

Mitigation
The following measures would prevent potential impacts to rare and unique natural resources in the project area.

- Conduct a pre-construction inventory of existing biological resources, native prairie, bedrock outcrops, and wetlands in the Project area;
- Avoid or minimize disturbance of individual wetlands or drainage systems during construction of the Project; and
- Avoid or minimize placement of turbines in high quality native prairie or bedrock outcrops, including all MCBS "Sites of Biodiversity Significance" ranked as "Outstanding," "High," or "Medium," and to the extent practicable sites ranked as "Low."
- Avoid impacts to streams with Topeka shiner habitat by directionally boring electrical cabling under the stream channel when crossings are necessary, and using BMPs to minimize erosion or runoff into potential Topeka shiner streams;
- Incorporate the DNR's "Summary of Recommendations for Avoiding and Minimizing Impacts to Blanding's Turtle Populations" to minimize impacts to Blanding's turtles during construction activities. Because permanent access roads will be at-grade with existing cropped areas, they are not anticipated to affect Blanding's turtle movement.

Generic 101 MW LWECS
A generic 101 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. Additionally, a biomass could also be sited to avoid unique habitats and would utilize construction practices that would avoid or minimize disturbances to wetlands or drainage systems.

6.5 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, Rock and Pipestone counties have decreasing populations and relatively low population densities compared to the state average. Table 9 summarizes the demographics in Rock and Pipestone Counties[57].

[57] Compiled from U.S. Census Bureau data, Census 2000. See State and County Quick Facts for Rock and Pipestone Counties, http://www.census.gov/.

Table 8. Demographic Characteristics of Rock and Pipestone Counties

Description	Rock County	Pipestone County	Minnesota
Population, 2000	9,721	9,895	4,919,492
Population, 2008	9,476	9,395	5,220,393
Percent population change (2000-2008)	-2.5	-5.1	6.9
Persons per square mile, 2000	20	21	62
Median Household Income (dollars), 2008	48, 104	41, 421	57,318

6.5.1 Aesthetic Impact and Visibility Impairment

The large size and high-tech appearance of wind turbines causes them to 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. Visual impairment would not be an issue with this project because wind turbines do not generate or emit by-products as a result of generation activities. This section discusses visual changes, shadow flicker, and perceptions of aesthetics of the proposed project.

Prairie Rose Wind

The Prairie Rose Wind 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. Prairie Rose Wind will be located in a predominantly rural agricultural area characterized by gently undulating topography.

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.[58] 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.

The project area contains approximately four miles of the King of Trails Scenic Byway, with an additional four and a half miles of the byway paralleling the western project boundary. Approximately 10 miles of snowmobile trail cross the project area and parallel U.S. Highway 75 in Rock and Pipestone Counties. Within five miles of the project boundary are state wildlife management areas (WMAs), state parks, and one national wildlife refuge, which provide recreational opportunities in a passively managed, "natural" landscape. Public lands provide numerous benefits, including aesthetic and visual. Recreational users

[58] Visual Considerations: Public Perceptions, Regulatory Environment and Assessment Methods in the Eastern U.S., http://www.nationalwind.org/assets/blog/Allen-NWCC_2009.pdf.

would likely see turbines from these areas, potentially diminishing qualities of perceived remoteness and scenic value.

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.

Mitigation

Mitigation of impacts to aesthetic and visual resources and shadow flicker is best accomplished through micrositing 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.[59] Wind turbines must be set back from non-participating properties a minimum distance of 5 rotor diameters (RD) on the prevailing wind direction and 3 RD on the non-prevailing wind direction. The potential setback distances for the Prairie Rose Wind are shown in Table 2. Additional setbacks may be required to meet Minnesota noise standards.[60] 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.

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 101 MW LWECS

A generic 101 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 less rural area of Minnesota; and such a location would also need wind resources equivalent to or greater than those in Rock and Pipestone counties. Impacts could be mitigated by utilizing wind turbines capable of generating more energy. For example, a 101 MW project consisting of 1.5 MW turbines requires 67 turbines; a similar project consisting of 3.0 MW turbines requires 37 turbines. The larger turbines would create a larger individual "eyeprint," but the smaller number of turbines would likely create a relatively smaller visual impact for the project.

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.

[59] Commission Order Establishing General Permit Standards, http://energyfacilities.puc.state.mn.us/documents/19302/PUC%20Order%20Standards%20and%20Setbacks.pdf.
[60] Minnesota Rules Chapter 7030 at all residential receivers (homes). Residential noise standard NAC-1, L50 50 dBA during overnight hours.

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

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.

6.5.2 Shadow Flicker

Shadow flicker is the intermittent change in light intensity due to rotating wind turbine blades casting shadows on the ground. 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.[61] 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).[62]
- Belgium has adopted the German standard.[63]

[61] 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.
[62] Shadow Flicker Assessment – Honeywood, Final Report, p. 5, http://www.eolectric.com/assets/honeywood/pdf/en/appendix%20k.pdf.
[63] Spatial Planning Report, p. 21.

- Denmark recommends a maximum of 10 hours/yr. assuming actual weather conditions in the project area.[64]
- France has adopted no standard but requires shadow flicker modeling.[65]
- The Netherlands have adopted a yearly maximum of 5 hours and 40 minutes assuming clear skies.[66]
- The State of Victoria, Australia, has adopted a shadow flicker standard of 30 hours/yr.[67]

Prairie Rose Wind

Shadow flicker would occur as a result of the proposed project. Areas most likely to experience shadow flicker would occur to the east and west 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. A discernable shadow forms and dissipates 15 to 45 minutes from sunrise or sunset depending on cloud cover.

Mitigation

Computer models can predict the amount of expected shadow flicker at locations within or near a wind farm. This information can be used to minimize shadow flicker within and adjacent to the project area. Additional mitigation measures include siting turbines to utilize vegetative screening, planting vegetative screening or installing blinds. These additional mitigation measures could be considered on a case-by-case basis.

Generic 101 MW LWECS

Depending on surrounding landscape and topography, a generic 101 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.

6.5.3 Turbine lighting

Prairie Rose Wind Project

Wind turbines, per Federal Aviation Administration (FAA) requirements and because of their height, would be lighted.[68] 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.

