Application for
A Large Wind Energy Conversion System
Site Permit

Walleye Wind, LLC

Rock County, Minnesota

MN PUC Docket Number: IP7026/WS-20-384

July 9, 2020

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ACRONYM/TERM DEFINITIONS

ACRONYM/TERM	DEFINITION
AADT	Average Annual Daily Traffic
ACS	United States Census Bureau American Community Survey
AGL	Above Ground Level
ABPP	Avian and Bat Protection Plan
ADLS	Aircraft Detection Lighting System
AMA	Aquatic Management Area
AMSL	Above Mean Sea Level
Analytics	NextEra Analytics, Inc.
ANSI	American National Standards Institute
Applicant	Walleye Wind, LLC
Application	This Site Permit Application submitted to the Minnesota Public Utilities Commission
BMPs	Best Management Practices – prevents soil erosion and sedimentation
BWSR	Board of Water and Soil Resources
Capacity	The capability of a system, circuit, or device for storing electronic charge
CON	Certificate of Need
Commission	Minnesota Public Utilities Commission
CREP	Conservation Reserve Enhancement Program
CRP	Conservation Reserve Program
dB	Decibel
dBA	A-Weighted Decibels
DBS	Direct Broadcast Satellite
Distribution	Relatively low-voltage lines that deliver electricity to the retail customer's home or business
DNH	Determination of No Hazard
EF	Electric Fields

ACRONYM/TERM	DEFINITION
ELF	Extremely Low Frequencies
EMF	Electromagnetic Field
ECT	Environmental Consulting & Technology, Inc.
EPA	United States Environmental Protection Agency
Epsilon	Epsilon Associates, Inc.
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FSA	Farm Service Agency
GE	General Electric
Generator	A machine by which mechanical energy is changed into electrical energy
Geotechnical	A science that deals with the application of geology to engineering
HEI	Hankard Environmental, Inc.
Hub	The central component of the wind turbine which connects the rotors to the generator
Hz	Hertz
IEEE	Institute of Electrical and Electronic Engineers, Inc.
Interconnection	Location of project connection to the power grid
IPaC	Information for Planning and Consultation
kV	Kilovolt
kV/m	Kilovolts per meter
kW	Kilowatt
kWh	Kilowatt-hour
LED	Light-emitting diode
Leq	Equivalent Sound Level
LF	Low Frequency
LGU	Local Government Unit
LiDAR	Light Detecting and Ranging

ACRONYM/TERM	DEFINITION
LIDS	Lighting Intensity Dimming Solution
LNTE	Low Noise Trailing Edge
LWECS	Large Wind Energy Conversion System
LWECS Guidance	Large Wind Energy Conversion System Noise Study Protocol and Report
MBS	Minnesota Biological Survey
MERRA2	Modern-Era Retrospective Analysis for Research and Applications
MET	Meteorological Tower
MF	Magnetic Field
mG	milliGauss
Micrositing	The process in which the wind resources, potential environmentally sensitive areas, soil conditions, and other site factors, as identified by local, state and federal agencies, are evaluated to locate wind turbines and associated facilities
MISO	Midcontinent Independent System Operator, Inc.
MNDEED	Minnesota Department of Employment and Economic Development
MNDNR	Minnesota Department of Natural Resources
MnDOT	Minnesota Department of Transportation
MMPA	Minnesota Municipal Power Agency
MPCA	Minnesota Pollution Control Agency
MSHSN	Minnesota State Historic Sites Network
MW	megawatt
Nacelle	A streamlined enclosure (as for an engine), which houses the gearbox, generator, brake, cooling system and other electrical and mechanical systems
NASA	National Aeronautics and Space Administration
NEER	NextEra Energy Resources, LLC
NESC	National Electric Safety Code
NHIS	Natural Heritage Information System

ACRONYM/TERM	DEFINITION
NAC	Noise Area Classification
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NRO	Noise Restricted Operation
NSP	Northern States Power Company
NTIA	National Telecommunications and Information Administration
NWI	National Wetland Inventory
O&M	Operations and maintenance building/facility
OSA	Office of the State Archaeologist
Phase Ia	Cultural Resources Literature Search – a large-scale review and compilation of known cultural resource data
Phase I	Environmental Site Assessment – is generally considered the first step in the process of environmental due diligence
POI	Point of Interconnection
PPA	Power Purchase Agreement
Project	Walleye Wind Project
PWI	Public Waters Inventory
PWI Wetlands	Minnesota Public Waters Inventory Public Water Inventory Basins
RD	Rotor Diameter – Diameter of the rotor from the tip of a single blade to the tip of the opposite blade
RES	Renewable Energy Standard
RIM	Reinvest in Minnesota
RIM-WRP	Reinvest in Minnesota – Wetlands Reserve Program
Rotor	The rotor consists of three blades mounted to a rotor hub
Route Permit	Permit required for high-voltage transmission lines over 1,500 feet in length
ROW	Right-of-Way
RPM	Revolutions Per Minute

ACRONYM/TERM	DEFINITION
SCADA	Supervisory Control and Data Acquisitions (communications technology)
SCS	Site Characterization Study
SHPO	Minnesota State Historic Preservation Office
Site	The area proposed to be developed for the Project
SLM	Sound Level Meter
SNA	Scientific and Natural Area
SPCC	Spill Prevention, Control, and Countermeasure Plan
Step-up Transformer	A transformer that increases voltage
Stray Voltage	A voltage resulting from the normal delivery and/or use of electricity (usually smaller than 10 volts) that may be present between two conductive surfaces that can be simultaneously contacted by members of the general public and/or their animals
Substation	Existing Rock County Substation
SWPPP	Stormwater Pollution Prevention Plan
TBD	To be determined
THPOs	Tribal Historic Preservation Offices
TCPs	Traditional Cultural Properties
TV	Television
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
V	Volt
Walleye Wind	Walleye Wind, LLC
Walleye Wind Substation	Project collection substation
WECS	Wind Energy Conversion Systems
WCA	Minnesota Wetland Conservation Act of 1991
WCFZ	Worst-Case Fresnel Zone

ACRONYM/TERM	DEFINITION
WMA	Wildlife Management Area
WNS	White Nose Syndrome
WPA	Waterfowl Protection Area
WRP	Wetlands Reserve Program
Yaw	To deviate erratically from a course (as when struck by a heavy sea); to move from side to side: to turn by angular motion about the vertical axis
ZVRT	Zero Voltage Ride Through

MINNESOTA RULE COMPLIANCE

Minnesota Rule	Required Information	Application Section(s)
7854.0500	**SITE PERMIT APPLICATION CONTENTS**	
Subpart 1	**Applicant Information**	
A	A letter of transmittal signed by an authorized representative or agent of the applicant	**1.1**
B	The complete name, address, and telephone number of the applicant and any authorized representative	**1.2**
C	The signature of the preparer of the application if prepared by an agent or consultant of the applicant	**1.3**
D	The role of the permit applicant in the construction and operation of the LWECS	**1.4**
E	The identity of any other LWECS located in Minnesota in which the applicant, or a principal of the applicant, has an ownership or other financial interest	**1.5**
F	The name of the person or persons to be the permittees if a site permit is issued	**1.6**
G	Statement of Ownership and list of any other LWECS or other energy facilities located in Minnesota in which the applicant, or a principal of the applicant, has an ownership or other financial interest.	**1.7**
Subpart 2	**Certificate of Need or Other Commitment**	
A	The applicant shall state in the application whether a certificate of need for the system is required from the commission and, if so, the anticipated schedule for obtaining the certificate of need. The commission shall not issue a site permit for an LWECS for which a certificate of need is required until the applicant obtains the certificate, although the commission may process the application while the certificate of need request is pending before the commission	**2.0**
B	The commission may determine if a certificate of need is required for a particular LWECS for which the commission has received a site permit application	**2.0**
C	If a certificate of need is not required from the commission, the applicant shall include with the application a discussion of what the	**2.0**

	applicant intends to do with the power that is generated. If the applicant has a power purchase agreement or some other enforceable mechanism for sale of the power to be generated by the LWECS, the applicant shall, upon the request of the commission, provide the commission with a copy of the document	
Subpart 3	**State Policy**	
3.	State policy. The applicant shall describe in the application how the proposed project furthers state policy to site such projects in an orderly manner compatible with environmental preservation, sustainable development, and the efficient use of resources.	**3.0**
Subpart 4	**Project Description and Overview**	
A	The boundaries of the site proposed for the LWECS, which must be delineated on a United State Geological Survey Map or other map as appropriate;	**4.1-4.2**
B	The following characteristics of the wind at the proposed site: (1) Interannual variations; (2) Seasonal variations; (3) Diurnal conditions; (4) Atmospheric stability, to the extent available; (5) turbulence, to the extent available; (6) extreme conditions; (7) speed frequency distribution; (8) variation with height; (9) spatial variations; and (10) wind rose, in eight or more directions;	**9.1**
C	Other meteorological conditions at the proposed site, including the temperature, rainfall, snowfall, and extreme weather conditions	**9.1**
D	The location of other wind turbines in the general areas of the proposed LWECS	**9.2, Map 5**
Subpart 5	**Project Design**	
5.	The applicant shall include in the application information describing the applicant's wind rights within the boundaries of the proposed site.	**4.6**
Subpart 6	**Description and Location of Associated Facilities**	
6.	The applicant shall provide the following information regarding the design of the proposed project:	
A	A project layout, including a map showing a proposed array spacing of the turbines;	**4.4, 5.1** **Maps 2 & 4**

B	A description of the turbines and towers and other equipment to be used in the project, including the name of the manufacturers of the equipment;	**5.2**
C	A description of the LWECS electrical system, including transformers at both low voltage and medium voltage; and	**5.3**
D	A description and location of associated facilities	**5.1** **Maps 2& 4**
Subpart 7	**Environmental Impacts**	
7.	An applicant for a site permit shall include with the application an analysis of the potential impacts of the project, proposed mitigative measures, and any adverse environmental effects that cannot be avoided, in the following areas:	
A	Demographics, including people, homes, and businesses;	**8.1**
B	Noise;	**8.4**
C	Visual impacts;	**8.5**
D	Public services and infrastructure;	**8.6**
E	Cultural and archaeological impacts;	**8.7**
F	Recreational resources;	**8.8**
G	Public health and safety, including air traffic, electromagnetic fields, and security and traffic;	**8.9**
H	Hazardous materials	**8.10**
I	Land-based economics, including agriculture, forest, and mining;	**8.11**
J	Tourism and community benefits;	**8.12**
K	Topography;	**8.14** **Map 8**
L	Soils;	**8.15** **Map 13**
M	Geologic and groundwater resources;	**8.16** **Map 14**
N	Surface water and floodplain resources;	**8.17** **Map 11**
O	Wetlands;	**8.18** **Map 10**
P	Vegetation;	**8.19**

Q	Wildlife; and	**8.20**
R	Rare and unique natural resources.	**8.21** **Map 12**
Subpart 8	**Construction of the Project**	
8.	The applicant shall describe the manner in which the project, including associated facilities, will be constructed	**1.4, 10.1-10.5**
Subpart 9	**Operation of the Project**	
9	The applicant shall describe how the project will be operated and maintained after construction, including a maintenance schedule	**10.6**
Subpart 10	**Costs**	
10.	The applicant shall describe the estimated costs of the design and construction of the project and the expected operating costs.	**10.7**
Subpart 11	**Schedule**	
11.	The applicant shall include an anticipated schedule for the completion of the project, including the time periods for land acquisition, obtaining a site permit, obtaining financing. Procuring equipment and completing construction. The applicant shall identify the expected date of the commercial operation.	**10.8**
Subpart 12	**Energy Projections**	
12.	The applicant shall identify the energy expected to be generated by the project.	**10.9**
Subpart 13	**Decommissioning and Restoration**	
13	The applicant shall include the following information regarding decommission of the project and restoring the site:	
A	The anticipated life of the project;	**11.1**
B	The estimated decommissioning costs in current dollars;	**11.6**
C	The method and schedule for updating the costs of decommissioning and restoration;	**11.7**
D	The method of ensuring that funds will be available for decommissioning and restoration; and	**11.8**
E	The anticipated manner in which the project will be decommissioned, and the site restored.	**11.2-11.5**
14	**Identification of Other Permits**	
14	The applicant shall include in the application a list of all known federal, state, and local agencies of authorities, and titles of the permits they use that are required for the proposed LWECS.	**12**

1.0 APPLICANT INFORMATION

Walleye Wind, LLC (Walleye Wind, Applicant) respectfully submits this application (Application) to the Minnesota Public Utilities Commission (Commission) for a Site Permit to construct and operate the Walleye Wind Project (Project), a Large Wind Energy Conversion System (LWECS) with a capacity of approximately 110.8 megawatts (MWs). The Applicant is an independent power producer that will develop, construct, own, and operate the Project, which is located in the western part of Rock County. Given the size of the Project, it qualifies as a LWECS as defined in the Wind Siting Act, Minnesota Statutes Chapter 216F. The Project facilities include turbines, collection lines, a collector substation, an operations and maintenance (O&M) facility, a construction laydown yard, crane paths, gravel access roads, meteorological (MET) tower, and a generation tie line connecting to an existing substation. All Project facilities will be located in Rock County, Minnesota. The Project is projected to start construction in the second quarter of 2021, with commercial operations anticipated to commence on December 27, 2021.

The point of interconnection (POI) of the Project to the transmission system will be the existing 161-kilovolt (kV) Rock County Substation (Substation) owned and operated by Northern States Power Company (NSP). The Substation is located on the east side of 40th Avenue, north of the City of Beaver Creek in Rock County, Minnesota. The Substation will be modified to accommodate the new 110.8 MW generation tie line at the POI on the north side of the Substation. This generation tie line will extend approximately 500 feet (ft) from the Substation to the Project collection substation (Walleye Wind Substation) planned at the north side of proposed POI.

Walleye Wind, an indirect wholly-owned subsidiary of NextEra Energy Resources, LLC (NEER),[1] benefits from the capabilities developed within its network of affiliated companies, which combine to make NEER the world's largest generator of renewable energy from the wind and sun. For example, NextEra Analytics, Inc. (Analytics) has an office in St. Paul, Minnesota and is an affiliate of Walleye Wind. Analytics has decades of experience in providing engineering, technical analysis, and consulting services in the field of studying, modeling, and forecasting meteorological airflow, including scientific analysis of wind resources, wind-modeling services, and climate-prediction services in support of wind-farm development. Among other contributions, Analytics supported the development and optimization of the array proposed in this Application. Additional internal capacities, including engineering and construction, environmental, legal, regulatory, land acquisition services, and project management, have also supported the Project. This internal team is also supplemented by qualified technical consultants.

[1] NEER is a global leader in development and operation of renewable energy resources, with a total generating capacity of 15,000 MW of wind generation in operation as of January 1, 2020.

1.1 Letter of transmittal signed by an authorized representative or agent of the applicant.

Letter of transmittal signed by an authorized representative is provided as a cover letter to this draft application submission.

1.2 Complete name, address, and telephone number of the applicant and any authorized representative. The authorized representatives for the Applicant are:

Mike Weich
Project Director Renewable Development
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(561) 694-3987

Brian J. Murphy
Managing Attorney
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Brian.J.Murphy@nexteraenergy.com
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1.3 Signature of the preparer of the application if prepared by an agent or consultant of the applicant.

The Application was prepared by the Applicant, and the Applicant therefore provides below a signature from an authorized representative.

Mike Weich
Project Director Renewable Development
Walleye Wind, LLC
700 Universe Blvd
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Mike.Weich@nexteraenergy.com
(561) 694-3987

July 9, 2020

1.4 Role of the applicant in the construction and operation of the LWECS.

Walleye Wind is an independent power producer that will develop, construct, own, and operate the Project.

1.5 Operator of the LWECS if different from the applicant.

The Applicant will operate the Project.

1.6 Statement of Ownership and list of any other LWECS or other energy facilities located in Minnesota in which the applicant, or a principal of the applicant, has an ownership or other financial interest.

Although the Applicant does not own or have a direct financial interest in any other LWECS located in Minnesota, NEER has indirect ownership and financial interests in: (1) the 98.2 MW Mower County Wind facilities in Mower County; (2) the 62.25 MW Marshall Solar facilities in Lyon County; (3) the proposed 170 MW Dodge County Wind facilities in Dodge and Steele counties; (4) the proposed 109 MW Buffalo Ridge Wind facilities in Lincoln County and (6) several battery storage and distributed generation solar projects throughout the state.

2.0 CERTIFICATE OF NEED

Concurrently with the filing of this application, Walleye Wind is applying for a Certificate of Need (CON) in Docket Number IP7026/CN-20-269. Given that the Project is over 50 MW, it qualifies as a "large energy facility," as defined in Minnesota Statutes Chapter 216B.2421, subd. 2(1). Accordingly, pursuant to Minnesota Rules 7849.0200 and Minnesota Statutes Chapter 216B.243, subd. 4, Walleye Wind is required to obtain a CON to construct and operate the Project.

On February 12, 2020, Walleye Wind filed with the Commission a Petition for Exemption from Certain CON Application Requirements. The Commission approved the requested filing exemptions on April 8, 2020. The CON application is being submitted concurrently with this Application so that the CON and Site Permit applications can be reviewed at the same time.

As explained in the CON application, Walleye Wind has executed a 30-year power purchase agreement (PPA) with the Minnesota Municipal Power Agency (MMPA) for the entire output of the Project (110.8 MW). The output of the Project will assist MMPA in exceeding the Renewable Energy Standard (RES) established in Minnesota Statutes Chapter 216B.1691.

3.0 STATE POLICY

LWECS, defined as wind projects with a nameplate capacity of five megawatts or greater, are governed by Minnesota Statutes Chapter 216F, portions of Chapter 216E, and Minnesota Rules Chapter 7854. Pursuant to Minnesota Statutes Chapter 216F.08, the Project is designed to further the state policy of siting a project in an orderly manner compatible with environmental preservation, sustainable development, and the efficient use of resources. In alignment with this policy, the Project is designed to maximize wind resource development while minimizing impact on land resources and the environment. Also, as required, the Application addresses the Site Permit criteria set forth in Minnesota Statutes Chapter 216F, portions of Chapter 216E, and Minnesota Rules Chapter 7854. Therefore, project design, wind resource, and technical information are provided in accordance with applicable laws and regulations to support a thorough evaluation of the reasonableness of the proposed Project and its site.

To facilitate the review of this Application, it has been organized and prepared following the *Minnesota Department of Commerce, Energy Facility Permitting Application Guidance for Site Permitting of Large Wind Energy Conversion Systems in Minnesota* (Minnesota DOC 2019).

4.0 PROJECT DESCRIPTION AND OVERVIEW

4.1 Project Location

Walleye Wind proposes to construct the Project in Rock County located in southwestern Minnesota, west of the City of Luverne, near the South Dakota/Minnesota border.

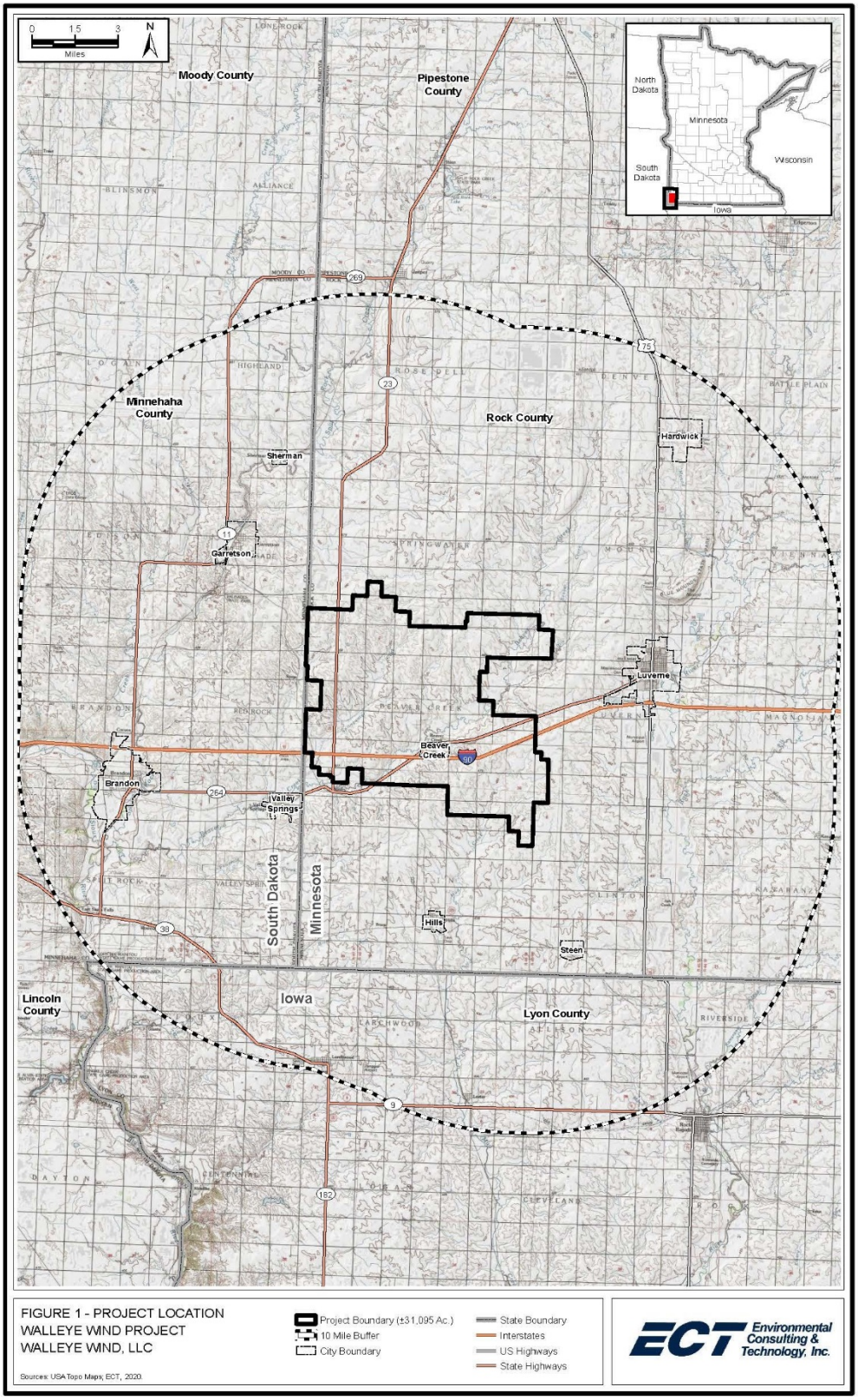
Evaluation of the area as a potentially suitable site for a wind project was begun in 2016 by a prior developer, RES. Over the course of three years, RES acquired land leases, meteorological data, filed for Federal Aviation Administration (FAA) Determinations of No Hazard (DNH), and initiated the Midcontinent Independent System Operator, Inc. (MISO) interconnection process. RES also conducted studies to determine environmental compatibility, potential wind resource, and suitability with other siting criteria. Since acquiring the Project and associated land leases from RES in September 2019, Walleye Wind has continued to study and adjust the Project boundary (Site) to minimize the potential of environmental impacts, sound and shadow flicker impacts, and land use impacts, as well as to reflect the participation of landowners in the Project. The Site is shown in **Figure 1,** and on **Map 1 (Project Location) and Map 2 (Site and Facilities).**

Table 1 below lists the Township, Range, and Sections in which the Project is located. The approximate size of the Site is 31,095 acres (49 square miles) of largely rural landscape dominated by agricultural and pasture lands typical of southwestern Minnesota.

Table 1: Project Location

County	Township Name	Township (N)	Range (W)	Section(S)
Rock County	Beaver Creek	T102N	R47W	1-2, 11-14, 23-26, 35-36
Rock County	Beaver Creek	T102N	R46W	1-11, 14-36
Rock County	Luverne	T102N	R45W	6, 30-31
Rock County	Martin	T101N	R46W	1-3, 12
Rock County	Springwater	T103N	R47W	35-36
Rock County	Springwater	T103N	R46W	30-32, 34-36

Figure 1: Project Location



4.2 Size of the Site in Acres

The Site is approximately 31,095 acres (49 square miles) of mostly agricultural land. The size of the Site allows some siting and construction flexibility in the event currently identified turbine locations prove to be unsuitable and provides sufficient room for the required setbacks and buffering of sensitive features. The siting of the turbines, collector substation, collector lines, construction laydown yard, MET tower, and O&M facility will be within the Site. The Project's facilities are shown on **Map 2 (Site and Facilities)**.

