July 15, 2013

Minnesota Public Utilities Commission
c/o Dr. Burl Haar
121 7th Place East, Suite 350
St. Paul, MN 55101-2147

Re: Fulfilling Conditions to Achieve Permit Acceptance
Stoneray Wind Farm in Pipestone and Murray County, Minnesota
PUC Docket No. IP-6646/WS-13-216

Dear Dr. Haar:

Stoneray Power Partners, LLC, a wholly-owned subsidiary of EDF Renewable Energy (EDF), went before the Public Utilities Commission on July 11th to discuss the Certificate of Need and LWECS Permit submitted on behalf of the project. The permit was granted conditional acceptance, with the following items needing to be achieved for the permit to be considered complete:

i. Further information on the project decommissioning plan and costs, as outlined by DOC EFP staff.
ii. An indication that a draft ABPP (or BBCS) will be filed by the Applicant by the end of the Public Meeting comment period and prior to the Commission's decision on draft Site Permit issuance.
iii. Require the Applicant to clarify the turbine layout maps as requested by the DOC EFP.
iv. Require the Applicant to provide Map 9 on a topographic background.

Items i, iii & iv have all been satisfied. The permit and maps included with this submittal were revised to satisfy these conditions. In regards to the maps, the turbine model is now noted in the map key when any turbine layout is shown. Additionally, Map 9 now has a topographic background, as does Map 14. The decommissioning section (10.10) has been updated and goes into more detail and is greatly expanded. Item number ii is still ongoing. Stoneray Power Partners is committed to preparing a BBCS and has communicated this intent to regulatory agencies in the development of the permit application. EDF will file a BBCS prior to the end of the Public Meeting comment period.

Should further action be required to achieve Permit completion, please contact me at (612) 508-6023 or Melissa.Peterson@edf-re.com.

Sincerely,

Melissa Peterson

Melissa Peterson
Senior Development Manager, EDF

June 10, 2013

Site Permit Application for a Large Wind Energy Conversion System (LWECS)

Prepared for Stoneray Power Partners, LLC

Stoneray Wind Farm
Pipestone and Murray Counties, Minnesota
PUC Docket No. IP-6646/WS-13-216

Prepared by:

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1.0 Applicant Information

1.1 Letter of Transmittal

1.2 Applicant Name and Contact Information

Applicant:	Stoneray Power Partners, LLC (Stoneray Power Partners) (Applicant) Stoneray Power Partners, LLC is a wholly-owned subsidiary of EDF Renewable Energy (EDF) - *formerly enXco Development Corporation*
Authorized Representative:	Melissa Peterson, Senior Developer
Address:	10 Second Street NE, Suite 400 Minneapolis, MN 55413
Phone:	(612) 486-4510
Email:	Melissa.Peterson@edf-re.com
Signature:	

1.3 Signature of Application Preparer

EVS, Inc. is the lead consultant and is responsible for the preparation of this permit application. Barr Engineering is providing support with the site application process and Burns and McDonnell is the environmental consultant providing support for parts of the environmental sections of this application as well as mapping support.

Preparer of Application:	Andy Kim EVS, Inc.
Address:	10250 Valley View Road, Suite 123 Eden Prairie, MN 55344
Phone:	(952) 646-0264
Email:	akim@evs-eng.com
Signature:	

1.4 Role of the Applicant

Stoneray Power Partners is the developer and current owner of the proposed 105 Megawatt Stoneray Wind Project (Project) in southwest Minnesota.

1.5 Operator of the LWECS

Stoneray Power Partners will be the operator of the LWECS (Large Wind Energy Conversion Systems).

1.6 Names of the Permittees

Melissa Peterson of EDF is the authorized representative and should be listed on all correspondence or documents.

2.0 Certificate of Need

Stoneray Power Partners (Applicant) proposes to develop a 105 MW wind farm in southwestern Minnesota to be called the Stoneray Wind Project. A Certificate of Need (CON) is required for any new generating plant that is 50 MW or greater per Minnesota Statutes §§216B.2421 and 216B.243, subd. 2. Therefore, a CON is required for this Project.

On March 15, 2013, the Applicant filed a request for exemptions from certain data requirements in Chapter 7849 of the Minnesota Rules and a variance of the 45-day waiting period between requesting exemptions and filing a CON application. The Commission granted the exemptions and variance on April 25, 2013.

On April 26, 2013, the Applicant electronically filed the CON application and received Docket No. IP-6646/CN-13-193.

The Applicant has not yet determined who will purchase the Project's output and is actively seeking the sale of the power and/or Project to offtakers.

3.0 State Policy

State policy requires that LWECS be sited in an orderly manner that is compatible with environmental preservation, sustainable development and efficient use of resources (Minnesota Statute § 216F.03). In addition, the siting considerations in the Minnesota Power Plant Siting Act also apply to large wind energy conversion systems. See Minnesota Statute § 216E.03, subd. 7.

This Project furthers these state policies by maximizing the use of the best wind resource area in Minnesota (Buffalo Ridge) while minimizing the project footprint and avoiding residences and sensitive natural areas to the extent feasible. This Project is proposed for an area of southwestern Minnesota where residents are accustomed to wind development at a site with low population density and no nearby high-quality natural areas or other risks to residents or the environment. One year of on-site monitoring data indicate the Project is an average, low risk site for impacts to birds and bats, including current or likely future protected species.

Additionally, wind turbine models currently under consideration for the Project have higher capacity factors than were available even several years ago, thereby maximizing the use of the state's wind resource while minimizing impacts on nearby residents and on natural resources.

4.0 Project Description and Overview

4.1 Project Location

The Project is located in Pipestone and Murray Counties in southwest Minnesota around the community of Woodstock (See Appendix A – Figure 1). The majority of the Project is within Rock and Burke Townships in Pipestone County with portions of the Project in Chanarambie and Cameron Townships in Murray County. Table 1 below lists the Township, Range, and portions of the Sections included within the Project area.

Table 1: Project Location

Township	Range	Sections
107N	43	30, 31
107N	44	8, 15-29, 32-36
106N	43	5-8, 17-20, 29, 30
106N	44	1-17, 19-21, 23-26

4.2 Project Size

The Project boundary encompasses approximately 29,500 acres. However, a small fraction of the area will be utilized for Project facilities. Depending on the turbine model selected, approximately 21-36 acres of land will be converted into Project facilities. Temporary disturbances related to construction may include approximately 452-588 acres, with the total depending on the turbine model used.

The Project boundary area is larger than the area to be used because various setbacks, discussed in Section 5.1, reduce the total buildable land.

4.3 Project Rated Capacity

The name plate capacity of the Project is expected to be 100 Megawatts (MW) with 105 MW gross output. Stoneray Power Partners has not made a final selection of the wind turbine for the Project, meaning the final rated capacity may range from 100 to approximately 105 MW. The 105 MW capacity will be cited throughout the permit document as the Project capacity. The four turbine models under consideration range from 1.7 MW to 3.2 MW and include the GE 1.7-100, Vestas V110-2.0, Siemens SWT-2.3-108, and Siemens SWT-3.2-113.

4.4 Number of Turbines

The proposed 105 MW wind power plant will consist of up to 62 wind turbines. The current location of these turbines is shown in Appendix A - Figures 2-1 through 2-4: Project Area and Facilities.

4.5 Meteorological Towers

At present, there are four temporary meteorological (met) towers within the Project boundary. Met tower locations are shown in Appendix A - Figures 5: Existing Wind Turbine Locations. Once the Project has been constructed, it is likely that up to three permanent met towers will be erected within the Project area per state guidelines.

4.6 Wind Rights

Stoneray Power Partners currently has agreements with land owners for approximately 14,500 acres of private land within the Project area. Chanarambie Power Partners, an EDF Renewable Energy company, holds easements on approximately 3,500 acres of private land within the Stoneray Project area. Combined, these two groups of holdings represent about 90% of the land rights needed to support the Project. Stoneray Power Partners is currently working to finalize the remaining agreements.

4.7 Ownership Statement

Stoneray Power Partners does not have any ownership or financial interests in any other LWECS in Minnesota. However, EDF, the parent company has ownership or financial interests in the following LWECS in Minnesota:

1. Viking Wind
2. Chanarambie Wind
3. Wapsipinicon Wind
4. Fenton Wind
5. Moulton Wind
6. Lakefield Wind
7. Champepadan Wind

5.0 Project Design

5.1 General Project Description

The Project has been designed to site wind turbines and related facilities on agricultural land. Approximately 95% of the Project area is classified as agricultural[1,2]. Turbine siting, spacing, and setbacks were determined based on the established standards, guidelines, and discussions with the Commission, Minnesota Department of Natural Resources (MDNR), U.S. Fish and Wildlife Service (USFWS), and local authorities. A map showing buildable land as determined by this data was developed to minimize impacts to the environment, and is provided in Appendix A - Figures 2-1 through 2-4.

Constraints also include the following: a wind access buffer of 5 Rotor Diameters (RD) in the prevailing wind direction and 3 RD in the non-prevailing wind direction; a noise setback meeting Minnesota Noise Standards, Minnesota Rules Chapter 7030; a minimum 1,000 foot setback from homes; and 250 feet from road rights-of-way and 5x3 Rotor diameters from property over which the wind rights are not controlled.

Selection of Turbines

Final selection of a turbine model will be dependent on a variety of factors which may include pricing and availability. As these factors change on a frequent basis, four models from three manufacturers are being considered at this time. They include the GE 1.7-100, Vestas V110-2.0, and the Siemens SWT-2.3-108 and SWT-3.2-113. It is likely the final selection will be one of the aforementioned models and each model is presented in this application with its unique layout. Preliminary turbine arrays and facility plans utilizing each model are depicted in Appendix A – Figures 2-1 through 2-4. The size and power output of the four turbines covers a range of potential sizes that could be used. This has been taken into account during the turbine siting and selection process and the Applicant is confident that substituting a similar model or size turbine into one of the existing layouts will have little or no effect on the permit conditions.

5.2 Description of Project Equipment

All wind turbines under consideration are three-blade, upwind, and horizontal axis. Regardless of the turbine model selected, the hub heights range from 80 meters - 100 meters and the rotor diameters range from 90 meters – 120 meters. A smooth tubular steel tower will be used to support the nacelle and rotor. All modern turbine models also contain emergency and backup power systems to allow shutdown of the turbine should power to the grid be lost.

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[1] Pipestone County, *Pipestone County Comprehensive Plan, Dec. 2004* (Pipestone, MN) Chapter 3, Page 5.
[2] Murray County Environmental Services, *Murray County Zoning Map*, http://murray-countymn.com/mc/pdfs/MapZoningDecember2005.pdf

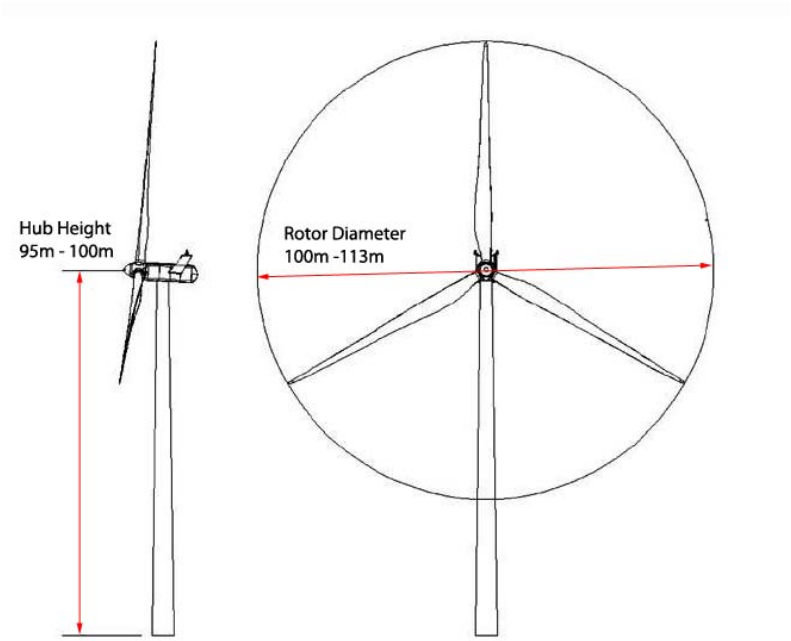

Figure 1: Hub Height and Rotor Diameter

Table 2: Turbine Characteristics

Characteristics	Turbines			
	GE 1.7-100	**Vestas V110-2.0**	**Siemens SWT-2.3-108**	**Siemens SWT-3.2-113**
Nameplate capacity	1,700 kW	2,000 kW	2,300 kW	3,200 kW
Hub height	100 m	95 m	100 m	100 m
Rotor Diameter	100 m	110 m	108 m	113 m
Rated capacity wind speed	7.5 m/s	11.5 m/s	11-12 m/s	Unavailable
Wind Swept Area	7,854 m²	9,503 m²	9,144 m²	10,000 m²
Blade length	48.7 m	54 m	53 m	55 m
Gearbox	multi-stage planetary/helical	two helical stages and one planetary stage	3-stage planetary/helical	N/A - Direct Drive

GE 1.7-100

GE claims this turbine series has the highest capacity factor in its class: 53% (1.7-100) @ 7.5 m/s. Reliability of the GE fleet is 98%+ availability with over 21,000 wind turbines installed globally. Features include standard tower corrosion protection, speed regulation through electric drive pitch control with battery backup, and an aerodynamic brake with full feathering of blade pitch.

Vestas V110-2.0

The Vestas V110-2.0 MW VCSS 60 Hz is a pitch regulated upwind turbine with active yaw and a three-blade rotor. The V110 has a rotor diameter of 110 meters with a generator rated at 2.0 MW. The turbine utilizes a microprocessor pitch control system called OptiTip® and the OptiSpeed™ (variable speed) feature. With these features, the wind turbine is able to operate the rotor at variable speeds (rpm), helping to maintain output at or near rated power.

Siemens SWT-2.3-108

The Siemens 2.3-MW family has established itself as a tried and tested workhorse for reliability, with a range of rotor diameters for different wind conditions. The new SWT-2.3-108 adds a new, larger rotor to the family. The new 108-meter rotor with its unique blade properties is perfectly optimized for sites with low wind speeds.

Siemens SWT-3.2-113

Siemens 3.0 MW family of direct drive wind turbines contains half the parts of conventional geared turbines and much less than half the number of moving parts. Eliminating the gearbox reduces complexity and increases reliability. Siemens has opted for a permanent magnet generator for improved efficiency. Unlike an electrically excited machine with a gearbox, a permanent magnet excited machine does not expend any energy on the excitation itself. The 3.0 MW family of direct drive wind turbines also have an outer rotor, where the rotor spins on the outside of the stator. This design feature allows the rotor to operate within narrower tolerances, which aids in keeping the dimensions of the nacelle compact.

5.3 Description of Project Electrical System

Stoneray Power Partners will have the electrical system designed by a professional and qualified electrical design firm. The entire electrical collection system will meet all requirements set forth by the Commission as part of the LWECS Site Permit.

At the base of each turbine, a pad mounted step-up transformer will be installed to raise the voltage to power collection line voltage of 34.5 kV. However, the Vestas V110 houses the step-up transformer in the nacelle of the turbine which will raise the voltage to 34.5 kV. Power will run through the underground collection system to the Project substation. From the Project substation, the electricity will interconnect at 34.5 kV to the 115kV Chanarambie Substation, located in Section 6 of Chanarambie Township in Murray County.