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[64] Id.
[65] Id.
[66] Id.
[67] Policy and planning guidelines for development of wind energy facilities in Victoria, p. 26, http://www.sustainability.vic.gov.au/resources/documents/WindEnergyGuidelines.pdf.
[68] FAA Advisory Circular AC 70/7460-2K, http://rgl.faa.gov/REGULATORY_AND_GUIDANCE_LIBRARY/RGADVISORYCIRCULAR.NSF/0/22990146db0931f186256c2a00721867/$FILE/ac70-7460-2K.pdf.

Generic 101 MW LWECS

A generic 101 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.

6.5.4 Noise

Large electric generation facilities generate noise. This section discusses potential impacts from such 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, annoyance and sleep disturbance.[69] Table 9 lists Minnesota’s Noise Standards by noise area classification.

[69] Occupational and Community Noise, World Health Organization, http://www.who.int/mediacentre/factsheets/fs258/en/.

Table 9. Minnesota Noise Standards[70]

Noise Area Classification[71]	Daytime		Nighttime	
	L_{50}[72]	L_{10}	L_{50}	L_{10}
1	60	65	50	55
2	65	70	65	70
3	75	80	75	80

Prairie Rose Wind

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).[73] 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.

Wind turbines produce audible, low frequency sound and sub-audible sound (infrasound). These sounds can have a rhythmic modulation due to the spinning of the turbine blades.[74] Impacts due to these sound characteristics are subjective, i.e., human sensitivity, especially to low frequency sound, is variable. However, in general, low frequency sounds can cause annoyance and sleep disturbance.[75]

Mitigation

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.[76] For rural residential areas in Rock and Pipestone counties, this means sound levels must meet an L_{50} standard of 50 dB(A). The distance that turbines are setback from residences would depend on the type and size of turbine. Setback distances to the 50 dB(A) level for turbines under consideration for this project are shown in Table 2. The setback distance for a 1.6 MW turbine is 623 feet. Turbines would not be placed within 1,000 feet of any home according to the Applicant.

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

[70] Minnesota Rules 7030.0040, https://www.revisor.leg.state.mn.us/rules/?id=7030.0040. Standards expressed in dB (A).
[71] 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).
[72] 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.
[73] 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.
[74] Id.
[75] Id.
[76] Minn. Rules 7030.0040, Noise Standards, https://www.revisor.leg.state.mn.us/rules/?id=7030.0040

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.[77]

Generic 101 MW LWECS

A generic 101 MW LWECS would have noise impacts and mitigation similar to the Prairie Rose Wind project. Depending on location, surrounding vegetation, and topography, impacts from noise could be less than those expected of the proposed project.

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.

Mitigation

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.

6.5.5 Property values

Large electric generation facilities have the potential to impact property values. This section discusses potential property value impacts from the operation of a generation facility in the project area.

Prairie Rose Wind

The proposed project would be located in Rock and Pipestone counties in southwestern Minnesota. Population in these counties is decreasing slightly and household income is less than the statewide average. (Table 8 summarizes the demographics and housing characteristics of Rock and Pipestone Counties.)

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.

[77] 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.

The Renewable Energy Policy Project (REPP) conducted a statistical analysis to determine the extent to which property values are influenced in the vicinity of wind projects.[78] 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.[79] 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 property values as a result of wind farms[80]. 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. [81]

Mitigation

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 101 MW LWECS

A generic 101 MW LWECS would have property value impacts similar to the Prairie Rose Wind.

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 Prairie Rose Wind , 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.

Mitigation

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.

[78] The Effect of Wind Development on Local Property Values, May 2003, http://www.repp.org/articles/static/1/binaries/wind_online_final.pdf.
[79] 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.
[80] Stearns County Board of Commissioners Meeting, June 8, 2010.
[81] Results were based on limited data.

6.5.6 Local Economy

Short-term and long-term economic benefits would result from the construction of the Prairie Rose Wind 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.

Prairie Rose Wind
Based on a production tax of $0.0012 per kWh produced, annual wind energy production taxes would range from approximately $409, 968 to $473,040. Additionally, payments to landowners would provide income that could add to the local economy.

Generic 101 MW Wind Project
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.

6.6 Infrastructure

A generation project of this size has to consider potential impacts to existing infrastructure, such as transportation and communication. Wind farms, and their associated transmission facilities, need to add to the overall infrastructure without disrupting existing system.

6.6.1 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[82]. 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.

Prairie Rose Wind
The Prairie Rose Wind project would construct a project substation and site it to minimize the length of the 115 kV overhead transmission line. [83] The location of the project substation is currently under consideration and would require less than an acre of land. The substation would step up the power from 34.5 kV to 115 kV.

[82] 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.
[83] Site Application, 2-4.

In addition to the proposed Prairie Wind Farm, the Certificate of Need is also requested for the associated 115 kV transmission line which would run from the point of interconnection in Rock County, MN to the Split Rock substation in Brandon, South Dakota. The transmission line will consist of approximately 24 miles of 115 kV transmission line and would extend west from the project substation for approximately 6 miles to the Minnesota-South Dakota border along County State Aid Highway 7/Township Road 72. Two alternative routes are being considered in South Dakota. Prairie Rose Transmission is working with landowners to voluntarily acquire easements along the transmission route to allow routing of the transmission line. An Environmental Analysis will be conducted separately from this report for the transmission line (TL-10-134).

The Prairie Rose Wind project would collect the electrical power generated by turbines through a 34.5 kV underground collection system. Collector lines would be buried underground between turbines and carry power to interconnection points. Collector lines may either continue underground or be constructed above ground when they reach public roads or the edge of farm fields. The collection lines carry power to the project substation

Impacts from the project's associated transmission facilities would include impacts due to construction and impacts due to 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. Power moving through a transmission line creates EMF. These fields decrease with distance from a transmission line. Stray voltage can occur with electrical distribution lines to residences and high voltage transmission lines that parallel them.

Mitigation

Siting the project substation near the point of interconnection to the power grid would reduce the extent of electric transmission poles and lines and associated impacts. Construction impacts could be mitigated by minimizing the amount of land cleared for the substation. Operation impacts could be mitigated by placing transmission lines away from population densities. Visual impacts could be mitigated by placing collector lines underground, while aesthetic impacts from overhead collector and transmission lines can be mitigated through design and pole placement.

Generic 101 MW LWECS

A generic 101 MW LWECS would have transmission facilities similar to the proposed project. Potential impacts and mitigation strategies are also similar. 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 Prairie Rose Wind project; 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 Prairie Rose Wind 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.

