Greenvale Wind Farm

Large Wind Energy Conversion System

Site Permit Application

Docket No. IP 6819,6820/WS-09-722

July 2009

Sparks Energy, LLC
2751 Hennepin Ave S
Suite 243
Minneapolis, MN 55408

Medin Renewable Energy, LLC
7256 290th Street W
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Applicant

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July 6, 2009

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

Subject: Draft Site Permit Application for the Greenvale Wind Farm, Dakota County, Minnesota

Dear Dr. Haar,

The entities listed below, hereafter known as Greenvale Wind Farm, respectfully submit this application.

Sparks Energy, LLC
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The preparers are Anna Schmalzbauer and Leone Medin. Ms. Schmalzbauer is a founder and CEO of Sparks Energy, LLC. Ms. Medin is a share holder and member of Medin Renewable Energy, LLC. Both are duly authorized to represent their organizations, and Ms. Schmalzbauer will be the lead contact with the PUC. Medin Renewable Energy LLC will own six N1000 Nordic Turbines and Sparks Energy LLC will own five, for a total nameplate capacity of up to 10.835 megawatts.

These persons will be listed as permitees of their respective companies.
Both persons will have an active, daily role in the operation of their companies, being responsible for administration, land leasing, on-going communications with neighbors and government entities, monitoring of daily expenses, community and press relations.

We look forward to working with you as we complete this application process.
Thank you.

Anna Schmalzbauer
Sparks Energy

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Medin Renewable Energy

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Section 1
Introduction

1.0 Introduction

Sparks Energy, LLC and Medin Renewable Energy, LLC are local, family owned entities that plan to collaborate to develop, own and operate a 10.84 megawatt (eleven 1-MW turbines) wind farm in Greenvale Township, Dakota County. Approximately 836.69 acres will be involved in the wind farm. The project site request for the permit consists of parcels in the following sections of Dakota County, Greenvale Township:

Northeast corner	Section 3 Township 112 North Range 20 West, 442.56 acres
Northwest corner	Section 4 Township 112 North Range 20 West, 164.03 acres
Southwest corner	Section 9 Township 112 North Range 20 West, 2 acres
Southeast corner	Section 10 Township 112 North Range 20 West, 228.10 acres.

Please see Attachment A for a map of the Greenvale Wind Farm.

1.1 Certificate of need or other commitment

Greenvale Wind Farm has negotiated a one-year contract with Great River Energy for the sale of electricity. This contract will be renegotiated on an annual basis. We are using a one year contract because we determined, in conjunction with our bank, that a one year renewable contract would enable us to benefit from market price increases in wholesale electricity to a much greater extent than conventional 20-year contracts with minimal escalators. This has proven particularly accurate over the last 5 years. Turbine developers, such as Carleton College, have agreed that the contracts signed five years ago are dramatically below current markets and are likely to continue to lag. We have the option to convert to a longer term contract at the end of any year, but do not feel that we will ever need to extend our contract. Our short term contract with Great River Energy also enables us to retain our Renewable Energy Certificates and our carbon credits. This was not possible, for example with a 20-year Xcel contract.

A Certificate of Need is required for any large energy facility erected in the state of Minnesota. The 2008 MN Statute 216B.2421, sub-division 2 defines a large energy facility as any electric power generating plant or combination of plants at a single site with a combined capacity of 50,000 kilowatts (50 megawatts) or more. The combined production of Medin Renewable Energy, LLC and Sparks Energy, LLC at the Greenvale Wind Farm site is 11,000 kilowatts (10.84 megawatts). This site does not meet the definition of a large energy facility, and therefore does not require a Certificate of Need.

1.2 State Policy

There is strong support for community-owned wind development in Minnesota. This project falls into that category. The project is developed by a group of Minnesota residents that believe in developing renewable energy sources. This project will be developed in an orderly manner compatible with environmental preservation, sustainable development, and the efficient use of resources, as demonstrated by the information provided in this application.

This application is intended to be consistent with the MN CBED law and will further Minnesota's goal of reaching 20% of its electricity need by renewable sources by 2020. Additionally, when commissioned, this wind farm offsets 18,552 metric tons of electricity-related greenhouse gas emissions annually, or the equivalent of taking 3,971 cars off the road or planting 17,101 acres of trees...(extrapolation based on New York Times, "Square Feet" by Jane Levere, April 21, 2009; link at http://www.nytimes.com/2009/04/22/business/energy-environment/22wind.html?_r=1&scp=7&sq=wind%20energy%20april%2021&st=cse.) We are working with the Federal Fish and Wildlife Service and the Minnesota Department of Natural Resources to ensure that minimal impact is made to native species of plants and animals. The applicant is committed to going the extra mile in having a minimal impact on the environment.

The applicant will use sustainable development practices in this project. All electric conduit lines will be buried. The project does not plan to tie into a high voltage transmission line, but will feed into the Dakota Electric distribution system at the Vermillion River (Farmington), Castle Rock, and Lake Marion sub-stations. Thus, no additional high voltage transmission lines will be built in the area. Furthermore, the applicant will work with qualified contractors in all phases of construction.

The individual turbines will be sited to optimize the wind resource while balancing the visual impact on area residents. Decisions with respect to turbine selection, site layout and spacing will be designed to make the most efficient use of the land and wind resources. Final project design will be based on environmental and topographical features and the prevailing winds.

Section 2
Proposed Site

2.1 Identification of Project Area

The project site is located in Greenvale Township in Dakota County, approximately six miles north of the city of Northfield. Local farmers and absentee landowners own the land required for the project. All land is currently in use as agricultural land. Greenvale Wind Farm controls the right to develop wind energy through land leases and wind right leases. Approximately 836.69 acres will be involved in the wind farm.