6.0 Description and Location of Associated Facilities

6.1 Transmission Lines and Project Substation

The Project substation will be the termination point for the collection system. The exact location of the Project substation has yet to be determined, but it is the Applicant's intent to construct the Project substation adjacent to the existing Chanarambie Substation, which is the point of interconnection (POI). Either above or below-ground lines will be constructed to connect the Project substation to the Chanarambie Substation. Should the Project substation not be constructed adjacent to the POI, the line will generally run parallel to public roadways or existing lines and be mounted on wood poles similar to those seen in the area.

The Project has a signed Large Generator Interconnection Agreement (LGIA) with the Midwest Independent System Operator (MISO): MISO GIA #G491. Payments for the next phase of upgrades have already commenced and upgrades are expected to be complete by December 31, 2014.

6.2 Collector Lines and Feeder Lines

Power from each turbine is stepped up to the collector system voltage of 34.5 kV through the step-up transformer. The electricity from the step-up transformers is connected through collection lines or feeder lines, which will generally be trenched underground to a depth of 36" or greater.

6.3 Associated Facilities

Turbine Access Roads

The Project includes a system of gravel access roads to allow vehicular access to the Project facilities. The estimated total length of gravel access roads is expected to be approximately 14 miles, but is dependent on the specific turbine layout. The roads will be primarily gravel with varying thickness and may contain a geofabric layer depending on specific soil conditions. The initial roads will be wide enough for construction traffic but the permanent condition will be a 16 foot wide all-weather road. Roads will have a low profile to allow cross travel by farm equipment when necessary. Stoneray Power Partners will work closely with landowners and regulatory agencies to determine the best final layout of access roads to minimize impacts to agricultural use and environmentally sensitive areas. Signage and gates will be installed as necessary to provide security for the Project and landowners. Culverts will be installed where necessary to allow the flow of stormwater without damaging the access roads.

Temporary and Permanent Meteorological Towers

At present, four temporary met towers are located within the Project boundary. One of these guyed monopole met towers is 50 meters tall, two are 60 meters tall and the fourth is 80 meters tall. The met towers contain up to six anemometers and wind direction sensors at varying levels.

Once the Project is operational, up to three permanent met towers will be installed at hub height, up to 100 meters. These towers will assist in the operations of the wind farm. The location of the permanent towers will be determined once the final layout is complete and will comply with applicable Federal Aviation Administration (FAA) guidelines[3].

Operations and Maintenance (O&M) Facility

An Operations and Maintenance (O&M) facility may be constructed within or near the Project area and will provide access and storage for Project maintenance and operations. Stoneray Power Partners, LLC is also looking at acquiring an existing structure to serve as the O&M building. If a newly constructed O&M building is needed, this facility will be permitted locally at a location to be determined. The buildings typically used for this purpose are 3,000 to 5,000 square feet and house the equipment to operate and maintain the wind farm.

6.4 Permitting of Associated Facilities

The Applicant will be responsible for undertaking all required environmental reviews and will obtain all permits and licenses required following issuance of the LWECS Site Permit. The Project will apply to Pipestone and Murray Counties for any required permits to construct utility road crossings and the O&M facility. However, a suitable existing building will be sought for the O&M facility. The Project will also obtain building permits and conditional use permits (CUPs), as required, from Pipestone and Murray Counties.

[3] Federal Aviation Administration, *Obstruction Evaluation,* https://oeaaa.faa.gov/oeaaa/external/portal.jsp

7.0 Wind Rights

The Applicant has secured about 90% of the leases and easements necessary to support the Project. Within the approximately 29,500 acre Project area, Stoneray Power Partners has secured wind rights for approximately 14,500 acres of private land at this time. Additional agreements are currently being finalized to optimize the turbine and electrical system layout. The secured agreements will ensure access to the Project area for construction and operation of the Project and will allow for 37 years of Project operation. Current participating and non-participating parcels and landowners are shown in Appendix A – Figures 11-1 through 11-4.

8.0 Environmental Impacts

This section provides a description of the environmental conditions at the Project site and evaluates the potential impacts of the proposed Project. The Project layout and design has been completed to avoid impacts to the extent feasible. To support this siting process, the following surveys and studies of the site were undertaken to minimize potential impacts:

8.1 Demographics

The Project is located in southwest Minnesota in Pipestone and Murray Counties. Both counties are lightly populated (8,725 residents in Murray County, 9,596 in Pipestone County[4]) and will likely remain lightly populated into the future[5]. The population of each county has been declining since 1960 with age cohort information indicating that roughly half of county residents are over age 45 (52.4% in Murray County, 46.9% in Pipestone County)[6]. The average family in Murray County has 2.2 residents, with 89% living in single family houses. Pipestone County has similar figures with an average household size of 2.3 individuals and 87% living in single unit-houses[7].

Unemployment numbers for the region are similar to the state average with around 5.6-6.5% of the region's workforce being unemployed[8]. The most common occupation is in the education or health/social services field (22.6% Murray County, 26.6% Pipestone County). Natural resource professions such as agriculture, forestry and mining ranks second in Murray County in terms of total employment by accounting for 14.3% of the workforce. In Pipestone County, 11.1% of employees work in the natural resource field, which is the third most common profession after manufacturing jobs (12.3%)[9].

The combined population density of the Project area and surrounding five miles is approximately 8.9 people per square mile. The population density exclusively within the Project area is approximately 8.5 people per square mile.

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[4] Minnesota State Demographic Center, *Minnesota Population Change by County 1990-2010*, http://www.demography.state.mn.us/resource.html?Id=31945
[5] Minnesota State Demographic Center, *Minnesota Population Projections for County 2015-2040,* http://www.demography.state.mn.us/projections2015-2040.htm
[6] MO Census Data Center, *Basic Five Age Cohorts Report for Minnesota,* http://www.demography.state.mn.us/resource.html?Id=31945
[7] Minnesota State Demographic Center, *Population and Household Counts from the 2010 Census*, http://www.demography.state.mn.us/CityProfiles2010/cty101yr2010.pdf and http://www.demography.state.mn.us/CityProfiles2010/cty117yr2010.pdf
[8] Minnesota Department of Employment and Economic Development, Minnesota Unemployment Statistic LAUS Data, http://www.positivelyminnesota.com/apps/lmi/laus/Results.aspx?geog=2704000101&adjusted=%200&periodtype=03&resultset=3&startyear=2004&endyear=2013 and http://www.positivelyminnesota.com/apps/lmi/laus/detail.aspx?geog=2704000117&adjust=0&graph=1
[9] US Census Bureau, *American FacfFinder* page, http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_11_5YR_DP03

Table 3: Estimated population within 5 miles of the Project area, including the Project area[10]

County	Population	Number of Homes
Murray	1054	435
Pipestone	1438	570

Table 4: Estimated population within the Project area[10]

County	Population	Number of Homes
Murray	61	21
Pipestone	331	75

Potential Impacts

The Project is likely to have little impact to the demographics of the area. Some agricultural acreage will be removed from production as a result of construction and operation of the wind farm. However, positive impacts may include an influx of spending and wages as a result of construction and long term operations and maintenance of the wind facilities. The Project will provide additional income to participating landowners and generate tax revenue.

Mitigative Measures

Any loss in agricultural production will be compensated for by the wind rights agreements. Additional mitigative measures are not necessary.

8.2 Land Use

8.2.1 Local Zoning and Comprehensive Plans

8.2.1.1 Comprehensive Plans

Pipestone and Murray Counties have each established comprehensive plans within the last decade. Both comprehensive plans address the issue of wind power development in the area. Both Counties encourage the development of wind power generating facilities, and both address many of the same concerns contained within this permit application.

8.2.1.2 Local WECS Ordinances

Pipestone and Murray Counties have specific Wind Energy Conversion System (WECS) ordinances. Both stipulate that the ordinances exist "to regulate the installation and operation of WECS within Murray

[10] Minnesota State Demographic Center, *Population and Household Counts from the 2010 Census*

[and Pipestone] County not otherwise subject to siting and oversight by the State of Minnesota"[11]. The Stoneray Wind Project is exempt from their WECS ordinances because the Project is over 25 megawatts in size.

Table 5: County Ordinance Summary

Name and Year	Area of Project	Associated Documents
Murray County Comprehensive Plan, May 2008	Southeast	Murray County Wind Energy Ordinance (2010) and Zoning Ordinance
Pipestone County Comprehensive Plan, Dec. 2004	Western three quarters	Section 5-10 of Pipestone County Zoning Ordinance

8.2.1.3 Zoning

Agriculture is the predominant zoning type found in Pipestone and Murray Counties[12, 13]. The next largest, at no more than a quarter the size of agriculture, is urban/rural municipalities and associated expansion zones. Woodstock is the only city within the Project area and it is not zoned for expansion.

Potential Impacts

The comprehensive plans and the Wind Energy Conversion System ordinances for both counties identify existing features and natural resources that are valuable to the area and are to be protected from impacts caused by development. There are no known current or future land use conflicts created by the development of the Project. The Project will not alter the land use or zoning classification.

Mitigative Measures

There are no mitigative measures proposed at this time.

8.2.2 Conservation Easements

There are several conservation programs to encourage setting aside wetland and grassland for conservation purposes or practices on private land. These programs include the Conservation Reserve Program (CRP), Reinvest in Minnesota (RIM), Wetland Reserve Program (WRP), and the Environmental Quality Incentive Program (EQIP).

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[11] Murray County, *Murray County Renewable Energy Ordinance*, http://murray-countymn.com/mc/pdfs/RenewableEnergyOrdinance.pdf and Pipestone County, *Section 5-10: Wind Energy Conversion Systems*, http://71.6.170.26/revize/pipestone/pipestone/board/departments_offices /uploads/Pipestone_County_Zoning_Ordinance_2_12_13.pdf

[12] Pipestone County, *Pipestone County Comprehensive Plan, Dec. 2004* (Pipestone, MN) Chapter 3, Page 5.

[13] Murray County Environmental Services, *Murray County Zoning Map*, http://murray-countymn.com/mc/pdfs/MapZoningDecember2005.pdf.

A search of lands enrolled in these programs within the Project area yielded a RIM conservation easement (#59-0105-01) that is located in the central part of the Project area (T107N, R44W, Section 35). Five state-managed WMAs, three RIM conservation easements, and five CREP conservation easements are located along the boundary or within one mile of the Project area (Appendix A - Figure 3).

Potential Impacts

Potential impacts could include removal of lands from conservation programs or impacts to habitat located within conservation lands.

Mitigative Measures

The Applicant has sited the turbines and facilities to minimize impacts to sensitive areas. The Applicant will work with landowners to identify and minimize impacts to conservation lands during the preparation of the final turbine layout.

8.3 Noise

A noise assessment was completed for each of the four wind turbine options to determine if all proposed turbines can operate simultaneously and still expect to comply with applicable county noise ordinances. Operational noise levels from the proposed Project were estimated using an industry-accepted, three-dimensional modeling program, Computer Aided Design for Noise Abatement (CadnaA), Version 4.1.137, published by DataKustik, Ltd., Munich, Germany.

Pipestone and Murray Counties both have Wind Energy Ordinances that refer to the Minnesota Pollution Control Agency (MPCA) administrative rules that govern noise – Minnesota Rules 7030. These rules provide noise limits applicable for various Noise Area Classifications (NAC). The NAC for the Project area will be Classification 1 due to the presence of household units. As such, the following limits contained in Table 6: Minnesota Rules 7030 are applicable.

Table 6: Minnesota Rules 7030

Noise Area Classification	Daytime*		Nighttime*	
	L_{50}	L_{10}	L_{50}	L_{10}
1	60	65	50	55

* It is assumed that these limits are in units of A-weighted decibels (dBA).

Since these turbines may operate 24 hours per day, the loudest impact of the turbines is assumed to equal the L_{50} and L_{10} sound levels for analysis purposes. The Project will be considered compliant with

the MPCA rules if all cumulative impacts are below 50 dBA, which is approximately the noise level at a typical library.[14]

8.3.1 Sound Emission Data

The model was developed considering the GE 1.7-100, Vestas V110-2.0, Siemens SWT-2.3, and Siemens SWT-3.2 wind turbines, with the nacelle mounted to the tower at a hub height of 100 meters for the GE1.7-100, Siemens SWT-2.3, and Siemens SWT-3.2 wind turbines and 95 meters for the Vestas V110 wind turbines. Hub heights and acoustical emissions were input into the model. The sound-power levels for the turbines were provided by the manufacturer. The expected worst-case sound power levels were used for each of the turbine options, and are displayed in Table 7: New Equipment Maximum Sound Power Levels.

Table 7: New Equipment Maximum Sound Power Levels

Equipment	dBA at Octave Band Frequency (Hz)									Total Sound Power Level (dBA)
	31.5	63	125	250	500	1000	2000	4000	8000	
GE 1.7-100	81.5	91.1	95.9	97.5	100.4	102.9	99.1	89.1	69.6	107.0
Vestas V110*	-	94.2	96.2	99.2	99.9	101.5	100.6	97.2	88.3	107.5
Siemens SWT-2.3	-	86.3	95.3	102.0	102.6	99.0	95.0	90.2	85.4	107.0
Siemens SWT-3.2	-	94.2	96.2	99.2	99.9	101.5	100.6	97.2	88.3	107.5

*Vestas only provided an overall sound power level of 107.5 dBA and the octave band frequencies have been assumed.

The following assumptions were made to maintain the conservativeness in the model and to estimate the worst-case, downwind-modeled sound levels:

- Attenuation was not included for sound propagation through wooded areas, existing barriers, and shielding.
- Ground absorption was assumed to be average (a value of 0.5 in the model).
- All turbines were assumed to be operating at maximum-power output (and therefore, maximum-sound levels) at all times to represent worst-case noise impacts from the wind farm as a whole.
- Turbines were assumed to generate sound at their maximum downwind sound-power level in all directions.

[14] MPCA, *A Guide to Noise Control in Minnesota: Acoustic Properties, Measurement, Analysis, Regulation,* 1999, http://www.pca.state.mn.us/index.php/view-document.html?gid=2172

8.3.2 Acoustical Modeling Results

Sound-pressure levels were predicted at all identified receivers (shown in Appendix A - Figures 13-1 through 13-4) using the manufacturer-specified sound-power levels at each frequency and the assumptions listed above. CadnaA modeling results have been demonstrated in previous studies to conservatively approximate real-life downwind-measured sound levels from a source when extraneous noises are not present.

The highest predicted sound level at any residential receiver for each wind turbine option is contained in Table 8: Noise Modeling Results at Receivers. The Vestas V110 had the highest, maximum predicted sound level of 48.4 dBA at any receiver.

Table 8: Noise Modeling Results at Receivers

Turbine Model	Maximum Modeled Sound Level at any Receiver (dBA)
GE 1.7-100	48.1
Vestas V110	48.4
Siemens SWT-2.3	46.6
Siemens SWT-3.2	47.0

The model-predicted values above represent only the noise emitted by the wind turbines and does not include any extraneous noises (traffic, insects, etc.) that could be present during physical noise measurements. Based on typical sound levels for rural areas, we have assumed an ambient level of 40 dBA during the nighttime and 55 dBA during the daytime. Using both of these values and the highest modeled sound level at any receiver (48.4 dBA) to calculate overall sound levels, the maximum sound level at night is estimated to be 49.0 dBA and 55.9 dBA during the day. Since the Project was modeled with all sources operating at maximum power output simultaneously in a downwind direction, in real-world situations, it is therefore expected that there would be no exceedances of the MPCA rules at any of the residential receivers for any of the wind turbine options.