6.6.2 Roads

An established transportation network of state, county and township roads exists in the project area. County and township roads generally follow section lines. Private roads, mostly used for agricultural purposes, are also common. U.S. Highway 75 borders the eastern edge of the property and crosses the northeast corner or the project area. There are four County State-Aid Highways (CSAH) within the Project area. CSAHs 6 and 11 run north to south, and CSAHs 7 and 12 run east to west through the Project area. Road surfaces vary and gravel roads are common.

Traffic volumes in the area are generally low. The highest existing Annual Average Daily Traffic (AADT) counts are approximately 3,000 vehicles per day along U.S. Highway 75 south of CSAH 7.[84] Along county highways, AADTs are often below 500 vehicles per day.

Constructing the Project would require approximately 10 to 17 miles of gravel access roads, depending on the size of turbine selected and final design. Access roads will be used by operation and maintenance crews while inspecting and servicing the wind turbines throughout the life of the project. The access roads would be between towers and one road would be required for each turbine string. Roads will be approximately 16 to 33 feet wide and low profile to allow cross-travel by farm equipment. Efforts would be made by the applicant to minimize land-use disruptions.

Construction traffic would use the existing county and state roadway system to access the Project area and deliver construction materials and personnel. During construction peak, it is anticipated that there will be an additional 250 vehicle trips per day. Since current traffic levels on the roadways in the project area are well below roadway capacities, construction traffic would be perceptible but similar to seasonal variations in traffic, such as autumn harvest. Construction is not anticipated to result in adverse traffic impacts. Operation and maintenance activities will not noticeably increase traffic in the Project area.

Prairie Rose Wind Project
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.

A system of access roads would be constructed along turbine strings or arrays. These roads would be constructed in accordance with state and local requirements. Access roads would be 16 feet wide and with a base sufficient for use during inclement weather.

Turbine assembly would also require the construction of a 40-foot-by-120 ft gravel crane pad extending from the access road to the turbine foundation. All temporary construction areas would be restored following construction, including grading to natural contours, seeding and dressing, as necessary.

[84] Site Application, Section 5.5.

Generic 101 MW
Impacts would be similar to those of the proposed project. Depending on location, impacts could greater on road systems, particularly on roads with higher daily use.

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

6.6.3 Communication Systems

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

Prairie Rose Wind 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.[85] 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.

Potential communications impacts due to the Prairie Rose Wind project are anticipated to be minimal.

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. One unique microwave beam path intersects the project area. Turbines would be sited to avoid microwave beam paths.

[85] Post Digital Television Transition - The Evaluation and Mitigation Methods for Off-Air Digital Television Reception in-and-around Wind Energy Facilities; http://www.comsearch.com/files/Wind_Energy_White_Paper.pdf.

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) coordinates government communication systems for all departments and agencies. [86] The applicant contacted the NTIA regarding potential interference with weather radars. Comments from the NTIA indicate the project would have a moderate impact risk on the Weather Surveillance Radar-1988 Doppler (WSR-88D) located northeast of Sioux Falls, South Dakota.[87] The applicant will continue coordination with NTIA and NEXRAD to minimize impacts to weather radars. Construction and operation of the proposed wind Project would be in accordance with all associated federal and state permits and laws, as well as industry construction and operation standards. Due to the moderate impacts expected, extensive mitigation measures are not anticipated.

Telephone Service

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

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. The local television stations with the strongest signal are listed in Table 10[88].

Table 10. Primary Digital Television Stations Serving the Project Area

Call Sign	Network	City of License
KDLT	NBC	Sioux Falls, SD
KELO	CBS	Sioux Falls, SD
KSFY	ABC	Sioux Falls, SD
KSMN	PBS	Worthington, MN
KSMN	PBS	Sioux Falls, SD
KSMN	FOX	Sioux Falls, SD
KSMN	CW	Sioux Falls, SD
KSMN	PBS	Brookings, SD

[86] For more information on the National Telecommunications and Information Administration, see http://www.ntia.doc.gov/about.html .
[87] Site Application, Section 5.5 and Appendix A (Agency Correspondence).
[88] HDR Engineering, Inc.

GPS
Global positioning systems (GPS) use satellite signals to determine locations on the earth's surface and are commonly used to guide agricultural operations.[89] Because GPS uses multiple digital satellite signals, interference with the signals or subsequent uses is not anticipated. Obstruction of any one satellite 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).

Mitigation

According to the draft permit for the project, the Applicant would be required 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.

Microwave Beam Paths
To prevent disruption of the microwave beam path, turbines should not be sited the centerline of a beam path. Appropriate turbine siting would mitigate potential impacts.

Land Mobile Stations
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.

Broadcast Facilities
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. Impacts on broadcast facilities as a result of the project are not yet known.

AM/FM Facilities
No impacts or disruptions are anticipated.

Generic 101 MW LWECS

A generic 101 MW LWECS would have communications impacts similar to the Prairie Rose Wind 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.

[89] Precision Farming Tools: Global Positioning Systems (GPS), Virginia Cooperative Extension; http://www.pubs.ext.vt.edu/442/442-503/442-503.html.

6.7 Fuel Availability

Large electric power generating facilities require some type of fuel. This section discusses the availability of fuel for the proposed project and alternatives.

Prairie Rose Wind Project

The Prairie Rose Wind 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.[90]

Wind capacity varies across Minnesota. Extensive wind measurements have been taken and analyzed by the Minnesota Department of Commerce.[91] These data suggest the mean annual wind speeds at 80 meters across the project area range from 8.1 -8.5 meters per second (mps) (18.1-19 mph).[92] 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.[93] 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 Prairie Rose Wind Project is estimated to have a capacity factor in this range.[94]

Generic 101 MW LWECS

A generic 101 MW LWECS would utilize the wind resources as the proposed project. To be economically feasible, a 101 MW LWECS sited elsewhere in Minnesota would need to be sited in area with sufficient wind resources to meet generation projections. The availability of productive, undeveloped wind resources in Minnesota remains high. Impacts on the wind resource would be similar to those for the Prairie Rose Wind Project.

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.

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[90] 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.
[91] Wind Resource Analysis Program 2002, http://www.state.mn.us/mn/externalDocs/Commerce/WRAP_Report_110702040352_WRAP2002.pdf.
[92] Site Permit Application, Section 2.0.
[93] See Table 2 of this ER which includes "Cut-in Wind Speeds", i.e., the minimum wind speed necessary for the turbine to operate.
[94] Site Permit Application, Section 2.0.

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.