The project site request for the permit consists of parcels in the following sections of Dakota County, Greenvale Township:

Northeast corner	Section 3 Township 112 North Range 20 West, 442.56 acres
Northwest corner	Section 4 Township 112 North Range 20 West, 164.03 acres
Southwest corner	Section 9 Township 112 North Range 20 West, 2 acres
Southeast corner	Section 10 Township 112 North Range 20 West, 228.10 acres.

Please see Attachment A for a map of the Greenvale Wind Farm.

2.2 Wind Data

Windlogics has completed a comprehensive wind analysis of the complete 836.69-acre Greenvale Wind Farm, utilizing 40 years of data. This data was normalized to reflect long term values. This report was used to reach the conclusion that the average wind speed is 7.50 m/s (16.77 mph) at 70 meters. The project area is classified as a class 3/class 4 wind site with wind speeds in the range of 6.7 to 7.2 m/s (14.98 mph – 16.10 mph) at a height of 50 meters (164 feet). Please see Attachment B for the summary of the wind study.

2.1.1 Interannual variation

The expected annual average wind speed at 70 meters hub height is 7.50 m/s (16.77 mph). Forty years of complete modeling of our proposed site indicates that the average wind speed has a 50% probability of occurrence with a standard deviation of .21 (see Attachment B1).

2.1.2 Seasonal variation

The WindLogics study shows wind speeds are highest in October at 8.0 m/s (18.56 mph) followed by January at 7.95 m/s (17.78 mph). The wind speed is lowest in July at 6.65 m /s (14.87 mph).

2.1.3 Diurnal variation

Attachment B2 shows a table that represents the diurnal variations of wind speed over the course of a 24 hour period. The table shows increasing wind speed in afternoon hours and a slight decrease in wind speed in early morning to mid-afternoon.

2.1.4 Atmospheric stability (to the extent available)

The applicant has not yet collected atmospheric stability data. However, local turbines (Carleton College is 6.95 miles to the southeast from the Greenvale Wind Farm site and St. Olaf College is 4.32 miles to the south southeast from our site) have experienced "moderately stable" weather for the last 5 years.

2.1.5 Turbulence (to the extent available)

Hub height turbulence intensity typically depends on wind speed W.T. thrust and the standard deviation of wind. Our hub height turbulence factor is 0.028.

2.1.6 Extreme conditions

Extreme wind speeds could occur in the area of the proposed site either as tornadoes or severe straight line winds. The Nordic N1000 turbine has withstood 90 meters per second (295.3 ft/s or 201.3 mph) winds off the North Sea Coast of Europe.

2.1.7 Speed frequency distribution

Windlogics is completing a study to provide this information.

2.1.8 Variation with height

The applicants' WindLogics wind study has analyzed the area wind at the height of 70 meters (229.66 feet). We are currently doing additional studies to provide more information at lower heights to calculate wind sheer.

2.1.9 Spatial variations

The applicant expects minimal spatial wind variations as all our turbines will be on consistently farmed cropland with relatively uniform crops growing around our turbines, with minimal tree stands.

2.1.10 The Wind Rose

The wind rose (see Attachment B3) presents wind direction and velocity at 70 meters (229.66 feet) at the project site over an average year. This wind rose indicates that prevailing winds are from the northwest from October through April. May is a transition month with slightly more northerly winds. From June through September, prevailing winds are from the southwest.

2.1.11 Other meteorological conditions

Greenvale Township experiences the same meteorological conditions as the Twin Cites metro area.

2.3 Other Turbines in the Area

Carleton College owns and operates a wind turbine 6.95 miles to the southeast from the proposed site and St. Olaf College owns and operates a wind turbine 4.32 miles to the south southeast from the site. Additionally, Medin Renewable Energy plans to install a turbine in Elko New Market as part of a housing development approximately 4.32 miles to the north northwest from our site. This turbine was planned with Dakota Electric two years ago, is financed separately from Greenvale Wind Farm, and will be back fed into the system. Therefore, it is not included in this application.

Section 3

3.1 Wind Rights

Greenvale Wind Farm is working with landowners to obtain lease and easement agreements sufficient to build the proposed 10.84 megawatt project. The secured site and easement agreements ensure sufficient access to the site for construction and operation of the project and prohibit construction of silos or other tall structures that might interfere with the execution of this project. The lease terms are for 30 years with two additional 10-year extension periods to allow for continued operation. Landowners embrace the project.

Section 4
Project Design

4.1 Project Design

Please see Attachment A – a map of the proposed wind farm showing turbine placement and residences. The project design meets all state set backs and zoning requirements.

4.2 Major Wind Turbine Components

The project will consist of eleven Nordic Windpower N1000 turbines. The N1000 is a two-bladed turbine. A two-bladed system minimizes loads and costs. With two blades, it is possible to use a damped teeter hub to dissipate the jamming fatigue loads on the gearbox and drive train that result from turbulence and wind shear. This virtually eliminates fatigue issues in the gearbox and drive train, resulting in longer service life and generally trouble-free operation. Please see Attachment C – the N1000 technical specifications.

The two blade turbine presented significant challenges in design, a consequence of its asymmetry. A horizontal blade has different dynamic characteristics than a vertical blade. A three blade turbine is symmetrical and no one characteristic of the blade is drastically different than another. Solving the problem of asymmetry, involving very complex calculation interrelations, required the utilization of a comprehensive simulation program. Such a program was developed in Sweden in the early '80's. This has resulted in 20 years of experience with two blade configurations running successfully with no major component problems. The other necessary component for a two blade turbine is the teeter hub, which means that the hub and blades are hinged to the turbine shaft. Although the range is quite small, (+/-2 degrees) this motion has a decisive influence on the loads acting on the wind turbine system. Nordic Windpower has developed teeter hubs that have been in continuous operation since 1992.