To demonstrate the results graphically, Appendix A - Figures 13-1 through 13-4 show the predicted sound-pressure level contours in 5-dB increments for all wind turbines operating concurrently, for each turbine option. As shown in the figures, the 50 dBA contour is not expected to encroach on any residence for any turbine option.

8.3.3 Model Used to Determine Noise Levels

Sound levels were predicted using industry-accepted sound-modeling software. The program used to model the Project was the Computer Aided Design for Noise Abatement (CadnaA), Version 4.1.137, published by DataKustik, Ltd., Munich, Germany. The CadnaA program is a scaled, three-dimensional program that takes into account air absorption, terrain, ground absorption, and ground reflection for each piece of noise-emitting equipment and predicts downwind sound-pressure levels. The model

calculates sound propagation based on International Organization for Standardization (ISO) 9613-2:1996, General Method of Calculation. ISO 9613, and therefore CadnaA, assesses the sound pressure levels based on the octave-band center frequencies. If compliance with the regulations is anticipated during times in which all turbines are operating simultaneously, any combination of the turbines operating should also expect to be within the regulations.

8.4 Visual Impacts

8.4.1 Public and Private Resources

The Project area is visually dominated by agricultural production: farm fields, farmsteads, and large, open vistas. The area can be classified as rural open space with a gently rolling topography. Local vegetation in the area is predominantly agricultural including pasture, grains, and forage crops creating a low uniform cover. Farmsteads often are surrounded by a mix of trees planted as windbreaks.

Most structures in Pipestone and Murray Counties are residences or farm buildings. A number of the farm structures date back to the late nineteenth or early twentieth century and are representative of that era of Minnesota farm architecture.

There are already several wind projects in the area. The Project will be located adjacent to the west side of the Chanarambie Wind Farm. The local roads will be the main vantage points for the wind project. Most of the roads in the Project area are two lane roads that exemplify the remote and rural character of the site. Traffic on these roads is almost exclusively local. At some of the higher elevations along the roadways, where there are expansive views, portions of the Project will be visible from a greater distance.

Potential Impacts

The placement of up to 62 additional turbines in the Project area may have some impact on the area's visual aesthetic. Because there are already turbines in the area, the installation of the additional wind turbines will have a lesser impact on the visual landscape.

Mitigative Measures

The following are proposed mitigative measures:

- Wind turbines and turbine access roads will avoid Nature Conservancy Land, State Wildlife Management Areas, or Scientific and Natural Areas and are not expected to be in native prairies.
- Turbines will avoid biologically sensitive areas such as wetlands or remnant prairies.
- Existing roads will be used for construction and maintenance where possible. Road construction will be minimized.
- Access roads created for the wind power plant will be located on gentle grades to minimize visible cuts and fills.
- Temporarily disturbed areas will be reseeded with native vegetation to blend in with existing vegetation.

8.4.2 Shadow Flicker

Burns & McDonnell performed a worst-case analysis of shadow flicker for the proposed Stoneray Wind Project. Shadow flicker occurs when moving wind turbine blades cast shadows upon stationary objects, such as occupied residences. Such shadows occur only under very specific conditions, including sun position, wind direction, time of day, and other similar factors.

The analysis was modeled utilizing WindPRO, an industry-leading software for the design and planning of wind energy projects. The following is a brief summary of the assumptions and inputs utilized in the shadow flicker analysis:

- **Turbine Layout**
  All four models of turbines that could potentially be used, each with different coordinates, were modeled at the Project site. The coordinates and number of turbine locations were furnished by the Applicant and are included in Appendices C-8.1 through C-8.4. Appendix A – Figures 2-1 through 2-4 show a map of the turbine locations. Three models of turbines were simulated with a hub height of 100 m while the Vestas V110-2.0 MW turbine was modeled with a hub height of 95 m.
- **Residences**
  A quantity of 139 residences was modeled at the Project site, using the coordinates furnished by EDF as provided in Appendices C-8.1 through C-8.4. Each receptor was modeled as a "greenhouse," which is a worst-case approach where every home is modeled as having windows on all sides.
- **Terrain**
  The terrain data were provided by EDF using privately flown data from 2011 composed by Westwood Engineering.
- **Flicker Relevance**
  A conservative distance of 2,000 meters was estimated as the maximum distance at which flicker was considered relevant (i.e., shadows cast beyond this distance were considered immaterial). Similarly, a value of three (3) degrees was utilized for the height below which the sun would not cause noticeable flicker (due to atmospheric diffusion, low radiation, sheltering, etc.).

Potential Impacts

Using the aforementioned assumptions and inputs, WindPRO was used to calculate how often and during what periods each receptor would be affected by shadows generated by one or more wind turbines. To produce a conservative output, the model was run under a worst-case scenario, including the following:

- The sun was assumed to always be shining from sunrise to sunset (i.e., no cloud cover, no rainy days, etc. that would reduce flicker effects);

- The turbines were assumed to always be operating (i.e., constantly spinning, and no downtime due to very low or very high wind speeds);
- The turbine rotors were assumed to always be perpendicular to the individual homes.

The results of the worst-case flicker analysis are included in Table 2 of each respective turbine model shadow flicker summary in Appendices C-8.1 through C-8.4. The results are also depicted in Appendix A – Figures 14-1 through 14-4. The following is a brief table summary of the results from the worst-case flicker analysis for each turbine model:

Table 9: Number of residences that experienced worst-case flicker over the course of a year for each turbine model

Shadow Flicker Exposure	Turbine Models			
	GE 1.7-100	V110-2.0	SWT-2.3-108	SWT-3.2-113
Under 10 minutes	43	53	52	59
Between 10 minutes and 25 total hours	58	52	54	53
25-50 total hours	20	13	17	13
50-100 total hours	13	14	11	12
More than 100 total hours	5	7	5	2

Mitigative Measures

The Applicant has made efforts to minimize shadow flicker by careful siting and utilizing setback distances from residences.

8.5 Public Services and Infrastructure

Public services and infrastructure in the area of the proposed development are typical for lightly populated rural areas of southwestern Minnesota. The proposed wind power plant is expected to have minimal effects on the existing public service and infrastructure.

8.5.1 Roads

Resource

There are two primary traffic routes through the Project area: Minnesota State Highway 30 is a two-lane paved highway running east/west and Pipestone County Highway 18 is a two lane paved highway running north/south. Murray County Highway 25 is a two-lane paved highway running north/south on the east border of the Project. Minor roads in the area include other county and township roads ranging from two-lane paved to gravel and unpaved minimum-maintenance roads.

Potential Impacts

Construction of the wind turbines will require modification to existing roads as well as construction of new access roads. Modifications include widening and improving the surface, improving durability, and installing drainage features. Impacts to local roads will be primarily during construction of new or

modified roads and during the wind turbine construction process when roads will be experiencing wear and tear from construction vehicles.

Mitigative Measures

Impacts to existing roads will be mitigated by a contractor-prepared transportation haul plan. Any impacts to the roads will therefore be documented and will be repaired as agreed upon with the local authorities. All construction, operation, and maintenance of the Project will be in accordance with associated federal, state, and local permits, as well as industry construction and operation standards.

8.5.2 Telecommunications

Resource

Pipestone County receives non-cellular telecommunications service from Frontier Communications, Knology Inc., Interstate Telecommunications, Media Comm, Qwest, MCI, and Woodstock Telephone. In Murray County, telecommunication providers include CenturyTel, Knology Inc., Frontier Communications, Media Comm, Qwest, and Woodstock Telephone.

Potential Impacts

Through careful siting of the turbines and associated facilities, impacts to telephone service are not anticipated.

Mitigative Measures

The need for mitigative measures is not expected.

8.5.3 Communications Systems

Resources:

a) **Cellular Towers:** There are cellular towers of varying heights located around the population centers of Pipestone and Murray Counties. However, based on the RF Impact Report conducted in 2011 by Evans Engineering, no cell towers are located in the Project area. Please see Appendix C-2 for a full copy of the report.

   Potential Impacts: The cellular towers identified were not within the Project site. Generally, construction, operation, and maintenance of the Project will not impact the cellular towers.

b) **Microwave Towers:** Research indicates one microwave tower is within the Project area near Woodstock. Five other towers are within 5 miles of the Project boundary.

   Potential Impacts: The microwave path interference report prepared by Evans Engineering shows microwave beam paths (Appendix A - Figure 12). Based on information provided in this study, none of the proposed turbine sites would interfere with microwave communications.

During final micrositing, turbines will be placed to avoid interference between the microwave towers.

c) **Radio:** Four land mobile stations are in the Project area. Additionally, seven stations can be found within 2 miles of the Project border. Fifteen full service FM stations broadcast to the Project area.

Potential Impacts: Impacts can be avoided by siting turbines away from radio broadcast sites. Very minimal disruption is expected to full service FM and AM station receivers.

d) **Radar:** There is one FAA radar site located approximately 6 miles north of the Project site, in Ruthton. Approximately 7 miles west of the Project site, radar towers are located at the Pipestone Municipal Airport. In Murray County, the only radar towers are located at the Slayton Municipal Airport which is approximately 8 miles east of the Project site.

Potential Impacts: A preliminary screening through a web tool jointly operated by the Department of Defense and Homeland Security revealed the Project may impact radar. The Department of Defense will formally commence a study following the filing of FAA 7460-1.

Mitigative Measures

Stoneray Power Partners will work with the respective agency responsible for each communication system to evaluate and site the turbines to minimize impacts.

8.5.4 Television

Resource

Television is available to the Project area through digitally broadcast signals and satellite signals.

Potential Impacts

Current satellite and cable subscribers should not be impacted. Rotating turbine blades have the potential to disrupt television signals broadcast to antennas.

Mitigative Measures

Stoneray Power Partners will evaluate and site the turbines to minimize impacts to television reception.

8.6 Cultural and Archeological Resources

8.6.1 Description of Resources

A comprehensive literature and archive review has been completed by EVS for the Stoneray Project. Sources consulted include the Minnesota State Historic Preservation Office (SHPO) located in St. Paul, Minnesota, as well as various private databases and online sources. A windshield survey of the potential

cultural resources was undertaken on September 22, 2011. An additional literature search was conducted on an expanded Project area in March of 2013. Both reports can be found in Appendix C-14.

Based on the literature reviews, it was determined that five archaeological sites and five historical sites fall within the Project area or immediately adjacent to it. These ten sites are provided below in Tables 10 and 11. An additional 12 archaeological sites and seven historical sites are within one mile of the Project borders. While much of the Project area has been disturbed by various uses through time, there remains a potential that artifacts might surface over time. There is also the possibility that some sites may hold intact deposits below the level of agricultural disturbance.

Table 10: Archaeological Sites within the Project boundary

County	Site #	Site Name	Site Type	Twp	Rng	Sec	NRHP Eligibility
Murray	21MU0068	Wind Turbine Loc 9	Single Artifact	107	43	31	Not evaluated
Murray	21MU0062	Unnamed	Single Artifact	106	43	5	Not evaluated
Pipestone	21PP0024	Pastures Edge	Lithic Scatter	107	44	32	Not evaluated
Pipestone	21PP0016	Faber II	Lithic Scatter	106	44	7	Not evaluated
Pipestone	21PP0019	Strayed Off	Lithic Scatter	106	44	20	Not evaluated

Table 11: Historic Facilities within the Project boundary

County	Site #	Site Name	Twp	Rng	Sec	NRHP Eligibility
Murray	MU-CHR-001	Buffalo Ridge, recognized by Minnesota statute	106	43	8, 17	Not evaluated
Pipestone	PP-RCK-001	Bridge No. L3558	107	44	27	Not evaluated
Pipestone	PP-WDC-001	Commercial district	106	44	2	Not evaluated
Pipestone	PP-BUR-002	Bridge No. 5189	106	44	17	Not evaluated
Pipestone	PP-BUR-004	Abandoned railway segment (Chicago and Northwestern)	106	44	8	Not evaluated

8.6.2 Potential Impacts and Mitigative Measures

Potential impacts to known historical and archaeological sites are minimal if these sites are avoided in Project construction planning. Potential impacts to unrecorded sites are possible, but may be minimized through evaluations before construction begins and after construction layouts have been defined. Should any additional sites be found, they will likely be similar in type and size with those previously identified.

EVS submitted a Phase IA Literature Search Report (Appendix C-14) on December 12, 2011 and received a comment letter dated February 9, 2012 from MN SHPO concurring with EVS' findings and recommendation to proceed with a Phase I Archaeological Survey. The Project has been given SHPO

#2012-0875. After potential Project boundaries were expanded in March of 2013, a supplemental Phase IA Literature Search Report was completed and submitted to SHPO for review. The original and supplemental reports recommended field survey in areas where Project activities could potentially affect as yet unrecorded resources. Stoneray Power Partners plans to proceed with the surveys as recommended. Impacts to any newly identified sites may be averted through a strategy of avoidance during the development of construction plans.

8.7 Recreation

Description of Resources

According to the Minnesota Department of Natural Resources[15], Pipestone and Murray Counties offer the following recreational opportunities: hiking, biking, boating, fishing, hunting, camping, snowmobiling, cross country skiing, horseback riding, and nature viewing.

Various public recreational areas are located within 10 miles of the proposed Project area including Wildlife Management Areas (WMAs), Walk-In Access sites (WIAs) and the Casey Jones Trail. The majority are located 5-10 miles to the north, northeast or southeast of the Project[16].

WMAs are State owned lands that are open to hunting a variety of species including upland game, large and small game, waterfowl, and turkeys[17]. No WMAs are within the Project boundary (Appendix A – Figure 3). Approximately 30 WMAs are located with 10 miles of the Project area.

Walk-In Access sites (WIA) are private lands that allow public hunting, and are typically open to the public from September 1st through the end of May[18]. Pipestone WIA # 10 falls within the Project area with another 11 WIAs being found within 10 miles of the Project boundary.

Other notable sites within 10 miles of the Project area include: Pipestone National Monument[19] north of Pipestone (5.5 miles west) and Prairie Coteau Scientific & Natural Area (1.5 miles north). The city of Pipestone has multiple public parks located within the city limits, which are within 10 miles of the Project boundary. Pipestone Country Club is a semi-private nine-hole golf course approximately 4.6 miles west of the Project site. Boat launches and public water access can be found on lakes within 10 miles to the north, northeast and east of the Project area. These lakes include East and West Twin Lake, North Marsh, Current Lake, Klinker's Marsh, and Lake Wilson.

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[15] Minnesota Department of Natural Resources, *Recreation Compass,* http://www.dnr.state.mn.us/maps/compass.html, accessed March 2013
[16] Minnesota Department of Natural Resources, *Public Recreation Information Maps*, http://www.dnr.state.mn.us/maps/compass.html accessed March 13, 2013
[17] Minnesota Department of Natural Resources, *More about wildlife management areas,* http://www.dnr.state.mn.us/wmas/description.html.
[18] Minnesota Department of Natural Resources, *Walk-In Access (WIA) Program,* http://www.dnr.state.mn.us/walkin/index.html.
[19] National Park Service, *Pipestone National Monument*, http://www.nps.gov/pipe/index.htm, accessed March 2013.