4.3 Rated Capacity

The rated capacity of the Project is approximately 110.8 MWs at the POI. In the event the alternative turbines are utilized the Project capacity would increase to approximately 111.52 MWs.

4.4 Number of Turbines and Alternate Turbine Locations

The Project capacity is approximately 110.8 MWs generated using no more than 40 wind turbines. The total capacity will be generated using a combination of four potential General Electric (GE) models including the 2.82 MW, 114 meter (m) hub height turbine; the 2.82 MW, 89 m hub height turbine; and the safe harbor 2.32 MW, 80 m hub height turbine; or the safe harbor 2.5 MW, 90 m hub height turbine.

The current preliminary turbine layout includes 11 alternative wind turbines locations utilizing the same potential turbine models. A maximum of 40 wind turbines are proposed for construction, with the inclusion of the alternative locations to provide for flexibility in the event development or constructability issues are encountered. See **Map 2 (Site and Facilities)** for the current turbine array layout.

4.5 Meteorological Towers

The Applicant anticipates installing one permanent MET tower within the Site that will remain operational for the duration of the Project. The permanent MET tower will be a free-standing lattice structure with medium intensity dual LED day and night lights as required by the FAA. Additional information on the permanent MET tower is provided in **Section 6.3**.

4.6 Percent of Wind Rights Secured

As of the June 16, 2020, Walleye Wind, has site control agreements with landowners for approximately 9,188 acres or 39.7% of the land required for successful construction and operation of the Project. At this stage, Walleye Wind is continuing to negotiate easements with landowners for the development of the Project. **Section 7** provides more details on the wind rights secured.

5.0 PROJECT DESIGN

5.1 Description of Project Layout

The Project optimizes the available wind resource while minimizing impacts to land use and the environment. The Project is sited where landowners are willing to provide Walleye Wind with wind rights. Many factors influence the best placement of Project infrastructure including, but not limited to; topography, environmental constraints, land constraints, proximity to residences, noise and shadow flicker considerations, turbine technology, engineering, landowner preferences, and siting criteria such as the setback requirements set forth in **Table 2**. The proposed turbine layout accounts for these various elements. The final turbine placement is subject to adjustment based upon pre-construction activities including, but not limited to; geotechnical and environmental surveys, land acquisition, micro-siting, field constructability reviews, and the identification and avoidance of siting constraints.

The proposed site layout is shown on **Map 4 (Turbine Layout and Constraints)**. The Project layout adheres to the wind energy conversion facility siting criteria outlined in the Commission's *Order Establishing General Wind Permit Standards*, Docket No. E, G999/M-07-1102 (2008). **Table 2** summarizes the Commission's setback standards for wind turbine permit setbacks and standards for LWECS. The Project is designed to meet these setback standards.

Review of the land cover/land use in the Site shows that it is dominated by agricultural lands. Agricultural lands are primarily cultivated crops and a small amount of pastures/hay. The Project layout has been designed to avoid sensitive areas within the Site. As discussed in more detail within **Section 8** of this Application, siting of Project infrastructure largely avoids sensitive environmental features.

Table 2: Wind Turbine Setback Requirements

Resource Category	Setback Conditions as Represented in Recent Site Permits General Permit Setback	Minimum Setback
WIND ACCESS BUFFER	Wind turbine towers shall not be placed less than 5 rotor diameter (RD) on prevailing wind directions and 3 RD on non-prevailing wind directions from the perimeter of the lands where the Permittee does not hold the wind rights, without the approval of the Commission. This section does not apply to public roads and trails.	3 RD (1146-1251 ft) on non-prevailing wind direction axis and 5 RD (1910-2085 ft) on prevailing wind direction axis using turbines with 116-127 m RD
INTERNAL TURBINE SPACING	The turbine towers shall be constructed within the site boundary as approved by the Commission. The turbine towers shall be spaced no closer than 3 RD in non-prevailing wind directions and 5 RD on prevailing wind	3 RD (1146-1251 ft) on non-prevailing wind direction axis and 5 RD (1910-2085 ft) on

Resource Category	Setback Conditions as Represented in Recent Site Permits General Permit Setback	Minimum Setback
	directions. If required during final micro-siting of the turbine towers to account for topographic conditions, up to 20% of the towers may be sited closer than the above spacing but the Permittee shall minimize the need to site the turbine towers closer.	prevailing wind direction axis using turbines with 116-127 m RD
NOISE STANDARD	Turbine towers shall be placed such that the Permittee shall, at all times, comply with noise standards established by the Minnesota Pollution Control Agency (MPCA) as of the date of this permit and at all appropriate locations. The noise standards are found in Minnesota Rules Chapter 7030. Turbine operation shall be modified, or turbines shall be removed from service if necessary, to comply with these noise standards. The Permittee or its contractor may install and operate turbines, as close as the minimum setback required in this permit, but in all cases shall comply with MPCA noise standards. The Permittee shall be required to comply with this condition with respect to all homes or other receptors in place as of the time of construction, but not with respect to such receptors built after construction of the towers.	Typically, 750-1500 ft is required to meet noise standards depending on turbine model, layout, site-specific conditions. In most cases turbines were setback at least 1,400 ft (426.7 m) from homes.
HOMES	Wind turbine towers shall not be located closer than 1,000 ft from all residences or the distance required to comply with the noise standards pursuant to Minn. R. 7030.0040, established by the MPCA, whichever is greater.	1,000 ft, or distance required to meet state noise standard, whichever is greater
PUBLIC ROADS AND RECREATIONAL TRAILS	Turbines and MET towers shall be placed no closer than 250 ft from the edge of public road right-of-way (ROW). Setbacks from state trails and other recreational trails shall be considered on a case-by-case basis.	Minimum 250 ft
PUBLIC LANDS	Turbines and associated facilities including foundations, access roads, underground cable, and transformers, shall not be located in public lands, including Waterfowl Production	3 RD (1146-1251 ft) on non-prevailing wind direction axis and 5 RD (1910-

Resource Category	Setback Conditions as Represented in Recent Site Permits General Permit Setback	Minimum Setback
	Areas, Wildlife Management Areas, Scientific and Natural Areas, or in county parks, and turbine towers shall also comply with the setbacks of WINDACCESS BUFFER.	2085 ft) on prevailing wind direction axis using turbines with 116-127 m RD
WETLANDS	Turbines and associated facilities including foundations, access roads, underground cable and transformers, shall not be placed in public waters wetlands, as shown on the public water inventory maps prescribed by Minnesota Statutes Chapter 103G.005, subdivision 5a, except that electric collector or feeder lines may cross or be placed in public waters or public waters wetlands subject to permits and approvals by the Minnesota Department of Natural Resources (MNDNR) and the United States Army Corps of Engineers (USACE), and local units of government as implementers of the Minnesota Wetlands Conservation Act.	No facility siting in public waters wetlands pending further agency action
NATIVE PRAIRIE	Turbines and associated facilities including foundations, access roads, collector and feeder lines, underground cable, and transformers shall not be placed in native prairie, as defined in Minn. Stat. § 84.02, subd. 5, unless addressed in a prairie protection and management plan and shall not be located in areas enrolled in the Native Prairie Bank Program. Construction activities, as defined in Minn. Stat. § 216E.01, shall not impact native prairie unless addressed in a Prairie Protection and Management Plan.	No facility siting in native prairie without a native prairie protection plan
METEOROLOGICAL TOWERS	Permanent towers for meteorological equipment shall be free standing. Permanent meteorological towers shall not be placed less than 250 ft (76 m) from the edge of the nearest public road ROW and from the boundary of the Permittee's site control, or in compliance with the county ordinance regulating meteorological towers in the county the tower is built, whichever is more restrictive. MET	Minimum 250 ft

Resource Category	Setback Conditions as Represented in Recent Site Permits General Permit Setback	Minimum Setback
	towers shall be placed on property the Permittee holds the wind or other development rights. MET towers shall be marked as required by the FAA. There shall be no lights on the MET towers other than what is required by the FAA. This restriction shall not apply to infrared heating devices used to protect the wind monitoring equipment.	
AVIATION	Turbines or associated facilities shall not be placed in a location that could create an obstruction to navigable airspace of public and licensed private airports (as defined in Minnesota Rule 8800.0100, subparts 24a and 24b) in Minnesota, adjacent states, or provinces. The Permittee shall apply the minimum obstruction clearance for licensed private airports pursuant to Minnesota Rule 8800.1900, subpart 5. Setbacks or other limitations shall be followed in accordance with the Minnesota Department of Transportation (MnDOT), Department of Aviation, and FAA. The Permittee shall notify owners of all known airports within 6 miles of the Project prior to construction.	
FOOTPRINT MINIMIZATION	LWECS will be designed and constructed so as to minimize the amount of land that is impacted by the LWECS. Associated facilities in the vicinity of turbines such as electrical/electronic boxes, transformers, and monitoring systems shall, to the greatest extent feasible, be mounted on the foundations used for turbine towers or inside the towers unless otherwise negotiated with the affected landowner(s).	
COMMUNICATION CABLES	All Supervisory Control and Data Acquisition (SCADA) communication cables shall be placed underground and within or adjacent to the land necessary for turbine access roads unless otherwise negotiated with the affected landowner(s).	

Resource Category	Setback Conditions as Represented in Recent Site Permits General Permit Setback	Minimum Setback
ELECTRICAL COLLECTOR AND FEEDER LINES	Collector lines that carry electrical power from each individual transformer associated with a wind turbine to an internal project interconnection point shall be buried underground. Collector lines shall be placed within or adjacent to the land necessary for turbine access roads unless otherwise negotiated with the affected landowner(s). Feeder lines that carry power from an internal project interconnection point to the Project substation or interconnection point on the electrical grid may be overhead or underground. Feeder line locations shall be negotiated with the affected landowner(s). Any feeder lines that parallel public roads shall be placed within the public ROW or on private land immediately adjacent to public roads. If feeder lines are located within public ROW, the Permittee shall obtain approval from the governmental unit responsible for the affected ROW. Collector and feeder line locations shall be located in such a manner to minimize interference with agricultural operations, including, but not limited to, existing drainage patterns, drain tile, future tiling plans, and ditches. Safety shields shall be placed on all guy wires associated with overhead feeder lines. The Permittee shall submit the engineering drawings of all collector and feeder lines in the site plan. The LWECS and associated facilities shall be designed to meet or exceed all relevant local and state codes, Institute of Electrical and Electronics Engineers, Inc. (IEEE) standards, the National Electric Safety Code (NESC), and North American Electric Reliability Corporation (NERC) requirements. The Permittee shall report to the Commission on compliance with these standards upon request.	

5.2 Description of Turbines and Towers

The Project will be using a combination of four potential GE models. The 2.82 MW, 114 m hub height turbine; the 2.82 MW, 89 m hub height turbine; and the safe harbor 2.32 MW, 80 m hub height turbine; or the safe harbor 2.5 MW, 90 m hub height turbine. The characteristics for these turbines are summarized in **Table 3**. The selected turbines are each three-bladed, active yaw, and active aerodynamic control regulated wind turbine generators with power/torque control capabilities. The rotors utilize blade pitch regulation and other technologies to achieve optimum power output under various site conditions and wind speeds. All of the turbines will attach Low Noise Trailing Edge (LNTE) serrations on the turbine blades to reduce sound impacts. LNTE serrations will be the same color as the turbine blades and will cover approximately 20-30% of the trailing edge of the outboard blade length. In addition to the LNTE some turbines may utilize Noise Reduced Operation (NRO), if required. The NRO mode reduces the sound power level by lowering the rotor speed, which therefore lowers the blade tip speed, and can also modify the blade pitch. Utilizing these two techniques, where needed, specific turbines will meet the required noise levels.

Table 3: Wind Turbine Characteristics

Design Features	GE 2.82 MW Turbine	GE 2.82 MW Turbine	GE 2.32 MW Turbine	GE 2.5 MW Turbine
Nameplate Capacity	2.82 MW	2.82 MW	2.32 MW	2.5 MW
Hub Height	114 m (374 ft)	89 m (292 ft)	80 m (262.5 ft)	90 m (295.3 ft)
Rotor Swept Area	12,704 m² (136,745 ft²)	12,704 m² (136,745 ft²)	10,660 m² (114,743 ft²)	10,660 m² (114,743 ft²)
Total Height (ground to fully extended blade tip)	178.1 m (584.3 ft)	152.1 m (499 ft)	138.3 m (453.7 ft)	148.25 m (486.4 ft)
Rotor Diameter	127.2 m (417 ft)	127.2 m (417 ft)	116.5 m (382 ft)	116.5 m (382 ft)
Design Life	Design criteria contemplates 20 years	Design criteria contemplates 20 years	Design criteria contemplates 20 years	Design criteria contemplates 20 years
Cut in Wind Speed	3 m/s (10 ft/second (s))	3 m/s (10 ft/ s)	3 m/s (10 ft/s)	3 m/s (10 ft/s)
IEC Wind Class	S	S	S	S

Design Features	GE 2.82 MW Turbine	GE 2.82 MW Turbine	GE 2.32 MW Turbine	GE 2.5 MW Turbine
Cut Out Wind Speed	30 m/s average (98.4 ft/s) in a 600-second interval, 35 m/s average (144.8 ft/s) in a 30-second interval and 39 m/s average (305 ft/s) in a 3-second interval	30 m/s average (98.4 ft/s) in a 600-second interval, 35 m/s average (144.8 ft/s) in a 30-second interval and 39 m/s average (305 ft/s) in a 3-second interval	32 m/s average (105 ft/s) in a 600-second interval, 37 m/s average (102 ft/s) in a 30-second interval and 41 m/s average (134.5 ft/sec) in a 3-second interval	32 m/s average (105 ft/s) in a 600-second interval, 37 m/s average (102 ft/s) in a 30-second interval and 41 m/s average (134.5 ft/sec) in a 3-second interval
Rotor Speed	7.4-15.7 Revolutions Per Minute (RPM)	7.4-15.7 RPM	7.4-15.7 RPM	7.4-15.7 RPM
Tip Speed at rated power	85.1-89.1 m/s (279.2-292.3 ft/s)	85.1-89.1 m/s (279.2-292.3 ft/s)	81.7-85.4 m/s (268.0-280.18 ft/s)	81.7-85.4 m/s (268.0-280.18 ft/s)
Sound at Turbine	Lw = 108.5 A-Weighted Decibels (dBA) with LNTE	Lw = 108.5 dBA with LNTE	Lw = 106.0 dBA with LNTE	Lw = 105.5 dBA with LNTE
Power Regulation	Blade pitch controls power. Controls included for Zero Voltage Ride Through (ZVRT) and enhanced reactive power (0.9 power factor).	Blade pitch controls power. Controls included for ZVRT and enhanced reactive power (0.9 power factor).	Blade pitch controls power. Control s included for ZVRT and enhanced reactive power (0.9 power factor).	Blade pitch controls power. Control s included for ZVRT and enhanced reactive power (0.9 power factor).
Generation	2.82 MW per turbine	2.82 MW per turbine	2.32 MW per turbine	2.5 MW per turbine
Tower	Multi-coated, conical tubular steel with safety ladder to the nacelle. Rest	Multi-coated, conical tubular steel with safety ladder to the nacelle. Rest	Multi-coated, conical tubular steel with safety ladder to the nacelle. Rest	Multi-coated, conical tubular steel with safety ladder to the nacelle. Rest

Design Features	GE 2.82 MW Turbine	GE 2.82 MW Turbine	GE 2.32 MW Turbine	GE 2.5 MW Turbine
	platforms each section.	platforms each section.	platforms each section.	platforms each section.
Nacelle Bedplate	Cast iron bedplate with fabricated extension to support the generator.	Cast iron bedplate with fabricated extension to support the generator.	Cast iron bedplate with fabricated extension to support the generator.	Cast iron bedplate with fabricated extension to support the generator.
Main Bearings	Roller Bearings	Roller Bearings	Roller Bearings	Roller Bearings
SCADA	Each turbine is equipped with SCADA controller hardware, software and database storage capability.	Each turbine is equipped with SCADA controller hardware, software and database storage capability.	Each turbine is equipped with SCADA controller hardware, software and database storage capability.	Each turbine is equipped with SCADA controller hardware, software and database storage capability.
FAA Lighting	Yes, per FAA permitting.	Yes, per FAA permitting.	Yes, per FAA permitting.	Yes, per FAA permitting.
NRO	Operation of a turbine at a reduced rotor speed and with an optimized blade pitch angle, to lower the sound emitted	Operation of a turbine at a reduced rotor speed and with an optimized blade pitch angle, to lower the sound emitted	-	-
Foundation	Per manufacturer specifications - spread foot or pier foundation- TBD.	Per manufacturer specifications - spread foot or pier foundation- TBD.	Per manufacturer specifications - spread foot or pier foundation- TBD.	Per manufacturer specifications - spread foot or pier foundation- TBD.

Source: GE manufacturer specifications.

Each turbine is comprised of a foundation, tower, nacelle, hub, and three blades. The turbine towers are comprised of cylindrical, tapered steel consisting typically of three to four sections joined together via factory-fabricated welds which are automatically controlled and ultrasonically inspected during manufacturing per American National Standards Institute (ANSI) specifications. Wind turbine surfaces are coated for protection against corrosion in generally non-glare white, off white, or gray. Each turbine can be accessed through a lockable steel door at the base of the tower, through which the nacelle and turbine blades can be accessed. Inside each tower, platforms are accessible via ladder or lift, which are equipped with fall arresting safety systems.

Each turbine tower includes a control panel housing electronic and communication equipment. Each unit includes a wind speed and direction sensor that supports signaling when winds are sufficient for turbine operation. Each turbine is equipped with variable-speed control and independent blade pitch to enhance efficiency. An automated SCADA system located at the Project substation provides local and remote supervision and control of turbine equipment and performance.

5.3 Description of Electrical System

Each of the Project's 40 turbines will have a step-up transformer pad-mounted outside at the base of unit. Energy from the turbines will be routed through underground electrical collection systems that will deliver power to the Walleye Wind Substation. This power will be stepped up at the Walleye Wind Substation from the collection line voltage of 34.5 kV to the interconnection voltage of 161 kV. The entire collection system will be designed to meet applicable requirements of the National Electric Safety Code (NESC). The design work includes a load flow analysis for the Project to ensure the facility will meet the power factor and voltage control specifications. A coordination study will determine the appropriate protective relay settings for optimum protection and selectivity for the Project's electrical system and transmission system interface requirements. See **Sections 6.1** and **6.2** for a more detailed description of the proposed electrical system. The preliminary electrical collection layout is provided on **Map 2 (Site and Facilities)**.

Transformers

Power from the turbines is fed through a breaker panel at the turbine's base inside the tower and is interconnected to a pad-mounted step-up transformer, which steps the voltage up from 690 volt (V) to 34.5 kV. Protection for the transformer and wind turbine is provided by a breaker at the turbine down tower cabinet, located inside the tower.

Electrical Collection System

The project will utilize 34.5 kV underground electrical power lines to collect power from the turbines and transmit it to the Walleye Wind Substation. The entire collection system will be direct buried cable. The underground cables will be installed in a trench that is approximately 3 to 4 ft (approximately 0.9 to 1.2 m) deep.

Substation

The POI for the Project will be the existing 161 kV substation owned and operated by NSP. The substation is located on the east side of 40th Avenue, north of the City of Beaver Creek in Rock County, Minnesota. The POI substation will be expanded to the north in order to accommodate the new 161 kV string from the Walleye Wind Substation. This generation tie line will extend approximately 500 ft from the Substation to the Walleye Wind Substation.

Interconnection

The interconnection to the transmission grid for the Project is planned at the existing 161 kV substation. The generation tie line will extend approximately 500 ft from the substation to the Walleye Wind Substation planned at the north side of proposed POI. Because the length of the generation tie line will be less than 1,500 ft, no Route Permit will be required.

6.0 DESCRIPTION AND LOCATION OF ASSOCIATED FACILITIES

Map 2 (Site and Facilities) shows the proposed locations of wind turbines, underground collection line corridors, crane walk paths, access roads, MET tower, the O&M facility, and other associated facilities.

6.1 Transmission and Project Substations

A 161 kV string bus will deliver the output of the Project from the Walleye Wind Substation described below to the POI.

Walleye Wind Substation

Walleye Wind proposes to construct the new Walleye Wind Substation to the north of the existing Substation located on the east side of 40th Avenue, north of the City of Beaver Creek in Rock County, Minnesota.

Using pad-mounted transformers outside each turbine, the low voltage (690 V) power produced by each wind turbine will be stepped up to 34.5 kV and channeled into the wind farm collection system, which in turn will feed into the 34.5 kV Walleye Wind Substation. The Walleye Wind Substation will then step up the 34.5 kV collection system voltage to the 161 kV generation tie line voltage.

The Walleye Wind Substation will include 34.5 kV and 161 kV busses, transformers, circuit breakers, reactive equipment if required, steel structures, a control building, metering units, and air break disconnect switches. Utility-grade ceramic/porcelain or composite/polymer insulators designed and constructed in accordance with ANSI C29 will be used.

The footprint of the Walleye Wind Substation will be on an approximately 10-acre site along with the O&M facility. The Walleye Wind Substation is anticipated to impact approximately a 20,000-square feet (sf) gravel pad permanently.

Point of Interconnection

The POI of the Project to the transmission system will be the 161 kV Substation owned and operated by NSP.

6.2 Collector Lines and Feeder Lines

Power from each wind turbine will be fed down the tower from the generator through the power conditioning equipment and circuit breaker. The generator voltage is stepped up to the collector system voltage of 34.5 kV via step-up transformers located on grade mounted pads outside the base of each tower. The electricity from each turbine step-up transformer is connected to the Walleye Wind Substation through a maximum of approximately 35 miles of trenched underground 34.5 kV collector lines. Corridors depicted on the maps show all potential collection corridors, but that the actual length of collection lines will total approximately 35 miles for primary turbines). Within the 35 miles of collection trench approximately 105 miles of underground collection cable will be buried. The underground collection line cables will be buried approximately 3 to 4 ft (0.9

to 1.2 m) underground. **Map 2 (Site and Facilities)** shows the preliminary design of the underground collection cables.

6.3 Associated Facilities

O&M Facility

An O&M facility will be constructed within the Site to serve as a center for the Project's O&M activities. The O&M facility will provide office space for the crews, as well as a storage area for spare parts and vehicles. It will also house the central monitoring equipment for the generating facility where the turbines are monitored and controlled. The footprint of the facility will be on an approximately 10-acre site along with the Walleye Wind Substation. The O&M building is anticipated to be approximately 3,500 sf with a fenced area to include an access road parking lot, storage, etc. of up to one acre.

Permanent Meteorological Tower

As stated in **Section 4.5**, the Applicant anticipates installing one permanent MET tower within the Site that will remain operational for the duration of the Project. The MET tower will be no closer than 250 ft (76.2 m) from the edge of road ROW and from the boundaries of Walleye Wind's site control. Consistent with typical Commission site permit requirements, the permanent MET tower will be free-standing and will not use guy wires. The MET towers will be approximately 374 ft (114 m) tall.

The MET tower will contain instruments such as anemometers, data loggers, wind direction sensors, and temperature probes that can be configured at various elevations, as well as a communication system for providing remote reporting of the data being collected. The temporary area required to construct the MET tower is expected to be approximately 400 by 400 ft (122 by 122 m) and includes space for equipment storage, material lay down, and construction staging. The permanently impacted area will be less than 0.1 acre since the MET tower will be self-supporting lattice structures. FAA DNHs will be obtained for the tower location prior to installation and will have appropriate lighting and marking as required by the FAA.

Turbines Access Roads and Temporary Laydown Yard

Each turbine will have a low-profile gravel access road to connect the turbine with the public road network or private access roads. Walleye Wind will design all access roads to serve the Project in an efficient manner, with the needs of landowners and input from local authorities considered. The roads will be all-weather gravel construction and approximately 16 ft (approximately 5 m) wide once the wind project is operational. The approximate length of permanent access roads to be installed is 11.6 miles with final length determined by final layout.

During construction, temporary access roadways will be prepared to facilitate crane movement and equipment delivery during construction. These temporary access roadways will be constructed to a width of up to 45 ft (14 m). Drainage culverts will be installed as appropriate.