Mitigation
Impacts related to harvesting for a biomass plant could be mitigated by using guidelines for biomass harvesting. [95] These guidelines minimize impacts to natural resources. Siting the plant in a location that reduces biomass transportation will 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.[96] If harvesting guidelines are used to mitigate impacts to natural resources and wildlife, suppliers of biomass fuels would need to follow biomass harvest guidelines.

6.8 Agriculture

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

6.8.1 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.

Prairie Rose Wind Project
Seventy-eight percent of the project area is cultivated.[97] Most of the remaining grasslands have been heavily grazed, although there are likely remnant areas of native prairie and bedrock outcrop areas that are intact. 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 these lands with adequate consultation with state and federal agencies.

[95] See Minnesota DNR Guidelines for Woody Biomass, 2007. http://www.dnr.state.mn.us/forestry/um/biomass/index.html
[96] Forest Biomass and Biofuels Harvest, http://www.frc.state.mn.us/initiatives_policy_biofuels.html.
[97] Site Application, Section 5.10

Crops and large scale animal production are common features in the area. Both Rock and Pipestone counties are large producers of hogs and cattle, in additional to row crops such as corn and soybeans. [98] Much of the soil in the area is prime farmland, defined as having the best combination of physical and chemical characteristics for producing food, fiber, forage, and oilseed crops.

Approximately 30-40 acres of farmland would be removed from agricultural production. This includes the construction of access roads, turbine pads, and the operations and maintenance facility. Farming activities would continue on the land surrounding turbines and access roads. Impacts to drain tile in the project area is not anticipated; however, any damages sustained as a result of project construction would be repaired according to agreement with the landowner.

Generic 101 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.

6.8.2 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. Potential impacts to wildlife are discussed in Section 6.4.

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 6.1 and 6.2 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 6.5.

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.). [99]

[98] ID., Section 5.10
[99] See eDockets 08-1233 (Doc. Id. 201010-55392-01).

Prairie Rose Wind

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 Prairie Rose Wind Farm is designed to be "a separately derived system" as defined in the National Electric Code. The system will have no direct electrical connection (including grounded circuit conductors) to conductors originating in another system. The wind farm collection system will have its own substation and transformers. The project does envision connection to the grid via a new 115 kV 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.

Mitigation

Mitigation of potential stray voltage impacts would include that all safety requirements are met during the construction and operation of the project. Appropriate measures could be taken to prevent stray voltage problems when the transmission lines proposed in this project parallel or cross distribution lines. Where possible, such crossings or parallel alignments would be avoided.

Generic 101 MW LWECS

A generic 101 MW LWECS located elsewhere in Minnesota would have impacts to livestock similar to the Prairie Rose Wind.

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.

7 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 Prairie Rose Wind Application.

7.1 Prairie Rose Wind

The proposed project is feasible and available to be implemented.

7.2 Generic 101 MW wind project

An alternative to the proposed Prairie Rose Wind Project in Rock and Pipestone counties is a large energy conversion system sited elsewhere in Minnesota. Such a project could be a 101 MW project or a combination of smaller dispersed projects. Several feasible projects are being evaluated in Minnesota.

7.3 38.5 MW biomass plant

A 38.5 MW biomass plant is feasible but not likely available. Currently there is a biomass plant of this size in Minnesota.[100] Many factors could limit the availability of a 38.5 MW biomass plant, including equipment, financing, and consistently available biomass fuels.

7.4 No-build alternative

The no build alternative is feasible and available, but would not further Minnesota's renewable energy objectives.

[100] The Fibrominn plant has an output of 55 MW and uses turkey litter as a fuel source, http://www.fibrowattusa.com/projects/fibrominn/

8 Permits

The Prairie Rose Wind project would 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 below in Table 11[101] .