Potential Impacts

The Project has been sited to avoid direct impacts to recreational resources.

Mitigative Measures

Turbines will not be located on public lands that are currently used for a specific recreational purpose. Additionally, the Project will be sited following MDNR recommendations for setbacks from recreational lands and/or nonparticipating landowners.

8.8 Public Health and Safety

8.8.1 Electric and Magnetic Fields (EMF)

Electric and magnetic fields are a natural force produced by electricity, and are often grouped together and referred to as an electromagnetic field. In the context of electrical generation, the frequency is low enough that the electric and magnetic field exist separately[20]. Both types of fields dissipate quickly as one moves away from the source, particularly electric fields which can be shielded by clothing or skin. Magnetic fields have received more attention from the health community because they can pass through objects.

Numerous studies and panels have investigated potential health effects of electric and magnetic fields, and generally have found little to no correlation between EMFs and health issues. A Minnesota interagency white paper put out in September 2002 reached this same conclusion and said, "The current body of evidence is insufficient to establish a cause and effect relationship between EMF and adverse health effects[21]." Similarly at the national level, a study conducted by the National Institute of Environmental Health Sciences and the Department of Energy found that the "overall scientific evidence for human health risk from EMF exposure is weak"[22].

Impacts

No health impacts are expected.

Mitigation

Due to the low risk of health impacts, mitigation measures are not expected.

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[20] Xcel Energy, Electric and Magnetic Fields (EMF): The Basics, 2007, http://www.xcelenergy.com/staticfiles/xe/Regulatory/Transmission/Electric_Magnetic_Fields(EMF)The%20Basics.pdf, accessed March 16, 2013.
[21] The Minnesota State Interagency Working Group on EMF Issues, A White Paper on Electric and Magnetic Field (EMF) Policy and Mitigation Options, September 2002, https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId=%7B474587DD-E5C5-4A6E-95BC-7BC805CE4975%7D&documentTitle=20101-45731-07, accessed March 16, 2013
[22] National Institute of Environmental Health Science, *EMF Electric and Magnetic Fields Associated with the Use of Electric Power*, June 2002, http://www.niehs.nih.gov/health/assets/docs_p_z/results_of_emf_research_emf_questions_answers_booklet.pdf, accessed March 16, 2013.

8.8.2 Aviation

The FAA[23] indicates that the Airports nearest the Project are:

- Pipestone Municipal Airport, Pipestone, MN – 5.75 miles west
- Slayton Municipal Airport, Murray County – 8 miles east

Additional research revealed three other small airports within 10 miles of the Project:

- Perkin's Lazy Meadows Airport, Pipestone, MN, 6.25 miles west
- DairyView Airport, Hadley, MN – 6.5 miles east
- Dykstra Acreage Airport, Trosky, MN - 8.5 miles southwest

These airports are not located within the proposed Project area. The wind turbines will be the tallest structures of the proposed project and will exceed 200 feet. Therefore, notification will be made to the FAA and requirements imposed by the FAA will be followed.

In agricultural areas such as this, crop dusting is used to spray a variety of treatment chemicals over large crop areas. Crop dusting is performed by either small maneuverable aircraft or helicopters flying low over the ground.

Potential Impacts

The air traffic generated by the airports listed above will not be impacted by the Project.

Mitigative Measures

There are no mitigative measures proposed at this time. However, Stoneray Power Partners will follow FAA guidelines for marking towers and implement the necessary safety lighting. Notification of construction and operation of the wind power plant will be sent to the FAA and steps will be taken to ensure compliance with FAA requirements.

8.9 Hazardous Materials

Description of Resources

EVS performed a Phase I ESA field inspection on September 22-23, 2011. A supplementary desktop review was performed on the expanded Project area in March and June 2013. The field reconnaissance revealed no Recognized Environmental Conditions (REC) or issues of environmental concern. Therefore, it is not expected that hazardous materials will be encountered in the site development, but unexpected hazards may still exist.

The initial Phase I ESA discovered three former dump sites known to the Minnesota Pollution Control Agency, which are closed. The supplementary review revealed an additional two former dump sites near

[23] Federal Aviation Administration, *Obstruction Evaluation/Airport Airspace Analysis (OE/AAA)*, https://oeaaa.faa.gov/oeaaa/external/portal.jsp, accessed March 2013

the expanded Project area. A "Clandestine Drug Laboratory" was discovered in the northeast section of the Project area and is considered closed.

Potential hazards, which are not unique to the Project, include:

- Radon, a common radioactive gas found underground throughout much of Minnesota. The southern half of Minnesota, including the Project area, is located in the highest risk category according to the EPA[24]. Typically radon is only a hazard in confined underground spaces.
- Concentrated Animal Feeding Operations (CAFOs), which can also be called "feedlots", are located throughout the Project area and contain pools of animal wastes.
- The farmsteads likely use fertilizers and pesticides that are potentially harmful substances. Many farms have fuel tanks, which contain hazardous substances.

Potential Impacts

Oil and gas products will be utilized during construction and operations of the wind farm. No impacts to the public are anticipated.

Mitigative Measures

Proper storage and handling of oil products should be maintained at all times. Should any indication of hazardous materials be encountered during construction, the contractor will immediately notify Stoneray Power Partners. Additionally the contractor will have hazardous response action plans in place prior to construction. Known areas of contamination, such as the dump sites, should be avoided.

8.10 Land-based Economies

Description of Resources

Farming is the primary economic activity within the Project area. Corn and soybeans are the primary crops, although oats, flax, wheat and hay are also grown. The main livestock are beef cattle and hogs with dairying and sheep also being important livestock. Within the Buffalo Ridge area, the trend is toward fewer and larger farms.

Other sources of income through farmland include The Conservation Reserve Program (CRP) and Reinvest in Minnesota (RIM) Program. Through these programs, farmland is diverted from growing crops and is instead planted with grasses and legumes for conservation purposes.

Mining activities in southwestern Minnesota include the mining of sand and gravel from unconsolidated surficial deposits, building stone from quartzite rock units, and scattered clay/shale deposits for brick making. Small gravel pits occur at greater frequency in the northern half of the Project site.

[24] Environmental Protection Agency, *EPA Map of Radon Zones*, http://www.epa.gov/radon/zonemap.html, accessed March 2013.

Potential Impacts

Construction, operation, and maintenance of the Project will not significantly impact existing land uses. Approximately 21-36 acres of land that was previously available will be converted into wind turbine pad sites or associated facilities. Agricultural planting and livestock grazing can continue between the wind turbines.

Mitigative Measures

Wind turbine sites will be selected to avoid prime farmland to the extent possible. It is unlikely that turbines will be placed in CRP or RIM lands. Micrositing efforts will include discussions with land owners to identify features which should be avoided. Owners of farmland that is removed from production will be compensated by land lease payments.

8.11 Tourism

Description of Resources

Tourism in Pipestone and Murray Counties is centered on their natural resources, history, and access to natural resources such as lakes, rivers, and public lands. Destinations include the Pipestone National Monument, visiting the lakes in Murray County, Slayton Country Club, Murray County Speedway in Slayton, Murray County Historical Museum in Slayton, and the End-o-Line Railway Park & Museum in Currie, MN. Other recreational activities include birding, visiting state parks, hiking, fishing, snowmobiling, and golf.

Potential Impacts

Construction, operation, and maintenance of the Project are not expected to negatively impact the tourism industry in the area.

Mitigation Measures

No mitigation measures are required.

8.12 Local Economies

Description of Resources

The local economy in the area of the Project is primarily a land based economy (see 8.10). The cities near the Project site each have some commercial and industrial businesses.

Potential Impacts

Potential impacts to the local economy resulting from the construction, operation, and maintenance of the Project are positive. Other wind projects of similar size have created 150-200 temporary construction jobs and 5-15 full time operations and maintenance jobs.

Land owners, whose land is utilized for construction or placement of the facility, will receive compensation for loss of crops and/or lease payments.

The Project will pay an energy production tax to the Counties based on the energy produced, which is projected to result in an estimated annual payment of $427,000.

Mitigative Measures

No negative impacts to the local economy are identified. As such, no mitigative measures will be taken.

8.13 Topography

Description of Resources

In a general sense, the Project area is undulating with gradual changes in elevation. Prior to agriculture, much of the Project area was prairie land[25], specifically the Coteau Moraine and Inner Coteau types of the North Central Glaciated Plains. Typical elevation of the Project area ranges from 1,750 to 1,800 feet. The highest elevations are in the northeast and east, generally decreasing in elevation to the southwest, where the lowest elevation is approximately 1700 feet above sea level[26]. Branches of the Rock River run through the west side of the Project area and predictably lead to some of the steepest changes in elevation. The Project is also on the divide between the Missouri and Mississippi river watersheds, indicating the Project area is on some of the highest ground in the area.

Figure 2: Typical Site Topography

Potential Impacts and Mitigative Measures

The Project is unlikely to alter the topography of the area.

8.14 Soils

Description of Resources

Most of the soils in the Project area consist of glacial till deposited from the late Wisconsin and Holocene periods. Silty clay loams of the Kranzburg-Vienna or Estelline-Lamore soil associations

[25] Hudak, J. G., E. Hobbs, A. Brooks, C. A. Sersland, and C. Phillips (editors). 2002. *Mn/Model: A Predictive Model of Precontact Archaeological Site Location for the State of Minnesota Final Report 2002*. Accessed October 2011.
[26] USGS, *7.5 Minute Topographic Maps*

predominate to the west, northwest, north and southeast of Woodstock[27]. The soils directly to the east of Woodstock tend to be loams or clay loams of the Barnes-Buse complex[28]. Sand and gravel deposits are common, especially in the northwest and west portions of the Project area. See Appendix A – Figure 10 for a soils map.

Potential Impacts

Construction activities associated with the Project may increase the potential for soil erosion.

Mitigative Measures

Care will be taken in the planning and design of the wind power plant so as to minimize erosion, especially during the construction phase of the Project. Erosion control features will be used and may include silt fence, slope stabilization matting, temporary seeding, and rip rap installation.

8.15 Geologic and Groundwater Resources

Description of Resources

The Project site is primarily anchored by a Sioux Quartzite bedrock[29] (Paleoproterozoic rock), which consists of mudstone and a conglomerate of local fluvial and marine origin. The far southern and southwest edges of the Project area are underlain by an "undifferentiated" conglomerate from the Cretaceous period of the Mesozoic. The depth to bedrock throughout the Project site varies from as little as 50 feet to nearly 500 feet, with the bedrock in the northern half of the Project tending to be closer to the surface[30]. Located between the bedrock and surface is a predominantly undifferentiated mix of Quaternary deposits including alluvium and glacial drift. On the east and northeast portions of the Project area, much of the sediment is till from the Bemis Moraine of the Pleistocene era[31]. The bulk of the Project area is covered by till from the Verdi Ice Position, which is believed to be a few thousand years older than the Bemis Moraine.

Groundwater

Wells are most often drilled in areas of high sand content that fall throughout the Project area. Aquifers can be confined or unconfined, with the water generally being hard and mineralized, especially in confined aquifers. Recharging of the shallow water table is primarily accomplished by precipitation. Rain

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[27] Hokanson, H. L., 1976. *Soil Survey of Pipestone County, Minnesota*. United State Department of Agriculture, Soil Conservation Service.
[28] Nelson, G.D., 1990. *Soil Survey of Murray County, Minnesota*. United State Department of Agriculture, Soil Conservation Service.
[29] S-21 Geologic Map of Minnesota-Bedrock Geology, http://purl.umn.edu/101466
[30] Preliminary Bedrock Geologic Map of Minnesota, depth to bedrock, PL14, http://purl.umn.edu/98043, and http://reflections.mndigital.org/cdm/singleitem/collection/mgs/id/902/rec/39
[31] Patterson C.J., 1995, *Regional Hydrogeologic Assessment Series RHA-2, Part A*. Quaternary Geology - Southwestern Minnesota. Plate 1, Surficial Geologic Map. St. Paul: University of Minnesota.

water infiltrates the water table within 50 feet of the surface in a matter of years, although it can take upwards of 40 years to recharge ground water found over 150 feet below the surface. As mentioned previously, the Project area sits on the divide between the Missouri and Upper Mississippi watersheds.

Potential Impacts

The Project will have minimal to no impact on the geologic resources, with large excavations being limited to the turbine pads and the few other support buildings. Groundwater resources should not be impacted.

Mitigative Measures

No mitigative measures are anticipated.

8.16 Surface Water and Floodplain Resources

Description of Resources

The Project area has numerous watercourses in the Project area, most notably Rock River, East Branch Rock River, and North Branch Chanarambie Creek (shown in Appendix A – Figure 8). Watercourses generally flow north to south. MDNR data indicates that approximately 96 linear miles of intermittent streams and 13 linear miles of perennial streams occur within the Project area. Additionally, approximately three linear miles of other types of streams (categorized as connectors to lakes and wetlands) are within the Project area. Many of the identified wetlands are associated with these streams and/or their associated floodplains. Numerous farm ponds also occur, although there are no relatively large water bodies (lake, reservoir, etc.) within close proximity. The closest large water bodies appear to be Lake Wilson, approximately four miles east of the Project area, and Current Lake, approximately nine miles northeast of the Project area.

Currently, there are no MDNR designated Wildlife Lakes within the Project area.

FEMA 100-year Flood Maps

Relevant maps for Murray County include FEMA Panel Nos. 270645-0175A and 270645-0325A[32]. 0175A does not have any areas with flooding concern, while 0325A shows a small area along the North Branch of Chanarambie Creek that may flood.

[32] Federal Emergency Management Agency (FEMA), *Flood Insurance Rate Map (FIRM)*, Murray County, Minnesota. Community Panel Number 270645 0175 A and 270645 0325 A. Effective Date May 3, 1990.

The Pipestone County section of the Project contains a larger area of potential 100 year floodplains. The East Branch Rock River, as well as the Rock River, flow through the west side of the Project area and are potential flood zones. These areas are shown on FEMA FIRM Map 270627-0100B[33].

Potential Impacts

Siting of turbines or constructing access roads in or near floodplains should not have a significant negative effect on the overall drainage of the area so long as the correct size of culvert is installed.

Mitigative Measures

Turbines and associated facilities will be sited to mitigate potential impacts. During construction, crews will avoid or minimize land disturbance along waterways. Best management practices (BMPs) will be implemented as part of the Storm Water Pollution Prevention Plan (SWPPP) and will be used to mitigate the risk of erosion and sedimentation in nearby waterways. Applicable permits and regulations will be observed to mitigate impacts. Additionally, existing roadways will be utilized when possible, and any new roads in floodplains will be constructed at grade level.

8.17 Wetlands

Description of Resources

A desktop wetlands assessment and regulatory review (Appendix C-13) for the 29,500 acre Project area was performed using publicly available data to identify potential wetland areas. The desktop analysis was conducted with the goal of aiding in the siting process and to avoid likely wetlands or other waters of the U.S.