The Project will also require grading of a temporary laydown area of approximately 18 acres. The temporary laydown area will serve as a location for parking during construction, an area where office trailers will be situated, and as a storage and staging area for construction materials and equipment during construction. The temporary laydown area will be located in an agricultural area within the Site where land use rights have been acquired and environmental surveys have been conducted.

It is not anticipated that a concrete batch plant will need to be established for Project use within the Site.

7.0 WIND RIGHTS

Walleye Wind has substantially completed securing landowner agreements for wind rights and property easements necessary to support the Project. The overall area within the Site consists of approximately 31,095 acres (49 square miles). As of June 16, 2020, Walleye Wind has executed and recorded landowner agreements for approximately 9,188 acres within the Site, which is approximately 39.7% of the land required to complete the Project. Walleye Wind remains in negotiation with a number of landowners within the Site and anticipates acreage being added to the Project's leased lands before construction. Participating and non-participating parcels and landowners are shown on **Map 4 (Turbine Layout and Constraints)**. The secured easement agreements will ensure access for construction and operation of the Project and identify the obligations and responsibilities of the landowners and Walleye Wind. When land acquisition is complete, the leasehold will be sufficient to accommodate the proposed Project in compliance with the setback requirements identified in **Table 2** above.

8.0 ENVIRONMENTAL IMPACTS

In accordance with Minnesota Rule 7854.05000, Subp. 7, Section 8 of this Application provides an analysis of the potential environmental impacts of the Project, proposed mitigation measures, and any adverse environmental effects that cannot be avoided. As part of Project development and in preparation for this Application, the Applicant initiated coordination with applicable regulatory agencies, including the MNDNR, the United States Fish and Wildlife Service (USFWS), the Minnesota State Historic Preservation Office (SHPO), and Rock County. A detailed list of agencies and entities contacted, coordinated with, and received responses are set forth in **Appendix A (Agency Correspondence)**.

Analysis of the area as a potentially suitable site for a wind project began in 2016. Since acquiring the Project from RES in 2019, Walleye Wind has continued to study and refine the Site to minimize the Project's potential impact on the environment and land use. Walleye Wind has used both the results of previously conducted and ongoing studies as well as agency input to inform the appropriate siting of Project infrastructure.

In order to assess potential environmental impacts from Project development, the Applicant reviewed available information and geospatial data from multiple sources, including federal, state, local, and non-governmental organizations. Datasets and resources reviewed include, but are not limited to:

- 2016 National Land Use/Land Cover Database
- United States Geological Survey (USGS) topographic maps
- USFWS's National Wetland Inventory (NWI) maps
- USFWS's Information for Planning and Consultation (IPaC) tool
- United States Census Bureau American Community Survey (ACS)
- Minnesota Department of Employment and Economic Development (MNDEED) Data
- USGS Protected Areas Database
- United States Department of Agriculture (USDA)-Natural Resources Conservation Service (NRCS) Web Soil Survey
- Minnesota Board of Water and Soil Resources (BWSR) Reinvest in Minnesota (RIM) Interactive Mapper
- SHPO data
- MNDNR data
- Minnesota Public Waters Inventory (PWI)
- MnDOT
- Rock County Planning and Zoning Ordinance
- Rock County Renewable Energy Ordinance
- MPCA data

8.1 Demographics

The Project is located in southwestern Minnesota in an agricultural/rural region within Beaver Creek, Luverne, Martin, and Springwater Townships in Rock County, Minnesota. The City of Beaver Creek is located within southwestern portions of the Site. Additional municipalities within 5-miles of the Site boundary include the cities of Luverne, Hills and Steen, Minnesota, as well as Valley Springs, Garretson, and Sherman, South Dakota.[2] The City of Luverne, located approximately 3-miles east of the Site, is the county seat for Rock County.

8.1.1 Population Density

The 2010 census population for Rock County was 9,687 (U.S. Census Bureau 2010) with a population density of 20.1 individuals per square mile, while the U.S. Census 2018 ACS population estimate for Rock County was 9,414, representing a decrease of approximately -2.8% (U. S. Census Bureau 2018).

8.1.2 Environmental Justice Analysis

According to the U.S. Environmental Protection Agency (EPA), "Environmental justice is the fair treatment and meaningful involvement of all people… with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies" (EPA 2015). Environmental justice entails making sure that all communities surrounding a Project are equally-protected under federal, state, and local laws.

U.S. Census Bureau 2013-2017 ACS demographic profile data for Minnesota, Rock County, and townships within the Site, including Beaver Creek, Luverne, Martin, and Springwater, are provided in **Table 4** (U. S. Census Bureau 2017). The demographic profile also summarizes some of the population and economic characteristics of the City of Beaver Creek, which overlaps southwestern portions of the Site.

Table 4: Population and Economic Characteristics

Location	2017 Estimated Population	Minority Population (%)	Housing Units (Occupied)	Per Capita Income	Individuals Below Poverty Line (%)
Minnesota	5,490,726	13.7	2,153,202	$34,712	10.5
Rock County	9,433	3.3	3,918	$29,000	11.0

[2] All Project infrastructure, turbines, and the Site are located in Rock County, Minnesota. The information collected for the Project's study areas that extend into South Dakota is presented for informational purposes consistent requirements set forth in the *Minnesota Department of Commerce, Energy Facility Permitting Application Guidance for Site Permitting of Large Wind Energy Conversion Systems in Minnesota* (Minnesota DOC 2019).

Location	2017 Estimated Population	Minority Population (%)	Housing Units (Occupied)	Per Capita Income	Individuals Below Poverty Line (%)
Beaver Creek Township	416	5.8	151	$27,533	16.1
Luverne Township	468	0	184	$34,666	3.2
Springwater Township	232	0	81	$30,426	14.7
Martin Township	362	1.4	155	$54,158	1.1
City of Beaver Creek	371	6.7	171	$27,176	7.9

Source: U.S. Census Bureau, 2013-2017 American Community Survey 5-Year Estimates

The Minnesota State Demographic Center's most recent population numbers are for 2018 (Minnesota State Demographic Center 2019). According to these estimates, Rock County had a total population of 9,435 and an estimated number of households at 3,906 in 2018. These numbers are very similar to those provided in the ACS 2013-2017 estimates (U. S. Census Bureau 2017) (**Table 4**).

According to the ACS 2013-2017 estimates, the educational services and health care and social assistance industries accounted for 25% of jobs statewide in Minnesota, followed by manufacturing at 13.5% and retail trade at 11.1%. According to the ACS 2013-2017 estimates, educational services and health care and social assistance accounted for 25.8% of jobs in Rock County, followed by retail trade at 12.1% and manufacturing at 11.2% (U. S. Census Bureau 2017).

Potential Impacts

During construction of the Project, approximately 150 to 185 temporary construction personnel will be required. Over the duration of construction (approximately 5-7 months), these personnel will abide in or around Rock County. During the operations phase of the Project, which is expected to be 30 years, approximately 4 permanent O&M staff will support Project operations locally.

As a result of these factors short-term housing for temporary construction personnel will be required during Project construction, but this need is expected to be met through nearby lodging such as hotels. During the operations phase of the Project, permanent O&M staff will support Project operations locally and will not generate a significant increase in the demand for long-term housing within the area. Due to the temporary nature of the construction personnel and the limited amount of permanent O&M staff, the Project is not anticipated to significantly change the population densities of the Site or Rock County.

Environmental justice concerns can arise as a result of wind development; however, "well-sited wind projects are more likely to be seen as an environmental justice asset" with a "minimal local burden of environmental harm" (Outka 2012). One environmental justice concern that arises in the region of the country where the Project is located is the impact of LWECS on contemporary resources that are important to Native American tribes, particularly in light of the Project's proximity to Blue Mounds State Park.

Mitigation Measures

Developing the LWECS will avoid impacts to resources important to Native American tribes by working with area tribes to identify and avoid these resources during design and construction. Walleye Wind contacted thirty-one (31) Native American tribes with expected ancestral ties to the Project area of which thirteen (13) responded. None of the respondents indicated a concern with contemporary resources in proximity to the Project location. Details of collaboration with interested Tribes to identify and avoid traditional cultural resources considered significant by the Tribes can be found in Section 8.7.1.

No additional mitigation measures for population density are proposed as the Project is not expected to impact the demographics of the local community.

8.2 Land Use

8.2.1 Local Zoning and Comprehensive Plans

Local governments develop comprehensive plans as community planning tools to guide the future and direction of land use and development within a county or municipality. Comprehensive plans generally include goals and objectives regarding current and future land use, demographics, housing trends, economic development, and natural resources. In preparing the Application, Walleye Wind has reviewed the area surrounding the Site for the most recently adopted comprehensive plans. Neither Rock County nor the townships within the Site have adopted a comprehensive plan; however, Rock County has adopted local zoning and ordinances that are applicable to wind energy conversion systems (WECS) under 5 MW.[3] **Table 5** provides an inventory of governing bodies within and adjacent to the Site, along with their respective local zoning ordinances, and comprehensive plans, if available.

[3] Under Minnesota Statute Section 216F.081, "The commission, in considering a permit application for LWECS in a county that has adopted more stringent standards, shall consider and apply those more stringent standards, unless the commission finds good cause not to apply the standards."

Table 5: Local Zoning Inventory for Local Governments

Governing Body	Name of Ordinance	Year Adopted/Updated
Rock County	Rock County Planning and Zoning Ordinance	2000
Rock County	Rock County Renewable Energy Ordinance (WECs with a rated capacity of less than 5,000 kV and Large and Small Solar Energy Systems)	2018

The nearby cities of Luverne, Minnesota, as well as Brandon and Valley Springs, South Dakota, all have established local zoning and/or comprehensive plans. All Project infrastructure, however, will be sited outside of and set back from these neighboring jurisdictions.

8.2.2 County or Local Ordinances

Under Minnesota Statute Section 216F.081, "The commission, in considering a permit application for LWECS in a county that has adopted more stringent standards, shall consider and apply those more stringent standards, unless the commission finds good cause not to apply the standards." Turbines associated with the Project are sited solely in Rock County. Rock County has adopted regulations and performance standards for WECS that can be found in Sections 8 and 9 of the Rock County Renewable Energy Ordinance. Rock County regulates WECS with a rated capacity of less than 5 MW, and regulates the installation, operation, and decommissioning of WECS within Rock County not otherwise subject to siting and oversight by the State of Minnesota pursuant to Minnesota Statutes, Chapter 216F, Wind Energy Conversion Systems, as amended (Rock County 2018). Should the Commission nevertheless determine that it must consider the County's standards under Minnesota Statute Section 216F.081, Rock County has provided a letter on July 6, 2020 indicating that the County supports a finding that there is good cause not to apply the County's standards to the Project. See **Appendix A (Agency Correspondence) Appendix A** for a copy of the letter from Rock County.

Walleye Wind is committed to working with the counties to address local concerns and obtain applicable local permits, including, for example, building permits for the O&M facility and substation.

8.2.3 Current and Future Zoning

The Rock County Planning and Zoning Ordinance only applies to unincorporated areas. Several neighboring cities have their own zoning regulations (Luverne, Minnesota; Valley Springs, Garretson, and Sherman, South Dakota); however, the entire Site occurs outside of incorporated areas and all Project infrastructure will be sited at least 1-mile from incorporated areas of Rock County, including Luverne, which has an orderly annexation agreement. No officially designated urban expansion areas are located within Rock County. The City of Luverne, which is approximately 3-miles east of the Site, is the largest urban area within the vicinity of the Project.

The 2010 Census population of Luverne was 4,745 (U.S. Census Bureau 2010), while the 2018 population estimate was 4,580 (U. S. Census Bureau 2018).

Map 7 (Zoning) shows the zoning in Rock County for the Site. The portions of the Site within Rock County primarily occur in the county-zoned General Agricultural District (A-2) with portions surrounding Interstate-90 occurring within the county-zoned Limited Agricultural District (A-1). A Federal Emergency Management Agency (FEMA) floodplain (Zone A) associated with Beaver Creek is also present within the Site as shown on the county zoning maps. Rock County Planning and Zoning Ordinance, adopted August 22, 2000, contains regulations for Shoreland and Floodplain districts. Section 18 of the ordinance is the Shoreland District regulations and Section 19 is the Floodplain Management District regulations. As proposed, the Project adheres to Rock County's zoning requirements, specifically section 18 and 19, with no permanent infrastructure placed in either district and it would be compatible with the rural, agricultural character of Rock County.

Potential Impacts

The Site occurs primarily within county-zoned agricultural districts. Walleye Wind is not likely to impact future zoning and expansion of incorporated areas in the vicinity of the Site, and development of the Project will allow the continued agricultural use of the Site.

Temporary and permanent impacts to current land use are anticipated to occur from the construction of the Project. For more information on these potential impacts, see **Sections 8.11** and **8.19**.

Mitigation

Mitigation for impacts to existing land use are described in **Sections 8.11** and **8.19**.

8.3 Conservation Easements

A variety of programs exist whereby landowners can sell or donate an easement to state, federal or non-governmental organizations to meet conservation objectives. Some of these programs include the Conservation Reserve Program (CRP), Conservation Reserve Enhancement Program (CREP), Reinvest in Minnesota (RIM) Program, Wetlands Reserve Program (WRP), and Permanent Wetland Preserves Program. These programs have varying requirements including the length of time parcels are protected, annual lease rates, and the type of habitat protected.

RIM acquires conservation easements to permanently protect and restore natural resources within the state (BWSR 2020b). Under the RIM Program, conservation easements remain under private ownership, but landowners receive financial assistance to establish conservation practices following plans developed by county Soil & Water Conservation Districts. One approximately 39-acre property perpetually enrolled with the RIM program is located within the southern portion of the Site, near the town of Beaver Creek, Minnesota (BWSR 2020b). The USDA-NRCS WRP program is a voluntary program in which the NRCS provides landowners with the financial and technical support in the restoration or enhancement of wetlands on their property. Property may

be enrolled with the WRP for 30 years or permanently. Under a cost-share agreement, property may also be restored or enhanced without the placement of an easement on the Property (USDA-NRCS 2020c). The RIM-WRP is a partnership between Minnesota's RIM and USDA-NRCS's WRP programs (BWSR 2017).

The Minnesota CREP is a partnership between the USDA Farm Service Agency (FSA) and BWSR that implements programs to improve water quality and habitat within agricultural areas of Minnesota (BWSR 2020a). Land cannot be enrolled in the CREP without first being enrolled in the CRP. The CREP is a partnership between county, state, and federal governments, while the CRP is a federal government program. Both programs are voluntary and focus on conserving environmentally sensitive land, with CRP contracts ranging from 10-15 years in length and CREP contracts being a 15-year agreement or a perpetual easement (USDA-FSA 2020; BWSR 2020a).

The National Conservation Easement Database identifies three properties totaling approximately 22 acres enrolled in the CREP within the eastern portion of the Site.

Refer to **Table 6** below for additional details on these parcels.

Table 6: Conservation Easements within the Site

Conservation Program	Acreage	Location	Expiration Year
CREP	7.4	0.18 miles west of the intersection of 90th Avenue and 131St Street along Beaver Creek	2052
CREP	10.2	0.18 miles west of the intersection of 90th Avenue and 131St Street along Beaver Creek	2052
CREP	4.7	Along County Road 4, 0.11 miles south of the intersection of 101st and 90th Avenue	2052
RIM-WRP	39.0	0.37 miles northwest of the intersection of I-90 and Highway 6.	N/A-Perpetual

Potential Impacts

Land with conservation easements could be directly impacted if Project infrastructure were placed within these easements. Participating landowners could also incur penalties due to the removal of their land from a conservation program.

Mitigation

Walleye Wind has incorporated the locations of the CREP and RIM-WRP easements into the proposed layout so that these locations will be avoided and not disturbed by Project activities. Refer to **Map 15 (Land Ownership)**. Walleye Wind will work with participating landowners to identify any CRP easements. If CRP easements are determined to be present, the locations will be incorporated into Project design as it relates to turbine and road layout, and any other associated construction activities, and these lands will be avoided to the maximum extent practicable. If the Project requires the placement of permanent infrastructure within CRP land, the Applicant will work with the landowner to remove the land from the CRP program and will cover the costs of any penalties incurred due to the removal of the easement from the program.

8.4 Noise

The Project is designed to meet the requirements of the MPCA's State Noise Standards (Minnesota Rules Chapter 7030). Epsilon Associates, Inc. (Epsilon), an expert environmental engineering and consulting firm specializing in sound and shadow flicker studies for wind projects, was retained to conduct a pre-construction sound level assessment for the Project. Epsilon completed a comprehensive sound level modeling assessment to predict worst-case future L_{50} sound levels from the Project which, when combined with existing non-Project wind turbine sound levels and non-wind-turbine ambient sound levels, were evaluated with respect to the total sound level limit. The assessment accounted for various factors in the Project vicinity including other existing wind turbines (Prairie Rose Wind Farm and MinWind I and II) not associated with the Project. The analysis includes a total of 51 Project-related wind turbines (40 proposed plus 11 alternates) of which four (4) are proposed to be GE 2.32-116 wind turbines and 47 are proposed to be GE 2.82-127 wind turbines. The array was designed to ensure that Project Only sound at Noise Area Classification (NAC) 1 receptors were 47 dBA or less. All wind turbines will have LNTE blades.

An ambient sound level measurement program for the Project was conducted by Hankard Environmental, Inc. in the late winter/early spring of 2020. The pre-construction sound level assessment utilizes the findings of the ambient sound level measurement program. Results of both the Sound Level Assessment and Pre-Construction Ambient Measurement Reports are presented in **Appendix B (Sound Level Assessment Report)**.

8.4.1 Modeling Methodology and Ambient Sound Levels

There are several ways in which sound levels are measured and quantified. All of them use the logarithmic decibel (dB) scale. The following information defines the sound level terminology used in this analysis.

The dB scale is logarithmic to accommodate the wide range of sound intensities found in the environment. A property of the decibel scale is that the sound pressure levels of two or more separate sounds are not directly additive. Every 3-dB change in sound level represents a doubling or halving of sound energy. The human ear does not perceive changes in the sound pressure level as equal changes in loudness. Scientific research demonstrates that the following general

relationships hold between sound level and human perception for two sound levels with the same or very similar frequency characteristics (Bies and Hansen 2009):

- 3 dBA increase or decrease results in a change in sound that is just perceptible to the average person,
- 5 dBA increase or decrease is described as a clearly noticeable change in sound level, and
- dBA increase or decrease is described as twice or half as loud.

Another mathematical property of decibels is that if one source of sound is at least 10 dB louder than another source, then the total sound level is simply the sound level of the higher-level source.

A Sound Level Meter (SLM) that is used to measure sound is a standardized instrument. It contains "weighting networks" (e.g., A-, C-, Z-weightings) to adjust the frequency response of the instrument. Frequencies, reported in Hertz (Hz), are detailed characterizations of sounds, often addressed in musical terms as "pitch" or "tone". The most commonly used weighting network is the A-weighting because it most closely approximates how the human ear responds to sound at various frequencies. The A-weighting network is the accepted scale used for community sound level measurements; therefore, sounds are frequently reported as detected with a sound level meter using this weighting. A-weighted sound levels emphasize middle frequency sounds (i.e., middle pitched – around 1,000 Hz), and de-emphasize low and high frequency sounds. These sound levels are reported in decibels designated as "dBA". The C-weighting network has a nearly flat response for frequencies between 63 Hz and 4,000 Hz and is noted as dBC. Z-weighted sound levels are measured sound levels without any weighting curve and are otherwise referred to as "unweighted". Because the sounds in our environment vary with time they cannot simply be described with a single number. Two methods are used for describing variable sounds. These are exceedance levels and the equivalent level, both of which are derived from some number of moment-to-moment A-weighted sound level measurements. Exceedance levels are values from the cumulative amplitude distribution of all of the sound levels observed during a measurement period. Exceedance levels are designated Ln, where n can have a value between 0 and 100 in terms of percentage. Several sound level metrics that are reported in community sound monitoring are described below.

- L_{10} is the sound level exceeded only 10 percent of the time. It is close to the maximum level observed during the measurement period. The L_{10} is sometimes called the intrusive sound level because it is caused by occasional louder sounds like those from passing motor vehicles.
- L_{50} is the sound level exceeded 50 percent of the time. It is the median level observed during the measurement period. The L_{50} is affected by occasional louder sounds like those from passing motor vehicles; however, it is often found comparable to the equivalent sound level (L_{eq}) under relatively steady sound level conditions.
- L_{90} is the sound level exceeded 90 percent of the time during the measurement period. The L_{90} is close to the lowest sound level observed. It is essentially the same as the residual sound level, which is the sound level observed when there are no obvious nearby intermittent sound sources.

- L_{eq} is the level of a hypothetical steady sound that would have the same energy (i.e., the same time-averaged mean square sound pressure) as the actual fluctuating sound observed. The L_{eq} and is typically A-weighted. The equivalent level represents the time average of the fluctuating sound pressure, but because sound is represented on a logarithmic scale and the averaging is done with linear mean square sound pressure values, the L_{eq} is mostly determined by loud sounds if there are fluctuating sound levels.

The Project, within Rock County, MN, is required to comply with MPCA's 7030.0040 sound standard, which states:

> Subpart 1. Scope. These standards describe the limiting levels of sound established on the basis of present knowledge for the preservation of public health and welfare. These standards are consistent with speech, sleep, annoyance, and hearing conservation requirements for receivers within areas grouped according to land activities by the noise area classification (NAC) system established in part 7030.0050. However, these standards do not, by themselves, identify the limiting levels of impulsive noise needed for the preservation of public health and welfare. Noise standards in subpart 2 apply to all sources, see **Table 7**.

Table 7: MPCA State Noise Standards – Hourly A-Weighted Decibels

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

Minn. Rule 7030.0020 defines daytime hours as 7:00 AM to 10:00 PM and nighttime hours from 10:00 PM to 7:00 AM. All daytime and nighttime limits are expressed in dBA and are applicable over the duration of an hour. These are to be measured using the fast response characteristic of the measurement instrumentation per Minn. Rule 7030.0060.

Noise is defined by the State of Minnesota under Minnesota Statute 2017 Section 116.06 as "any sound not occurring in the natural environment, including, but not limited to, sounds emanating from aircraft and highways, and industrial, commercial, and residential sources." The methodology for evaluating noise limits is set forth in the Large Wind Energy Conversion System Noise Study Protocol and Report (LWECS Guidance) published by the Minnesota Department of Commerce, Energy Environmental Review and Analysis, dated July 2019.

NAC 1 receptors are protected by the lowest sound level limits of the MPCA. Since wind turbines can operate under conditions resulting in maximum sound power during both the day and at night, the Project would need to comply during the period with more stringent limits, nighttime. Furthermore, because wind turbine sound is generally steady during a relatively constant wind

speed there would be minimal difference, i.e., < 5 dBA, between the L_{50} and L_{10} sound levels due to a wind turbine. As the L_{50} and L_{10} noise limits differ by 5 decibels, the L_{50} limit is more restrictive for a wind energy facility. Therefore, NAC 1 receptors have been evaluated against the L_{50} sound level limit of 50 dBA in this analysis.

Ambient Sound Levels

The ambient sound level study was designed to measure and characterize the existing sound environment at the Project site and followed the LWECS Guidance. The program included an hourly sound level and ground level wind speed data were continuously measured at five (5) locations for approximately two weeks **(Map 17-1; Ambient Noise Measurement Locations)**. These locations were submitted in a protocol to the MN DOC in March 2020.

As presented in **Table 8** below, nighttime measurements showed non-wind-turbine ambient L_{50} sound levels range from 22 to 59 dBA when ground-level wind speeds were at or below 11 mph and winds at hub height corresponded to conditions in the modeling. The A-weighted L_{50} sound pressure levels had no contribution from existing wind turbines based on in-person observations.

In order to calculate 'total' sound levels (ambient + Project) at the five measurement locations, a single, representative L_{50} ambient nighttime sound level has been assigned to each location. As these are the median sound levels, there will be times under comparable hub height wind speeds when the ambient sound levels at these locations will be lower and other times when the sound levels will be higher.