These technical arguments for two blade turbines have long been known to the wind power community, and for this reason, the Swedish National Wind Power Program began in the 70's to concentrate its efforts on the two blade technology. Others in the worldwide industry attempted two blade configurations. At that time, however, the companies involved did not master the technology because the necessary computer codes had not been developed. In many cases this resulted in technical problems, which is why most commercial producers have implemented the less demanding three blade technology. The technical problems centered on the gearbox to hub to blade interference where failures were caused by excessive loads. Nordic has demonstrated the teeter hub solution to these issues with 13 years and over 100,000 hours of successful, trouble-free operation. The teeter hub effectively

smoothes out the loads so that the gearbox and blades experience lower loads than even three blade configurations. A teeter hub is not feasible with a three blade turbine.

The turbine stands on a 70-meter (229.65 feet), welded steel tube. The diameter is 3.0 meters (9.84 feet) at the bottom and 1.9 meters (6.23 feet) at the top. The blades are constructed from glass reinforced plastic and carbon. The turbine will be orientated upwind with a rotational speed of 21.5 rpm. The blade tip speed is 66 m/s (216.5 feet per second). It is designed with a teeter hub and the teeter bearing is elastomeric. The maximum teeter is plus or minus two degrees. The power factor is .985 at 100% power.

The two-blade design enables a simpler construction process due to lightweight construction requirements resulting in lower installation and operating costs and ease of maintenance.

Construction will include the use of a rubber tire, 80-meter (262.5 feet) hook height crane with a 30-meter (98.42) hook height and helper crane. The erection of the turbine will require three lifts. The tower is made up of two sections. Each section is one lift. The nacelle and blades are assembled on the ground and lifted in one lift onto the tower. This construction of the two-blade turbine will require fewer machines, have a minimal impact on the surrounding area and take less time than the traditional three blade model.

Four Nordic 54 meter (177.16 feet) and 59 meter (193.56 feet), 2-bladed turbines have been operating for more than 115,000 hours or 13 years with no significant maintenance issues or major component failures. The turbines have achieved an availability of better than 98%. The most significant maintenance issue has been the replacement of the elastomeric bumpers on the teeter hub approximately every five years, which is a fairly simple and inexpensive operation.

It should be noted that the second research and development model of the 3MW Nordic prototype still operates and is the world record holder for power production, as well as accumulated operating hours.

4.3 Electrical System

Nordic N1000 Wind Turbines generate at 690v. The turbine will feed a 1000 kVA pad mounted three-phase transformer. The transformer is proposed to be 7.2/12.47kV: 690 volt, grounded wye: delta unit. “Wye” is used in describing the winding arrangements of the generator transformers used in the interface transformers. The primary voltage is 690 volts. The secondary voltage is 25,000 volts. The primary winding arrangement is “wye”. The secondary winding arrangement is “delta”.

The transformer will feed a 12.47 kV underground collector line, collecting from all units to feed an underground 12.47 kV feeder line to the interconnect at the local distribution system.

The final electrical system design and system tie-in details will be determined through discussions with Excel Engineering. The project will meet electrical design requirements, including power factor, voltage control, and system protection by the purchasing utilities. Current plans call for an interconnect as per attachments J, K & L. These maps will be updated with the details of the interconnect upon completion of the final design.

4.4 Associated Facilities

Each wind turbine will have a gravel access road. The roads will be approximately 14 feet (4.3 meters) wide with class 5 gravel and a fabric underlay. The planned road construction has been walked and measured. The total length of the roads will not exceed two miles. No temporary roads will be needed. The applicants will continue to work with landowners to reach agreements on exact location of turbines, access roads, and a collector system to minimize land use disruptions. The applicant has been informed by the Federal Fish and Wildlife Service that there is endangered Prairie Bush Clover in Dakota County. We will work with the FWS to determine if any Prairie Bush Clover could potentially be disturbed. Each Prairie Bush Clover plant will be transplanted in accordance with the Federal Fish and Wildlife requirements. The applicant plans construction from November through March while fields are not in use, further minimizing land use disruption.

Each concrete pad foundation for the turbines will be a 40 foot diameter spread foundation. It will be 5 feet thick. The top of the spread foundation will be 3 feet below the ground surface. The foundations will be refilled and compacted in a 5-foot ring surrounding the foundation. A 50-foot diameter gravel pad will surround the base of the concrete pad once the concrete pad is covered with backfill.

The operations and maintenance facility will be located at a barn owned by Medin Renewable Energy LLC that is no longer used for agriculture purposes. The barn will be retrofitted based on requirements from Nordic Windpower, the turbine manufacturer, as part of the maintenance agreement. The maintenance agreement will cover the turbines for the first 10 years. The barn will be used to store any spare parts required as part of the maintenance agreement. The barn is located at

7256 290th Street W
Northfield, MN 55057.

Please see Attachment A for the map showing the exact location in relation to existing structures and the 11 proposed turbines.

Section 5
Environmental impacts

5.1 Description of the Environmental Setting

5.1.1 Project Site

The project site consists of parcels in the following sections of Dakota County, Greenvale Township:

Northeast corner, Section 3 Township 112 North Range 20 West, 442.56 acres

Northwest corner, Section 4 Township 112 North Range 20 West, 164.03 acres

Southwest corner, Section 9 Township 112 North Range 20 West, 2 acres

Southeast corner, Section 10 Township 112 North Range 20 West, 228.10 acres

The land to be developed is currently in agricultural use, typically in a corn and soybean rotation.

5.2 Human Settlement

The project is located in Dakota County, approximately 6 miles north of the city of Northfield. There are two nationally renowned colleges in the town of Northfield as well as Malt-o-Meal headquarters and many small businesses. Outside of the town, near the proposed project site, agriculture is the primary commercial activity. In 2007 the population of Northfield was approximately 19,859. This number includes 5,000 college students. According to the 2000 census, the population of Greenvale Township is 684. The population density is 23 people per square mile (8.9 square /kilometers). There are 232 housing units at an average density of 7.8 sq/mile (3.0 square/kilometers).