Following review of National Wetland Inventory (NWI) data, Minnesota Public Wetland Inventory (PWI) data, and Reinvest in Minnesota (RIM) data, an analysis of wetland inventories revealed the potential presence of approximately 765 acres of wetlands within the Project area. A breakdown by wetland type is provided below in Table 12: Wetland Acreage Estimates. Please note that the NLCD, marsh, calcareous fen, and wet meadow acreages overlap with the rest of the wetland acreages and therefore result in an inflated overall total. A map of wetland areas is available in Appendix A – Figures 7.1 through 7.4.

Based on MDNR data, three types of rare wetland-related features, marsh, calcareous fen, and wet meadows, have been recorded in the Project area totaling 44 acres. A marsh is a type of emergent wetland that is frequently or continually inundated with water. Calcareous fens are a type of wetland fed by groundwater that supports a unique plant community and are considered to be exceptionally rare in regard to both occurrence and the abundance of vegetation communities (often sensitive and protected species) that they support. Wet meadows are a type of wetland that occurs in poorly drained,

[33] Federal Emergency Management Agency (FEMA), *Flood Insurance Rate Map (FIRM)*, Pipestone County, Minnesota. Community Panel Number 270627 0100 B, and 270627 0150 B. Effective Date July 3, 1986. https://msc.fema.gov/webapp/wcs/stores/servlet/CategoryDisplay

often low lying areas that are saturated at the surface, but without standing water except for brief periods during the growing season.

Table 12: Wetland Acreage Estimates

Wetlands Estimates from databases	Acreage
Palustrine Emergent Wetland (PEM)	657
Palustrine Forested/Shrub Wetland (PSS)	7
Palustrine Pond (PUB)	23
Riverine Wetland (R)	1
PWI Wetland	63
RIM Wetland Areas	14
NLCD Wetland	62*
Calcareous Fen	3*
Wet Meadow	37*
Marsh	5*
* These land cover types overlap with the national and statewide wetland inventories.	

Potential Impacts

Turbine access roads and pad development have the potential to impact wetland areas if sited in the vicinity of wetlands. In addition, underground electrical collection lines have the potential to temporarily impact wetlands as well. To the extent practicable, all Project facilities will be sited in an effort to avoid impacts to wetlands and other waters of the U.S.

Mitigative Measures

A formal, on-site delineation of the proposed Project footprint will be conducted to verify the desktop study and identify any additional wetland areas. Design efforts will be made to first avoid, then minimize potential impacts to wetlands or other waters of the U.S. As turbines are typically located on upland ridges to maximize wind capacity factors, wetland impacts due to wind farm construction are typically minimal. For any unavoidable impacts to jurisdictional wetlands or other waters of the U.S., the Project team will work with the various permitting authorities to obtain the necessary permits and clearances.

8.18 Vegetation

Description of Resources

The vegetated portion of the Project site is primarily cultivated land (76%) that is used to grow row crops such as corn, soybeans, and wheat. Grasslands make up much of the remaining land area, with

approximately 19% being used for pasture. Grasses and herbaceous species are often found directly along the road ways as well. Prior to settlement, the area was predominantly prairie with remnant patches of the prairie remaining. Trees occasionally occur in clusters, but are mostly planted as windbreaks by homes and developments. Appendix A – Figure 6 provides a map of NLCD land cover.

Table 13: Land Cover Estimates

Land Cover Type	Acreage
NLCD	
Developed, Open Space	1,409
Developed, Low Intensity	51
Developed, Medium Intensity	17
Developed, High Intensity	1
Barren Land	17
Deciduous Forest	48
Shrub/Scrub	1
Grassland/Herbaceous	3,838
Pasture/Hay	1,620
Cultivated Crops	22,379
NLCD Total:	**29,381**
Wetlands	
Palustrine Emergent Wetland (PEM)*	657
Palustrine Forested/Shrub Wetland (PSS)*	7
Palustrine Pond (PUB)*	23
Riverine Wetland (R)*	1
PWI Wetland*	63
RIM Wetland Areas*	14
NLCD Wetland	62
Wetlands Total:	**827**
USFWS Data	
Trosky Till Plain Area 5*	5,589
USFWS Data Total:	**5,589**

MDNR Natural Communities	Acreage
Marsh*	4
Wet Meadow*	38
Calcareous Fen*	3
Upland Prairie*	435
MDNR Natural Communities Total:	**480**

*These land cover types overlap with the NLCD. NLCD for the Project area encompasses the entire Project area.

Potential Impacts

The Project is anticipated to permanently displace 21-36 acres, and replace it with roads, turbines and the project substation. During construction, temporary disturbances may include approximately 452-588 acres. These estimates are based on a desktop review of the preliminary layouts and will be subject to change upon the final project layout.

Mitigative Measures

The Project has been sited to utilize cultivated areas to the extent practicable. In areas where potential vegetation may be impacted, the Applicant may reseed disturbed areas with similar vegetation and/or consult with the MDNR.

8.19 Wildlife

8.19.1 Describe Existing Resources and Impacts; Discuss USFWS Tiered Screen Process

In accordance with the recommendations of the USFWS Wind Turbine Advisory Committee Guidelines, the Applicant used a tiered approach for assessing potential impacts to wildlife and habitats.

In Tier 1, a preliminary evaluation was performed to identify potential Project sites. This included evaluating environmental factors as well as wind resource, interconnection options, and other critical issues.

Once it was determined to move forward with the Project, a Tier 2 site characterization was performed in 2011-2012. Desktop studies and windshield surveys were performed. The results of those surveys were reported to the MDNR and USFWS thus initiating discussion about the potential impacts and resulting expectations of the agencies. The results are reported in the following sections.

Tier 3 field studies commenced in spring 2012 and ran through the spring 2013. The field studies were based on the recommendations of the MDNR and USFWS as a result of numerous meetings, emails, and telephone correspondence. The list of field studies and results are summarized in the following sections. At the time of this LWECS Site Permit submittal, field studies are complete and the results have been discussed with the agencies. No additional stick nest surveys, avian point count surveys, or acoustic bat surveys have been requested by either agency.

Description of Resources

The following sections do not include any detailed discussion on wildlife species considered by federal or state authorities to be threatened, endangered or of special concern. Refer to Section 8.20 Rare and Unique Natural Resources for information on these resources and attached reports in Appendix C for more detail.

Four desktop studies were completed for the Project area:

1. Avian, Bat, and Sensitive Species Risk Assessment
2. Desktop Wetlands Assessment and Regulatory Review
3. Initial Desktop Sensitive Habitat Assessment
4. Desktop Threatened and Endangered Species Habitat Assessment and Proposed Field Survey

In addition, five field studies were completed for the initial Project area in 2012 through 2013 and are briefly summarized below:

1. Avian Stick Nest Survey 2012
2. Spring and Fall Avian Point Count Survey 2012
3. Acoustic Bat Survey 2012
4. Threatened and Endangered Species Field Habitat Assessment 2012
5. Great Blue Heron Rookery Survey 2013

As part of the assessments, the USFWS and MDNR were contacted to provide data and input on wildlife, sensitive species, sensitive habitats, wildlife areas, etc. These reports are provided in Appendix C and initial agency response letters are provided in Appendix B. The field studies were also provided to the USFWS and MDNR in March 2013. These submittals were followed by meetings with both agencies on March 26, 2013. It was determined by the agencies that additional field studies for the expanded Project area will not be required because the topography, species and other habitat conditions of the expanded Project area are similar to the initial Project boundary. The one additional survey requested by the agencies was a great blue heron rookery survey of the known rookery. This effort was completed in the spring 2013 and the report is provided in Appendix C-12.

Habitat and Communities

In addition to the primary land use of cultivated land discussed above, MDNR data indicates there have been four state-designated rare natural communities recorded in the Project area, which include three acres of calcareous fens, 38 acres of wet meadows, 435 acres of upland prairie segments, and four acres of marshes. Many of these features appear to be associated with streams[34]. Also based on MDNR data, two state-managed properties occur within the Project area. These are a Conservation Reserve Enhancement Program (CREP) area located in the central part of the Project area (T107N, R44W, Section 35) and the Casey Jones State Trail that bisects the west and central portions of the Project area from

[34] Minnesota Department of Natural Resources, Natural Heritage and Nongame Research Program, April 2012 through June 2013, *Review of the Minnesota Natural Heritage database for rare plant or animal species or other significant features in Murray and Pipestone Counties, St. Paul*, Natural Heritage Program.

east to west (T106, R43W, Sections 5, 6, 7, 8 and T106, R44W, Sections 1, 2, 3, 4, 5, 7, and 8). The Terrace Wildlife Management Area (WMA) is located along the western boundary of the Project area (T106N, R44W, Section 6 and T107N, R44W, Section 31). The Van Beek WMA is located along the eastern boundary of the Project area (T107N, R44W, Section 24). The Salt & Pepper WMA is located along the southern boundary of the Project area (T106N, R43W, Section 29). Additionally, MDNR data indicates there are two "terrestrial communities" within the Project area.

In total, five state-managed WMAs, three RIM conservation easements, and five CREP conservation easements are located along the boundary or within one mile of the Project area (Appendix A - Figure 3). Some of these state-managed lands are known to or could potentially host sensitive species and habitats. These areas include:

- Holland WMA (T107N, R44W, Section 5)
- Gromer's Draw WMA (T107N, R44W, Section 10)
- Terrace WMA (T106N, R44W, Section 6 and T107N, R44W, Section 31)
- Van Beek WMA (T107N, R44W, Section 24)
- Salt & Pepper WMA (T106N, R43W, Section 29)
- Wetland Preserve (RIM) (T107N, R43W, Section 18)
- Marginal Cropland (RIM) (T107N, R44W, Section 7)
- Marginal Cropland (RIM) (T107N, R44W, Section 13)
- Native Prairie Bank (CREP) (T106N, R43W, Section 32)
- Native Prairie Bank (CREP) (T106N, R43W, Section 32)
- Native Prairie Bank (CREP) (T106N, R43W, Section 33)
- Native Prairie Bank (CREP) (T106N, R43W, Section 33)
- Native Prairie Bank (CREP) (T106N, R43W, Sections 32 and 33)

Avian[35,36]

Per recommendations of the USFWS and MDNR, Burns & McDonnell conducted spring and fall avian point count surveys (Appendix C-7) in April, May, June, August, September, and October 2012 for the initial Project area. These surveys were completed to demonstrate the existing conditions for avian species in the Project area and for Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703) compliance with the USFWS consultations. The MBTA protects 1,007 avian species as of 2012 (50 CFR Part 10 9282-9314). A total of 67 species were observed during the avian point count surveys with 63 species having federal protection under the MBTA. None of the observed species were identified as being protected under the federal Endangered Species Act (ESA) (16 U.S.C. 1531 *et seq.*) or Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. 668) in Pipestone and Murray counties. In addition, an avian stick nest survey (Appendix C-4) was conducted from April 5-12, 2012 for the initial Project area, including a two-mile buffer around the Project boundary. Two potential raptor nests were identified within the initial Project area, with one additional raptor nest observed within a portion of the additional land area. Other raptor

[35] Tekiela, S., 1998. *Birds of Minnesota Field Guide*. Cambridge: Adventure Publications.
[36] Janssen, R.B., 1987. *Birds in Minnesota*. Minneapolis: University of Minnesota Press.

stick nests were observed within the two-mile buffer area around the initial Project area, but are not within the additional land area. Other stick nests were observed, but were likely those belonging to the American crow (*Corvus brachyrhynchos*), as determined by the small size nests and the number of observations of this species during the 2012 spring and fall avian point count survey. In recent discussions, the USFWS and MDNR did not request any additional avian point count surveys for the Project. The agencies did request an additional great blue heron (*Ardea herodias*) rookery survey be completed in the spring 2013 to determine the abundance and activity of an existing great blue heron rookery located approximately 1.75 miles south of the Project. Four great blue heron nests were observed in the rookery; however, no great blue heron activity was observed during the surveys conducted on April 23 and 24, 2013 at the rookery or in the general vicinity (Appendix C-12).

Bats

Seven species of bats are known to occur in Minnesota; all are generally found throughout the state according to MNDR and are described in Table 14: Bat Species in Minnesota. Currently, there are no bats included on the USFWS or MDNR sensitive species lists for Pipestone and Murray counties. According to USFWS, the northern myotis (*Myotis septentrionalis*; also known as the northern long-eared bat) has been petitioned to be federally listed. The timetable for listing, or even the location (counties), is unknown at this time. In addition to the northern myotis, one other bat species in Minnesota, the tricolored bat (*Pipistrellus subflavus*; also known as the eastern pipistrelle), has been listed as a state special concern species in some counties, but not within Pipestone, Murray, or their neighboring counties.

Table 14: Bat Species in Minnesota

Species	Habitat/Roosts/Hibernacula	Roosts	Migration
Big brown bat (*Eptesicus fuscus*)	Caves, tunnels, crevices, hollow trees, buildings, wooded areas.	Singly or in small clusters	May migrate or winter in northern areas (common in buildings in winter). Many migrate short distances (less than 80 km) to find mines or caves for hibernation.
Eastern pipistrelle (*Pipistrellus subflavus*)	Caves, mine tunnels, crevices, buildings, wooded areas near water. In the summer, generally roost singly, often in trees, but some males and non-reproductive females also roost in their winter hibernacula.	Singly or in small clusters	Migrate or hibernate in north.
Eastern red bat (*Lasiurus borealis*)	Requires trees and shrubs for roosting, occasionally enters caves. Has regular feeding hours, tends to feed same area over and over (100-yard route).	Solitary, but feeds in pairs	Migrates south in groups.

Hoary bat (*Lasiurus cinereus*)	Wooded areas. They are solitary and roost in trees, occasionally in caves.	Solitary	Migrates south
Little brown bat (*Myotis lucifugus*)	Forested areas. Day roosts in tree cavities and crevices. Feed near or over water, mainly on aquatic insects such as caddis flies, mayflies, and midges.	Colonial	Most migrate in fall, caves or suitable location.
Northern long-eared bat (*Myotis septentrionalis*)	Thinly forested areas, around buildings or trees, occasionally caves. In summer, the species is often associated with forested habitats, especially around wetlands. Summer roosts are believed to include separate day and night roosts. Day roosts may be under loose tree bark, in buildings, or behind signs or shutters, and night roosts may include caves, mines, and quarry tunnels.	Small colonies	Hibernates in Minnesota caves and mines.
Silver-haired bat (*Lasionycteris noctivagans*)	Can occur in both grassland and forest, and are abundant in old-growth forest. Occasionally in buildings and caves. They start foraging after sunset, finding their prey at treetop level or over streams and ponds.	Solitary	Likely migrate southward in winter, can enter torpor, thus some may not migrate

Sources: Burt and Grossenheider (1976); MDNR (2013), Smithsonian, National Museum of Natural History (2011).

Per recommendations of the USFWS and MDNR, Burns & McDonnell conducted an acoustic bat survey (Appendix C-5) at three locations within the initial Project area. The survey was conducted from April 9 to October 31, 2012. The purpose of the acoustic bat survey was to record general bat activity in the vicinity of the Project. Acoustic monitoring locations consisted of three locations. Two of the locations were on met towers (M1 and M2), while one was located on a contrivance within a riparian zone (M3) in the western portion of the initial Project area. Five of the seven common species listed above were recorded within the Project area; however, there was no apparent evidence of large migration through the Project area. Throughout the entirety of the study, 26 calls belonging to the genus Myotis were recorded. Given the call data and sequences retrieved, no specific call sequences stood out as indicative of the northern long-eared bat (*Myotis septentrionalis*) and based on the dominant open habitat (non-forested) in the area, they would likely be little brown bats (*Myotis lucifugus)*. In discussions with USFWS it is likely that the bats recorded are from localized populations and are not requiring additional bat acoustic surveys. In addition, MDNR is not requiring additional acoustic surveys.