Table 8: MPCA State Noise Standards – Hourly A-Weighted Decibels

Location	Range of Ambient Nighttime L_{50} Sound Levels (dBA) [1]	Representative (Median) Ambient Nighttime L_{50} Sound Level (dBA)
M1	25 to 49	38
M2	22 to 59	37
M3	28 to 50	37
M4	26 to 55	36
M5	29 to 43	35

1. Ground-level wind speeds at or below 11 mph, and winds at hub height correspond to conditions in the modeling.

Project Wind Turbines

The sound level analysis for the Project conservatively includes 51 wind turbines, of which 11 are considered alternate locations **(Map 17-2; Sound Level Modeling Locations)**. Of these 51 wind turbines, 47 wind turbines are GE 2.82-127 units and four (4) are GE 2.32-116 units. All proposed wind turbines have LNTE blades. The GE 2.82-127 wind turbines have a rotor diameter of 127.2 m. Forty-two (42) have a hub height of 114 m and the other five (5) have a hub height of 89 m. A technical report from GE was provided to Epsilon which documented the expected sound power

levels associated with the GE 2.82-127 LNTE. These sound power levels are defined as "calculated apparent" by the turbine manufacturer and therefore do not include any uncertainty factor.

Three (3) GE 2.82-127 LNTE wind turbines are proposed to operate under NRO (wind turbine numbers Alt6 [114m HH], Alt10 [89m HH], and Alt11 [89m HH]). As described in an acoustic document from GE, a wind turbine in NRO mode operates at a reduced rotor speed and with an optimized blade pitch angle, thus lowering the sound emitted by the wind turbine. The document from GE provides sound power levels for four (4) NRO modes. In this report, the modes are referred to as NRO Mode 1 through 4, with NRO Mode 4 being the quietest mode. Of the 47 GE 2.82-127 wind turbines, 44 will run in normal operation and three (3) will run in NRO Mode 1.

All GE 2.32-116 wind turbines have a hub height of 80 m and a rotor diameter of 116.5 m. A similar technical report from GE was provided to Epsilon that documented the expected sound power levels associated with the GE 2.3-116 LNTE wind turbine. These sound power levels are defined as "calculated apparent" by the turbine manufacturer and therefore do not include any uncertainty factor.

In addition, sound level modeling was competed utilizing the alternative 2.5-116 turbine with a 90-m hub height in place of the proposed 2.32 MW turbine. The results of the alternative layout are presented in **Appendix B (Sound Level Assessment Report).**

Project Substation Transformer

In addition to the wind turbines, there will be a collector substation associated with the Project in Rock County **(Map 17-2; Sound Level Modeling Locations)**. One 125 megavolt-ampere (MVA) transformer is proposed for the substation. Epsilon has estimated octave-band sound power levels using the MVA rating and techniques in the Electric Power Plant Environmental Noise Guide (Edison Electric Institute 1984).

Existing Non-Project Wind Turbines

Existing non-Project wind turbines are currently in the vicinity of the Project area and are assumed to remain as operational (**Map 17-2; Sound Level Modeling Locations)**. To predict the future wind turbine sound levels in the vicinity of the Project, a desktop cumulative modeling analysis was conducted which included the sound level contribution from these non-Project turbines. Coordinates and descriptions for the turbines associated with Prairie Rose Wind Farm and MinWind I and II were based upon publicly available data from the USGS Wind Turbine Database. According to the database, Prairie Rose Wind Farm consists of 119 wind turbines that were included in the modeling. Based on information indicated in the USGS Turbine Database, the wind turbines were modeled as GE 1.68-82 units. The GE 1.68-82 wind turbine model has a hub height of 80 m and a rotor diameter of 82.5 m. Sound power level data for the wind turbine type were not available; however, data for a similar wind turbine type (GE 1.85-82) were available to Epsilon in the WindPRO WTG Catalog. WindPRO is a software suite developed by EMD

International A/S and is used for assessing potential environmental impacts from wind turbines. Octave band sound power levels were available for the GE 1.85-82 unit in the WindPRO Catalog.

According to the database, MinWind I and II consists of four (4) non-Project wind turbines that were included in the modeling. Based on information indicated in the USGS Turbine Database, the wind turbines were modeled as NEG Micon NM54 units. The NM54 wind turbine model has a hub height of 70 m and a rotor diameter of 54 m. Sound power level data for this wind turbine type were available to Epsilon in the WindPRO WTG Catalog. Only broadband total sound power levels were available for the NM54 unit.

Modeling Methodology

The sound impacts associated with the proposed wind turbines were predicted using the Cadna/A sound level calculation software developed by DataKustik GmbH. This software uses the ISO 9613-2 international standard for sound propagation (Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation). The benefits of this software are a more refined set of computations due to the inclusion of topography, ground attenuation, multiple building reflections (if applicable), drop-off with distance, and atmospheric absorption. The Cadna/A software allows for octave band calculation of sound from multiple sources as well as computation of diffraction. Inputs and significant parameters employed in the model are described in **Appendix B (Sound Level Assessment Report)**. A summary of the key sound level inputs is provided in **Table 9**.

Table 9: Summary of Key Sound Level Modeling Inputs

Modeling Parameter	Description / Value
Wind Turbine Layout	Provided by ECT
Terrain	U.S.G.S. Data
Wind Turbine Sound Power Levels	GE Specifications Documentation, WindPRO Catalog
Uncertainty (Added to Wind Turbine Sound Power Levels)	2 dBA
Meteorological Conditions	T=10°C / RH=70%
Ground Absorption Factor	0.5

A total of 665 receptors within 1.5 miles of the Project were included in the modeling. Two hundred and twenty-two (222) of these receptors are in South Dakota and have been included for informational purposes only. All modeling receptors were input as discrete points at a height of 1.5 m above ground level to mimic the ears of a typical standing person. All modeling receptors are identified in **Map 17-2 (Sound Level Modeling Locations)** and receptors in Minnesota are distinguished as either participating, targeted, or non-participating.

Octave band sound power levels corresponding to the highest available wind turbine broadband sound power level for each wind turbine type including uncertainty were input into Cadna/A to

model wind turbine generated L_{eq} sound pressure levels during conditions when worst-case sound power levels are expected. These calculations were performed for Project plus existing non-Project wind turbines, Project wind turbines only, and the existing non-Project wind turbines only. Sound pressure levels were modeled at 665 receptors within the vicinity of the Project area including those in SD. In addition to modeling at discrete points, sound levels were also modeled throughout a large grid of points, each spaced 20 m apart to allow for the generation of sound level isolines.

8.4.2 Projected Post-Project Sound Levels

All modeled sound levels, as output from Cadna/A are A-weighted equivalent sound levels (L_{eq}, dBA). Based on Epsilon's experience in conducting post-construction sound level measurement programs for wind energy facilities, the equivalent sound level has been comparable to the median (L_{50}, dBA) sound level when the wind turbine sound was prevalent and steady under ideal wind and operational conditions. Therefore, the modeled sound levels may be considered as L_{50} sound levels and directly compared to the Minnesota L_{50} limit.

Project + Existing Non-Project

The predicted "Project + Existing Non-Project" broadband (dBA) L_{50} sound levels range from 21 to 47 dBA and represent the worst-case future L_{50} sound levels produced solely by wind turbines near the Project following the Project construction. The maximum modeled sound level of 47 dBA is at 11 receptors in Minnesota (5 participating, 4 targeted, and 2 non-participating receptors). In addition to the discrete modeling points, sound level isolines generated from the modeling grid are presented in **Map 17-3 (Project + Existing Non-Project Sound Level Modeling Results)**.

Project Only Results

The predicted "Project Only" broadband (dBA) L_{50} sound levels range from 14 to 47 dBA and represent the worst-case future L_{50} sound levels produced solely by the Project wind turbines. The maximum modeled sound level of 47 dBA is at 11 receptors in Minnesota (5 participating, 4 targeted, and 2 non-participating receptors). In addition to the discrete modeling points, sound level isolines generated from the modeling grid are presented in **Map 17-4 (Project Only Sound Level Modeling Results)**.

Existing Non-Project Only Results

The predicted "Non-Project Wind Turbines" broadband (dBA) sound levels L_{50} modeled sound levels range from 6 to 43 dBA.

Evaluation of Sound Levels

The proposed Walleye Wind Project within Rock County, MN is required to comply with the sound level requirements in Minn. R. Ch. 7030 for Noise Pollution Control. NAC 1 (primarily residential) receptors are protected by the lowest sound level limits of the MPCA. Since wind turbines can operate under conditions resulting in maximum sound power, during both the day and at night, the Project would need to comply during the period with more stringent limits, nighttime.

Furthermore, because wind turbine sound is generally steady, the L_{50} (median) sound level is more likely to be affected by wind turbine sound than the L_{10} which is controlled more by unsteady sound. The L_{50} limit is also more restrictive than the L_{10} limit. Therefore, NAC 1 receptors have been evaluated against the L_{50} sound level limit of 50 dBA in this analysis. This is a total sound level limit which includes sound from the Project and existing sound sources.

Table 11 below presents an evaluation of total (wind turbine + ambient) sound levels at the five measurement locations utilized in the pre-construction measurement program. These sound levels represent the ambient experienced during nighttime hours when the Project would be operating under worst-case sound level conditions. As these are median sound levels, there will be times under comparable hub height wind speeds when the ambient sound levels will be lower and other times when the sound levels will be higher. Modeled Project Only and Existing Non-Project wind turbine L_{50} sound levels for the respective modeling receptor locations are provided in **Table 10**. The non-wind-turbine ambient sound levels are logarithmically added to the modeled sound levels to determine a representative total nighttime L_{50} sound level for each measurement location. The values in **Table 10** demonstrate compliance with the MPCA L_{50} nighttime total sound level limit of 50 dBA. However, non-wind-turbine ambient sound levels in the Project region may fluctuate due to sound sources such as ground-level winds, vehicular traffic, birds, and vegetation rustle, all of which have the potential to cause total sound levels to exceed the limit at times.

Table 10: Total Sound Levels at Measurement Locations

Measurement Location	Representative (Median) Ambient Nighttime L_{50} Sound Level (dBA)	Modeled Project Only L_{50} Sound Level (dBA)[2]	Modeled Existing Non-Project Wind Turbines L_{50} Sound Level (dBA)[2]	Total L_{50} Sound Level (dBA)[1]	Meets MPCA Nighttime L_{50} Limit?
M1	38	29	26	39	YES
M2	37	46	14	47	YES
M3	37	42	18	43	YES
M4	36	36	22	39	YES
M5	35	47[3]	19	47	YES

1. Sound pressure levels rounded to the nearest whole decibel are shown. Sound level addition was performed with greater precision.
2. Modeled at receptors 25, 147, 142, 108, and 332 for Locations M1 through M5, respectively.
3. Highest modeled Project Only L_{50} sound level.

Since ambient sound levels in the Project area vary, modeled Project-Only sound levels have been combined with modeled Existing Non-Project wind turbines sound levels and a range of non-wind turbine ambient sound levels in order to evaluate the Minnesota limit of 50 dBA. The highest Project-Only L_{50} sound level to be 47 dBA at receptors #163, 317, 320, 332, 83, 316, 307, 335, N9, 334, and 148. This includes 5 participating receptors, 4 targeted receptors, and 2 non-

participating receptors. Accordingly, total sound levels (Project + Existing Non-Project + non-wind-turbine ambient) will meet the Minnesota limit of 50 dBA when non-wind-turbine ambient sound levels are less than or equal to 47 dBA. The predicted total sound levels are shown for when ambient (non-wind-turbine) L50 sound levels are 35, 40, 45, 47, and 50 dBA. As found in the ambient measurement study, ambient nighttime sound levels can exceed 47 dBA. Non-wind-turbine ambient sound levels can fluctuate due to sound sources such as ground-level winds, vehicular traffic, birds, and vegetation rustle, all of which have the potential to cause ambient sound levels to be equal to or exceed the MPCA L_{50} nighttime limit of 50 dBA. In these instances, the increase to the non-wind-turbine ambient sound level will be zero to two decibels since the highest modeled Project-Only sound level is 47 dBA. Under conditions where two sound levels have the same or very similar characteristics a 2-dBA change is imperceptible to the average person.

An evaluation of low frequency (LF) and infrasound levels from a wind energy center at receptors is not required by the State of Minnesota. However, a discussion of LF and infrasound, as it pertains to wind turbines, is provided below for informational purposes.

LF and infrasound are present in the environment due to other sources besides wind turbines. For example, refrigerators, air conditioners, and washing machines generate infrasound and low frequency sound as do natural sources such as ocean waves. The frequency range of low frequency sound is generally from 20 Hz to 200 Hz, and the range below 20 Hz is often described as "*infrasound*". However, audibility can extend to frequencies below 20 Hz if the energy is high enough. Since there is no sharp change in hearing at 20 Hz, the division between "low-frequency sound" and "infrasound" should only be considered "practical and conventional." The threshold of hearing is standardized for frequencies down to 20 Hz (International Organization for Standardization 2003). Based on extensive research and data, Watanabe and Moeller have proposed normal hearing thresholds for frequencies below 20 Hz (Watanabe and Moeller 1990). These sound levels are so high that infrasound is generally considered inaudible. For example, the sound level at 8 Hz would need to be 100 dB to be audible.

Health Canada, in collaboration with Statistics Canada, conducted one of the most extensive studies to understand the impacts of wind turbine noise to-date (Health Canada 2012). A cross-section epidemiological study was carried out in 2013 in the provinces of Ontario and Prince Edward Island on randomly selected participants living near and far from operating wind turbines. Many peer-reviewed publications have been written based on the Health Canada research, including an analysis of low frequency and infrasound data. For example, Keith et al concluded that there was no advantage of using C-weighting to measure low frequency sound since the relationship between A-weighting and C-weighting are so highly correlated (Keith et al. 2016). In other words, acceptable A-weighted limits also eliminate low frequency and infrasound impacts. Additional discussion regarding low frequency and infrasound related to wind turbines can be found in **Appendix B (Sound Level Assessment Report)**.

8.4.3 Turbine and Facility Lighting

See Section 8.5 Turbine and Facility Lighting.

8.4.4 Potential Impacts and Mitigation

Walleye Wind has designed the Project to meet the MPCA state noise standards and to minimize the sound levels due to the wind turbines at the homes in the community, while also meeting the other constraints of Project design and regulatory requirements. Compliance with MPCA standards setbacks will be accomplished through establishing setbacks for turbines of at least 1,400 ft from residential developments. The Applicant will also conduct a post-construction sound level measurement program to evaluate compliance with respect to MPCA noise standards.

8.5 Visual Impacts

The aesthetic quality and appeal of a region generally derive from the terrain, natural features (*e.g.*, lakes, rivers, ponds, etc.), native flora, and man-made features that define its landscape. Individual observers will have differing opinions on the appeal of a region and impacts that may alter the aesthetic quality of the area. Those likely to be viewing the proposed Project include permanent observers (residents) and temporary observers (motorists, tourists, or recreationists passing by or using the area intermittently). Residents within and in the vicinity of the Site are expected to have a higher sensitivity to the potential aesthetic impacts of the Project as they will look at the Project more frequently than those individuals periodically passing through the area.

The general topography of the Site is undulating, rolling relief with approximate elevations between 1,380 and 1,620 ft above mean sea level (AMSL). Refer to **Map 8 (Topographic)**. The Site generally slopes southwest with lower elevations in the southwestern and southern sections and higher elevations in the northeastern and northern sections. Agricultural fields, farmsteads, and gently rolling topography visually dominate the Site, which is located in a rural area west of the City of Luverne. The landscape can generally be classified as rural open space.

Vegetation within the Site is predominantly agricultural crops and pasture, with isolated woodlots and wooded shelter belts that surround residences and riparian areas. This type of largely rural landscape dominated by agricultural and pasture lands is typical of southwestern Minnesota. The main agricultural crops grown in this region include corn, soybeans, and hay. Settlement in this area of Rock County includes residential and farm buildings scattered along county and township roads, which are generally in a grid-like arrangement.

The City of Beaver Creek is located within the southwestern portion of the Project. Additional municipalities within 5-miles of the Site include the cities of Luverne, Hills, and Steen, Minnesota; and Garretson, and Valley Springs, South Dakota. The closest portion of Luverne, which is the county seat of Rock County, is approximately 2-miles east of the Site, while the main portion of the city is approximately 4-miles east of the Site. Hills is approximately 3.6-miles south of the

Site, and Steen is approximately 4-miles southeast of the Site. Garretson is approximately 3-miles west of the Site, and Valley Springs is approximately 1.6-miles southwest of the Site.

The main visual focal points within the Site are aspects of an agricultural landscape, which are broken up by residences, buildings, shelter belts, and small wooded lots. Viewsheds in the area are generally long and open. Viewsheds are more limited in areas where vegetation, topography, or existing structures limit the larger view. Palisades Cemetery, West Palisades Cemetery, Pleasant View Cemetery, and Beaver Valley Cemetery, are located within the Site, while Springwater Cemetery and Pleasant View Cemetery, are located within 2-miles of the Site. For Clarity, there are two Pleasant View Cemeteries—one in the Site and one within 2-miles of the Site, in South Dakota.

Existing WECSs are visible in the south-central portion of the Site and to the south and northeast of the Site. The seven wind turbines located within the Site itself are Perch Wind an 11.5 MW project with a COD in 2004 and were acquired by Walleye Wind in September 2019 from RES as MinWind III-IX. These seven, 1.65 MW NEG MICON turbines are no longer operating and Walleye Wind plans to decommission these turbines in 2021. At this time, only one new turbine is planned in the vicinity of Perch Wind. The removal of Perch Wind will lessen the overall visual impacts on local landowners in this area.

The four turbines located approximately 0.6-miles south of the Site are MinWind I and II. These projects are part of a farmer-owned venture, and they came online in 2002. Each of the projects consists of two Micon 950 kW turbines. The 119 turbines located starting approximately 4-miles northeast of the Site are the 200 MW Prairie Rose I Wind Farm. Each of the GE turbines can generate 1.6 MW. Prairie Rose I is a commercial farm developed by Mortenson/Geronimo Energy and currently owned and operated by Enel GreenPower. Two more turbines are located 14-miles north of the Site. These 750 MW NEC Micon turbines are associated with Olsen Farms. MET towers associated with each of these wind facilities may be present on the landscape as well.

Generally, the MinWind I and II, Perch Wind, Prairie Rose I, and Olsen Farms WECSs contain similar or smaller sized turbine models to those proposed in this Project, with total hub heights ranging from approximately 197 ft (approximately 60 m) to approximately 263 ft (approximately 80 m) (**Map 5; Existing Wind Turbine Locations**).

There are two existing transmission lines running a total of approximately 14.9-miles in a northeast-to-southwest trending direction through the southern portion of the Site. The transmission line to the north is a 161 kV line owned by the NSP, and the transmission line to the south is a 345 kV line. Approximately 27.1-miles of additional existing transmission lines are located within 2-miles of the Site. Refer to **Map 2 (Site and Facilities)**. A short (approximately 500 ft) new 161 kV generation tie line to the existing Substation is proposed as part of this Project. The existing transmission lines currently create visual impacts to the Site and its vicinity.

The Federal Communication Commission's (FCC) Antenna Structure Registration database identifies four antenna structures within the Site. Two additional existing antenna structures are

located within 2-miles of the Site, creating existing visual impacts within the vicinity of the Project as well as the four structures within the Site itself. An additional 12 existing antenna structures exist within 10-miles of the Site in Rock County, Minnesota.

Project infrastructure, including turbines, MET towers, the new 161 kV generation tie line to the existing Substation, the collector substation, and the O&M facility, will create new man-made features throughout the landscape. The primary visual impact associated with wind farms are the turbine structures because they can typically be seen from a greater distance than other project infrastructure.

There are four turbine models currently proposed for the Project, the GE 2.5 MW or the GE 2.32 MW and two models of the GE 2.82 MW. All are similar in appearance with three blades, a hub, and a monopole. The GE 2.32 MW turbine model has a 116.5-m (382-ft) RD and a hub height of 80 m (262.5 ft), the GE 2.5 MW turbine model has a 116.5-m (382-ft) RD and a hub height of 90 m (295.3 ft), one GE 2.82 MW turbine model has a 127.2-m (417-ft) RD and a hub height of 114 m (374.0 ft), and the second GE 2.82 MW turbine model has a 127.2 m (417-ft) RD and a hub height of 89 m (292 ft) (**Table 11**). In general, the larger the RD, the fewer turbines are required to produce the same energy output.

Table 11: Rotor Diameter and Number of Turbines (Proposed)

Turbine Model	Total Height (m/ft)	Rotor Diameter (m/ft)	Ground Clearance (m/ft)	Number of Turbines Base Option /Option 2	Number of Alternate Turbines Base Option /Option 2
GE 2.32 MW	138.3/453.7	116.5/382	21.8/71.7	4/-	-/-
GE 2.5 MW	148.25/486.4	116.5/382	31.75/104.4	-/4	-/-
GE 2.82 MW	178.1/584.3	127.2/417	51/167.3	36/36	5/5
GE 2.82 MW	152.1/499	127.2/417	25/82	-/-	3/3
GE 2.82 MW-NRO	178.1/584.3	127.2/417	51/167.3	-/-	1/1
GE 2.82 MW-NRO	152.1/499	127.2/417	25/82	-/-	2/2

The turbines will be uniform in color and painted with a non-reflective/off-white color designed to minimize visual impacts. The towers and blades, including the LNTE, will be of a color, design, operation, and appearance consistent with other turbines in the area. No advertising or graphics will be placed on any part of the tower or blades; however, the turbines will be clearly numbered for identification and emergency response. The towers will not be illuminated except as required by the FAA. The FAA requires obstruction lighting or marking of structures over 200 ft AMSL

because they have the potential to obstruct air navigation. Walleye Wind will request FAA approval of a lighting plan that is compliant with the FAA's requirements.

The proposed Project will be visible to permanent observers (residents) and temporary observers (motorists, tourists, or recreationists passing by or using the area intermittently). Visual impacts may also be noticeable to users of public lands and public snowmobile trails within and in the vicinity of the Site. Further information regarding public lands and snowmobile trails in relation to the Site is located in **Section 8.8**. The Project, however, will not be introducing a new feature type to the landscape because existing wind turbines are already located within and in the vicinity of the Site.

Turbines will likely be viewed in one of three perspectives:

- As a visual disruption;
- As generally compatible with the rural agricultural heritage of the area, which includes existing wind turbines, silos, and grain elevators; or
- As adding a positive aesthetic quality to the landscape.

The topography in the vicinity of the Project is generally rolling, the vegetation is low, and the Project will be visible to residents of the area and to people traveling on existing federal, state, county, and township roads as well as farmstead driveways and farming access roads within the Site and in the Project vicinity (**Map 1; Project Location**). The installation of wind turbines will not significantly alter the character of the regional landscape given the presence of existing wind turbines in the Site and in the vicinity of the Project; however, the degree of visual impact will vary based on the type of observer and individual preference.

The Project includes a new collector substation to the north of an existing Substation north of Beaver Creek. The Walleye Wind Substation will have a graveled footprint approximately 20,000 sf in size. The Walleye Wind Substation's general vicinity currently includes the existing Substation, overhead transmission lines, distribution lines, a railroad, wind turbines, and farmsteads. In addition, highways and county roads are an existing part of the man-made alterations to the environment. Collection lines utilized by the Project will not result in additional visual impacts since all collection lines will be buried approximately 3 to 4 ft (0.9 to 1.2 m).

The O&M facility will be located directly adjacent to the Walleye Wind Substation and both will occupy approximately a 10-acre parcel. The footprint of the proposed one-story O&M building is anticipated to be approximately 3,500 sf with a fenced area to include an access road, parking lot, storage, etc. of up to one acre.

Visual alterations of the land related to temporary construction activities, such as equipment staging and laydown areas, crane paths, and the installation of underground collection lines, will be short-term and converted back to cropland or replanted with grasses and vegetation native to the area following the completion of construction. The increase in traffic and human activity within the Site during construction will also be short-term as well. The long-term operation of the

Project is not anticipated to increase visual impacts associated with human activity or traffic within the Site or in the Project's vicinity.

Turbine and Facility Lighting

The Applicant will use lighting required by the FAA. The Applicant also commits to equip the Project with a FAA-approved Aircraft Detection Lighting System (ADLS) or Lighting Intensity Dimming Solution (LIDS) system to minimize the visual impact of the Project. The date on which an ADLS or LIDS system will be installed is subject to FAA approval, availability of vendors, and the manufacturing, delivery, installation, and testing of the system.