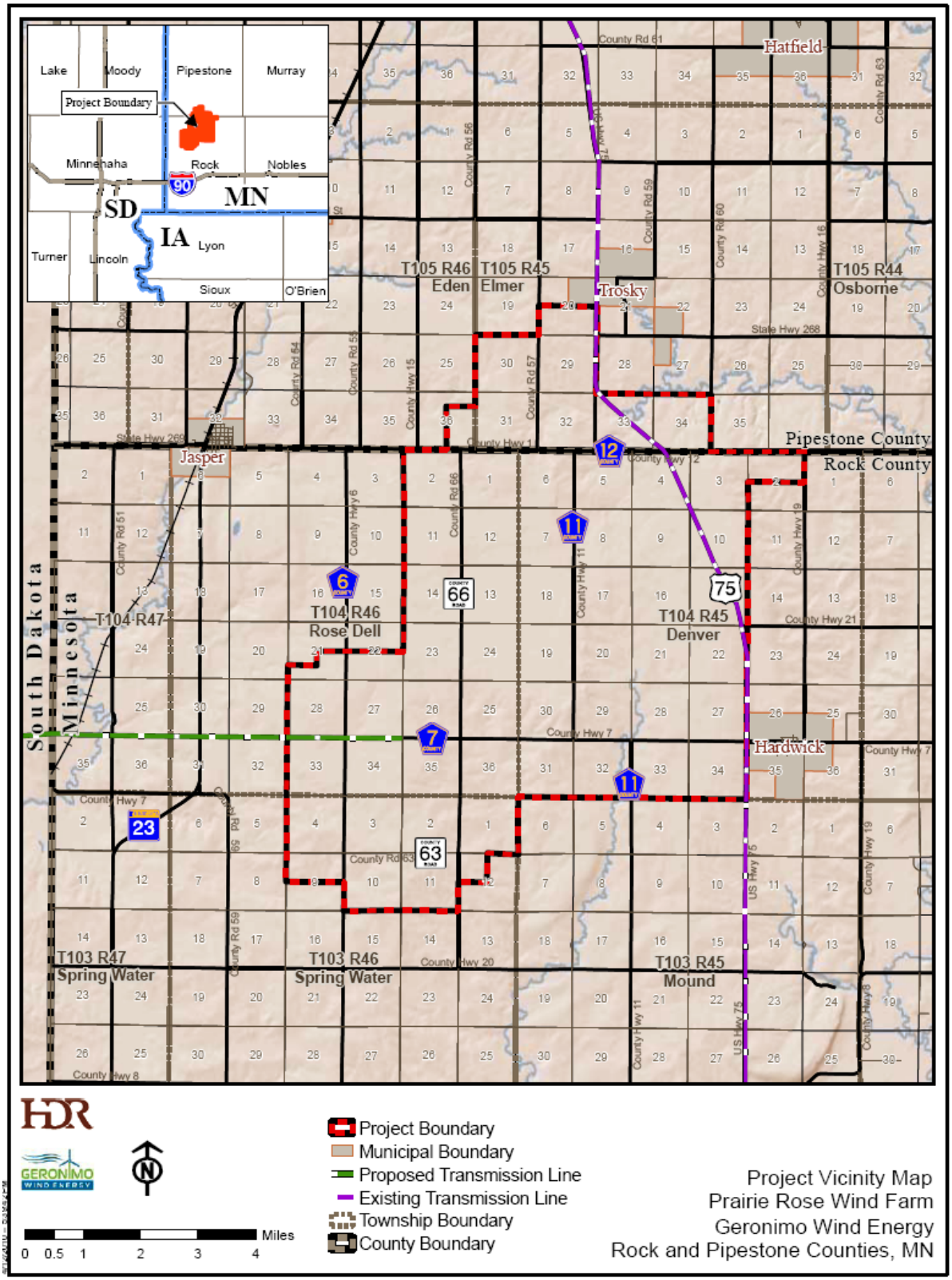
Table 11. Permits and Approvals

Agency	Type	Description
Federal Approvals		
Federal Aviation Administration (FAA)	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 regviews possible impacts to air safety and navigation, as well as the potential for adverse effects on radar systems.
United States Army Corps of Engineers (USACE)	Section 404 Permit	Required for the discharge of dredged or fill material into waters of U.S. Minimal levels of file may be covered under existing General Permits/Letters of Permission
Natural Resources Conservation Service	Prime Farmland Permit	Farmland protection, specifically conversion of farmland to non-agricultural uses.
State Approvals		
Minnesota Public Utility Commission	LWECS Site Permit	For facilities with greater than 25 MW nameplate capacity.
Minnesota Public Utilities Commission	Certificate of Need	Needed for a large energy project in Minnesota. Commission determines basic types of facility to be constructed, size of facility, and the time of the facility
Minnesota Pollution Control Agency	Section 401 Certification	Compliance with state water quality standards.
Minnesota Pollution Control Agency	General Permit (Construction)	For stormwater discharges from construction activities
Minnesota Pollution Control Agency	License for Very Small Quantity Generator of Hazardous Waste	For discharge of hazardous waste.
Minnesota Department of Natural Resources	License to Cross Public Land and Water	For projects that affect the course, current, or cross-section of DNR Public Waters, or for utility crossings of Public Lands

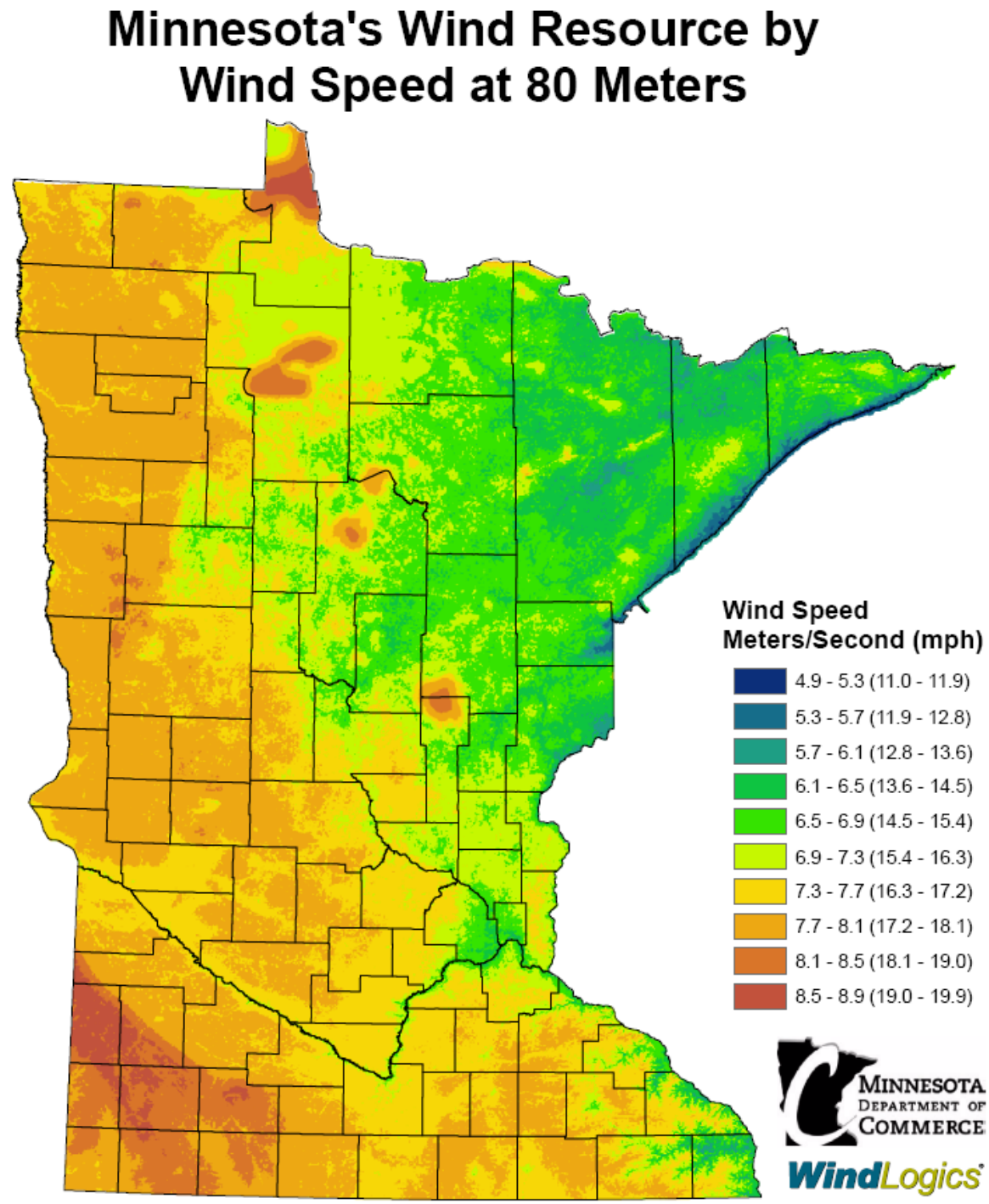
[101] Site Permit Application, Section. 6.0