The county zoning requirements are as follows. County regulations require a 5 acre minimum for each parcel. Land owners can sell no more than one 5 acre lot every 5 years.

The construction of the Greenvale Wind Project should have a positive impact on the surrounding area. The project will add to the local revenue base through the collection of the Wind Production Tax. Construction and maintenance workers will support local businesses. Furthermore, a local resident will be employed to

maintain access roads and turbine base and pad areas. Nordic Windpower will have an operations and maintenance expert in the area to respond to maintenance issues.

Greenvale Wind Farm will work with homeowners in the vicinity of the wind farm to address concerns. Major concerns typically are noise, shadow flicker, visual impact and safety.

Noise

Noise complaints generally come from two sources, the swishing of the blades and the gearbox. Two-bladed turbines have less of a swishing noise because there are only two blades. The manufacturer states that the rpm's of the Nordic 59 meter (193.56 feet) diameter blade is 21.5 rpm's. The blade tip speed is 66 meters per second or 148 mph. The rpm's of the typical 82 meter (269.0 feet) diameter 3 bladed turbine is 14.4 rpm's with a blade tip speed of 139 mph. The swishing noise generally increases in strong wind and the wind in fact diminishes the swishing sound. The N1000 design has reduced noise due to the teetered hub that reduces the size of the gearbox (www.nordicwindpower.com). Bonestroo Engineering is in the process of completing additional noise studies. There have been few noise complaints with the N1000 turbines in operation.

Shadow Flicker

Shadow Flicker is the term used to describe what happens when the turbine blades come between the viewer and the sun, causing a moving shadow. If any effect is experienced, it is generally short-lived, as in a few hours over a year's time. The applicant will take steps in the turbine placement process to minimize shadow flicker whenever possible. Additionally, the turbines' Systems Control and Data Acquisition (SCADA) can be programmed to determine when the angle of the sun will cause flicker and the turbines can be automatically powered down during that time.

Visual Impact

Some people see wind turbines as large majestic machines that will decrease our dependence on foreign oil sources and thus improve our national security. Others will see wind turbines as negatively impacting the beauty of the natural environment. We will work with homeowners in the area to mitigate concerns through turbine siting. We will follow all state setback requirements.

Safety

Wind energy is one of the safest forms of energy available. Safety concerns include construction accidents, turbine malfunction, collapse and ice throws. The applicant is negotiating with Boldt Construction for the construction of the turbines. Last year alone, Boldt installed over 707 turbines without a major accident. In over ten years of operating, Nordic Windpower has never had a turbine collapse or major malfunction. The N1000 will automatically

power down if the blades become uneven, eliminating the concern of ice throws.

The applicants are working to build strong relationships in the community and will address community concerns. The applicants invited all residents and land owners within the proposed site and residents who live adjacent to the project to two informational meetings. In addition, the applicants attended two township meetings to present the proposal to board members and attendees. The applicants have contacted those community members who have not responded to the meeting invitations in an attempt to speak to them directly.

5.2.1 Noise

Background noise levels in the project area are typical to those in agricultural areas and are generally equivalent to household noise. Higher levels of noise exist in the town of Northfield, closer to Highway 35W and close to well-traveled county roads.

Estimating noise levels at receptors is a complex process. The receptor level, at various distances, will vary dependent on a number of variables such as air density and humidity level, topology, relative wind direction, superposition of multiple turbines and other climatic conditions, all of which are site- and time-dependent. Generally, noise decreases logarithmically with distance, with some attenuation adjustments for instantaneous temperature conditions.

The industry standard is a reporting of broadband sound pressure emission levels from a point source at hub height. For the N1000, this level is 106 dB(A) as listed on the specification sheet for the turbine.

Assuming some typical, average parameters for air density, site reflectivity/absorption and other parameters, basic estimates can be made. Using the rough calculator (http://www.windpower.org/en/tour/env/db/dbcalc.htm) the applicant has determined that the receptor level at 500 feet should be ~50-45 dB(A) after ambient noise (which may mask the turbine emissions) is filtered. Again, this is a rough estimate and could vary depending on the site specific parameters. Please see Attachment D for a visual of a sound map calculator for three-bladed wind turbines.

Because rough three-bladed estimates are not sufficient to the applicant, Bonestroo Engineering has been contracted to conduct detailed noise analysis (A and C) specific to the each turbine location and also specific to the N1000 turbine. Their recommendations for micrositing will follow government regulations.

Bonestroo was selected because of their extensive experience conducting noise studies for various industries and projects nationwide, and, should the need arise, in developing mediation strategies and specifications. A complete report of the analysis will be available to all parties.

After careful analysis of these studies, the applicant will work to mitigate noise pollution to area residents through siting and setbacks. The project will meet or exceed noise standards issued by the Minnesota Pollution Control Agency.

5.2.2 Visual Impact

The landscape in the project site area is rural open cropland with a gently rolling topography. The area is characterized by agricultural fields, farmhouses and associated buildings. The most widely grown crops are corn and soybeans on a rotating schedule. Trees, planted as a windbreak, generally surround the farmhouses and buildings.

The wind farm will have a visual presence on the landscape. Some residents may embrace the turbines as a boost to the local economy and national security by lowering our dependence on foreign oil. Some will see a new cash crop. Others may resist the change and mourn the loss of the natural landscape. There are 20 residences within or bordering the proposed site area and as mentioned before, turbines will be sited to help mitigate a negative public response. Carleton College and St. Olaf College both have turbines in the area. A second turbine has been approved for Carleton College. There has been very minimal negative public response to the building of these turbines.