8.5.1 Visual Impacts on Public Resources

There are public resources that may be visually impacted by the Project. These include two MNDNR wildlife management areas (WMAs) that are located within and adjacent to the Site: Springwater WMA and Rooster Ridge WMA. Additionally, one USFWS National Wildlife Refuge (NWR), two state parks, one MNDNR aquatic management area (AMA), four MNDNR WMAs, and one community park are located within 5-miles of the Site. No scenic byways overlap the Site; however Historic Highway 75 is located approximately 4-miles east of the Site near the City of Luverne, Minnesota.

Blue Mounds State Park is located approximately 4-miles northeast of the Site, and it contains resources that are sacred to Native American tribes in the region. The park provides protection to an American bison herd that grazes on one of the state's largest prairie remnants. Blue Mounds also protects a distinct linear escarpment of Precambrian Sioux Quartzite bedrock known for its distinctive pinkish color as well as a 1,250-ft long line of rocks aligned by indigenous peoples to mark the spring and fall equinoxes.

Potential visual impacts to architectural resources listed in the National Register of Historic Places (NRHP) are addressed in **Section 8.7**.

While the installation of the proposed wind turbines will impact the visual surroundings of the wind facility and could visually impact these public resources and individuals' visual experiences, the degree of visual impact will vary based on personal preferences. The Project will not be introducing a new feature type to the landscape, and it will not significantly affect public resources because existing wind turbines are within the vicinity of the Site.

The nearest proposed turbine for the Project is approximately 4.3-miles southwest of Blue Mounds State Park. The closest existing turbine to Blue Mounds, which is part of the Prairie Rose I Wind Farm, is 3.7-miles northwest of the park (B.D. Hoen et al. 2020) and several of the Prairie Rose I turbines are visible from northern portions of the park. While these turbines are visible from portions of Blue Mounds State Park, the rolling topography of the region and wooded areas within the park obscure the turbines in other portions of the park. There are other visual intrusions in the area as well, including a water tower just west of the park. In addition, Walleye Wind contacted thirty-one (31) Native American tribes with expected ancestral ties to the Project area of which

thirteen (13) responded. None of the respondents indicated a concern with contemporary resources in proximity to the Project location. Visual impacts to Blue Mounds State Park, therefore, are not expected to be a concern. Walleye Wind will also avoid visual impacts to the NRHP-listed resources through careful siting of Project infrastructure.

8.5.2 Visual Impacts on Private Lands and Homes

Settlement in this area of Rock County includes residential and farm buildings scattered along rural county and township roads. Residents associated with the City of Beaver Creek, which is located within the southwestern portion of the Site, are considered within the Site.

The installation of the proposed wind turbines will impact the visual surroundings of a wind facility and will visually impact these private resources. The degree of visual impact will vary based on personal preferences. Residents of the area are expected to have a higher sensitivity to the potential aesthetic impacts of the Project than temporary observers. The Project, however, will not be introducing a new feature type to the landscape, and it will not significantly affect private resources because existing wind turbines are within the vicinity of the Site.

8.5.3 Shadow Flicker

With respect to wind turbines, shadow flicker can be defined as an intermittent change in the intensity of light in a given area resulting from the operation of a wind turbine due to its interaction with the sun. An observer experiences repeated changes in the brightness of the room as shadows cast from the wind turbine blades briefly pass by windows as the blades rotate. In order for this to occur, the wind turbine must be operating, the sun must be shining, and the window must be within the shadow region of the wind turbine, otherwise there is no shadow flicker. A stationary wind turbine only generates a stationary shadow similar to any other structure.

A Project-specific shadow flicker analysis was conducted using the software package, WindPRO version 3.3 (**Appendix C; Shadow Flicker Modeling Report**). The worst-case annual duration of shadow flicker was calculated based on the following modeling inputs:

- Proposed wind turbine locations. The modeling analysis included 51 wind turbines (40 primary + 11 alternates).
- Discrete modeling points, i.e., sensitive receptors. All modeling receptors and participation status are presented in **Map 18 (Shadow Flicker Modeling Results)**. A total of 665 receptors were included in the modeling and subset of these, 512 receptors, were identified as NAC 1 receptors and modeled in the sound level analysis.
- Wind turbine dimensions, i.e., RD and hub height. A combination of GE 2.82-127 and GE 2.32-116 wind turbines are proposed for this Project. See **Table 12** for RDs and hub heights for these turbines.
- Flicker Calculation Limits
    - There are no federal, state, or local regulations regarding the maximum radial distance from a wind turbine to which shadow flicker should be analyzed applicable to this Project. Various approaches for defining a calculation area are discussed in

the detailed report. Conservatively, this analysis includes shadow flicker calculations out to 1.25-miles from each wind turbine in the model for the proposed layout.

- In addition to modeling discrete points, shadow flicker was calculated at grid points in the area surrounding the modeled wind turbines to generate flicker isolines. A 20-m (66-ft) spacing was used for this grid.
- The terrain height contour elevations for the modeling domain were generated from elevation information derived from the National Elevation Dataset developed by the USGS.
- Conservatively, obstacles, i.e., buildings and vegetation, were excluded from the analysis. This is effectively a "bare earth" scenario, which is conservative. When accounted for in the shadow flicker calculations, such obstacles may significantly mitigate or eliminate the flicker effect depending on their size, type, and location.
- Shadow flicker durations were only calculated when the angle of the sun was at least 3° above the horizon.

Table 12: Proposed Turbine Characteristics[4]

	GE 2.32-116 (4 Turbines)	GE 2.82-127 (47 Turbines)
Rated Power	2,320 kV	2,820 kW
Hub Height	80 m	114 or 89 m
Rotor Diameter	116.5 m	127.2 m
Cut-in Wind Speed	3 m/s	3 m/s
Cut-out Wind Speed	32 m/s (105 ft/s)	30 m/s (98.4 ft/s)
Maximum RPM	15.7 rpm	15.7 rpm

The WindPRO modeling was further refined by incorporating sunshine probabilities and wind turbine operational estimates by wind direction over the course of a year. The values produced by this further refinement are known as the "expected" shadow flicker. Project-specific inputs are presented below:

- Monthly sunshine probability values for each month from January to December. These numbers were obtained from a publicly available historical dataset for Sioux Falls, South Dakota, from the National Oceanic and Atmospheric Administration's National Centers for Environmental Information shown in **Table 13**.

Table 13: Monthly Sunshine Probability Values

January	53%
February	59%

[4] The alternative GE 2.32-116, 90-m hub height was also modeled and the results are in Appendix C

March	46%
April	54%
May	55%
June	58%
July	71%
August	61%
September	59%
October	57%
November	49%
December	55%

- Annual operational hours per wind direction sector were provided by Analytics. These hours per wind direction sector are used by WindPRO in the estimation of the "wind direction" and "operation time" reduction factors. Based on this dataset, the wind turbines would operate 98% of the year. **Table 14** shows the distribution of operational hours for the 16 wind directions.

Table 14: Operational Hours per Wind Direction Sector

N	505
NNE	368
NE	393
ENE	314
E	306
ESE	354
SE	699
SSE	1,070
S	872
SSW	451
SW	289
WSW	255
W	398
WNW	691
NW	853
NNW	674
Annual	**8,492**

Potential Impacts

Six hundred and sixty-five receptors were modeled for worst-case and expected annual shadow flicker duration. The worst-case modeling does not account for sunshine probability and expected hours of operation, while the expected modeling takes into account these two additional factors. In addition, shadow flicker modeling was competed utilizing the alternative 2.5-116 turbine with a 90 m hub height in place of the proposed 2.32 MW turbine. The results of the alternative layout are presented in **Appendix C (Shadow Flicker Modeling Report).**

The modeled worst-case duration for the 443 receptors in Minnesota ranged from 0 hours, 0 minutes per year to 120 hours, 4 minutes per year. The maximum worst-case shadow flicker was at a targeted receptor (#147). The maximum worst-case annual shadow flicker at a non-participating receptor (#333) is 104 hours, 55 minutes. While the maximum worst-case at a participating receptor (#332) is 119 hours, 59 minutes.

The predicted expected annual shadow flicker duration for the 443 receptors in Minnesota ranged from 0 hours, 0 minutes per year to 42 hours, 22 minutes per year. The maximum expected shadow flicker was at a targeted receptor (#331). The maximum expected worst-case annual shadow flicker at a non-participating receptor (#333) is 34 hours, 11 minutes. While the maximum expected worst-case annual shadow flicker at a participating receptor (#332) is 41 hours, 45 minutes.

Map 18 (Shadow Flicker Modeling Results) present expected shadow flicker durations as isolines overlaid aerial imagery. Many of the Minnesota receptors (206) were predicted to experience no annual shadow flicker. 167 locations were predicted to experience some shadow flicker but less than 10 hours per year. The modeling results showed that 60 locations would be expected to have 10 to 30 hours of shadow flicker per year. Ten receptors are expected to have over 30 hours of flicker per year, three of which are non-participating receptors. The modeling results are conservative in that modeling receptors were treated as "greenhouses" and the surrounding area was assumed to be without vegetation or structures (bare earth).

Summaries of the modeling results are presented in **Tables 15**, **16**, and **17**. **Appendix C (Shadow Flicker Modeling Report)** provides further details of the shadow flicker study and results for the Project.

Table 15: Predicted Shadow Flicker Impacts at Participating Residents

	Duration (hrs:mins/yr)
Maximum Shadow Flicker – Worst-Case	119:59
Maximum Shadow Flicker - Expected Case	41:45

Table 16: Predicted Shadow Flicker Impacts at Targeted Residents

	Duration (hrs:mins/yr)
Maximum Shadow Flicker – Worst-Case	120:04
Maximum Shadow Flicker - Expected Case	42:22

Table 17: Predicted Shadow Flicker Impacts at Non-Participating Residents

	Duration (hrs:mins/yr)
Maximum Shadow Flicker – Worst-Case	104:55
Maximum Shadow Flicker - Expected Case	34:11

Mitigation Measures

The use of 36 GE 2.82 MW turbines helps to mitigate the visual impact of the Project by minimizing the number of turbines needed. Walleye Wind will also implement the following mitigation measures to minimize potential visual impacts:

- Turbines will be uniform in color;
- Turbines will not be located in sensitive areas such as public parks, WMAs, scientific and natural areas (SNA), or Waterfowl Protection Areas (WPA);
- Turbines will be illuminated to meet the minimum requirements of FAA regulations for obstruction lighting of wind turbine projects and will utilize an ADLS or LID system when Walleye Wind can obtain these technologies based on commercial constraints and delivery scheduling;
- Electric collection lines will be buried to minimize above-ground structures within the Site;
- Existing roads will be used for construction and maintenance, as appropriate, to minimize the number of new roads constructed; and
- Temporarily disturbed areas will be converted back to cropland or otherwise reseeded with native seed mixes appropriate for the region.

The Project was designed to minimize shadow flicker exposure of the residences in the area. Project design in most cases utilized turbine setbacks of at least 1,400 ft (426.7 m) from homes. In addition, the 2.82 MW turbine's increased size reduces the total number of turbines required to accomplish project capacity, thus reducing shadow flicker impacts.

Walleye Wind will use site-specific mitigation measures to address shadow flicker impact, as appropriate, including the following:

- Meet with the homeowner to determine the specifics of their complaint;
- Investigate the cause of the complaint; and
- Provide the homeowner with mitigation alternatives including shades, blinds, awnings or plantings.

8.6 Public Services and Infrastructure

The Project is located in rural southwestern Minnesota (**Map 1; Project Location**). A network of existing roads and utilities provide access, electricity, water supply, and telephone service to rural residences, farmsteads, small industry, and unincorporated areas. Water wells and septic systems are used within the Site to provide for household needs.

The Rock County Sheriff is headquartered in the City of Luverne, located 3-miles east of the Site, and is the only law enforcement service within Rock County. The county sheriff's office also provides dispatch services for the county ambulance. Nearby cities that maintain fire departments include Luverne, Beaver Creek, Steen, Hills, Hardwick, Kenneth, and Magnolia. The Rock County Sheriff's department also provides dispatch for these city fire departments. Luverne's volunteer fire department provides the only hazardous-materials services within Rock County (Luverne, Minnesota 2020; Rock County, Minnesota 2019).

The Project is expected to have a minimal effect on existing services and infrastructure and will be constructed and operated in accordance with associated federal, state, and local permits and laws. Industry construction and operation standards and prudent utility practices will also be followed. Extensive public service and infrastructure mitigation measures are not anticipated because only minor impacts to services and infrastructure are expected.

8.6.1 Roads

Existing road infrastructure within the Site consists of federal, state, county, and township roads that typically follow section lines, and farmstead driveways and farming access roads. Interstate-90 crosses west-to-east through the southern portion of the site, and Minnesota Highway 23 crossing north-to-south through the western portion of the are the primary routes into the site. 488th Avenue serves as the western boundary of the Site as well as the Minnesota/South Dakota state line. Though not in the Site, U.S. Highway 75 is a main access route into the region and to the nearby City of Luverne, Minnesota. The county roads and township roads, used to access the proposed turbine locations, are either two-lane paved roads or gravel roads. A summary of roadways within the Site is found in **Table 18**.

Table 18: Summary of Roadways within the Site

Road Type	Approx. Miles Within the Site
Federal Highways	9.53

Road Type	Approx. Miles Within the Site
State Highways	5.85
County Highways/Roads	32.41
Township Roads	54.35

Traffic volume within the Site has been summarized in **Table 19** below based upon MnDOT data (MN/DOT 2018). Interstate-90 has the highest Average Annual Daily Traffic (AADT) count with 10,500 vehicles per day, using 2018 data, while the lowest count was at County Road 59 with 40 vehicles per day, using 2018 data. The remainder of roads within the Site contained traffic counts between 90 and 2,000 vehicles per day with the higher counts in closer proximity to nearby cities.

Table 19: Existing Daily Traffic Levels

Roadway Segment Description	Approx. Miles Within the Site	Traffic Volume	Year Data Collected
Interstate 90	9.53*	10,500	2018
Minnesota State Highway 23	5.85	2,000	2014
County State-Aid Highway (CSAH) 4	6.15	1,000	2018
CSAH 6	6.29	355	2018
CSAH 5	6.65	290	2018
CSAH 8	0.50	250	2018
CSAH 17 (91st)	4.37	205	2018
CR 53	0.51	90	2014
County Road (CR) 52	0.37	85	2014
CSAH 15 (71st)	3.01	75	2014
CR 59	4.57	40	2018

Source: Minnesota Department of Transportation, (2018), Office of Transportation Data & Analysis, Traffic Volume Program, 2018 AADT Product

*This calculation for Interstate-90 includes existing on and off-ramps.

Potential Impacts

Temporary impacts are expected to public roads during the construction phase of development as materials, personnel, and equipment will be brought in via existing highways and roads. Although exact routes will not be determined, in coordination with state and local jurisdictions, until closer to construction, U.S. Highway 75 and Interstate 90 are the main access routes into the region of the Site and would likely be used as corridors to bring materials and equipment to the site. The functional capacity of a two-lane paved rural highway is in excess of 5,000 vehicles per day, far greater than the maximum amount of construction traffic that is expected during peak construction. The peak amount of construction traffic is estimated to be 700 vehicles in a ten (10) to twelve (12) hour workday. However, some minor, short-term traffic delays within and near the Project site may occur during turbine and equipment delivery and construction activities.

Permanent and temporary public road and intersection improvements, as well as permanent and temporary access road approaches and turning radii, are required to link the Project access roads to the existing road network and for transportation and delivery of turbine components during the construction phase of the Project. Walleye Wind will complete all necessary road improvements required for the construction of the Project, along with formalizing a road development agreement with applicable roadway authorities to ensure that impacted or damaged roadways will be restored to their original condition or better.

Another temporary activity associated with construction is a temporary route required for oversized crane machinery movement between turbine assembly points (*i.e.*, crane walk). Large components of the turbines, including but not limited to the tower, blades, rotor, and generator, will be delivered to respective turbine sites for assembly in place. Once a turbine is constructed, the crane must be mobilized to access the next turbine assembly point. In order to minimize damage over roads, temporary base material, such as sand, will be applied where the crane will cross. Temporary and/or permanent culvert crossings within regulated features will be installed where necessary for permanent access roads, access road approaches, intersection improvements, and/or the crane walk path. Proper placement and sizing of culverts will require approval from the appropriate federal, state, and local agencies. Temporary culverts will be removed after construction and temporarily disturbed areas will be converted back to cropland or otherwise reseeded with native seed mixes appropriate for the region.

Mitigation Measures

Consistent with the wind energy conversion facility siting criteria outlined in the Commission's *Order Establishing General Wind Permit Standards*, Docket No. E, G999/M-07-1102 (2008) turbines will be setback from roads no less than 250 ft. Walleye Wind has spaced turbines and access roads to reduce congestion. For example, the majority of access roads are proposed off of local roads and avoid major highways that cross and border the Project. Prior to construction, Walleye Wind will coordinate with applicable local and state road agencies to ensure all relevant permits are obtained, delivery plans are communicated, traffic management plans are implemented where necessary, and weight limits are not exceeded. Walleye Wind will formalize road

development agreements with applicable roadway authorities to ensure that impacted or damaged roadways will be restored to their original condition or better. Walleye Wind will require that the general contractor be in contact with the relevant road authorities during construction.

During operations, only a few O&M crew workers will utilize roads within the site for regular inspections and maintenance. Traffic is not expected to noticeably increase during the operations phase of the Project.

8.6.2 Communication Systems

A review of the Project was conducted by the U.S. Department of Commerce, National Telecommunications and Information Administration (NTIA) as part of the Project's Telecommunications Study (**Appendix D; Electromagnetic Interference Analysis**). The NTIA responded with a letter stating "no harmful interference anticipated" (NextEra Analytics 2020)**.**

Microwave Beam Paths

The Electromagnetic Interference Analysis (**Appendix D; Electromagnetic Interference Analysis)** examined microwave beam paths in the vicinity of the Site. Twenty-six microwave beam paths were identified within the vicinity of the Site. The analysis identified one microwave tower within the Site and eight microwave beam paths that intersect the Site. The beam paths within the vicinity of the Project are owned and operated by the state of Minnesota, East River Electric Power, T-Mobile, and Sprint Spectrum. Analytics calculated Worst-Case Fresnel Zones (WCFZ), which are determined by the 2nd Fresnel zone radius obtained at the midpoint of the microwave link. Utilization of the WCFZ, and an offset of 74 m reduced probability of interference and enabled turbines to be sited such that impacts to microwave beam paths are avoided (**Map 16; Microwave Beam Path**). Refer to **Table 20** for a summary of FCC-licensed signals within the vicinity of the Site.

Table 20: Summary of FCC-Licensed Signals within 15.5-Miles of the Site

Communication System Type	Number Signals
AM (AM Radio Signals)	1
FM (FM Radio Signals)	4
Microwave (Radio Wave Transmission)	26
Cellular	5

Potential Impacts

Potential impacts to microwave beam paths are associated with the physical placement of the turbines in relation to the microwave beam paths. Turbine placement in the line of sight of a microwave beam path may distort or completely interrupt the transmission of the signal.

Mitigation Measures

A non-federal and federal electromagnetic interference study has been performed for the Project site. The results were considered in the wind turbine array design by quantifying WCFZ and using these as turbine exclusion zones. WCFZ are quantified for each fixed point to point microwave beam depending on its path, distance, and frequency. A buffer of 74 m is placed around each WCFZ. Turbines are located outside of these buffers to mitigate any impact on the signal. The Telecommunications Study conducted by Analytics is attached as **Appendix D (Electromagnetic Interference Analysis)**.

AM/FM Radio

No active AM or FM radio towers were identified within the Site. One AM tower (KQAD) and four FM (KLQL, KNWC-FM, KTWB, and KXRB-FM) radio towers are located within 15.5-miles of the Site.

Potential Impacts

Some AM/FM signal loss may occur in close proximity to individual turbines, but most AM/FM radio receptors near residences and residences should have sufficient setback to minimize signal interruptions. Interference to AM towers would be limited to a distance equal to one wavelength from non-directional antennas and 10 wavelengths, or 1.9-miles, from directional antennas. The closest AM tower, KQAD, is located 9.0-miles from the Site and has a wavelength of 0.23-miles. Thus, the closest AM tower is greater than 10 wavelengths from the Project and would not be impacted. Interference to FM towers would be constrained to approximately 2.5-miles from the FM tower, and there are currently no FM towers within 2.5-miles of the Site. Impacts to AM/FM radio signals are not anticipated.

Mitigation Measures

While impacts to AM/FM radio are not anticipated, due to the distance between existing radio towers and the Project, Walleye Wind will address any reception impacts which may arise following construction of the Project on a case-by-case basis. If impacts do occur, additions or changes to transmitters, receivers, or amplifiers can also be made to communication systems to minimize impacts.

Fixed Land Mobile Stations

Land mobile stations will be used within the Site for several reasons, such as communications between maintenance crews for the Project, public safety, emergency response, and local government communications. Typically, land mobile stations are unaffected by wind projects due

to their radio systems with multiple transmitters to provide redundancies that allow their signal to broadcast through wind turbines.

Potential Impacts

Wind turbines may interrupt or impose scattering onto the radio link causing degradation of the signal depending on the proximity of the turbines to the transmitter or receiver station and its position relative to the line of sight.

Mitigation Measures

In the unlikely event that land mobile licenses experience impacts to coverage due to the Project, Walleye Wind will address these issues on a case-by-case basis. If interference does occur, additions or changes to transmitters, receivers, or amplifiers can also be made to communication systems to minimize impacts.

Other Local Infrastructure and Services

No pipelines were identified within the Site in publicly available databases or mapping (USDOT 2020). The Applicant is conducting a detailed review to identify other potential pipelines, easements, and buried infrastructure within the anticipated area of construction disturbance.

Two railroads run through the Site, the Chicago, and Northwestern Railroad, runs through the southern portion of the Site along East County Road 4, and the Great Northern Railroad, runs through the southwest corner of the Site. Both are now owned by the Ellis and Eastern Company. The Burlington Northern Railroad line is also located within 2-miles of the Site.

Two existing transmission lines are located within the Site and five other transmission lines are located within 5-miles of the Site.

The Substation owned and operated by NSP is located within the Site and will be the POI of the Project to the transmission system. The Substation will be modified to accommodate the new 161 kV generation tie line at the POI on the north side. This generation tie line will extend approximately 500 ft from the Substation to the newly constructed Walleye Wind Substation.

Potential Impacts

Crossing of proposed collections lines with the railroad are planned within the Site. Potential impacts to electric distribution lines consist entirely of incidental physical damage from construction equipment during the construction of the Project.

Mitigation Measures

Proposed collection lines will be bored under the railroad within the Site to avoid direct impacts to the railroad. In order to avoid potential physical impacts to underground electric distribution lines, all lines will be located using a utility location service to ensure there will be no direct impacts to underground electric distribution lines. Additionally, warning signs and/or flagging will be installed to mark the locations of overhead distribution lines to aid in the avoidance of these

features. In the unlikely event that impacts to other local services occur due to the Project, Walleye Wind will address these issues on a case-by-case basis.

8.6.3 Television

There are no digital or analog television (TV) towers located within the Site. There are 43 licensed TV towers within approximately 62-miles of the Project (**Table 21**). Of these 43 stations, nine are located within 31-miles of the Site and are likely to be broadcasting to the region. Most of the TV towers within approximately 62-miles of the Site are low power stations or translator stations that have limited range and would not be expected to experience reception interference. Ten full-power towers (call signs KTTW, KELO-TV, KSFY-TV, KSMN, KDLT-TV, KCSD-TV, KUSD-TV, KWSD, KWSD, and KWSD) have a possibility of experiencing reception interference if a turbine is in the line-of-sight between the TV tower and the receptor.