Agency	Type	Description
Minnesota Board of Water and Soil Resources	Wetland Conservation Act Approval	For wetland impacts. Ranges from an exemption for small or temporary impacts to a permit and mitigation for greater impacts
Minnesota Department of Transportation	Access Driveway Permit	Required to provide driveway access to state owned right of way.
Minnesota Department of Transportation	Utility Permit on Trunk Highway Right of Way	Required to install utilities within state owned right of way.
Minnesota Department of Transportation	Wind Energy Transportation Oversize and/or Overweight Permit	Required to transport oversize loads on state maintained roads.
Minnesota Department of Transportation	Tall Structure Permit	Required for wind turbines and other tall structures
Minnesota Department of Health	Water Supply Well Notification	New water supply well construction.
Minnesota Department of Health	Plumbing Plan Review	Required to ensure compliance with Minnesota Plumbing Code
County and Township Regulations		
Rock County	Right-of-way permits, road access permits, driveway permits for access roads and electrical collection system.	N/A
Rock County	WCA Approval	For wetland impacts. Ranges from an exemption for small or temporary impacts to a permit and mitigation for greater impacts
Pipestone County	WCA Approval	For wetland impacts. Ranges from an exemption for small or temporary impacts to a permit and mitigation for greater impacts
Pipestone County	Right-of-way permits, road access permits, driveway permits for access roads and electrical collection system.	N/A
Denver Township		N/A
Rose Dell Township		N/A
Springwater Township		N/A
Eden Township		N/A
Elmer Township		N/A