The project will not generate an increase in traffic volumes or daily activity on an ongoing and regular basis. There will be an increase during project construction. However the two-blade turbine requires smaller cranes and less construction time. The turbine tower is 70 meters (229.66 feet) tall and the blade diameter is 59 meters (193.56 feet).

The following measures will be taken to ensure minimal negative impact on the area:

- Turbines will not be located on biologically sensitive areas such as wetlands. See Attachment A for a map of wetlands.
- Turbines will be illuminated to meet Federal Aviation Administration (FAA) regulations.
- All collector lines will be buried to minimize aboveground structures.

- Existing roads will be used for construction and maintenance to the extent possible.
- New access roads will be located on gentle grades to minimize visible cuts and fills.
- Temporarily disturbed areas will be converted back to cropland or otherwise reseeded to blend in with existing vegetation.

5.2.3 Public Service and Infrastructure

The proposed wind farm is expected to have minimal effects on existing public services and infrastructure. Impacts may include the following:

- A production tax on the energy produced by the turbines will generate tax revenues for the county and township.
- Short-term wear and tear on local roads will occur as a result of the transport of heavy equipment and other materials. The applicant will repair any road damage occurring during the construction of the wind farm.
- The wind farm is expected to create several new jobs in the local area.
- The project will secure service from the local telephone provider to facilitate data transmission from each tower and to allow for voice communication to and from the wind farm.

5.2.4 Cultural and Archaeological Impacts

The Minnesota Historical Society has been contacted and they indicated that there are no known archaeological sites in the proposed project area. However, if any archaeological or historic sites are discovered in the proposed area, measures will be taken to minimize the impact. All turbines will be constructed on land that has been cultivated for over 100 years, so the expectation that any cultural or archaeological site will be found is extremely low. Please see Attachment E for the response from the Minnesota Historical Society and its brief report regarding Archaeological Site Locations.

5.2.5 Recreational Resources

The wind farm will not impact recreational activities, as the turbines will be located on agricultural land. The impact to wild game should be minimal, as the turbines will be constructed in an area lacking cover to provide habitat for game animals. There are no snowmobile or bike trails in the area of the project. All lines will be buried, so there will be no impact on any roadsides or ditches used for snowmobiles or all-terrain vehicles.

5.3 Effects on Public Health & Safety

5.3.1 Air Traffic

The project is 22 miles south of the Minneapolis Saint Paul International Airport. The Owatonna Regional Airport and the Airlake Airport are within about a 35-mile radius of the project. Because the project area is surrounded by agriculture land, there could be occasional crop dusting. Crop dusting is typically done by small aircraft during the day. The Federal Communications Commission and the Federal Aviation Administration have been contacted.

All turbines will conform to FAA and FCC regulations and are not expected to create a burden for air traffic.

5.3.2 Security

The proposed wind farm is located in a rural area with large open fields. Construction and operation of the project will have minimal impact on the security and safety of the local population. Some additional risk for workers or the public will exist in the construction phase, as it would for any large construction project. However, work plans and specifications will address safety issues during the construction phase. OSHA regulations will be followed.

5.3.3 Electromagnetic Fields

Greenvale Wind Farm has contracted with Evans Associates to conduct a series of studies to ensure that the proposed wind farm will not interfere with microwave, VHF, and FAA radar. The farm will not interfere with microwave of VHF waves. We have submitted FAA form 7460-1 for all turbine locations and are awaiting approval from the FAA.

Please see Attachment F for the final report.

5.3.4 Hazardous materials

The three types of petroleum products necessary for the operation of the wind turbines are synthetic gear box oil, hydraulic fluid, and gear grease. Florescent lighting will be utilized in the O&M building. These lights contain mercury. Propane will be used for building heating. During normal turbine operation, all fluids will be contained in the nacelle of the wind turbine. Leakage from the structure is not anticipated. Fluids will be stored at the maintenance facility in compliance with state and federal guidelines. Proper maintenance procedures for handling fluid will be followed. When fluids are replaced, the waste products will be handled according to regulations and disposed of through an approved waste disposal firm. Spent fluorescent lights will be collected for proper disposal at a recycling center.

5.3.5 Traffic

During the construction phase, there will be heavier traffic than usual as the turbines are delivered, cranes arrive on site and other materials are needed to erect the turbines. Township and County officials will receive advance notice of the construction schedule including the delivery of towers and turbines and the arrival of the crane to erect the turbines. The applicant will obtain permission from land owners to drive on privately owned access roads. The trucking company selected to deliver the turbines will be responsible for all road and highway permits.

Wear and tear on the roads will occur as a result of the transport of heavy equipment and other materials. The applicants will be responsible for repair of road damage occurring during construction of the wind farm.

Once the construction is complete, it is not anticipated that traffic will increase as a result of the wind farm. Occasionally there may be school groups or environmental interest groups that will tour the farm to learn about the benefits and technology of wind energy.

5.4 Effect on Land-Based Economics

5.4.1 Land-Based Economics

The area in which the turbines would be erected consists of rural agricultural farming. It is estimated that each turbine (including access roads) will take about 1.5 acres out of farming operation, with a total farming land loss of about 16.5 acres. However it is anticipated that this project will contribute to the local economy through lease payments, production tax payments, the employment of locals for ongoing support of the turbine project and the purchase of local goods and services through the construction and operation of the wind farm. There are no old growth forests in the area of interest.

5.4.2 Tourism and community benefits

We believe that the Northfield community will benefit from the wind farm. This will be the closest wind development to the Twin Cities and we anticipate that it will generate interest, bringing visitors to the area. This has been the experience in other communities that host wind farms. Additionally the area will benefit from the Wind Production Tax.

5.5 Effects on the Natural Environment

5.5.1 Topography

The Northfield area is made up of gently rolling hills, agricultural land and wetlands from Interstate 35W to Chubb Creek. No turbines will be placed in wetlands and any potential impact to Chubb Creek will be mitigated. The applicant has contacted Dakota County and per regulation, no wind turbine will be placed within 300 feet of the normal high water mark of Chubb Creek.