Table 21: Digital TV Signals in the Vicinity of the Site

Call Sign	Station	Licensee	Signal Strength (kw)
K14QR-D	14	LANDOVER 2 LLC	1
K30NS-D	30	LANDOVER 2 LLC	1
K40NS-D	40	LANDOVER 2 LLC	1
K33NF-D	33	LANDOVER 2 LLC	1
K35LZ-D	35	LANDOVER 2 LLC	1
K3O8Z-D	38	LANDOVER 2 LLC	1
K48OK-D	48	LANDOVER 2 LLC	1
K43LX-D	43	IOWA PUBLIC BROADCASTING BOARD	15
K33PV-D	33	IOWA PUBLIC BROADCASTING BOARD	15
KELO-TV	11	NEXSTAR BROADCASTING, INC.	30
KSFY-TV	13	GRAY TELEVISION LICENSEE, LLC	22.7
K20MB-D	20	GRAY TELEVISION LICENSEE, LLC	13.2
KABY-LD	20	GRAY TELEVISION LICENSEE, LLC	13.2
KDLT-TV	21	GRAY TELEVISION LICENSEE, LLC	589
KTTW	7	INDEPENDENT COMMUNICATIONS, INC	7.5
KWSD	36	J.F. BROADCASTING, LLC	36.9
KWSD	36	J.F. BROADCASTING, LLC	18.45

Call Sign	Station	Licensee	Signal Strength (kw)
KWSD	36	J.F. BROADCASTING, LLC	1000
KCSD-TV	24	SOUTH DAKOTA BOARD OF DIRECTORS FOR EDUCATIONAL TELECOMMUNIC	80.9
K22KD-D	22	EDGE SPECTRUM, INC.	3
K56GF	23	DIGITAL NETWORKS-MIDWEST, LLC	15
K56GF	56	DIGITAL NETWORKS-MIDWEST, LLC	10.1
K56GF	56	DIGITAL NETWORKS-MIDWEST, LLC	10.1
K04RR-D	4	DTV AMERICA CORPORATION	3
K06QJ-D	6	DTV AMERICA CORPORATION	3
K27LB-D	27	LANDOVER 2 LLC	2
K38NI-D	38	LANDOVER 2 LLC	2
K42KO-D	42	LANDOVER 2 LLC	2
K45LV-D	45	LANDOVER 2 LLC	2
KCPO-LP	26	G.I.G., INC.	7.57
KAUN-LP	25	J.F. BROADCASTING, LLC	0.88
KCWS-LP	27	J.F. BROADCASTING, LLC	0.68
KAUN-LP	42	J.F. BROADCASTING, LLC	0.88
KCWS-LP	44	J.F. BROADCASTING, LLC	0.68
NEW	35	CASEY C. PETERSON	15
K18IW-D	18	DTV AMERICA CORPORATION	3
K18IW-D	18	DTV AMERICA CORPORATION	3
K31KU-D	31	DTV AMERICA CORPORATION	3
K31KU-D	31	DTV AMERICA CORPORATION	3
K32JG-D	32	DTV AMERICA CORPORATION	3
K32JG-D	32	DTV AMERICA CORPORATION	3
K32JG-D	32	DTV AMERICA CORPORATION	3
K18IW-D	18	DTV AMERICA CORPORATION	3

Potential Impacts

The Electromagnetic Interference Analysis (**Appendix D; Electromagnetic Interference Analysis**) examined impacts to TV service. While impacts to TV reception from wind turbines are still not well known, interference is expected to be limited to areas near the edge of a TV station reception and areas of complex topography. With these specified areas at the edge of broadcast reception, broadcast interference is most likely to occur in receptors where a nearby turbine that is in the line-of-sight between a transmitting tower and receptor. Impacts to low power stations and translator stations are not anticipated to occur because those stations have a limited range. Broadcasts from full power TV stations would potentially be impacted if the wind farm is located in the line-of-sight of the TV tower. Ten full-power stations could possibly experience reception degradation if the Project is in the line-of-sight between the towers and their receptors.

Mitigation Measures

Analytics conducted an Electromagnetic Interference Analysis (**Appendix D; Electromagnetic Interference Analysis**) for the Project and concluded that TV interference is expected to be limited to areas near a turbine that are within the line-of-sight between a transmitting tower and a TV receptor. In the unlikely event that TV interference is reported following Project construction, Walleye Wind will work with affected residents or businesses to determine the cause of interference, and, when necessary, reestablish TV reception and service in a timely manner. Reported TV interference will be addressed by Walleye Wind on a case-by-case basis, and if reported Walleye Wind will:

- Log the report and determine if the interference is Project-related;
- Meet with the complainant and the local communications technician to determine the status of the affected TV reception equipment;
- Discuss with the complainant the option of: (1) installing a combination of high gain antenna and/or a low noise amplifier; or (2) entering into an agreement to provide a monetary contribution (equal to the cost of installing the recommended equipment) toward comparable Direct Broadcast Satellite (DBS) service;
- At the complainant's election, Walleye Wind will either install the recommended equipment or enter into an agreement to reimburse the complainant for the cost of comparable DBS service;
- If the complainant chooses DBS service, Walleye Wind will consider the matter closed upon installation of the satellite dish;
- If the complainant selects antenna and/or amplifier installation and later reports continued interference issues, Walleye Wind will send a technician to the property to assess the status of the equipment and provide any necessary repairs;
- If Project-related interference remains an issue, Walleye will propose an agreement that reimburses the complainant for the cost of comparable DBS service and will remove the antenna and/or amplifier equipment, unless it was initially installed to service multiple households; and

- If Walleye Wind and the complainant are unable to reach an agreement to resolve interference-related issues, Walleye Wind will report the concern as an unresolved complaint and defer to the Commission's dispute resolution process to resolve the matter.

8.6.4 Cell Towers and Broadband Interference

Telephone service in the project area is provided to farmsteads, rural residences, and businesses through both landlines and wireless signals. The Electromagnetic Interference Analysis identified one cellular tower within the Site as well as an additional four towers within 15.5 miles of the site (**Table 20**). The towers are owned and operated by AT&T Mobility Spectrum LLC and Alltel Cooperation. Broadband is provided by 18 providers within Rock County including Sprint, T-Mobile, and Verizon Wireless (MNDEED 2019b).

Potential Impacts

Impacts to telephone or internet services are not expected. The Electromagnetic Interference Analysis (**Appendix D; Electromagnetic Interference Analysis**) indicates that interference to cellular communications is very unlikely as cellular transitions or packet switching occurs when a cellular link becomes unavailable. While efforts to identify and avoid underground telephone lines will take place prior to and/or during construction, physical damage to underground telephone lines may incidentally occur during construction of the Project from construction equipment. No other impacts associated with telephones are anticipated including interference that may result from paralleling collector lines with copper phone lines.

Mitigation Measures

In order to avoid potential physical impacts to underground telecommunication lines, all existing underground lines will be located using a utility locate service, and collection line locations will be coordinated with local telecommunications providers to ensure there will be no direct impacts to existing telephone lines. If inadvertent impacts are identified during or after construction, Walleye Wind will address these impacts on a case-by-case basis and repair any damage.

8.7 Cultural and Archaeological Resources

8.7.1 Description of Historic and Archaeological Resources

The Applicant began investigating cultural resource concerns for the Project in November 2019. Walleye Wind conducted a Phase 1a Cultural Resources Literature Review (Phase 1a) for the Project by reviewing NRHP, SHPO, and Office of the State Archaeologist (OSA) records; available historic atlases; and historic maps. Based on SHPO guidance, a 2-mile radius around the Site was used to identify NRHP-listed resources and cemeteries that could be directly or visually impacted by the proposed Project. A 1-mile radius around the Site was used to identify archaeological sites and unevaluated architectural resources for direct impacts. The Phase Ia report is included in **Appendix E (Phase Ia Cultural Resources Literature Review)**.

The results of the records search indicate that four previous cultural resource inventories have been conducted within the Site, none of which were completed in the past 10 years. These four previous

inventories include two bridge survey projects and two highway and road construction projects. It is likely that additional undocumented cultural resources, especially prehistoric and historic archaeological sites, and historic architectural resources (historic structures), could be located within the Site because the previous inventories were only conducted along highway and road corridors. Additional cultural resource inventories have not been conducted within the 1-mile research buffer.

Two NRHP-listed architectural resources are within the Site, and two NRHP-listed architectural resources are within 2-miles of the Site (**Table 22).** The two resources within the Site (the Beaver Creek State Bank and Bridge No. L-4646) are located within the city of Beaver Creek. The Beaver Creek State Bank (RK-BCC-01; NPS #80002148), also known as First National Bank of Beaver Creek, is listed in the NRHP under Criteria[5] A and C. The bank is significant for its representation of the commerce of the town and the area and for the unique architectural design. This bank is also listed in the Minnesota State Historic Sites Network (MSHSN). Bridge No. L-4646 (RK-BCC-003; NPS #89001844) is listed in the NRHP under Criterion C as an excellent, unaltered example of a regional, vernacular variation on the small, rural, early reinforced-concrete vehicular bridge, particularly that variety of reinforced-concrete arch bridge built by, or attributed to, Perley N. Gillham of Luverne, Rock County, Minnesota. This bridge is also listed in the MSHSN. The two NRHP-listed resources within 2-miles of the current Site include the Jacob Nuffer Farmstead (NPS #80002149) and the Valley Springs Rest Stop Tipi (NPS #14001183).

Table 22: NRHP-Listed Resources[6]

County	Resource Number(s)	Property Name	Location
Rock	RK-BCC-01; NPS #80002148	Beaver Creek State Bank, First National Bank of Beaver Creek	Site
Rock	RK-BCC-003; NPS #89001844	Bridge No. L-4646	Site
Rock	NPS #80002149	Jacob Nuffer Farmstead	2-Mile Research Buffer

[5] These resources are significant for one or more of the following reasons: association with a significant event (Criterion A), association with a significant person (Criterion B), or association with a significant architectural style (Criterion C).

[6] All Project infrastructure, turbines, and the Site are located in Rock County, Minnesota. The information collected for the Project's study areas that extend into South Dakota is presented for informational purposes consistent requirements set forth in the *Minnesota Department of Commerce, Energy Facility Permitting Application Guidance for Site Permitting of Large Wind Energy Conversion Systems in Minnesota* (Minnesota DOC 2019).

County	Resource Number(s)	Property Name	Location
Minnehaha, South Dakota	NPS #14001183	Valley Springs Rest Stop Tipi	2-Mile Research Buffer

Blue Mounds State Park, located approximately four miles northeast of the Site, is an area of importance to Native American tribes with ties to the region. The park also has significant associations with the history of the Great Depression and the Minnesota state parks system.

The park contains several buildings and structures that are significant for their association with the impacts of the Great Depression as well. In 1989, the resources associated with the Works Progress Administration were listed in the NRHP as a historic district (MNDNR 2020d). Blue Mounds is also historically significant as an important link in the state park system that provided recreational facilities to the far southwestern corner of Minnesota.

Six recorded architectural resources were identified within the Site, and three architectural resources were identified within 1-mile of the Site (**Table 23).** The majority of these resources are bridges. The remaining three resources include one church, one school, and one farmstead. These nine architectural resources are currently unevaluated for their listing in the NRHP.

Table 23: Previously Reported Architectural Resources within 1-Mile of the Site

Architecture Inventory Number	Property Name	Location	NRHP Eligibility Recommendation
RK-BCT-002	Palisades Lutheran Church	Site	Unevaluated
RK-BCT-003	Lois & Hansen Farmstead	Site	Unevaluated
RK-BCT-005	Bridge No. L2340	Site	Unevaluated
RK-BCT-006	Bridge No. 1090	Site	Unevaluated
RK-BCT-020	Bridge 9687	Site	Unevaluated
RK-MAR-003	Sunnyside School District No. 39	Site	Unevaluated
RK-BCT-008	Bridge No. L2237	1-Mile Research Buffer	Unevaluated
RK-BCT-011	Bridge No. L2033	1-Mile Research Buffer	Unevaluated
RK-MND-024	Bridge No. L2069	1-Mile Research Buffer	Unevaluated

Four cemeteries—Palisades Cemetery, Pleasant View Cemetery (MN), Beaver Valley Cemetery, and West Palisades Cemetery—are located within the Site. Two additional cemeteries—Springwater Cemetery and Pleasant View Cemetery (SD)—are located within 2-miles of the Site.

The project is within the Southwest Riverine Archaeological Region (Anfinson 1990; Hudak et al. 2002). Archaeological sites in this region tend to be small and widely scattered, and they are primarily located near prominent landforms and/or permanent water sources. Resources of traditional cultural value to Native Americans associated with this area are not well defined in available literature. These Traditional Cultural Properties (TCPs) instead were identified during archaeological surveys for the Project, with Walleye Wind working directly with area tribes on those surveys.

Eight archaeological sites were identified within the Site, and two archaeological sites were identified within 1-mile of the Site (Table 24). The eight sites within the Site include two pre-contact lithic scatters, four pre-contact find spots, one post-contact cemetery/burial site, and one pre-contact camp. The two sites within the 1-mile research buffer include one pre-contact lithic scatter and one pre-contact artifact scatter. All of the identified archaeological sites are currently unevaluated for the NRHP. Archaeological site 21RK0065 is a cemetery/burial site and, therefore, would need to be avoided by the Project pursuant to Minnesota Statute 307.08.

Table 24: Previously Reported Archaeological Sites Identified

State Site Number	Site Context	Site Type	Location	NRHP Eligibility Recommendation
21RK0017	Pre-Contact	Camp	Site	Unevaluated; Recommended Not Eligible
21RK0044	Pre-Contact	Find Spot	Site	Unevaluated; Recommended Not Eligible
21RK0045	Pre-Contact	Find Spot	Site	Unevaluated; Recommended Not Eligible
21RK0046	Pre-Contact	Lithic Scatter	Site	Unevaluated; Recommended Not Eligible
21RK0047	Pre-Contact	Lithic Scatter	Site	Unevaluated; Recommended Not Eligible
21RK0048	Pre-Contact	Find Spot	Site	Unevaluated; Recommended Not Eligible

State Site Number	Site Context	Site Type	Location	NRHP Eligibility Recommendation
21RK0055	Pre-Contact	Find Spot	Site	Unevaluated; Recommended Not Eligible
21RK0065	Post-Contact 1870-1940	Cemetery/ Burial	Site	Unevaluated
21RK0043	Pre-Contact	Lithic Scatter	1-Mile Research Buffer	Unevaluated; Recommended Not Eligible

As of the date of this filing, archaeological surveys have been initiated within the Site and additional archaeological survey is planned concurrently with the final siting of Project facilities. Prior to initiating archaeological surveys, Walleye Wind conducted micrositing to identify suitable locations for facility components. Micrositing involves examining areas where infrastructure is planned in order to identify any cultural resources in these areas and to assist with the planning of an array that avoids these resources. The additional archaeological surveys consist of systematic, intensive surveys within areas that will be impacted by the proposed Project. Walleye Wind invited several tribes with ties to the project area to participate in micrositing and archaeological surveys. This resulted in participation by the Yankton Sioux, Sisseton Wahpeton Oyate, Rosebud Sioux, Lower Sioux, and Cheyenne River Sioux during micrositing, archaeological surveys, or both. Tribal participation is anticipated during additional archaeological surveys as well. Tribal participation in micrositing included small teams of tribal participants trained in TCP identification and trained archaeologists that inspect all planned infrastructure locations to assist in identifying suitable locations for facility components and avoiding important cultural resources. Where TCPs are identified at a location, Walleye Wind makes adjustments to planned infrastructure to avoid TCPs and other important resources, where practicable. The archaeological surveys are planned for completion by fall 2020, and the report is expected to be completed and submitted with the preconstruction filings.

Five archaeological sites and three isolated finds have been found during micrositing and archaeological survey efforts to date (**Table 25**). These sites have not been formally evaluated for listing in the NRHP; however, Project infrastructure has already been redesigned to avoid these five sites.

Table 25: Identified Archaeological Sites within the Site

Field Site Number	Site Context	Site Type	Location	Site Status	Additional Comments
11182019-01-01	Pre-Contact	Isolated Find; Lithic Scatter	Site	Unevaluated	Identified during Micrositing; No Issue
11182019-01-02		Isolated Find	Site	Unevaluated	Identified during Micrositing; No Issue
11182019-02-01	Pre-Contact	Isolated Find; Lithic Scatter	Site	Unevaluated	Identified during Micrositing; No Issue
05/28/2020_site-05	Post-Contact	Historic Scatter	Site	Recommended Not Eligible	In Agricultural Field; No Impact to Construction
05/28/20_06	Post-Contact	Historic Scatter	Site	Recommended Not Eligible	In Agricultural Field; No Impact to Construction
11202019-01	Pre-Contact	TCP	1-Mile Research Buffer	Unevaluated	No Issue
11202019-02			1-Mile Research Buffer	Unevaluated	No Issue
11242019-01	Post-Contact	Historic Habitation	Outside of 2-Mile Research Buffer	Unevaluated	No Issue

8.7.2 Potential Cultural and Archaeological Impacts

While Walleye Wind has designed the Project to avoid identified cultural sites, the proposed construction activities for the Project may impact unidentified archaeological sites or create new visual impacts on cultural resources within the region of the Site. Construction within the turbine footprint, cable trenching, access roads, and borrow areas could directly impact unidentified TCPs, architectural, and archaeological resources. In addition, construction of turbines or other protruding structures may impact viewshed integrity for existing architecture inventory resources. In early outreach efforts, Walleye Wind provides a map with Project boundary information to the tribes so the tribes may search their records and tribal knowledge sources for potential tribal resource concerns in the area and the proximity to reservation lands, identify ancestral lands in the Site, and identify important historical events in the area (i.e., battle sites, removal trails, and similar sites). Walleye Wind similarly consulted Minnesota state repository files on documented architectural and archaeological resources. This information, combined with field surveys, aids the Project in identifying and avoiding important TCPs and architectural and archaeological resources. Tribes may not disclose all of their information and knowledge on important resources; however, participating tribes do participate in field surveys to help ensure that resources important to them are avoided.

The NRHP-listed Bridge No. L-4646 (RK-BCC-003; NPS #89001844), located north of Beaver Creek within the southern portion of the Site, will be checked during upcoming surveys to ensure that the bridge has not already been replaced. Walleye Wind will avoid using this bridge for haul routes and material shipments during Project construction.

Walleye Wind will avoid impacts to previously recorded archaeological resources, cemeteries, and any discovered significant architectural resources to the extent practicable during all phases of the Project, including development, micrositing, construction, and operation. In addition, Walleye Wind will coordinate with Tribal Historic Preservation Offices (THPOs) to avoid impacts to TCPs. Walleye Wind will complete a Phase Ia archaeological survey prior to Project construction for Project related ground disturbance locations. The survey protocol will be designed in cooperation with the participating THPOs, SHPO and/or OSA, as applicable. If significant archaeological resources are identified during the Phase Ia archaeological survey, the integrity and significance of the resource(s) will be assessed in terms of the potential for NRHP eligibility. If the identified resource(s) are significant and cannot be avoided by the Project, further investigation and/or mitigation of the resource may be needed and will be coordinated with the THPOs, SHPO and/or OSA. While avoidance of archaeological resources would be the preferred option, mitigation of impacts to NRHP-eligible archaeological resources may include additional documentation through data recovery. The results of this additional investigation or mitigation will be described and documented on a case-by-case basis by compilation into a report or reports and shared with the participating THPOs, SHPO and/or the OSA.

Walleye Wind will require an Unanticipated Discovery Plan (UADP). Should Project construction and/or operation inadvertently encounter previously undocumented archaeological resources or

human remains, the discoveries will be reported to the participating THPOs, SHPO and/or OSA, as applicable. Should human remains be inadvertently discovered, the UADP will address Minnesota's *Damages; Illegal Molestation of Human Remains; Burials; Cemeteries; Penalty; Authentication Statute* (MS 307.08), which protects known or suspected human burials and burial grounds regardless of land ownership status.

8.8 Recreation

8.8.1 Description of Resources

Rock County provides a variety of recreational opportunities including hiking, fishing, hunting, camping, and nature viewing including areas of parks, public lands, and public trails. Information from the USFWS, MNDNR, and Rock County was reviewed to identify recreational resources in the vicinity of the Site. As shown on **Map 3 (Public Lands Ownership and Recreation)**, there is one WMA located within the Site and an additional eight WMAs, one WPA, one AMA, one NWR, two state parks, and one community park located within 10-miles of the Site. Portions of the Buffalo-Ridge Snowmobile Trail also overlap portions of the Site and the surrounding 5-mile area. No Minnesota scenic riverways, scientific or natural areas, or state trails are located within the Site or within 10-miles; however, one scenic byway (which is Highway 75, King of Trails Scenic Byway) is located within 5-miles east of the Site. Recreational areas within the Site and surrounding region are described further in the following text.

Minnesota Wildlife Management Areas

WMAs are owned by the State of Minnesota and were established to protect and manage lands and waters for wildlife production, public hunting, trapping, fishing, or other recreational activities. Minnesota has approximately 1,500 WMAs, consisting of over 1.3 million acres of public land (MNDNR 2020n). As shown in **Table 26**, there is one WMA, the Rooster Ridge WMA, within the Site, and comprising approximately 93-acres of the Site as shown in **Table 25**. The Rooster Ridge WMA is approximately 93 acres of planted prairie habitat, managed by MNDNR.

Table 26: Wildlife Management Areas within 10-Miles of the Site

WMA Name	Distance from the Site Boundary (mi)	General Location Relative to the Site	WMA Area (Acres)
Rooster Ridge WMA	Within the Site	Within the Site	92.8
Springwater WMA	0.00	Abuts northern Site boundary	152.18
Little Beaver Creek WMA	2.43	Northeast	55.12
Stephen WMA	4.27	East	20.47

WMA Name	Distance from the Site Boundary (mi)	General Location Relative to the Site	WMA Area (Acres)
Russ Blanford WMA	4.37	East	154.28
P.F. Mulder WMA	4.42	East	87.85
Rock River WMA	5.07	East	413.04
Smiley Barn WMA	6.59	North	81.39
Big John's WMA	6.94	Southeast	66.53

Scientific Natural Areas

Minnesota's state SNAs are lands that are set aside for scientific study and to promote public understanding. They may consist of native plant and animal communities, rare species, and areas of significant biodiversity. The goals of the SNA program are to preserve Minnesota's natural heritage and to provide opportunities for nature-based recreation, education, and research (MNDNR 2020h). There are no SNAs within 10-miles of the Site or within Rock County.

Aquatic Management Areas

State AMAs are management areas meant to protect, develop, and manage aquatic resources that are critical to the preservation of aquatic life for their water quality, intrinsic biological value, public fishing, and other outdoor recreational uses (MNDNR 2020a). State AMAs were not identified within the Site. However, the Stephen AMA, is located approximately 4.4-miles east of the Site. Additionally, other ponds, and rivers used for recreational purposes appear present within the Site and within 10-miles of the Site.

Waterfowl Production Areas

WPAs are public lands managed by USFWS that are meant to preserve habitat for waterfowl and other wildlife. These areas are typically wetlands or grasslands that provide roosting and nesting habitat for waterfowl. Most of these federally managed wetlands and surrounding uplands are open to hunting (USFWS 2007). There are no WPAs within the Site. There is one WPA, the Rock County WPA, approximately 6-miles northeast of the Site.

Parks and Public Trails[7]

Parks and public trails may also provide outdoor recreational opportunities within Rock County. There are no federal, state, or city parks located within the Site; however, there are two Minnesota

[7] All Project infrastructure, turbines, and the Site are located in Rock County, Minnesota. The information collected for the Project's study areas that extend into South Dakota is presented for informational purposes consistent with recommendations set forth in the *Minnesota Department of Commerce, Energy Facility Permitting Application Guidance for Site Permitting of Large Wind Energy Conversion Systems in Minnesota* (Minnesota DOC 2019).

state parks, one South Dakota state park, and one community park within 10-miles of the Project. Additionally, the Touch the Sky Prairie Unit of the Northern Tallgrass NWR is also located approximately 3-miles northeast of the Site. Parks within 10-miles of the Site are displayed in **Table 27**.

Table 27: Federal, State, and County Parks within 10-Miles of the Site

County Park Name	Distance from the Site (mi)	General Location Relative to the Site	Park Area (Acres)
Legion Community Park	1.13	Southwest	15.84
Palisades State Park	2.97	West	167.37
Touch the Sky Prairie NWR	3.06	Northeast	927
Blue Mounds State Park	3.65	Northeast	1,585.86
Beaver Creek Nature Area	5.65	Southwest	165.00
Big Sioux State Recreation Area	7.71	Southwest	430.00

State-designated snowmobile trails traverse most of the state of Minnesota. Although the trails are state-designated, most snowmobile trails are monitored and maintained by the local snowmobile clubs. One snowmobile trail, the Buffalo-Ridge Trail is present within the southern Site. This trail also crosses through multiple communities and properties to the east to the Site as shown on **Map 3 (Public Lands Ownership and Recreation)**. Because the snowmobile trails are designed each season through an agreement with each property owner, the location of the trails can differ from season to season and may deviate from mapped trails.