Mammals[37]

Mammals use the food and cover available from agricultural fields, grasslands, farm woodlots, wetland areas, and wooded ravines. Agricultural crops provide seasonal food sources for the herbivores and omnivorous species. Grassland areas and woody vegetation are also habitat for a variety of small mammals such as mice, which serve as a food base for the larger carnivorous and omnivorous mammals and birds. White-tailed deer have a strong affinity for agricultural crops and use farm woodlots, wooded ravines and intermittent stream bottoms for shelter.

Reptiles and Amphibians

The Project area is potentially home to a variety of reptile and amphibian species known from the area, such as eastern tiger salamander (*Ambystoma tigrinum*), American toad (*Bufo americanus*), northern leopard frog (*Rana pipiens*), common snapping turtle (*Chelydra serpentina*), prairie skink (*Eumeces septentrionalis*), smooth green snake (*Opheodrys vernalis*), and plains garter snake (*Thamnophis radix*). Species that occasionally are found in the area, and theoretically could be found in the Project area include: the Great Plains toad (*Bufo cognatus*), spring peeper (*Pseudacris crucifer*), and plains hognose snake (*Heterodon nasicus nasicus*), among others. Reptiles and amphibians may use wet areas of the Project (*i.e.*, wetlands, waterways, and ponds) as well as overland dry areas to fulfill needs within their respective life histories.

Insects

Insect species in the area are endemic and introduced to the region. The primary insect economically important within the Project area is honey bees for honey production and agricultural pollination *(i.e.*, alfalfa [*Medicago sativa*] seed production). Many insect species are important to the indigenous vegetation and wildlife.

Potential Impacts

Development of the Project is expected to have a minimal impact on wildlife, including avian and bat species.

Mitigative Measures

The following measures were and will be used to help avoid or minimize potential conflicts and impacts on wildlife during development and operation of the Project:

- Identify established wildlife management, recreation and scientific natural areas. During the turbine siting process, Stoneray Power Partners will attempt to avoid and minimize impacts to these resources.

[37] Hazard, E.B., 1982, *The Mammals of Minnesota*, Minneapolis: University of Minnesota Press.

- Avoid or minimize disturbance of wetlands and waterways during the siting and construction of the Project. Protect existing trees, shrubs, and any remnant prairie, which are important to the wildlife of the area.
- Conduct a field habitat assessment for sensitive habitat areas that cannot be avoided in the Project design.
- Development and implementation of a Bird and Bat Conservation Strategy (BBCS) plan would be completed before operation of the Project, including additional review of the Project BBCS by the USFWS. A BBCS will be used in place of an Avian and Bat Protection Plan (ABPP).
- One (1) field season of post construction fatality monitoring for avian and bat species using survey protocol developed by the MDNR for low risk sites. Recent consultation with the MDNR has indicated the Project area will be a low risk site.

8.19.2 Waterfowl Feeding & Resting Area

There appears to be no USFWS-owned lands, Waterfowl Production Areas (WPAs), MDNR-Designated Wildlife Lakes, MDNR Migratory Waterfowl Feeding and Resting Areas (MWFRAs), State Game Refuges, or State Wild, Scenic, and Recreational Rivers (WSRs) within the Project boundary.

8.19.3 Important Bird Areas

In November 2012, The Audubon Society of Minnesota designated six separate areas lying within the Prairie Pothole and Eastern Tallgrass Prairie Bird Conservation Regions as an Important Bird Area (IBA). Designated as the Prairie Coteau Complex Important Bird Area, portions of the IBA occupy the northwestern corner and a small portion of the far southeastern corner of the Project area.

The IBA program is voluntary and participatory and with no legal implications or enforcement. An IBA can be designated without approval from landowners or any regulatory body or agency. Stoneray Power Partners has coordinated with the USFWS and MDNR and has completed the suggested desktop and field study recommendations to minimize impacts to the habitat and wildlife. Therefore, the Applicant believes the Project to be low-risk and will complete post-construction monitoring in order to adhere to the guidelines set forth by the MDNR and USFWS to be a low risk site.

8.20 Rare and Unique Natural Resources

8.20.1 Habitat, Threatened and Endangered Species, Avoidance and Mitigation Plans

The series of desktop and field studies performed for the Project were used to identify sensitive species and their habitats that could occur in or around the Project area and that may be affected by the Project. The results of those studies are provided in Appendix C and briefly summarized below.

Federally-Listed Species Review

There are four species that are federally-listed or candidates for federal listing (Table 15: Federally Listed Species Known or Likely to Occur in Pipestone and Murray Counties) that were evaluated for their potential to occur within the Project area. Federal candidate species are often evaluated on a similar

level as threatened or endangered species by the USFWS because they could become listed as threatened or endangered at some point in the future. However, a candidate species is not afforded protection under the ESA. Three of these species (Dakota skipper [*Hesperia dacotae*], Poweshiek skipperling [*Oarisma poweshiek*], and Topeka shiner [*Notropis topeka*]) have been recorded within the Project area. Bald and golden eagles have not been recorded within the Project area.

Table 15: Federally Listed Species Known or Likely to Occur in Pipestone or Murray Counties

Species	Federal Status	Habitat	County
Dakota skipper *(Hesperia dacotae)*	Candidate	Native dry-mesic to dry prairie, dominated by mid-height grasses, such as little bluestem (*Schizachyrium scoparium*), prairie dropseed (*Sporobolus heterolepis*), and side-oats grama (*Bouteloua curtipendula*). Larval stages require clump grasses that are not annually maintained (*i.e.*, little bluestem) and adults prefer flowering plants in the coneflower genus (*Echinacea* spp.). Most productive sites feature some topographic variation.	Pipestone & Murray
Poweshiek skipperling *(Oarisma poweshiek)*	Candidate	Occurs in wet to dry native prairie, but not in sand prairie. Larval stages require clump grasses that are not annually maintained (*i.e.*, little bluestem, sideoats grama) and adults prefer flowering plants in the coneflower genus (*Echinacea* spp.). Non-native, grass-dominated habitats composed of Kentucky bluegrass (*Poa pratensis*), smooth brome (*Bromus inermis*), or redtop (*Agrostis gigantea*) are not suitable habitat.	Pipestone & Murray
Topeka shiner *(Notropis topeka)**	Endangered	Inhabit slow-moving, small to mid-size prairie streams with sand, gravel, or rubble bottoms; prefer pool and oxbow areas that are outside main channel courses. These pools are in contact with groundwater and usually contain vegetation and areas of exposed gravel.	Pipestone & Murray
Western prairie fringed orchid *(Platanthera praeclara)*	Threatened	Remnant native prairies, wet prairies & sedge meadows; full sunlight on moist, calcareous till or sandy soils; not in areas with a significant history of cattle grazing.	Pipestone
Source: MDNR 2013a, MDNR 2013b, USFWS 2013a			
*Critical Habitat Has Been Designated.			

Although the majority of the Project area is comprised of cultivated lands, there are some areas within the Project area that can be considered potentially sensitive habitats for these species. As a result and per recommendation of the USFWS, a desktop study (Appendix C-10) was completed followed by a field survey for a portion of the Project area (Appendix C-6) for skipper and orchid habitat. Areas were identified as having potential habitat for these species; however, turbine locations have been selected to avoid these habitats. Final location of access roads and collection systems will also consider these locations and attempts will be made to avoid these habitats. If they cannot be avoided, additional coordination with the USFWS and MDNR may be warranted.

Topeka shiner

The Topeka shiner is a small minnow, typically three inches or less in length, that inhabit prairie streams. This species is the only federally protected species that has designated critical habitat within the Project boundary (Appendix A – Figure 9). According to the Federal Register (dated July 27, 2004), critical habitat has been designated for this species in both Pipestone and Murray counties, including reaches of four streams within the Project area. These reaches are associated with the following watercourses:

- Rock River (4a)
- East Branch Rock River (4aa)
- Unnamed Tributary (4bb)
- North Branch Chanarambie Creek (4x)

MDNR data indicated that there are records of Topeka shiners occurring in streams within the Project area. As long as prairie streams are not directly or indirectly impacted during construction and operation of the Project, the potential risk of impacting this species is relatively low. Turbines are placed in uplands, thus will avoid these critical habitats. Final location of access roads and collection systems will also consider these designated habitat locations and attempts will be made to avoid these habitats. If they cannot be avoided, additional coordination with the USFWS and MDNR may be warranted. This species is sensitive to sedimentation and stream impacts, therefore erosion and sedimentation control BMPs will be implemented during construction.

Western Prairie Fringed Orchid

According to MDNR species information, the western prairie fringed orchid, a federally protected species, is almost exclusively found in remnant native wet prairies and sedge meadows. The majority of the MDNR-recorded occurrences in Minnesota are located in full sunlight on moist, calcareous till or sandy soils, none of which have a significant history of cattle grazing. The risk of affecting this species is low because the majority of the Project area is cultivated agricultural land and grazed pasture. Based on its known life-history, this species usually appears in late April to early May; however, identification in the early-season of its vegetative state is very difficult. The species generally flowers in early to mid-July through early August, depending on location and recent moisture and temperature constraints. There are three growing stages that may be present for an individual in a given year; immature/not flowering vegetative, mature/not flowering vegetative, and flowering vegetative. If potential suitable habitat is

found to exist in the Project area and cannot be avoided, a western prairie fringed orchid presence/absence survey should be conducted.

Dakota Skipper

As a candidate species for listing under the ESA, the Dakota skipper is not currently federally protected, but it is state protected as threatened. From MDNR species information, the Dakota skipper prefers native dry-mesic to dry prairie with mid-height clump grasses in Minnesota. The root areas of the mid-height grasses are used by the larval stages of the species and include primarily little bluestem (*Schizachyrium scoparium*), prairie dropseed (*Sporobolus heterolepis*), and side-oats grama (*Bouteloua curtipendula*). Adult life stages of the species require coneflower species (*Echinacea* spp.) for foraging, among others. The risk of affecting this species is low because the majority of the Project area is cultivated. However, Project infrastructure may require routing to avoid remnant native prairies containing these herbaceous species, to the extent practicable. If potential suitable habitat exists and cannot be avoided, a Dakota skipper presence/absence survey should be conducted or time-of-year restrictions may need to be implemented to avoid the brief flight period for the species. Based on its behaviors and known life-history, survey timeframes for this species may be limited to portions of late June and early July.

Poweshiek Skipperling

As a candidate species for listing under the ESA, the Poweshiek skipperling is not currently federally protected under the ESA. Additionally, it is a state special concern species and is, therefore, not state-protected at this time. According to MDNR, this small butterfly species occurs in wet to dry native prairie in Minnesota, but not in sand prairie. This species uses habitat similar to that required for the Dakota skipper. Similar to the Dakota skipper, the risk of affecting this species is low because the majority of the Project area is cultivated. However, Project infrastructure may need to be routed to avoid remnant native prairies containing the herbaceous species preferred by the skipperling, to the extent practicable. If impacts to native prairie are possible, a presence/absence survey for this species might be warranted or time-of-year restrictions may need to be implemented to avoid the brief flight period for the species. Based on its behaviors and known life-history, survey timeframes for this species may be limited to portions of late June and early July.

State-Listed Species Review

Considering the 20 state-protected species (threatened or endangered) listed for Pipestone and Murray counties, none of these protected species have been recorded within the Project area, according to MDNR data. Six non-state-protected special concern species and two state-managed communities have been recorded within the Project area, which include the dry hill prairie (southern) and a calcareous fen. The protected special concern species included the marsh arrow-grass (*Triglochin palustris*), northern grasshopper mouse (*Onychomys leucogaster*), plains topminnow (*Fundulus sciadicus*), regal fritillary (*Speyeria idalia*), Topeka shiner, and upland sandpiper (*Bartramia longicauda*) (Table 16). The Topeka shiner is federally protected under the ESA and upland sandpiper is federally protected under the MBTA.

Table 16: MDNR Species and Community Types with a Managed Status Recorded Within the Project Boundary

MDNR Species or Community Type	Federal Status	State Status	Number of Occurrences
Calcareous Fen Community	None	State Monitored	1
Marsh arrow-grass	None	State Monitored	1
Dry Hill Prairie Community (Southern)	None	State Monitored	1
Northern grasshopper mouse	None	State Monitored	1
Plains topminnow	None	Special Concern	7
Regal fritillary	None	Special Concern	1
Topeka shiner	Endangered	Special Concern	3
Upland sandpiper	None	State Monitored	1
Source: MDNR 2013a, MDNR 2013b, USFWS 2013a			

Excluding the four federally-listed species (Topeka shiner, western prairie fringed orchid, Dakota skipper, and the Poweshiek skipper) that were previously discussed, the following state-listed species were recorded within the Project area:

Marsh Arrow-grass

This species of a sedge-like plant is widespread in North America, with a relatively scattered distribution or known occurrences. This species persists in fen or fen-like habitats often found in relatively small isolated wetlands with a consistent source of calcareous groundwater. Habitat capable of supporting this species is similar to the habitat described for the hair-like beak-rush. When located, marsh arrow-grass is often found intermixed with other sedge species. If impacts to fens are possible, a survey for this species might be warranted.

Northern Grasshopper Mouse

The northern grasshopper mouse is found in dry areas, prairies, and grasslands. This species often prefers disturbed areas such as lands used for row-crop agriculture. This species requires multiple burrows that are each used for different purposes. Habitat capable of supporting this species is likely present in the Project area; however, this mobile small mammal is adaptable to numerous disturbed areas and not likely to be impacted by Project activities.

Plains topminnow

The plains topminnow is a state special concern species that inhabits small prairie streams, much like the Topeka shiner. As indicated previously for the Topeka shiner, the risk of adverse impacts to prairie fish species or their potential aquatic habitats is low as long as stream impacts are avoided or minimized. Impacts to stream channels can usually be avoided by using typical industry methods for

boring or directional drilling the electrical collection system cabling and other utilities under stream channels. Turbines have been located to avoid streams and watercourses. Access roads and collection system locations will be selected to avoid or minimize stream impacts/crossings. If streams cannot be avoided it may warrant additional coordination with MDNR, depending upon crossing methods or the season of construction.

Regal Fritillary

In Minnesota, this non state-protected butterfly species is strongly associated with native prairies (both upland and wet prairies). Various types of prairie (*e.g.*, native, wet, dry, etc.) are state managed and should be avoided to the extent possible. If disturbance to these habitat types are avoided, impacts to this species would be low. The majority of the Project is located in cultivated land; therefore, impacts to this species are anticipated to be low. Turbines have been located to avoid prairies. Access roads and collection system locations will be selected to avoid or minimize impacts to prairies; however, if they cannot be avoided additional coordination with the MDNR may be warranted.

Upland Sandpiper

According to the MDNR, the upland sandpiper can be found in open country including prairies and grasslands. Native prairies or large portions of uncultivated and open land are required for this species. This species is not common within its range in Minnesota. This species is unlikely to be present in high abundances in the Project area due to the dominant land use in the area being crop land and, therefore consisting of disturbed soils that are unsuitable to the species. Impacts to the upland sandpiper are not likely to result from the Project.