The project site was selected because of open agriculture fields. The area of interest is of sufficient size to be able to select sites that will take advantage of the topography.

5.5.2 Soils

The soil in the project area consists primarily of clay-loam. The applicants will make every effort to avoid potential soil impacts.

The applicant will work with the construction company to mitigate soil erosion. Any area that is disturbed by construction will be reseeded. Very few changes will be made to the landscape and drainage patterns will not change. All access roads will be properly graded and will be class 5 gravel, a pervious material. Turbine pads will be properly graded as well. The construction site will be restored at termination of construction. Any damage to drain tiles will be repaired at applicant's expense.

5.5.3 Geologic and Groundwater Services

The proposed wind farm site is well-drained farm land. The applicant has requested maps from the county which would detail the location of tiling, but that information is not available to the public. Each land owner has been contacted to secure this information.

The wind turbine foundations and transformers cannot be completed until geo-technical core sampling has been done at each turbine site. The construction of the foundations and transformers is not expected to effect local subsurface water.

The applicant anticipates that geologic and groundwater resources will not be impacted. The bottom of the foundations will be approximately 8 feet deep (3 feet below surface and 5 feet of concrete). Soil borings are required to a 35-foot depth but are back-filled once the soil samples are collected. Water needed during construction will be limited and local supplies are adequate. No water will be needed for ongoing operations.

5.5.5 Wetlands

The applicant will not place any turbines on wetlands. See Attachment A for a map of the wetlands and turbine placement.

5.5.6 Vegetation

The proposed wind farm will be located on land that is used for agricultural row cropping. The federally threatened Prairie Bush Clover can be found in Dakota County. We have been told by the Federal Fish and Wildlife Service that the clover prefers dry prairie habitat. The sighting of the turbines will not be a problem to the Prairie Bush Clover as the turbines will be located on cultivated land. Before any trenching is done along established roadsides, the wetland and natural resources specialist from Bonestroo will walk the route to determine if any Prairie Bush Clover could possibly be threatened during construction. We will then work with the FWS to ensure that an appropriate process is followed to protect the species.

Please see Attachment G for a record of our communication with the Federal Fish and Wildlife Service. The MN Department of Natural Resources has also been contacted.

5.5.7 Wildlife

The wildlife found in the project area is typical of that found in agricultural areas throughout the state. Species found are typical of Minnesota game and non-game wildlife that are associated with roadside ditches, fencerows, wetlands, and areas of non-maintained grasses and shrubs, creeks and wetlands. The Minnesota Department of Natural Resources has notified the applicant that there are several rare and endangered mussels in Chubb Creek. The DNR has also designated the center line of the creek and notified the applicants' engineers at Bonestroo of the 300 feet setback line. The closest turbine will be 65 feet outside of the setback line.

The anticipated turbine sites and roads lack a vegetative cover for wildlife. Except for minimal impact from driveway access, it is anticipated that wind farm development will have no or minimal affect on local wildlife.

During site/microsite selection, the following measures will be taken to avoid impact on wildlife in the project area.

- Avoid disturbance of wetlands or drainage tiles during construction.
- Protect existing trees and shrubs that are important to the wildlife present in the area.
- Maintain sound water and soil conservation practices during construction and operation of the project to protect topsoil and prevent soil erosion. Practices may include containing excavated material; protecting exposed soil and stabilizing restored areas.
- The applicant anticipates that all project construction will take place on crop land. However if non-crop land is disturbed during the construction, it will be re-planted with native species.
- There are no large concentrations of migratory birds in the project site. Our site is outside migration patterns.

Birds and Bats

The applicant has contacted the MN DNR and FSW. Neither agency has indicated that the wind farm is in a migratory path. It is not near a coast line or specifically identified habitat that functions to funnel or concentrate birds or bats during migration or for feeding, breeding, wintering or roosting. Additionally, recent studies have shown that bird and bat strikes can be greatly reduced by turbine lighting. Greenvale Wind Farm is concerned about environmental hazards and will work to mitigate avian loss by siting and following best practices in lighting.

Aquatics and Mammals

Both large and small game are found in the project area. Game includes deer, rabbits and ground rodents. The project area is completely within tilled farmland, which does not act as a natural habitat for area game. Therefore, area game will not be adversely impacted. Chubb Creek is the western border of the project area. The MN DNR has notified the applicant that there are several state-recognized rare and endangered species of mussels in Chubb Creek. The applicant will adhere to the 300 foot required set back, which will protect the Creek. See Attachment A for a map of Chubb Creek and the nearest turbine location.

5.6 Rare and Unique Natural Resources

The Federal Fish and Wildlife Service has informed the applicant that there are no federally-recognized rare mussels in Chubb Creek. As per county requirements, no turbines will be placed closer than 300 feet of the high water mark of the creek. The Minnesota Department of Natural Resources has also notified the applicant that there are several state-recognized rare and endangered mussels in the creek. As stated previously, we will not impact these mussels through turbine siting. The wetlands along Chubb Creek are part of a Central Region Regionally Significant Ecological Area. The wetlands will not be disturbed through turbine placement. The Chubb Creek Wildlife Management Area is immediately north of the project boundary. The applicant will work with the DNR to meet all recommended setbacks from public lands. Please see Attachment A for a map of Chubb Creek and the required setbacks and Attachment G for a record of the communication between applicant and the Federal Fish and Wildlife Service.

6.1 Project Construction

If granted a site permit, the applicant will begin constructing eleven foundations in late October 2009 after crops are harvested. We will be excavating 8-foot deep by 40-foot diameter holes for the foundations and installing a grounding system approximately 3 feet out from that diameter. All foundations will be poured in October and all road construction and burying of all connector and feeder lines will be completed just after the first frost. We will construct Class 5 roadways for access. We will be using lighter rubber based cranes that will minimize contraction in the fields and minimize any possible damage to roadways.