Although several public and recreational lands are located within and near the Site, the Project has been designed to avoid direct impacts to recreational resources and public lands. No turbines have been sited within public lands or designated recreational resources, and all turbines will be sited consistent with the 3 RD X 5 RD setback of WMAs, SNAs, AMAs, WPAs, NWRs, and state and county parks. Turbines located within the viewshed of public trails and public lands, however, may affect the aesthetic quality of those areas. Further information regarding potential visual impacts to public lands in relation to the Site is found in **Section 8.5**.

Construction sounds and equipment may also temporarily diminish the aesthetic quality and scenery of the snowmobile trails and public lands within the Site. The Project may also require the temporary closing or relocating of part of the snowmobile trails to ensure the safety of

construction personnel and recreationists during construction activities. These aforementioned impacts will be temporary as they would only occur during the construction of the Project.

No direct impacts to recreational resources are anticipated as a result of the Project as all turbines have been sited outside of recreational resources. Typical mitigation includes following, at a minimum, the setback guidance for public lands of 3 RD X 5 RD. Also, Rock County requires WECS to be setback from snowmobile trails (*i.e.*, other ROWs) of either 250 ft or 1.1 times the total height of the structure (approximately 535 or 642 ft, depending upon the model), whichever is greater (Rock County Renewable Energy Zoning Ordinance, Section 8 Subdivision 1). Since the location of the trails can differ from season to season and may deviate from mapped trails, the Applicant will continue to work with the local snowmobile groups to confirm the land locations of the trails and turbines and other project elements consistent with required setbacks. Additional mitigation measures related to potential visual impacts to public lands and recreational resources in relation to the Site are found in **Section 8.5.1**.

8.9 Public Health and Safety

8.9.1 Electromagnetic Fields (EMFs)

The term "electromagnetic fields" or "EMFs" refers to electric and magnetic fields that are coupled together, such as in high-frequency radiating fields. For lower frequencies associated with power lines (referred to as "extremely low frequencies" or "ELFs"), EMFs are separated into electric fields (EFs), measured in kilovolts per meter, and magnetic fields (MFs), measured in milliGauss (mG). EFs are dependent on the voltage and MFs are dependent on the current. The intensity of an EF is proportional to the voltage of the line, and the intensity of an MF is proportional to the current flow through the conductors. Power lines in the United States operate at a power frequency of 60 Hz (cycles per second).

This section discusses EMFs associated with the wind farm. It should be noted that low-level EMFs may exist within the Project's wind turbines during operation. However, the Project turbines and collector substation will be located distant from homes and will not be accessible to the public.

Electric Fields

The 34.5 kV underground power cable used in the Project collector system is shielded, meaning the energized conductor is located at the center of the cable and is completely surrounded by a grounded metallic shield. This design confines the electric field to the interior of the cable. Thus, there is no detectable EF produced by the cable or by any other components of the Project collection system.

Magnetic Fields

A MF is produced by the flow of current through a conductor or cable. The Walleye Wind 34.5 kV collector system is a three-phase system, which requires three separate cables to make up each circuit. The three cables that comprise a circuit are installed in close proximity to each other, with

the entire assembly buried approximately 3 to 4 ft below grade. This method of installation causes the MFs produced by each cable to be largely canceled out by the fields produced by the other cables, resulting in relatively low MFs even at ground level directly above the cables.

The estimated MF calculations are assuming maximum current when all turbines are operating at 100% on the most heavily loaded cables. These maximum values represent the collection cables nearest to the substation, specifically, between the low side of the generator step-up transformer at the collector substation and the first junction cabinet from the substation, with the cables laid flat but reasonably close together, so it represents the highest field that can reasonably be expected from the entire 34.5 kV collector system. **Table 27** shows maximum calculated MF values for the collection system home run cables. Home run cables, which are the lines that come together to bring the power into the collector substation, are the largest cables carrying the most current within the collection system design. The values in **Table 27** represent the maximum possible MF values, at a height of one (1m) (3.3 ft) above the ground, under a maximum generation condition.

The MF profile data shows that MF levels decrease rapidly as the distance from the centerline increases (proportional to the inverse square of the distance from the source). The maximum calculated MF profiles around the collector lines considered for this Project and for the life of the Project are shown in **Table 28**.

Table 28: Estimated Magnetic Fields

Structure Type	System Condition	Current (Amps)	Distance to Proposed Centerline								
			-100'	-75'	-50'	-25'	0'	25'	50'	75'	100'
Home run cable (34.5kV)	Normal	680	0.22	0.34	0.86	2.89	49.18	2.89	0.86	0.34	0.22

Stray Voltage

Stray Voltage is defined by the IEEE as:

> *A voltage resulting from the normal delivery and/or use of electricity (usually smaller than 10 volts) that may be present between two conductive surfaces that can be simultaneously contacted by members of the general public and/or their animals.*

Stray voltage is caused by primary and/or secondary return current and power system-induced currents, as these currents flow through the impedance of the intended return pathway, its parallel conductive pathways, and conductive loops in close proximity to the power system. Stray voltage is not related to power system faults and is generally not considered hazardous.

Stray voltage generally refers to a voltage between the grounded neutral of a distribution system and the Earth. Most instances of stray voltage can be traced to unbalanced currents in distribution circuits, when the currents in the three-phase conductors are not all equal. Walleye Wind's collector circuits are inherently balanced, so no appreciable neutral to Earth voltage is expected. Additionally, because there will be no connection between Walleye Wind's collection system and the local distribution system, and, no stray voltage from the electrical system is anticipated to impact the existing electrical system.

Potential Impacts

Extensive research has been conducted by the National Institute of Environmental Health Sciences (NIEHS) regarding EMFs. To date, there is no conclusive research evidence that EMFs stemming from power lines pose significant impacts to health (Boorman et al. 1999; NIEHS and NIH 2002; WHO 2007; 2020). EMFs from underground electrical collection and feeder lines dissipate quickly and relatively close to the source due to the fact that they are buried underground, heavily insulated, and also shielded. Research has shown that electrical fields surrounding buried lines are negligible and MFs often dissipate significantly within approximately three ft of stronger EMF sources, such as transmission lines and transformers (CDC 2014).

Stray voltage is a natural phenomenon that is the result of low levels of electrical current flowing between two points that are not directly connected. Electrical systems, including farm systems and utility distribution systems, must be adequately grounded to ensure continuous safety and reliability and to minimize this current flow. Potential effects from stray voltage can result from a person or animal coming in contact with neutral-to-earth voltage. Stray voltage does not cause electrocution and is not related to ground current, EMF, or earth currents.

Mitigation Measures

Based upon current research regarding EMFs, and the separation distances being maintained between transformers, turbines, and collector lines from public access and homes, EMFs associated with the Project are not expected to have an impact on public health and safety. No detectable EF produced by the cable or by any other components of the Project collection system is anticipated and relatively low MFs, even at ground level directly above the cables, is expected. Electrical equipment will be grounded per ASNI and NESC guidelines to ensure safety and reliability. Connecting and grounding electrical equipment will prevent potential issues related to stray voltage. Stray voltage is typically not associated with underground electric collector lines, which connect to the Project substation and are not tapped or diverted for other uses. Therefore, stray voltage is not expected to have an impact on public health and safety. Beyond public safety considerations incorporated in design of the Project, additional mitigation measures are not proposed.

8.9.2 Aviation

A review of the FAA National Airspace Systems Resources database and the AirNav Aviation Information database revealed three active registered airports and one active heliports located

within 10-miles of the Site (AirNav 2020). Details about these airports and heliports are set forth in **Table 29**. The public airports nearest the Project are the Quentin Aanenson Field Airport (3.53-miles east of the Site) and the Rock Rapids Municipal Airport (9.72-miles southeast of the Site).

Table 29: Airports within 10-Miles of the Site

Airport Name	City	County	Distance (Miles) from Site	Runway Information	Runway Elevation (ft)
Quentin Aanenson Field Airport (Public)	Luverne	Rock, MN	3.53	1 Asphalt	1,435
Sanford Hospital Luverne Heliport (Private)	Luverne	Rock, MN	3.62	Concrete	1,427
Rock Rapids Municipal Airport (Public)	Rock Rapids	Lyon, IA	9.72	2 Asphalt	1,363
Zangger Vintage Airpark (Private)	Larchwood	Lyon, IA	9.87	1 Turf and 1 Hard Surface	1,476

There are no registered public airports or heliports located within the Site. The closest registered airport is the Quentin Aaenson Field Airport located approximately 3.53-miles away from the eastern extent of the Site boundary. This is a public-use airport with one, 4,200-ft, asphalt, runway with detailed published instrument approach procedures (AirNav 2020). Due to agricultural use within the region, small private runways may be associated with crop dusting activities within or near the Site.

Aviation Towers

The electromagnetic interference analysis (**Appendix D; Electromagnetic Interference Analysis**) did not identify active aviation towers within the site. Aviation towers provide radio communications related to air traffic. Two aviation towers, call signs KRQ9 and WQBL287, are located within 15.5 miles of the Site.

Potential Impacts

Under 14 CFR Part 77.9, all structures exceeding 200 ft above ground level (AGL) must be submitted to the FAA so that an aeronautical study can be conducted. The purpose of the study is to identify obstacle clearance surfaces that could limit the placement of wind turbines. The end result of the aeronautical study is the issuance of a determination of Hazard or No Hazard. Additionally, a Tall Towers Permit and approval may be required by the MnDOT prior to developing the Project to ensure the safety of airspace within Minnesota. A permit from MnDOT is required for any of the following (MN/DOT 2020a):

- Structure is greater than 500 ft AGL;
- Structure is more than 200 ft AGL within three nautical miles of an airport and increasing by 100 ft for each additional mile out to 6-miles or 500 ft;
- Structure would increase an instrument approach minimum flight altitude or increase its flight visibility minimums;
- Structure would increase the minimum obstruction clearance altitude of a federal airway; or
- Structure penetrates any of the following imaginary surfaces: primary, horizontal, conical, approach, or transitional surfaces.

To determine potential impacts to aviation associated with the development of the Project, Walleye Wind contracted with Capitol Airspace Group, an expert aviation consulting firm, to conduct an Obstruction Evaluation for the Site. The summary of that evaluation is detailed below.

Obstacle clearance surfaces (OCS), which are associated with instrument approach procedures and minimum flight altitudes, range within the Site from 1,496 to 2,349 ft AMSL. Proposed wind turbines that exceed each calculated OCS for that particular turbine (*i.e.*, surface elevation + turbine height) would require an increase in the FAA documented minimum flight altitudes within the Site. If the FAA determines a single OCS exceedance, or a cumulative effect from multiple exceedances, would constitute a substantial adverse effect, it could result in a determination of hazard.

The USGS elevation data indicates that circling approach procedures could limit wind turbines in very small southeastern sections of the study area. Minimum vectoring altitudes could limit wind turbines in a very small western section of the Site.

If the FAA accounts for a circling approach at Quentin Aanenson Field, it could result in lower height constraints than those identified above. These lower surfaces could limit wind development in the southeastern section of the study area.

In addition, military radar coverage overlays the Project, and, thus, siting of turbines will need to be coordinated with the military and the United States Air Force. Walleye Wind has already initiated coordination with the military and FAA as part of a formal review of the Project. Walleye Wind has coordinated through the militaries informal review process and identified the existence of a NORAD radar coverage overlapping the project boundary. Walleye Wind has negotiated a mitigation agreement with the U.S Air Force which is currently being reviewed by the U.S Air Force's counsel for approval. Walleye wind will continue to coordinate with Air Force officials to ensure the project is sited in accordance with military requirements.

Aerial application of seeds, fertilizers, and crop protection chemicals are likely to occur within or near the Project. The construction of wind turbines has the potential to impact crop dusting by creating a physical obstacle within the flight paths required to perform aerial application activities or by creating unstable air near turbines while in operation. Even if wind turbines are not directly located within the field requiring treatment, turbines adjacent to fields where aerial application

occurs can impact the airspace required for pilots to turn for their next pass over the field. These impacts may result in higher costs to the farmers from the increased time and complexity of spraying or may result in the fields requiring ground application. Additionally, MET towers may impact aerial application activities (Minnesota DOC 2019).

While no harmful interference is expected for the aviation towers, Walleye Wind is subject to an FAA study to determine any exclusion zones. Proposed turbine locations will maintain the standard appropriate offset distances in addition to any setbacks set by the agency to minimize harmful impact.

Mitigation Measures

Walleye Wind submitted the proposed location of the turbines and associated Project facilities to the FAA in early December 2018 for an aeronautical study and has received a DNH for each wind turbine and MET tower location. In order to avoid potential impacts to air traffic, the Applicant will mark and light the turbines to comply with FAA requirements. Tall Towers Permits will be obtained from MnDOT to ensure the safety of airspace within Minnesota.

Walleye Wind's operations will coordinate with crop dusting plane pilots, and will work with them on a case-by-case basis. If notified prior to aerial application activities in the Project vicinity, Walleye Wind can adjust turbine direction to create flyways through the wind farm when advance notice of flight plans is provided. This can facilitate crop dusting activities in the Project vicinity. If requested, Walleye Wind may also shut down the turbines to reduce air turbulence to allow for aerial application within or near the Project.

8.10 Hazardous Materials

The predominant land use in the Site is agriculture. Potentially hazardous materials within the Site may include petroleum products (diesel fuel, gasoline, propane, heating oil, lubricants, and maintenance chemicals), pesticides, and herbicides used in prior or ongoing agriculture-related activities. Contaminants associated with asbestos and/or lead-based paint may be present due to the age of the farmsteads within the Site. Polychlorinated biphenyls associated with pad-mounted and pole-mounted transformers may also be present. In addition, trash or junk piles are a common occurrence in rural regions such as the Site, particularly in wooded areas.

The MPCA "What's in My Neighborhood?" database (MPCA 2020b), documents known and potential sources of soil and groundwater contamination, was reviewed for the Site. The MPCA database indicated that a total of 123 sites are listed within the Site, 84 of which are listed as active. Of these sites, there are 91 feedlots; eight construction stormwater sites; seven hazardous waste sites, three industrial stormwater sites, two multiple program sites, one solid waste site (Janet Faber Property), one air quality site (U of M – AURI Wind Bio-Diesel Project); three sites with aboveground tanks; and four sites with underground tanks (MPCA 2020b).

Hazardous materials used and stored for the Project, within the Site during construction may consist of fuel, lubricating oil, hydraulic oil, propylene glycol, and other materials required for the

construction of a wind farm. Additionally, during operation of the wind farm, hazardous materials such as hydraulic oil, lube oil, grease, and cleaning solvents will be used and stored on-site as they are necessary to maintain wind turbines and other equipment. Also, pad-mounted and grounding transformers required for the operation of the Project contain large quantities of cooling fluids, typically consisting of mineral oil.

An American Society for Testing and Materials conforming Phase I Environmental Site Assessment (ESA) was conducted in July 2019, for the portion of the Site purchased from RES (LaForge 2019). Prior to construction, the Applicant will conduct an updated Phase I ESA to identify and avoid existing recognized environmental conditions (RECs) within the proposed Site, particularly associated with facilities identified by the MPCA database.

Due to the presence of hazardous materials during Project construction and operations, there is the potential for spills and/or leaks to occur. The primary concerns associated with these potential spills and/or leaks are the potential impacts to surface and groundwater resources and the potential for soil contamination within the Site.

Information from the Phase I ESA will be used to identify and avoid, where appropriate, any identified RECs (via buffers or infrastructure redesign). If RECs cannot be avoided, additional investigation activities will be performed to verify the presence or absence of contamination. Remediation activities may be required should contamination be found at concentrations above established exposure criteria. A REC may not be avoided if it is undocumented in a public database and unexpectedly encountered during construction. An example might include finding contaminated soils during collection boring. Any wastes generated during any phase of the Project will be handled and disposed of in accordance with Minnesota Rule Chapter 7045, local rules and regulations, and the site-specific Spill Prevention, Control, and Countermeasure Plan (SPCC). Any monitoring, transportation, or handling of materials will be conducted by trained and qualified personnel utilizing established procedures and proper equipment.

To avoid potential impacts to water and soil resources, new and used oils will be stored within the O&M building or inside a secondary containment structure. Secondary containment will prevent impacts and will ensure that leaks, if they occur, will be contained. Additionally, a SPCC will be created for both the construction and operational phases of the Project. The SPCC will detail the appropriate storage, cleanup, and disposal of hazardous wastes to ensure potential impact are avoided.

8.11 Land-based Economies

Land use within the Site is primarily agricultural. The 2016 National Landcover Database indicates that cultivated crops account for approximately 27,041-acres or approximately 87% of the Site as shown in **Map 6 (Land Cover)**. An additional 7% of land is indicated as hay/pasture/grassland/herbaceous land cover, much of which is used for livestock grazing (Yang et al. 2018; MRLC Consortium 2019). According to the 2017 USDA Census of Agriculture

County Profile for Rock County, Minnesota, over 93% of the land in Rock County (roughly 287,871-acres) was used for agriculture on approximately 701 farms (USDA-FSA 2017). Corn, soybeans, hay, and oats are the primary crops grown in Rock County, while swine and cattle are the predominant livestock raised in the county. The market value of agricultural products sold in the county for 2017 was approximately $419 million, with crop markets at approximately $143.2 million and livestock markets at approximately $275.9 million (USDA-FSA 2017).

The USDA-NRCS provides farmland classes for agricultural land across the country in accordance with the Farmland Protection Policy Act, part of the 1981 Farm Bill. Prime farmland is "land that has the best combination of physical and chemical characteristics" to grow crops (Soil Science Division Staff 2017:459). Farmlands of statewide importance include land with soils that are almost, but not quite, prime farmland. These lands produce high crop yields when properly managed (USDA-NRCS 2020a). Approximately 49.5% of the total Site is classified as prime farmland, while approximately 23.4% is considered to be farmland of statewide importance. Additionally, approximately 15.0% of land within the Site is prime farmland, if drained, and approximately 7.2% is not prime farmland. Finally, approximately 4.9% is considered prime farmland if it is protected from flooding or not frequently flooded during the growing season (USDA-NRCS 2020a; 2020b).

The use of feedlots is a common practice in raising livestock in the state of Minnesota. The MPCA administers rules regulating livestock feedlots in Minnesota. According to the MPCA's "What's in My Neighborhood" database (MPCA 2020b), there are 209 registered feedlots in Rock County. Ninety-one of the aforementioned registered feedlots are in the Site (MPCA 2020b).

Potential Impacts

The Project is not expected to significantly impact agricultural land use or the general character of the area. While an average of 1.32-acres of land per turbine will be taken out of agricultural production for the life of the Project to accommodate the turbine pad, access roads, substation, O&M facility, and ancillary facilities, landowners may continue to plant crops near and graze livestock up to the gravel roadway around each turbine pad. This assumes 0.25-acres of permanent impact at each turbine location, (including the concrete foundation and gravel ring around the foundation, see **Figure 2**), 16-ft wide permanent access roads, 0.1-acres of permanent impact for the MET tower, approximately 10-acres for the O&M facility and the Walleye Wind Substation. The primary permanent impact to active agricultural land will be the reduction of crop production on a total of approximately 42.8 acres of cultivated crop production in the Site (0.14% of the total Site) (refer to **Section 8.19**). Collector lines will not result in permanent impacts as they will be installed entirely underground below the plow zone. All collection lines will be buried approximately 3 to 4 ft (0.9 to 1.2 m). Large-scale impacts to agriculture or agricultural lands are not anticipated with the placement of turbines, access roads, and ancillary facilities in agricultural

fields. **Table 30** summarizes the permanent impacts to prime farmland for turbines, access roads, MET tower, the O&M facility, and the Walleye Wind Substation.

Figure 2: Turbine Permanent Impact Image

Table 30: Summary of Permanent Prime Farmland Impacts

Prime Farmland Type	Turbines	Alt. Turbines	Access Roads	Alt. Access Roads	MET Tower	O&M Facility /Substation	Total
Prime Farmland	4.0	1.2	9.6	4.2	-	4.4	**23.4**
Prime Farmland if Drained	1.2	0.3	2.3	0.3	-	5.2	**9.3**
Farmland of Statewide Importance	4.8	1.0	10.4	2.4	0.1	0.4	**19.1**
Prime Farmland if Protected from Flooding	-	0.3	-	0.1	-	0.1	**0.5**
Not Prime Farmland	-	-	0.3	-		-	**0.3**
Total	**10**	**2.8**	**22.6**	**7.0**	**0.1**	**10.1**	**52.6**

Land that is used for agricultural production will largely remain unchanged. Crops will be able to be planted up to the gravel roadway around each turbine pad and up to the access roads. Changes in agricultural equipment maneuvering routes around turbine structures will be required, but they should have a nominal effect on overall production and are negotiated with each potentially affected landowner.

Temporary impacts to farmland during construction will include access road approaches, crane walks, turning radii, equipment laydown areas, construction easements around turbines, collection line installation, and/or intersection improvements. When construction occurs outside of winter months, there is a higher possibility for temporary minor impacts due to construction, such as soil compaction, loss of planting opportunity, crop damage, and drain tile damage. Temporary impacts shown in **Table 31** were calculated using the following assumptions: a 300-ft radius construction easement around each turbine location (for crane pads, equipment storage, soil stockpiling, etc.), 50-ft wide construction easements for access roads (for equipment delivery and staging), 50-ft wide construction easements for collection lines, 100-ft wide construction easement for crane paths, and 18 acres for the laydown yard. Of note, construction of the Project will not likely impact the entire construction easements as detailed; these calculations are provided to show the worst-case scenario.

Table 31: Summary of Temporary Prime Farmland Impacts

Prime Farmland Type	Turbines	Alt. Turbines	Access Roads	Alt. Access Roads	Collection*	Alt. Collection*	MET Tower	Laydown Yard	Crane Paths	Alt. Crane Paths	Total
Prime Farmland	107.9	32	27.5	11.9	84.5	16.9	-	17.0	93.9	2.5	**394.1**
Prime Farmland if Drained	33.2	7.0	6.6	1.0	27.7	5.6	-	1.0	24.0	2.2	**108.3**
Farmland of Statewide Importance	113.9	26.6	29.8	6.8	73.5	14.7	3.6	0.1	104.7	15.7	**389.4**
Prime Farmland if Protected from Flooding	1.0	5.8	0.1	0.5	10.5	2.1	-	-	3.6	0.6	**24.2**
Not Prime Farmland	3.4	-	1.0	-	11.3	2.3	-	-	3.1	-	**21.1**
Total	**259.4**	**71.4**	**65.0**	**20.2**	**207.5**	**41.6**	**3.6**	**18.1**	**229.3**	**21.0**	**937.1**

*Temporary collection corridors depicted on the maps show all potential collection corridors, but the actual collection line trench total will be approximately 35 miles for primary turbines and 7 miles for alternate turbines. This is what was utilized for estimated temporary impacts.

Livestock in pastureland may be temporarily disrupted during construction due to temporary activity and sound, but appropriate measures will be made to ensure fenced pastureland is secure. Temporary fencing may be put in place if fencing is impacted and will be repaired or replaced after construction by Walleye Wind. Feedlot impacts will be avoided during construction. Stray voltage is discussed in **Section 8.9.1.**

Mitigation Measures

Only the land for the turbines and associated pads, the Walleye Wind Substation, the MET tower, the O&M facility, certain electrical equipment, and the access roads will be permanently taken out of crop production. After construction is completed, remaining land surrounding the turbines and access roads may still be farmed. The permanent loss of approximately 42.8 acres of agricultural land will not result in the loss of agricultural-related jobs or net loss of income, until such time that the project is decommissioned and the land restored. Revenue lost from the removal of land from agricultural production will be offset by lease payments to individual landowners according to their respective contracts with Walleye Wind.