Map 1. Project Vicinity



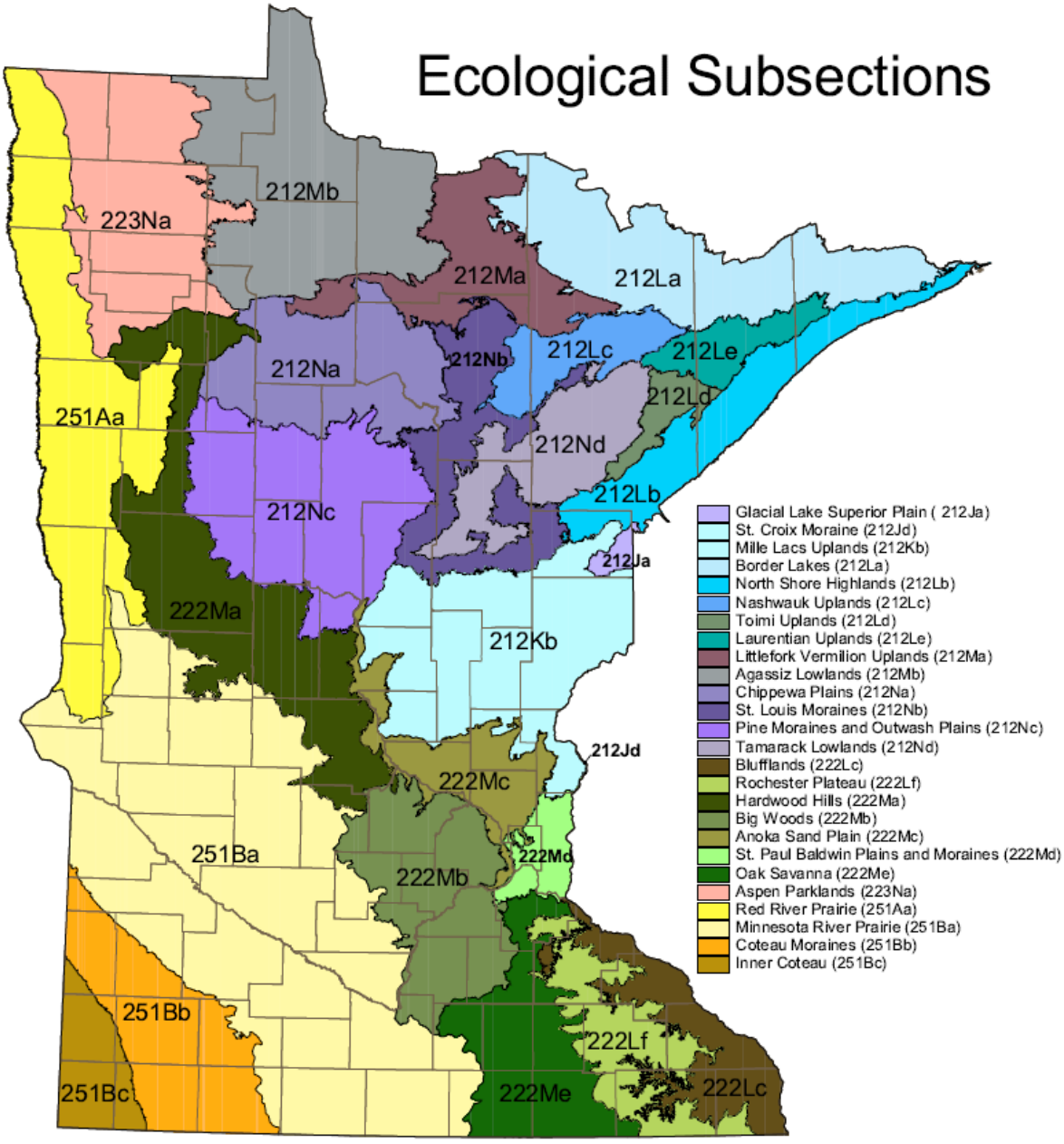
Map 2. Wind Resource



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 3. Ecological Subsections



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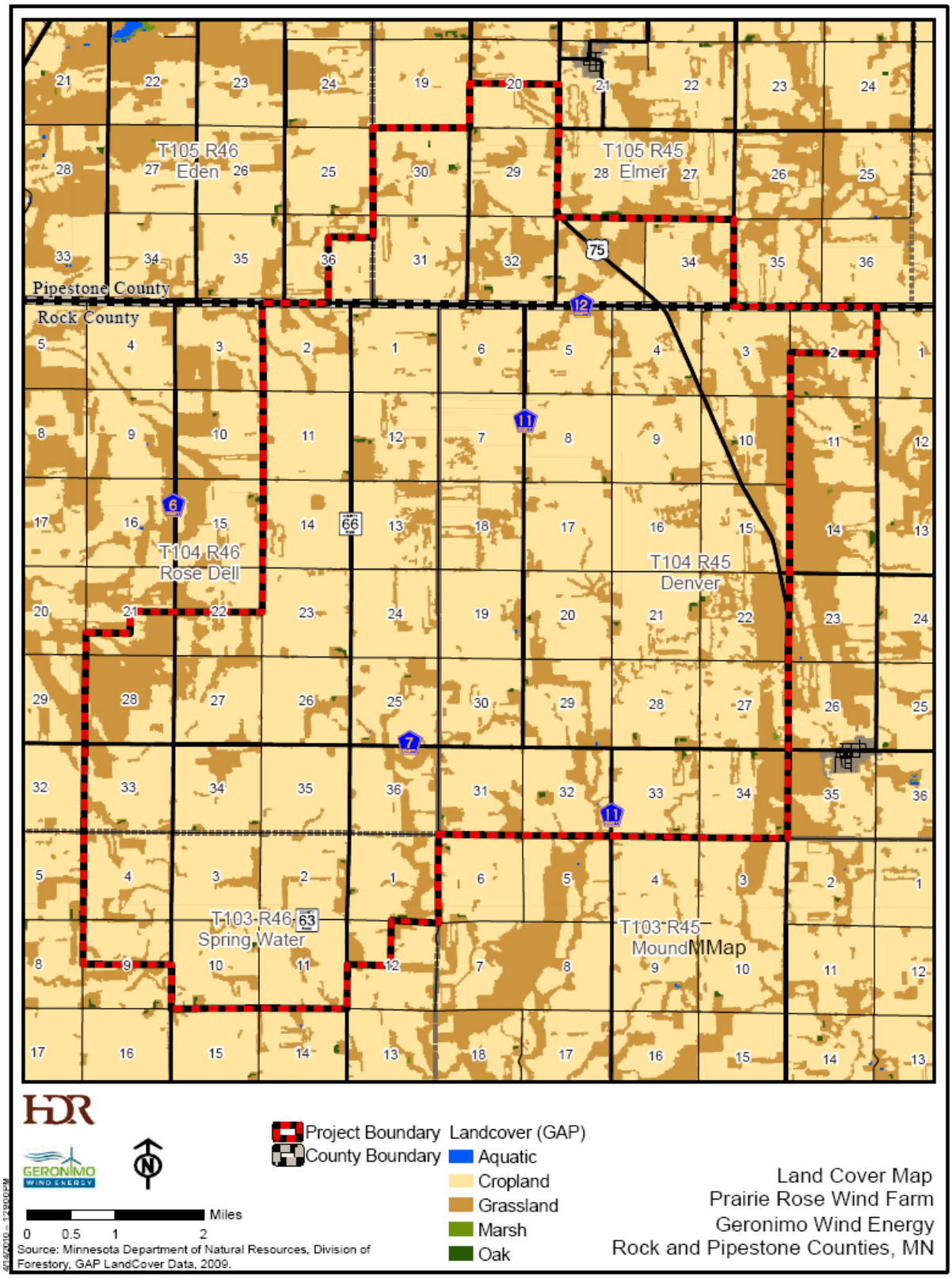
(218) 327-4449 ext 239

September, 2000

Division of Forestry
Ecological Land Classification Program

Map 4. Land Cover



Appendix A. Environmental Scoping Decision

office of energy security

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In the Matter of the Application of Prairie Rose Wind, LLC, for a Certificate of Need for the 101 Megawatt Prairie Rose Wind Project in Rock and Pipestone Counties

ENVIRONMENTAL REPORT SCOPING DECISION

PUC Docket No. IP-6943/CN-10-80

The above matter has come before the Director of the Office of Energy Security (OES) for a decision on the scope of the Environmental Report (ER) to be prepared in consideration of the Prairie Rose Wind, LLC, Application for a Certificate of Need for the proposed 101 Megawatt (MW) Prairie Rose Wind Project in Rock and Pipestone counties.

A final decision on turbine selection and design has not been made, but the project will consist of turbines with a rated capacity between 1.5 and 2.3 MW in such number and combination as to yield up to 101 MW. Facilities associated with the project include gravel access roads, an operation and maintenance building, meteorological towers, a Sonic Detection and Ranging (SODAR) unit, and an electrical collection system, including a project substation.

The Project is located in southwestern Minnesota approximately three miles east of the town of Jasper. The project boundary is 35,335 acres in the townships of Denver, Rose Dell, and Springwater, in Rock County and Elmer and Eden townships in Pipestone County. There are currently over 14,000 acres under site control. Electricity from the Project would be transmitted via a 24-mile 115 kV transmission line to the existing Split Rock Substation near Brandon, South Dakota.

The project requires a certificate of need (CN) and a site permit for the wind farm from the Minnesota Public Utilities Commission (Commission). The CN (CN-10-80), the site permit (WS-10-425), and the routing permit (TL-10-134) are being considered by the Commission in separate dockets.

On May 13, 2010, Prairie Rose Wind, LLC, filed a certificate of need application with the Commission for the Prairie Rose Wind Project. On July 19, 2010, 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. Statute 216B.2421). As such, it requires the Minnesota Department of Commerce to prepare an environmental report for the project (Minn. Rule 7849.1200).

A public meeting was held on July 27, 2010, in Jasper, Minnesota, to receive comments on the scope of the environmental report. Approximately 80 persons attended the meeting.

A public comment period followed the meeting, closing on August 17, 2010. Approximately 10 comments were received from the public as well as comments from Minnesota Department of Transportation (Mn/DOT) and Department of Natural Resources (MnDNR). Public comments range from concern about turbine setbacks, noise (and associated impacts to livestock), impacts to local roads, and benefits to local communities (jobs and tax revenues). Mn/DOT expressed concerns about possible impacts to the "King of Trails" Scenic Byway along Hwy 75, transportation of oversize materials and equipment on public roads, and acquiring appropriate permits for using road rights-of-way. MnDNR expressed concerns regarding potential impacts to native prairie and loss of habitat for threatened and endangered species in the project area.

Comments were also received regarding the associated 24-mile 115 kV transmission line that will run from the project area to the Split Rock Substation near Brandon, South Dakota. Specific comments on the impacts of the transmission line will be fully addressed in the Environmental Assessment for the route permit (TL-10-134).