Negotiations continue with Boldt Construction which has installed over 1000 turbines including 707 turbines in 2008. They are experienced, licensed and bonded. Boldt will use a main crane with 80 meters (262.5 foot) under the hook and a helper crane with 30 meters (98.4 foot) under the hook. All transformers will be on a reinforced concrete pad offset 15 feet from the center of the tower. All connector lines and feeder lines will be buried per county and Minnesota regulations.

6.2 Construction Management

Boldt Construction will assign a full time project manager to oversee the wind farm installation. The project management team will work with the project manager to ensure timely and quality work.

6.3 Civil Works

Each wind turbine will have a permanent gravel access road. No temporary roads will be needed. The roads will be approximately 14 feet wide with class 5 gravel and a fabric underlay. It is expected that the total length of the roads will not exceed two miles.

Greenvale Wind Farm will continue to work with landowners to reach agreements on exact location of turbines, access roads, and a collector system to minimize land use disruptions. The applicant plans construction from November through March while fields are not in use to further minimize land use disruption.

Pad foundations for the towers will be constructed. The pad will be 40 feet in diameter to a depth of 8 feet. A 5-foot ring of compacted re-fill will surround the base of the concrete pad.

Most of the construction will be completed when the ground is frozen to facilitate the movement of heavy cranes and other construction vehicles. Due to the smaller size of the N1000 turbine, smaller construction equipment is needed.

6.4 Commissioning

The project will be commissioned after completion of the construction and testing phases. Inspection and testing occurs for each component of the wind turbines, as well as the communication system, meteorological system, the low- and high-voltage collector system and the SCADA system. The commissioning procedures ensure that the generation units are performing to guaranteed levels and that the project meets electrical system requirements. The turbine manufacturer will provide technical engineers to assist in the commissioning process. The engineers from the turbine manufacturer will continue until the turbine is capable of continuous operation for more than 72 hours.

Section 7
Project Operations and Maintenance

7.1 Project Operations

The applicants will enter into a 10-year contractual agreement with Nordic Windpower to provide service and maintenance for the project. Upon termination of the contract, the applicant will have the right to renew. If the decision is not to renew the maintenance contract, a qualified and licensed maintenance and service operation will be hired, employing an individual trained specifically by Nordic on this type of wind turbine.

The Nordic Windpower N1000 turbine has over 10 years of operating history in Europe with a 98% reliability rating. Thus, we anticipate that the operations management company will generally be overseeing regular maintenance and service.

The applicant will be responsible for maintaining access roads, project structures, drainage systems and other facilities. A local company will be hired for this on-going work.

7.2 Maintenance Schedule

During the turbine commissioning and initial commercial operation, the project will be inspected on-site daily to see that it is operating within expected parameters. Following the "break-in" period, the turbines will be monitored by computer on a daily basis with planned service and maintenance at the following intervals:

- First year – monthly inspections
- Following years – quarterly inspections

Section 8
Costs

8.1 Costs

The project will have a nameplate capacity of 10.84 MW. This capacity is based on 11 Nordic Windpower N1000 turbines, each with 0.985 MW. The Project's final costs have not yet been determined, but the estimated installed capital cost amounts to $2,044 per KW, or $22,146,600 for a 10.84 MW project. Annual operating costs are projected to be $436,746 and debt servicing costs are estimated at $1,656,422 per year.

Project costs are preliminary pending the finalization of development, construction and other contractual arrangements. Power Purchase Agreements (PPA) are to be finalized in the fall of 2009 when 2010 rates become available.

Section 9
Schedule

9.1 Land Acquisition

The applicant is currently meeting with landowners and discussing lease options. We anticipate that we will have lease agreements signed by July 15, 2009.

9.2 Permits

The applicant will be responsible for completing all permit requirements.
We hope to obtain a site permit in Fall 2009 and construction will start almost immediately thereafter.

9.3 Equipment Procurement, Manufacture, and Delivery

The applicants are in queue for turbine manufacture. Delivery is scheduled to begin in December, with continued deliveries in January and February 2010. Through October 2009, the applicant has the ability to delay our place in queue.

9.4 Construction

All prospective turbine sites are planted in soy beans, which are harvested after the first frost. Excavation will begin immediately after harvest. Concrete pads will be poured in November, and turbine delivery is expected to begin in December. Greenvale Wind Farm is expected to be operational by March 31, 2010, so that spring planting will not be disrupted.

9.5 Financing

Each of the two LLC's in the Greenvale Wind Farm are responsible for financing pre-development, development and construction. Both LLCs are working with MinnWest Bank in developing the financing package.

Section 10

10.1 Energy Projections

All turbine efficiencies are in the range of 20% - 40%. The theoretical absolute maximum is 59%. The Nordic turbine is in the range of 32% - 33% efficient. These efficiencies are based on the calculated production levels of the Nordic N1000 turbine in our specific location. The calculations were determined by Windlogics in their wind study completed in May 2009.

Efficiency, however, is not the determining factor in calculating estimated production from a wind turbine. The power curve is the turbine's ability to produce power at any particular wind speed. Nordic's power curve is attached as Attachment H.

Windlogics performed a wind study that shows the long-term wind resources of 7.5 meters per second (24.61 feet per second) at 70 meters (229.66 feet) above ground level. These results were applied to the Nordic Windpower N1000 meter (193.57 feet) rotor power curve, showing an estimated gross energy production of 2,833 megawatt hours (MWH) per year, which corresponds to a 32% gross capacity factor. This gross capacity is the capacity at the base of the tower at the output of the transformer. The only reduction from that capacity is the line loss through the collection system and feeder lines. Those losses are currently being calculated. However the 32% figure is actually the net capacity of the turbine. The applicant considers the net capacity of the wind farm to be calculated after line losses.