Other Sensitive Land Types and Species

The State of Minnesota lists 45 species with various levels of state oversight in Pipestone and Murray counties. Nine of these species are listed as endangered, 11 are listed as threatened (Appendix C-15: State Listed Threatened or Endangered Species Known or Likely to Occur in Pipestone and Murray Counties), and 25 are listed as special concern (not state-protected) (Appendix C-16).

In addition to the species and communities discussed above, MDNR data indicates there are other rare natural community types recorded in the Project area. These include calcareous fens and dry hill prairies, as well as wet meadows, upland prairie segments, and marshes. The majority of the Project is located in cultivated land; therefore, impacts to these habitats are anticipated to be low. Turbines have been located to avoid prairies, wetlands, and other sensitive resources. Access roads and collection system locations will be selected to avoid or minimize impacts to these resources as well; however, if they cannot be avoided additional coordination with the MDNR may be warranted.

Potential Impacts

Based on the results of desktop and field studies, and through coordination with the USFWS and MDNR, turbines have been sited out of sensitive resource areas to minimize potential impacts to protected species, their habitats, and other sensitive communities. Access roads and collection system locations

will also be selected to avoid or minimize impacts to these sensitive resources, otherwise additional coordination with agencies may be warranted. Best management practices, applicable permit conditions, and guidance from agencies will be implemented to avoid or minimize negative impacts to the Project area.

Mitigative Measures

Based on the results of desktop and field studies, and through past and ongoing coordination with the USFWS and MDNR, attempts have been made to site turbines and associated facilities out of sensitive resource areas. This effort will minimize potential impacts to protected species and their habitats, as well as to sensitive communities. If necessary, pertinent federal and state permits will be obtained. As a result, impacts to sensitive species and habitats are not anticipated as long as BMPs are used during construction and issued permit conditions are adhered to. A BBCS plan will be developed to address avian and bat concerns during operation of the Project. As a result, no additional mitigative measures are anticipated for the Project.

8.20.2 Native Prairie

Data provided by the MDHR indicates that approximately 435 acres of upland prairie are located in the Project area. Much of the acreage is located in the northwest corner near small streams. Siting turbines away from prairie would greatly reduce the likelihood of any adverse impacts on this habitat. If Project development will need to take place in or near native prairies, a field survey for specific species or habitats may be required.

Potential Impacts

Wind turbines are unlikely to be sited in native prairies. Best management practices will be utilized and guidance from agencies will be implemented to avoid negative impacts to any prairie segments within the Project area to the extent practicable.

Mitigative Measures

Impacts to native prairies are not anticipated as long as BMPs are used during construction and issued permit conditions are adhered to. Pertinent federal and state permits will be obtained if needed.

9.0 Site Characterization

9.1 Description of Site Characteristics

Wind energy is a variable resource at a number of temporal scales. In order to determine the variation, data was consulted from Project met towers and local monitoring stations.

9.1.1 Interannual Variation

Measurements collected from six on-site met towers indicate a wind speed of 8.2 m/s at an elevation of 80 m above the ground. Additionally, wind resource maps produced by NREL expect the Project to receive average wind speeds of 8-9 m/s at 80 meter hub height[38]. This supports the met tower data and provides confidence in the accuracy and consistency of the wind speed assessment.

9.1.2 Seasonal Variation

Typically, the wind speeds measured on the development site are weakest in July and August and increase steadily during the fall. The strongest winds occur between November and May. The pattern of seasonal wind speed variation at 80, 95 and 100 meters is shown below in Figure 3: Seasonal Variations.

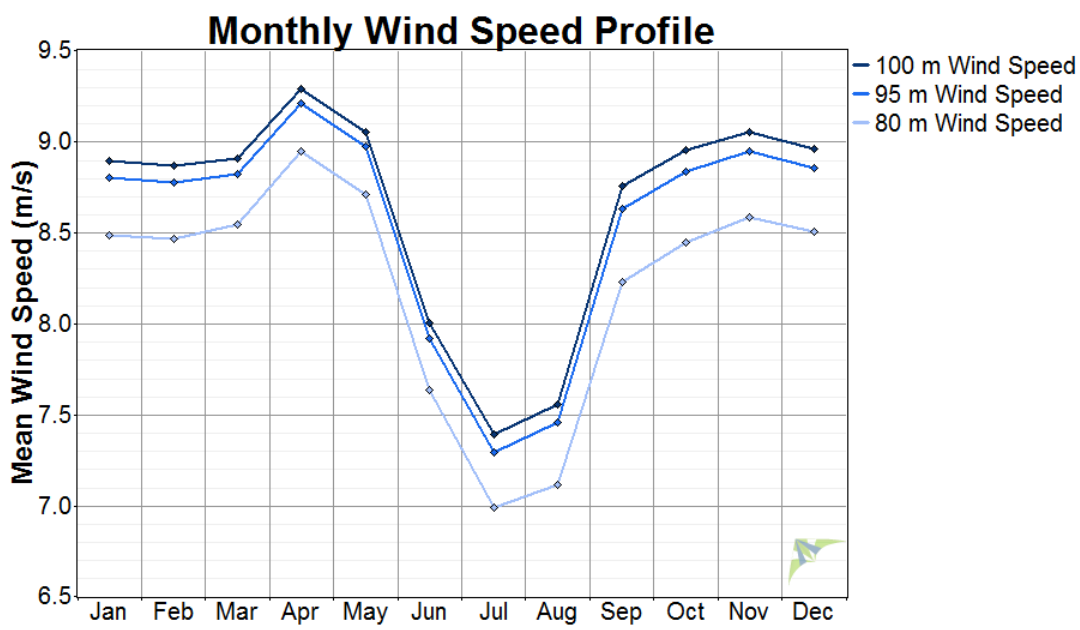

Figure 3: Seasonal Variation

[38] National Renewable Energy Laboratory, *Map of Annual Average Wind Speed (80m Hub height)*, http://www.windpoweringamerica.gov/wind_resource_maps.asp?stateab=mn

9.1.3 Diurnal Conditions

At hub heights of 80-100 meters, the wind speeds generally decline in the morning due to the solar warming and mixing of the atmosphere. After sunset, less mixing occurs and the wind speeds at hub height gradually increase. Diurnal variation is amplified during the summer months and at elevations below hub height. Figure 4: Diurnal Conditions shows the Diurnal wind speed pattern at the Project area.

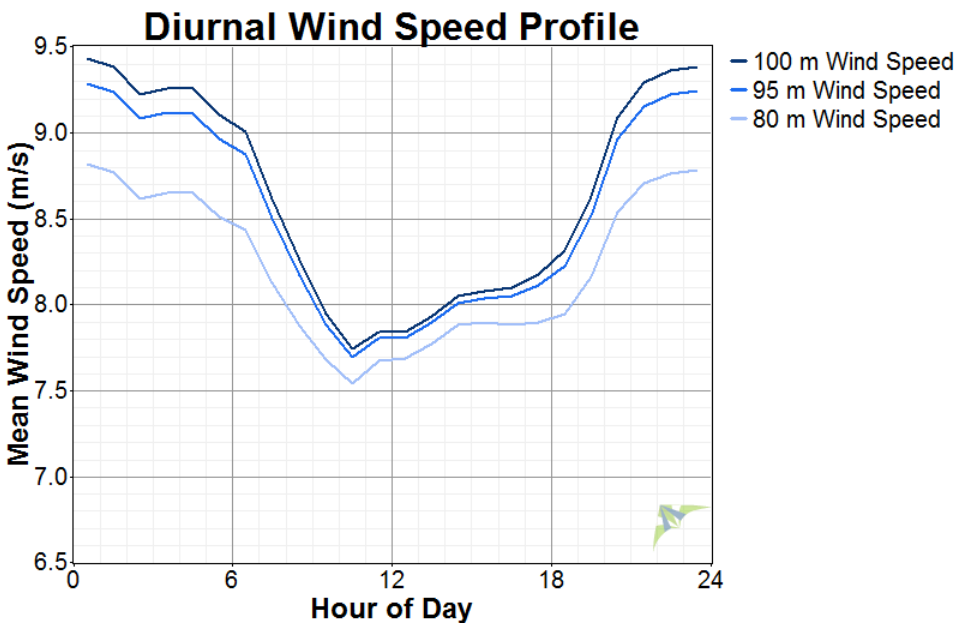

Figure 4: Diurnal Conditions

9.1.4 Atmospheric Stability

Atmospheric stability can be calculated when temperature readings are available at multiple elevations.

However, temperature data was not measured at multiple heights at this site. In general in the U.S. plains and Midwest, the thermal stability close to the earth's surface varies from stable at night to unstable during the day. We are confident that this is also the case at the Stoneray Project, even without direct measurement of the stability conditions.

9.1.5 Turbulence

Greater turbulence tends to occur at lower elevations, and should be reduced at the 80-100 m hub height of a standard wind turbine. The middle of the day tends to have the highest level of turbulence. Based on met tower data, the mean turbulence intensity at 15 m/s is less than 9% at 80m. The turbulence intensity is within normal operating range and should not have any negative effects on the turbine operation.

9.1.6 Extreme Conditions

Like much of Minnesota, severe storms and other extreme weather can take place at the Project site. Tornadoes and high wind speeds are the most notable.

9.1.7 Speed Frequency Distribution

Six met towers located at the project site have gathered wind data which is represented below in Figure 5: Speed Frequency Distribution. As is typical, the data shows that speed frequency distribution closely resembles a bell curve centered in the 7-9 m/s range.

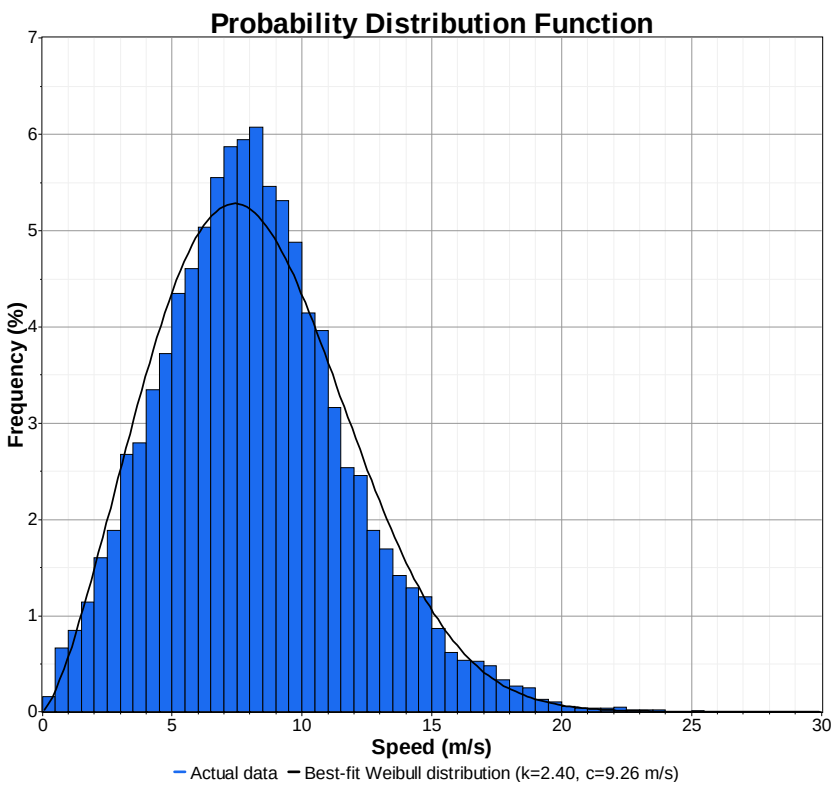

Figure 5: Speed Frequency Distribution

9.1.8 Variation with Height

Wind shear is the relative change in wind speed as a function of height. It is calculated using a power function based on the relative distance to the ground. The measured shear at this site ranges from 0.21 to 0.28. Data from anemometers was not available at varying heights. Figure 6 shows a wind shear profile and represents the diurnal shear profile measured at the site.

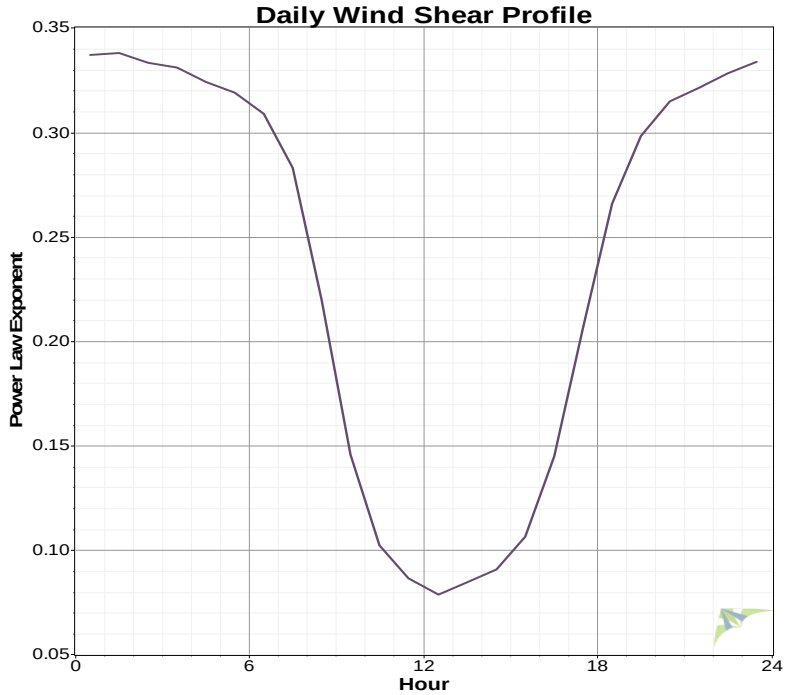

Figure 6: Wind Shear Profile

9.1.9 Spatial Variations

Due to the uniform land cover and topography, little spatial variation is expected. The Project area is mostly void of mature tree growth. A linear wind flow model was used to predict the spatial variation in wind resource across the site. This model predicted average hub height wind speeds to range from 8.0 to 8.4 m/s.

9.1.10 Wind Rose

In this region, the wind typically blows from two primary directions, south and north-west. Met data confirmed this expectation. Please see Figure 7: Annual Wind Rose.