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. Statute 216B.1691). These alternatives include: (1) a generic 101 MW wind generation project sited elsewhere in Minnesota, (2) a 38.5 MW biomass plant, and (3) a "no-build" option. An ER provides a high level 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 OES 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

Prairie Rose Wind Project

The Environmental Report for the Prairie Rose Wind Project will address and provide information on the following matters:

1.0 Description of the Prairie Rose Wind Project [Minn. Rule 7849.1500, subp. 1, A]
2.0 Regulatory Framework
3.0 Description of Alternatives [Minn. Rule 7849.1500, subp. 1, B]

- 3.1 Generic 101 MW wind project
- 3.2 A 38.5 MW biomass plant
- 3.3 No-build option

4.0 Feasibility and Availability of Alternatives [Minn. Rule 7849.1500, subp 1, F]

4.1 Prairie Rose Wind Project
4.2 Generic 101 MW wind project
4.3 A 38.5 MW biomass plant
4.4 No-build alternative

5.0 Human and Environmental Impacts and Mitigation [Minn. Rule 7849.1500, subp 1, C, D and E]

5.1 Environmental

5.1.1 Air Quality
5.1.1.1 Emissions – pollutants [Minn. Rule 7849.1500, subp. 2, A]
5.1.1.2 Emissions – hazardous air pollutants [Minn. Rule 7849.1500, subp. 2, B]
5.1.1.3 Ozone formation [Minn. Rule 7849.1500, subp. 2, D]

5.1.2 Water Quality
5.1.2.1 Water appropriations [Minn. Rule 7849.1500, subp. 2, G]
5.1.2.2 Wastewater [Minn. Rule 7849.1500, subp. 2, H]
5.1.2.3 Surface and Ground Waters

5.1.3 Natural Environment

5.2 Community and Social Environment

5.2.1 Aesthetic impact and visibility impairment [Minn. Rule 7849.1500, subp. 2, C]
5.2.2 Noise [Minn. Rule 7849.1500, subp. 2, J]
5.2.3 Property values
5.2.4 Tax Revenues
5.2.5 Livestock

5.3 Infrastructure and Land Use

5.3.1 Fuel availability [Minn. Rule 7849.1500, subp 2, E]
5.3.2 Associated transmission facilities [Minn. Rule 7949.1500, subp. 2, F]
5.3.3 Solid and hazardous wastes [Minn. Rule 7849.1500, subp. 2, I]
5.3.4 Agriculture
5.3.5 Roads
5.3.6 Communication Systems

6.0 Required Permits [Minn. Rule 7849.1500, subp. 1 G]

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 October 2010. 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 20th day of August 2010

STATE OF MINNESOTA
DEPARTMENT OF COMMERCE
OFFICE OF ENERGY SECURITY

William L. Glahn

William Glahn, Director

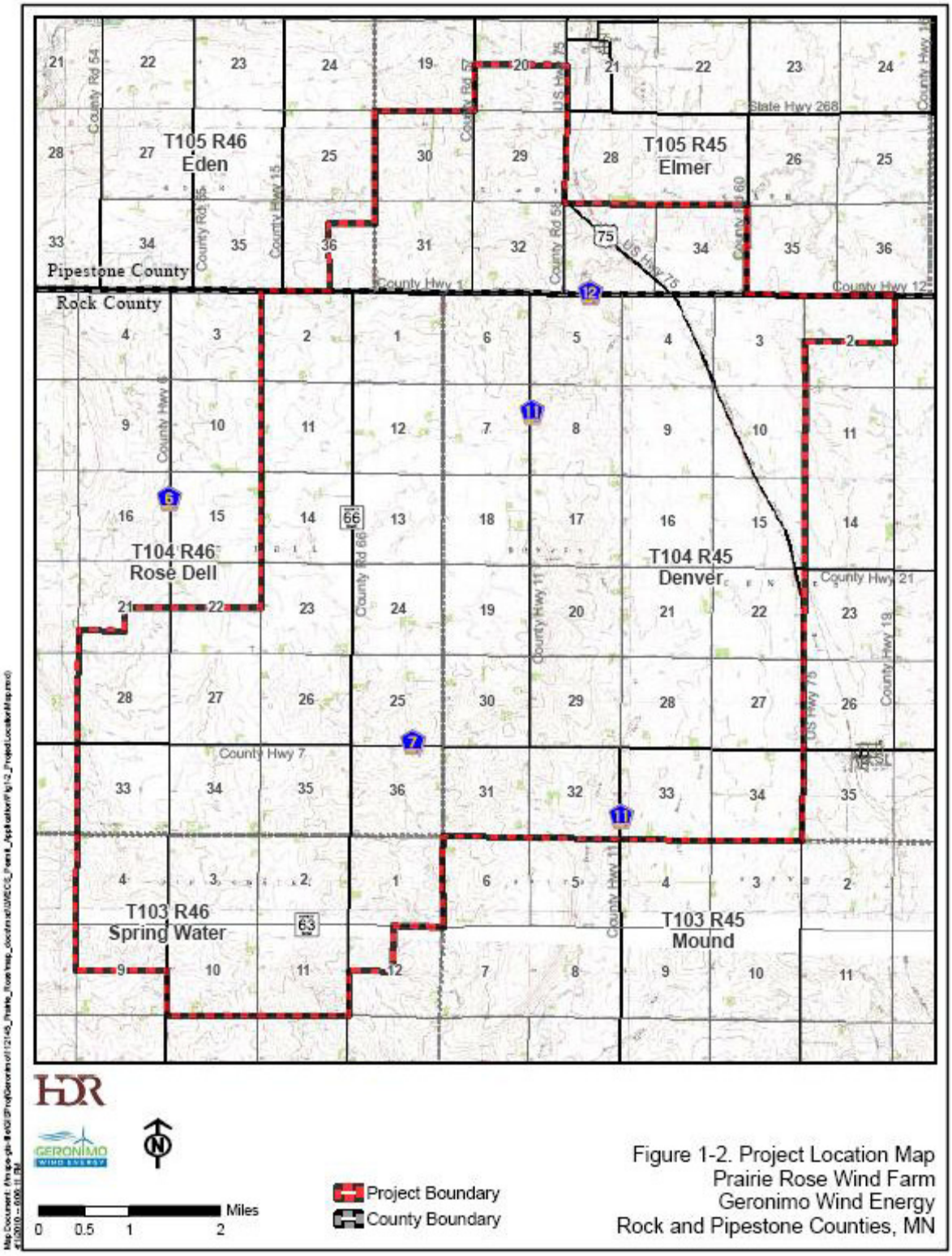

Figure 1-2. Project Location Map
Prairie Rose Wind Farm
Geronimo Wind Energy
Rock and Pipestone Counties, MN