Further Windlogics analysis for the specific sites chosen for the eleven turbines shows gross average energy production of 2,780,573 KWH per turbine per year or 30,586,303 KWH per year for all eleven turbines. Energy production has been calculated for each turbine based on the Windlogics Resource Assessment. Please see Attachment I.

Section 11
Decommissioning and Restoration

Each of the two LLC's will be fully responsible for decommissioning their respective turbines and associated facilities. Greenvale Wind Farm reserves the right to extend options instead of decommissioning at the end of the site permit term. These options may include applying for an extension for the permit and continuing the operation of the wind farm. At that time, the applicant may decide to upgrade existing turbines.

11.1 Anticipated Life of the Project

It is anticipated that the project will continue to operate for approximately 35 years. The Nordic N1000 turbine has more than 10 years of operating experience at 98% reliability. Because of the two-blade and teetered hub, resulting in lighter loads and a smaller gearbox, it is anticipated that the turbine could function beyond 35 years.

11.2 Decommissioning

In the event that any wind turbine has exhausted its useful life and is decommissioned, the site will be excavated back to four foot below grade as required by local zoning ordinances. An escrow account will be set up to ensure there are adequate funds to decommission the project.

11.3 Description of Decommissioning and Restoration Activities

In addition to any requirements under the site permit, each individual land lease requires proper decommissioning of turbines. Decommissioning of the site would include removal of turbines and related facilities. Removal of related facilities would include access roads, equipment, towers, buildings and transformers. Foundations will be removed to a depth of 4 feet below grade and buried back to grade. Additionally, any disturbed surface would be graded, reseeded, and restored as nearly as possible to its pre-turbine condition.

The applicant has anticipated decommissioning and restoration costs in the project's financial performance. Beginning in the 11th year of operation, an annual "set aside" of $5,000 per turbine is scheduled for each of the remaining years of operation. After 30 years of operation, this will provide for a fund of $1,800,000 (including 5% interest) to pay for the decommissioning and site restoration costs. Additionally, turbine parts will be sold for scrap to cover any additional costs.

The project will be decommissioned through a qualified contracting firm and in accordance with acceptable standards at the time of decommissioning. The project leaders will work to ensure that during project decommissioning there is minimal

impact on surrounding land and natural resources. It is anticipated that during decommissioning, the site will need to be accessed by a crane, several trucks and a crew.

Section 12

12.1 Identification of Permits

Permit	Permitting Agency	Trigger	Permit Required
Federal			
Notice of Proposed Construction or Alteration	Federal Aviation Administration	Facility Safety Lighting	Yes In Process
Determination of Hazard	Federal Aviation Administration	Turbine and facility safety lighting	Yes In Process
Clean Water Act Section 404 Permit: GP/LOP-98-MN	U.S. Army Corps of Engineers; St. Paul District Office	Discharge of dredged fill material into waters of the United States, including their adjacent wetlands	No
Exempt Wholesale Generator Status	Federal Energy Regulatory Commission	Seeking status as an exempt wholesale generator; must file with the Commission	Yes To be filed in October
Market-based Rate Authorization (Petitions for Rate Approval pursuant to Section 284.123 (b)(2) 18 C.F.R. Section 381.403)	Federal Energy Regulatory Commission	Commissioning of the wind facility	Yes To be applied for in October

State of Minnesota			
Site Permit	Minnesota Public Utilities Commission (PUC)	Construct of a Large Wind Energy Conversion System (LWECS) defined as a system capable of generating over 5MW	Yes
General NPDES Permit for Storm water Discharges Associated with Construction Activities	Minnesota Pollution Control Agency (MPCA)	Disturbance of greater than 1 acre of ground	Yes Construction firm to pull permit
Section 401 Water Quality Certification	MPCA	Impacts to waters of the US (Corps Section 404 permit)	No
Very Small Quantity Hazardous Waste Generator	MPCA	Generation of more than 100 pounds of hazardous waste each year	No
Above-ground Storage Tank (AST) Notification Form	MPCA	Any above-ground petroleum storage tank, 500 gallons or greater	No
License for Crossing Public Lands and Waters	Minnesota Department of Natural Resources (DNR)	Any construction activities that impact waterways, including Wetlands, applies to public waters that are identified on DNR public waters inventory maps	No

Wetland Conservation Act Compliance	Dakota County Soil and Water Conservation District – MN Board of Soil and Water Resources (rules)	Construction activities that impact non-state wetlands	No
Well Construction Notification	Minnesota Department of Health (MDH)	Installation of private well(s) for O & M building	No
Highway Access Permit	Minnesota Department of Transportation (DOT)	Access to State roads from wind farm facilities	No
Utility Access Permit	DOT	Utility construction impacts to state roads	Yes Turbine shipping company to pull permit
Oversize & Overweight Permit	DOT	Use of oversize vehicles	Yes Turbine shipping company to pull permit
Local			
Dakota County			
	NA		
Greenvale Township			
	Building Permit		Pending Approval of PUC Application

Section 13

13.1 Attachments

Attachment A
- Map of the Area of Interest

Attachment B
- Wind Study Executive Summary

Attachment B1
- Interannual Variation

Attachment B2
- Diuranal Variation

Attachment B3
- Wind Rose

Attachment C
- Nordic Technical Specifications

Attachment D
- Sound Map Calculator

Attachment E
- Correspondence from Minnesota Historical Society

Attachment F
- Report from Evans on FCC issues

Attachment G
- Correspondence from Richard Davis of the Federal Fish and Wildlife Service

Attachment H
- Nordic Power Curve

Attachment I
- Turbine Power Production

Attachment J
- Interconnect Map

Attachment K
- Detailed Interconnect Map

Attachment L
- Interconnect One Line Diagram