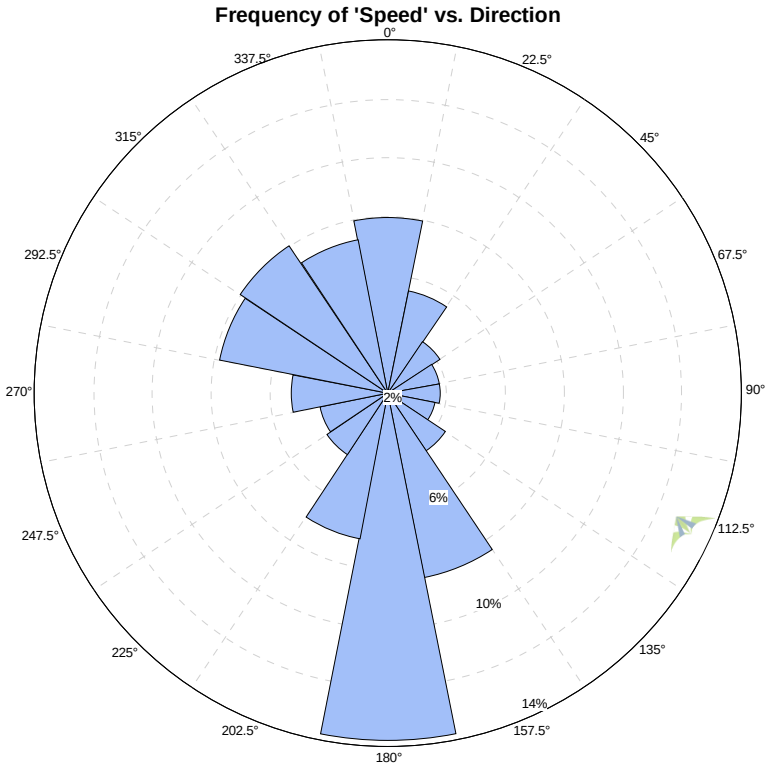

Figure 7: Annual Wind Rose

9.1.11 Other Meteorological Conditions

Monthly average temperatures range from a low of 11.2°F in January to a high of 71.7°F in July[39]. Occasional severe thunderstorms and hail are typically short in extent and result in minimal damage. All of the proposed turbines have lightning protection systems.

9.2 Location of Other Projects

There are numerous wind energy facilities near the Project area. Smaller wind energy facilities (2-3 commercial size turbines) nearby include Boeve Windfarm, Chandler Wind, Fey Windfarm, K Brink Windfarm, Kas Brothers Windfarm, Champepadan Wind Project, Moulton, Pipestone Schools and Windcurrent Windfarm, and Woodstock Municipal. Larger wind energy facilities (3 or more turbines and utilizing 750kw or greater models) include: Chanarambie, DanMar I, Eastridge, Fenton, Lake Benton II, Moraine, Nobles, Prairie Rose, Ridgewind, Valley View Wind, Viking, West Pipestone, Windshare and Woodstock Hills Wind Farms.

[39] Midwest Regional Climatic Data Center, Pipestone and Murray Counties, http://mrcc.isws.illinois.edu/climate_midwest/maps/mn_mapselector.htm#javascript:newWindow(%27mn/mn_temp/mn_murrayco.htm%27), accessed March 13, 2013.

10.0 Project Construction

10.1 Roads and Infrastructure

Civil works and improvements required for the preparation of roads and infrastructure for the Project include the following:

- Documenting and potentially improving the existing road sections for greater access to the Project area.
- Obtaining all necessary over-weight and over-size permits issued by MnDOT for turbine delivery.
- Clearing & grubbing for access roads, laydown yards and O&M facilities.
- Constructing culverts and drainage features to maintain drainage patterns.
- Installation of all underground collection lines for connecting turbine strings for delivery to collection and metering locations.
- Installation of site fencing and security measures.

Pavement reinforcement will be dependent on the time of year, but will be returned to pre-construction condition or better at the conclusion of the Project.

10.2 Access Roads

Each wind turbine will have a 16 foot wide gravel access road that will provide year round access. These access roads will be designed to meet or exceed minimum dimension requirements for expected vehicles and will be constructed of class-five gravel and geotextile fabric underlay. Stoneray Power Partners will coordinate with land owners throughout the micro-siting process to minimize disturbances due to access road construction. Access roads will be temporarily widened to a maximum of 40-56 feet to allow for crane movement and delivery of equipment. Temporary crane pads will be constructed on the access roads to allow for wind turbine component lay down. Culverts will be placed where needed to facilitate existing drainage patterns. Farm equipment will continue to have maneuverability along and over all access roads. Any temporary access roads used solely for construction will be re-graded, filled and dressed as needed at the completion of all construction activities. All local or state requirements will be followed where access roads join state or local roadways including permits to work within right-of-way.

10.3 Associated Facilities

O&M Facility

An O&M building may be constructed on the site for access and storage. The buildings for O&M are typically less than 5,000 square feet and will have an adjacent parking lot of approximately 3,000 square feet.

Laydown Yard

A secure laydown yard will be prepared where wind turbine components are temporarily stored, assembled, or processed, as part of the wind turbine assembly operation. This area may also house temporary construction offices and facilities. The laydown yard will be relatively flat, near the site access point, and central to the proposed turbine sites.

10.4 Turbine Site Location

Wind turbine towers will likely be erected on reinforced concrete spread footing foundations. The bearing surface of the foundation will likely be at a depth of up to 12 feet while the octagonal footprint of each foundation will be approximately 3,200 square feet. The tubular steel tower will be connected to the concrete foundation through high strength anchor bolts embedded in the concrete foundation. The wind turbines will be freestanding tubular towers. Geotechnical data, turbine loads, and cost considerations will dictate the final design of the foundation at each site.

10.5 Post-Construction Cleanup and Site Restoration

At the completion of construction activities all temporary access roads, crane pads, the laydown yard and O&M areas will be graded back to natural contours with soil loosened and seeded as needed with native seed mixes. New gravel roads that are to be kept for ongoing operation and maintenance access will be corrected of any deterioration due to the construction process. Erosion control practices will be kept in operating condition until seeded areas are stabilized. The Applicant anticipates that cleanup and restoration will take no longer than 30 days.

10.6 Operation of Project

Operations and Maintenance

Stoneray Power Partners will oversee all operations, maintenance, service, and management of the facilities either through service agreements with qualified O&M service providers or through EDF Service Corporation.

The Project will have a full time staff of technicians, a supervisor, and others as necessary. The staff will be required to complete scheduled maintenance, non-scheduled repairs, daily checks, and resets. When site staff are not present, on call technicians will be available to perform repairs in a timely manner.

Site Control and Data Acquisition (SCADA) System

A computer controlled SCADA system will be used to remotely monitor the conditions of the wind farm and will alert technicians to any irregularities with the wind turbines, circuit breakers, meters, meteorological equipment, etc.

Error messages from the SCADA system are sent to the Operations Control Center (OCC). OCC staff will then evaluate the nature of the error message and make a determination of the correct procedure. Site

technicians will be alerted if necessary. If the site is not staffed, on call technicians will be called upon to take corrective action at the facility.

Maintenance Schedule

Maintenance will be required for site facilities, transmission facilities, and wind turbines. Site facilities (roads, drainage, fences, etc) will be maintained as needed and scheduling will be adjusted based on local use and environmental conditions. Wind turbine and transmission facility maintenance schedules and required outage duration are based on equipment manufacturer's recommendations and EDF's experience operating this type of facility.

Wind turbine scheduled maintenance includes a first service inspection, which is performed one to three months after the turbines have been engaged. Following the first service inspection, turbines will be serviced bi-annually. Turbine maintenance will be performed during periods of low wind so as to not sacrifice energy production. Scheduled maintenance will be phased so that not more than two turbines will be offline at any time.

10.7 Costs

The total Project installed capital cost is estimated to be between $160,000,000 and $200,000,000 including wind turbines, associated electrical and communications systems, and site facilities. The final installed capital cost of the Project is dependent on site conditions including ease of access, geologic and hydrologic conditions, and turbine layout.

10.8 Schedule

Stoneray Power Partners has completed land acquisition and is finalizing a small number of agreements. The Certificate of Need was filed on April 26, 2013 (eDocket 12-216). The LWECS Site Permit will be electronically submitted on June 10, 2013. This would allow initial phases of construction to begin in December 2013.

The construction of the roads, turbine foundations, and electrical collection system would take approximately four months to complete. The erection of the turbines would begin shortly after and take approximately two months to complete. The Project would become commercially operational beginning in December 2014. This schedule is dependent upon securing a power purchase agreement.

10.9 Energy Projections

Stoneray Power Partners has performed energy projections based on data gathered from met towers located on site as well as long term correlations to other available data. It is estimated that the Project will have an annual average production of approximately 397,100 MWh (Megawatt hours). The estimated net capacity factor ranges from 42% - 47%.

10.10 Decommissioning and Restoration

10.10.1 Anticipated Life of the Project

Stoneray Power Partners estimates the service life of the Project to be approximately 30 years. This estimate is based on EDF's extensive experience in the ownership and operation of this type of facility.

10.10.2 Estimated Decommissioning Costs

The exact dollar amount necessary to cover decommissioning costs is difficult to determine as many of these costs will be borne approximately 30 years from the present. Recent estimates for similar projects range from approximately $46,000 to $75,000 per turbine. Based on EDF's vast experience in Operations & Maintenance, decommissioning costs are expected to be approximately $60,000 per turbine or approximately $2,500,000 - $3,750,000 for the project. These estimates do not factor in the resale or salvage value of the turbines, which is expected to offset all or a large majority of these costs.

10.10.3 Method for Ensuring that Funds are Available for Decommissioning

Based on estimates for other EDF projects, the total salvage value of the Project is greater than the total decommissioning cost of the Project. In the event future estimates prepared by the Project Owner or its affiliates result in the total decommissioning costs exceeding the total salvage value, the Project Owner can provide a form of security, if necessary: a cash security deposit, a guarantee, letter of credit or other form of security that is reasonably acceptable. The security shall be in the amount equal to the difference between the total decommissioning costs and the total salvage value.

The total salvage value is based upon the worst case scenario assuming the only salvage value of the wind turbine is from scrapping the steel. The estimate was based upon the total weight of each wind turbine and tower, which is primarily steel. This is a conservative estimate considering approximately 10% of the total weight of the each wind turbine is copper, yielding a higher value than steel.

10.10.4 Method for Updating that Funds are Available and Updating Decommissioning Costs

The project owner will report every 2 years on the status of the Decommissioning Plan, which lays out the timeline and strategy for decommissioning the Stoneray Wind Project. As part of the report, the project owner will review the steel market to insure the salvage value of the wind facility will cover the decommissioning costs. If the costs of decommissioning exceed the salvage value, the project owner will obtain a form of security as described in 10.10.3.

Additionally, the Decommissioning Plan and all appendices shall be reviewed and updated by the Project Owner as needed.

10.10.5 List of Decommissioning Activities

At the conclusion of the Stoneray project's useful or permitted life, portions of the project or its components could be repurposed for a different wind project. Depending on landowner consent and the interest of potential wind developers, the existing project could apply for a renewed site permit or reuse

the Stoneray turbine locations for a new project. If the turbine locations are not reused, decommissioning would involve removal of all above-ground wind facilities including wind turbine nacelles, blades, towers, foundations, cables, roads, and other ancillary facilities. Foundations will be removed to a depth of 48 inches below grade. All access roads will be removed unless the affected landowner provides written notice that the road or portions of the road can remain. Additionally, disturbed surfaces shall be graded, reseeded, and restored as nearly as possible to their preconstruction condition. Work will be performed in conformance with local laws and regulations.

11.0 Identification of Other Permits

In November 2011, EVS, on behalf of Stoneray Power Partners sent letters to multiple agencies notifying them of the proposed project (Details in Appendix B). The purpose of the letters was to give each agency notice early in the development process as well as provide adequate time for their response. Stoneray Power Partners has been in contact with the various agencies to understand the applicable permitting requirements and learn of and mitigate any concerns by these agencies. Potential applicable regulatory approvals required for the construction and operation of the proposed wind power plant are shown below:

Agency	Permit/ Approval	Need for Permit/ Approval
Federal		
U.S. Army Corps of Engineers (USACE)	Review and Approval of Wetland Delineations	Required to determine extent of USACE jurisdiction, quantify impacts, or document avoidance.
	Federal Clean Water Act Section 404 Permit(s)	Project may require a USACE Regional General Permit or an Ind. Permit depending on amount and type of wetland impact proposed. Permit from USACE required if wetlands are jurisdictional and not avoidable.
Environmental Protection Agency (Region 5) (EPA) in coordination with the Minnesota Pollution Control Agency (MPCA)	Spill Prevention Control and Countermeasure (SPCC) Plan	May be required if turbine commissioning or construction activities will require oil storage in excess of 1320 gallons. May be required for O&M facility or if an oil storage tank is planned for this Project.
Lead Federal Agency	Federal Section 106 Review	Section 106 of the National Historic Preservation Act (NHPA) may be invoked by a Federal Agency if the Project requires federal land, funding, or permits.
Federal Aviation Administration	Form 7460-1 Notice of Proposed Construction or Alteration (Determination of No Hazard)	Determination of No Hazard to Air Navigation needed for each structure over 200 feet tall via form 7460-1.
	Notice of Actual Construction or Alteration (Form 7460-2)	Notify FAA of construction via Form 7460-2.
Federal Communications Commission	Non-Federally Licensed Microwave Study	May be required for MN LWECS Site Permit compliance
	NTIA Comm. Study	May be required for MN LWECS Site Permit compliance
	Communication Study	May be required for MN LWECS Site Permit compliance
	Signal strength assessment	May be required for MN LWECS Site Permit compliance
	Onsite Signal strength assessment	May be required for MN LWECS Site Permit compliance

Agency	Permit/ Approval	Need for Permit/ Approval
State		
Minnesota Public Utilities Commission (MPUC)	Large Wind Energy Conversion System (LWECS) Site Permit	Required under Minnesota Statute Section 216F.03 for a LWECS that generates 5 MW or more of electricity.
	Certificate of Need (CON)	A CON is required under Minnesota Statute Section 216B.243 for a LWECS unless the project meets exemption criteria set forth within Minnesota Statutes.
Minnesota State Historic Preservation Office (SHPO)	Class I Literature Review / Class III Cultural Field Survey. Cultural and Historic Resources Review and Review of State and National Register of Historic Sites and Archeological Survey	May be required for MN LWECS Site Permit compliance. Consultation with SHPO is recommended. Should Section 106 of the National Historic Preservation Act (NHPA) be triggered, consultation will be mandatory.
Minnesota Pollution Control Agency (MPCA)	Section 401 Water Quality Certification	Individual Section 401 Water Quality Certification or Waiver is required under the Federal Clean Water Act (CWA) for projects that require an Individual Section 404 Permit from the USACE to ensure that authorized activities do not violate state water quality standards.
Minnesota Pollution Control Agency (MPCA)	National Pollutant Discharge Elimination System Permit (NPDES) — MPCA General Storm water Permit for Construction Activity (MN) R100001)	Coverage under the MPCA General Storm water Permit for Construction Activity is required for projects that disturb more than one acre of land.
Minnesota Department of Transportation	Utility Agreements and Permits	Minnesota Statute Section 161 requires a permit to place utility facilities on trunk highway rights-of-way.
	Oversize/Overweight Permit for State Highways	Under Minnesota Statute Section 169, a permit is required for hauling construction equipment and materials that exceed height and weight limits on U.S., Interstate, and state highways through Minnesota.
	Access Driveway Permits for MnDOT Roads (TP-1721)	Permit for temporary or permanent accesses and temporary widening of access points.
Minnesota Department of Natural Resources	License for crossing Public Lands and Waters (Minn. Stats. 84.415)	Required for wind farm facilities that cross or locate on State administered Public Lands or Waters.
	Public Waters Work Permit (Minn. Stats. 103G)	Any construction activities that impact waterways, including wetlands, applies to public waters that are identified on MDNR public waters maps
Agency	**Permit/ Approval**	**Need for Permit/ Approval**
Other		
Pipestone County Murray County	Building Permit	County requests building permit for access roads & project substation, if a suitable existing building cannot be found