The Applicant will coordinate with landowners to identify property features, such as drain tiles, that need to be avoided during construction activities and will mark the location of known tile lines during construction to avoid these features where practicable. Where identified features, such as drain tiles, are not avoided due to routing restrictions; such as, depth of collection and depth of drain tiles are the same, or are incidentally damaged, the drain tile or other features will be repaired following construction and landowners will be compensated for crop damages or losses related to the damage. To the extent possible, staging areas and associated infrastructure will be placed in areas where previous soil impacts have occurred to avoid impacting undisturbed farmland. Should soil compaction or drain tile damage occur as a result of temporary construction activities including staging areas, laydown areas, and crane paths, appropriate measures (*e.g.*, soil decompaction, tile repair) will be taken by Walleye Wind to ensure farmland is restored in accordance with the lease agreement between the landowner and Walleye Wind. Where soil compaction occurs, restoration measures will include ripping up the compacted areas with a grader and revegetating the areas as discussed in **Section 10.5**. If damage related to construction activity is later discovered following restoration, Walleye Wind will reimburse landowners for the repair costs.

Forestry

There are no economically important forestry resources within the Site. The 2016 National Land Cover Database indicates the Site contains limited forest cover (Yang et al. 2018; MRLC Consortium 2019). Approximately 87-acres of deciduous forest (less than 0.5%) are mapped within the Site. Properties within 1-mile of the Site contain a similar amount of deciduous forest cover to the Site and only 2-acres (less than 0.01%) of mixed forest. This forest cover is present as isolated woodlots and, to a lesser extent, narrow tree lines and shrubby corridors along streams and rivers within the Site. Walleye Wind has sited Project infrastructure to avoid larger, continuous woodlots. According to the 2016 National Landcover Database – Land Use-Land

Cover dataset (Yang et al. 2018; MRLC Consortium 2019) and extensive siting efforts, the turbine pads, access roads, and other permanent infrastructure are sited primarily within agricultural land and in some grassy areas associated with roadsides and ditches. No impacts to economically important forestry resources are expected to occur; therefore, no mitigation is proposed.

Mining

Quarries, gravel, and sand pits exist throughout Rock County, but are largely inactive, abandoned, or their use is limited to private landowners. Based on review of MnDOT (2003) County Pit Maps and USGS topographic maps for the Site, there are two gravel pits located within the Site, northeast of Beaver Creek. Review of aerial imagery indicates that the southernmost of these pits is likely still active and has not been returned to agriculture. The gravel pit farther to the north is likely abandoned/inactive and has been returned to agriculture. Project infrastructure will not be located within sand or gravel operations.

Impacts to mining resources are not anticipated. Project infrastructure will not be located within mining resources; therefore, direct impacts to mining resources will not occur. Walleye Wind may request to use aggregate from mining operations for use during construction. Walleye Wind will coordinate with the local mining operations, as appropriate.

Walleye Wind will design the Project to avoid locating infrastructure within or near sand or gravel operations.

8.12 Tourism

Rock County offers tourism opportunities throughout the year. According to Minnesota's *Tourism and the Economy Fact Sheet 2019* (Explore Minnesota 2019), in 2017, annual leisure and hospitality expenditure in Rock County was approximately $10.8 million. There were about 269 tourism-related jobs in the Rock County in 2017, seven of which were in state government and the rest were in private industry (MNDEED 2020). While the annual leisure and hospitality expenditure numbers have not been released for the current year , according to currently available numbers, tourism-related jobs increased to 292 in Quarter 3 of 2019 (Explore Minnesota 2019). Generally, tourism in Rock County focuses on promoting the area's parks, art, history, and hospitality facilities as well as recreational activities. Local community events include Buffalo Days and Arts in the Park in Luverne, Relay for Life of Rock County, the Rock County Fair in Luverne, the Tri-State Band Festival in Luverne, and the Luverne Winterfest (American Cancer Society 2019; Mosher and Mosher 2019).

As shown in **Section 8.5.1** and **Section 8.8**, there is one WMA within the Site and an additional eight WMAs, one WPA, one AMA, one NWR, one community park, and two state parks within 10-miles of the Site. These public resources provide tourism opportunities including hiking, wildlife watching, hunting, fishing, and snowmobiling. Refer to **Map 3 (Public Lands Ownership and Recreation)**.

Snowmobiling is a popular activity in Rock County with several miles of trails offering a potential tourism draw. More specifically, approximately 91-miles of snowmobile trails are found throughout Rock County (MNDNR 2020g). Approximately 3.2-miles of the Buffalo-Ridge Snowmobile Trail run through the Site itself, and portions of the Buffalo-Ridge Trail also run through the surrounding 5-mile area (MNDNR 2020g). A local group called the Rock County Sno-Masters maintains groomed trails within Rock County that connect Pipestone and Nobles Counties (Minnesota United Snowmobile Association 2020).

Potential Impacts

The Project facilities are planned on private lands, and, therefore, are not expected to have direct impacts on tourism activities. As discussed in **Section 8.8**, there is one snowmobile trail present within the Site. Impacts to recreational users of snowmobile trails and public lands will be mostly visual in nature.

Proposed setbacks from recreational facilities, public roads, and non-leased properties will minimize any indirect impacts. Therefore, the Project is not anticipated to have a negative effect on area tourism.

Mitigation Measures

Turbines will be set back at least 1.1 times the total turbine height from snowmobile trails to minimize the potential for ice throw. No direct impacts to tourism are anticipated as a result of the Project. Additional mitigation measures related to potential visual impacts to the viewshed from public and recreational lands are detailed in **Section 8.5.1**.

8.13 Local Economies and Community Benefits

According to the ACS 2013-2017 estimates, the educational services and health care and social assistance industries accounted for 25% of jobs statewide in Minnesota, followed by manufacturing at 13.5% and retail trade at 11.1%. The ACS 2013-2017 also estimates that educational services and health care and social assistance accounted for 25.8% of jobs in Rock County, followed by retail trade at 12.1%, manufacturing at 11.2%, and agriculture, forestry, fishing and hunting, and mining at 10.8% (U. S. Census Bureau 2017). According to MNDEED's 2019 County Profile for Rock County (MNDEED 2019a), health care and social assistance was Rock County's leading industry in 2018 as well at 24.9% of total jobs, followed by retail trade at 11.9%, and finance and insurance at 10.2%.

8.13.1 Potential Economic Impacts

Overall, the Project will have a moderately positive impact on the region by adding temporary and permanent jobs, increasing the county's tax base, and providing lease payments to participating landowners. The communities near the Project are also expected to receive positive economic benefits as construction will necessitate the need for numerous temporary and full-time positions that include good-paying jobs which help develop a skilled clean-energy workforce. Approximately 150 to 185 jobs over the five to seven-month construction period and 4 full-time

O&M jobs are expected as part of the Project. Some jobs may be filled by existing local or regional workers. Walleye Wind plans to use local contractors and suppliers, where feasible, for portions of construction, which will contribute to the overall economy of the region. Below, **Table 32** shows the breakdown of jobs and estimated use of local labor.

Table 32: Estimated Construction Job Creation for an Indicative Wind Project in Minnesota

Labor Type	Average Headcount	Peak Headcount	Approximate Source Location	
			Non-Local	Local[8]
Laborers	50-60	65	50%	50%
Equipment Operators	30-35	41	20%	80%
Crane Operators	5-10	12	20%	80%
Electricians	40-50	52	25%	75%
Supervision/Management	25-30	30	80%	20%

Also, the local and regional purchase of products such as fuel, equipment, services, and supplies necessary to construct and operate the facilities will benefit businesses in the counties as well as in the state.

Minor short-term impacts to the socioeconomic resources of the area are anticipated. Approximately 47-acres will be removed from agricultural production, or other land use, for the length of the Project.

8.13.2 Tax Payments and Local Spending

The Project will provide long-term positive economic benefits to local landowners, the state, and the local economy of southwestern Minnesota. Landowners in the Site will benefit from annual lease payments, while, in accordance with state and county law, Walleye Wind will pay applicable property tax and production taxes on the land and energy production to local governments. The Project will pay a Wind Energy Production Tax to the local units of government of $0.0012 per kilowatt-hour (kWh) of electricity produced. This would result in annual Wind Energy Production Tax payments ranging from approximately $80,000 to $600,000 in the first year, and between $400,000 and $600,000 annually after the first year in Rock County. During the first year, Energy Production Taxes may not be maximized due to partial energy generation during the startup months when the facility is not running at optimal capacity and may also only include a partial calendar year of energy production.

Local businesses within Rock County are expected to experience a short-term positive increase in revenue generation during the construction phase of the Project due to the purchase of goods and

[8] Local workers are defined as any workers that live in Minnesota or within 150 miles of the state.

services. Patronage at hotels and restaurants, the purchase of consumer goods and services by the various workers associated with the Project, as well as the purchase of materials such as fuel, concrete, and gravel from local vendors will generate revenue for local businesses. It is anticipated that the largest increase in economic activity would be located near the Project, between Luverne and Jasper, Minnesota. The economic impact could also expand into towns and cities within adjacent counties such as Pipestone and Nobles Counties in Minnesota, Minnehaha County in South Dakota, and Lyon County in Iowa.

8.13.3 Mitigation Measures

Adverse economic impacts as a result of the Project are not expected. Regional businesses and service providers are anticipated to experience a temporary increase in business during the construction of the proposed Project, while annual lease payments to landowners are expected to offset potential losses from agricultural production. Walleye Wind does not have the authority to exercise eminent domain for the Project. Land lease agreements and wind easement agreements are voluntary and will be agreeable by all involved parties to ensure the landowners are fairly compensated. Additionally, Rock County will experience an increase in tax revenues due to the Wind Energy Production Tax and property tax payments.

8.14 Topography

The topography of the Site is generally flat but contains undulating terrain typical of Minnesota and eastern South Dakota with approximate elevations between 1,400 and 1,660 ft AMSL (USGS 2019c; 2017a; 2019b; 2019a; 2017b). The lowest elevations within the Site occur in the southern portion along Beaver Creek. See **Map 8 (Topographic)**.

According to the MNDNR Ecological Classification System (ECS), the Project is located within the Prairie Parkland Province (251). The Prairie Parkland Province spans much of western Minnesota and extends into the surrounding states of North Dakota, South Dakota, and Iowa. Each ECS Province is divided further into sections and subsections. The Site is within the North Central Glaciated Plains (251B) section and the Inner Coteau Moraines (251Bc) subsection. The North Central Glaciated Plains is characterized by rolling calcareous till soils. The Inner Coteau subsection is characterized by areas of dissected moraines capped by thick wind-blown loess deposits (MNDNR 2020j).

Potential Impacts

Some limited, localized impacts to the topography, within the Site will come from grading for the construction of turbine pad sites, access roads, and associated Project facilities. Anticipated impacts, however, will be minor in nature as construction of these features will not require significant excavation or fill for foundations or road bases.

Mitigation Measures

Walleye Wind will implement construction Best Management Practices (BMPs), in accordance with the MPCA's (2000) *Stormwater Best Management Practices Manual* and the approved

Stormwater Pollution Prevention Plan (SWPPP), to ensure erosion and sedimentation are minimized around construction areas. A grading plan will be developed for the Walleye Wind Substation and O&M facility area. Following decommissioning of the Project, the site will be restored to its natural topographical contours to the extent possible.

8.15 Soils

Overall, the Site is comprised of 41 soil types (USDA-NRCS 2020b). Soils within the Site range from poorly drained to excessively drained. Three soil types account for nearly half of the soils (45%) within the Site and are generally composed of silt loams with 0-10 percent slopes. Five soil types (8%) within the Site are designated by the USDA-NRCS as hydric: Calco silty clay loam, 0 to 2 percent slopes, frequently flooded (P4A); Marcus silty clay loam, 0 to 2 percent slopes (P21A); Colo silty clay loam, deep loess, 0 to 2 percent slopes, occasionally flooded (P6A); Spillco silt loam, 0 to 2 percent slopes, frequently flooded (P32A); Havelock clay loam, 0 to 2 percent slopes, frequently flooded (1015A); (**Map 13; Soils**). All soil types within the Site are listed in **Table 33** below.

Table 33: USDA-NRCS Soils in the Site

Soil Symbol	Map Unit Name	Area (Acres)	Percent of the Site	Hydric	Corrosion of Concrete	Corrosion of Steel
P25C2	Nora silt loam, 4 to 10 percent slopes, eroded	5952.60	19.15%	No	Low	Low
P24B	Moody silty clay loam, cool, 2 to 6 percent slopes	5110.29	16.44%	No	Low	Moderate
P46	Trent silty clay loam, 0 to 3 percent slopes	3062.07	9.85%	No	High	High
P26C2	Nora-Crofton complex, 6 to 12 percent slopes, eroded	2441.64	7.86%	No	Low	Low
P47A	Whitewood silty clay loam, overwash, 0 to 2 percent slopes	2438.20	7.85%	No	Low	High
P19A	Alcester silty clay loam, cool, 0 to 2 percent slopes	1798.76	5.79%	No	Low	Moderate
P42A	Whitewood silty clay loam, 0 to 2 percent slopes	1518.54	4.89%	No	Low	High
P4A	Calco silty clay loam, 0 to 2 percent slopes, frequently flooded	1196.94	3.85%	Yes	Low	High

Soil Symbol	Map Unit Name	Area (Acres)	Percent of the Site	Hydric	Corrosion of Concrete	Corrosion of Steel
P34B	Splitrock silty clay loam, 2 to 5 percent slopes	1001.45	3.22%	No	Low	High
P20B	Alcester silty clay loam, cool, 2 to 6 percent slopes	930.25	2.99%	No	Low	Moderate
P16A	Graceville silty clay loam, 0 to 2 percent slopes	766.90	2.47%	No	Low	Low
P6A	Colo silty clay loam, deep loess, 0 to 2 percent slopes, occasionally flooded	509.51	1.64%	Yes	Low	High
P32A	Spillco silt loam, 0 to 2 percent slopes, frequently flooded	506.67	1.63%	Yes	Low	High
P33A	Spillco silt loam, 0 to 2 percent slopes, occasionally flooded	504.58	1.62%	No	Low	High
P5A	Calco silty clay loam, 0 to 2 percent slopes, occasionally flooded	493.67	1.59%	No	Low	High
P16B	Graceville silty clay loam, 2 to 6 percent slopes	457.34	1.47%	No	Low	Low
P14B	Flandreau silt loam, 2 to 6 percent slopes	362.12	1.17%	No	Low	Low
P21A	Marcus silty clay loam, 0 to 2 percent slopes	343.25	1.10%	Yes	Low	High
P26D2	Nora-Crofton complex, 12 to 18 percent slopes, eroded	261.99	0.84%	No	Low	Low
P24C2	Moody silty clay loam, cool, 6 to 11 percent slopes, eroded	189.10	0.61%	No	Low	Moderate
P11B	Dempster silt loam, 2 to 6 percent slopes	180.11	0.58%	No	Low	Low
P38C	Thurman loamy fine sand, terrace, 6 to 11 percent slopes	174.48	0.56%	No	Moderate	Moderate

Soil Symbol	Map Unit Name	Area (Acres)	Percent of the Site	Hydric	Corrosion of Concrete	Corrosion of Steel
P7A	Comfrey clay loam, 0 to 2 percent slopes, occasionally flooded	152.46	0.49%	No	Low	High
P34C2	Splitrock silty clay loam, 5 to 9 percent slopes, eroded	141.29	0.45%	No	Low	High
1024A	Havelock clay loam, 0 to 2 percent slopes, occasionally flooded	116.37	0.37%	No	Low	High
P44E	Shindler clay loam, 15 to 45 percent slopes	109.51	0.35%	No	Low	Moderate
P37D	Talmo gravelly sandy loam, 6 to 35 percent slopes	77.12	0.25%	No	Low	Low
1015A	Havelock clay loam, 0 to 2 percent slopes, frequently flooded	66.69	0.21%	Yes	Low	High
P25D2	Nora silt loam, 10 to 18 percent slopes, eroded	51.29	0.17%	No	Low	Low
GP	Pits, gravel-Udipsamments complex	37.78	0.12%			
P11A	Dempster silt loam, 0 to 2 percent slopes	37.75	0.12%	No	Low	Low
P37B	Talmo gravelly sandy loam, 2 to 6 percent slopes	16.07	0.05%	No	Low	Low
P8A	Cylinder loam, 0 to 2 percent slopes, occasionally flooded	14.81	0.05%	No	Low	High
P14A	Flandreau silt loam, 0 to 2 percent slopes	13.92	0.04%	No	Low	Low
P3A	Biscay silty clay loam, 0 to 2 percent slopes, occasionally flooded	12.55	0.04%	No	Low	High
P38B	Thurman sandy loam, 2 to 6 percent slopes	6.08	0.02%	No	Moderate	Low
W	Water	5.88	0.02%			

Soil Symbol	Map Unit Name	Area (Acres)	Percent of the Site	Hydric	Corrosion of Concrete	Corrosion of Steel
P29A	Rushmore silty clay loam, 0 to 2 percent slopes	5.11	0.02%	No	Low	High
P28A	Ransom silty clay loam, 1 to 3 percent slopes	4.23	0.01%	No	Low	High
M-W	Water, miscellaneous	4.07	0.01%			
P43A	Wilmonton silty clay loam, 1 to 3 percent slopes	4.05	0.01%	No	Low	High

Potential Impacts

Construction and operation of the Project will result in short and long-term impacts to soils within the Site. Short-term impacts will result from the clearing of vegetation, generation of dust, and the excavation, stockpiling, and redistribution of soils. These activities are described further in **Section 10**. During construction, there is also the potential for localized soil erosion and sedimentation. Long-term impacts will include soil compaction. Soils that are the most prone to compaction are soils with high moisture content or medium to fine textures. Soils within the Site may be prone to compaction from heavy construction equipment, especially when wet. Refer to **Section 8.11** for additional information related to impacts related to soils designated as prime farmland.

Mitigation Measures

A National Pollutant Discharge Elimination System (NPDES) permit, a SWPPP, and BMPs will be developed and implemented prior to the commencement of construction. Sedimentation and erosion will be reduced through the use of BMPs, which may include, mulching, hydroseeding, erosion control blankets, silt fence installation, jute matting, revegetation, and/or interim reclamation. Water and chemical application will be used to suppress dust as discussed in **Section 10**.

Following the completion of construction, impacted soils that will not continue to be used for operation of Project facilities, will be restored to pre-construction condition in accordance with landowner lease agreements as described further in **Section 10.5**. As part of the restoration efforts, compacted soils will be ripped up with a grader and revegetated. Soil will be used as backfill, spread out around the construction areas, graded in some locations to drain away from turbines, and topped with gravel or topsoil as appropriate. Areas where infrastructure is not located, will be topped with topsoil and revegetated. Implementation of the NPDES permit requirements, SWPPP, and BMPs ensures that appropriate measures will be taken to protect surface water form direct and

indirect impacts of sedimentation and erosion caused by construction and operation of the Project while simultaneously preventing any adverse impacts to soil resources.

At the end of the Project's life, Project facilities will be decommissioned, and soils will be returned back to agricultural use.

8.16 Geologic and Groundwater Resources

Glacial activity was the dominant force in shaping the outwash plain and loess deposits of the southwestern region of Minnesota. Around 75,000 year ago, the Wisconsin stage of glacial activity began, and, during this period, the Laurentide ice sheet fed the Des Moines lobe encouraging it to advance southeast across Minnesota, eventually reaching central Iowa, around Des Moines, approximately 14,000 years ago. Around 13,000 years ago, warmer weather initiated a general slow retreat of the glacial front with occasional advance still occurring depending on climate micro-trends. Around 11,300 years ago, the Des Moines lobe completely disappeared from the area (Wright 1972).

During the early Pleistocene Epoch, approximately 60,000 years before present (B.P.), southwest Minnesota experienced several glacial ice sheet advances and retreats that contributed to the formation of the landscape (Hudak et al. 2002). As a result of these glaciations, cumulative and extensive loess deposits covered the region. The Site is located within the most prominent topographic feature in the region, the Coteau des Prairies, or "highland of the prairie" (Hudak et al. 2002). The Coteau des Prairies formed as a result of reductive glacial activity. The thick accumulation of deposits almost entirely prevented glaciation from forming in the area of Pipestone County, which is north of Rock County, at the end of the Pleistocene (60,000–17,000 B.P.). Following glacial retreat, water erosion dissected the landscape, creating a well-drained topography characterized by very gently rolling hills and valleys and virtually no lake development (Hudak et al. 2002).

Bedrock within the region of the Project is comprised of Mesozoic and Paleoproterozoic rocks. Northern portions of the Site are underlined by Sioux Quartzite bedrock, which is comprised of quartzite, mudstone, and conglomerates of fluvial and marine origin. Bedrocks within the southern portion of the Site are undifferentiated and are comprised of sandstone, mudstone, shale, marlstone, siltstone, and minor lignite (Jirsa et al. 2011). Depths to bedrock range from 2.1 to 300 ft deep (**Map 14; Site Geology and Depth to Bedrock**).

Groundwater within Minnesota is separated into six provinces based on the geology and bedrock of the various regions. The Project is located in the Western Province. Aquifers in the Western Province occur locally under unconsolidated sediments of sands and gravel (MNDNR 2020f). Major unconfined aquifers within Rock County are associated with the Rock River and Beaver Creek (Lindgren 1997). Beaver Creek crosses through southern portions of the Site.

According to the Minnesota Department of Health's County Well Index online database (MDH 2020), wells are interspersed throughout the Site. Wells within the Site are associated with the Sioux Quartzite, Quaternary Buried Artes, and Quaternary Undifferentiated Aquifers. Well depths

within the Site vary widely ranging between 33 ft to 725 ft deep, with most being in excess of 100 ft in depth (MDH 2020).

Potential Impacts

Footings designed to support turbines will in some cases require minor impacts to glacial drift. Geotechnical testing will occur at turbine locations prior to construction to determine soil stability and depth to hard rock.

Major impacts to groundwater resources and wells are not expected from Project-related activities due to setbacks from water wells and the minimal water-related needs of the Project. A well will be installed to fulfill the O&M building water requirements. The water used for dust abatement and other construction needs would either come from a local well or may be trucked in from a suitable local source and stored at the laydown yard. The source of water will be determined closer to construction. Construction dewatering may occur depending on the weather, soil conditions, and specific locations. Dewatering consists of the removal of surface water and/or groundwater by diverting and/or removing construction areas within water features or wet areas, as needed for construction.

Mitigation Measures

Construction and operation of the proposed Project is not expected to impact groundwater resources as well locations will be considered, and turbines will be set back following state and county standards. A well will be installed at the O&M building to provide water for the office space. A well permit will be received from the Minnesota Health Department prior to construction. Mitigation measures to address dewatering are summarized in **Section 8.17**.

8.17 Surface Water and Floodplains

8.17.1 Lake, Rivers, Streams, and Ditches

The Site is within the Rock (Hydrologic Unit Code [HUC] 10170204) and Lower Big Sioux (10170203) watersheds (USEPA 2017). Both watersheds are part of the larger Missouri River Basin (Onsrud et al. 2014). In Minnesota, the Missouri River Basin drains approximately 1,783-square miles (approximately 1,141,120-acres) of Lincoln, Murray, Nobles, Jackson, and Rock counties. This water basin is significant to the agricultural industry in Minnesota due to its highly rich soils. Approximately 60% of the watershed is currently in cropland land use (Onsrud et al. 2014).

Public waters are identified on PWI maps and may include such features as meandered lakes, water basins, watercourses with a drainage area greater than 2-square miles, Waters of the State determined to be navigable by a court of competent jurisdiction, and trout streams, per Minn. Statutes Chapter 103G.005, subd. 15. Public waters classified as “Public Ditch/Altered Natural Watercourse” are watercourses in which the MNDNR’s jurisdiction is subject to the Minnesota Drainage Code (Minn. Stat Chapter 103E).

According to the USGS National Hydrography Dataset (NHD) and the Minnesota PWI, the approximate mileage of streams within the Site is 33.56-miles (USGS 2020; MNDNR 2018b). Refer to **Map 11 (Surface Waters)**. A total of eight PWI watercourses, including Mud Creek, Beaver Creek, and Springwater Creek, were identified within the Site. These eight watercourses have a designated 50-foot protection buffer requirements according to the MN Buffer Law (MNDNR 2018a). Protection buffers surrounding public water resources are intended to aid in their protection from potential construction activities. See **Table 34**, below, for a list of the public watercourses within the Site.

Table 34: Public Waters Inventory

PWI Type	PWI Feature Name	Protection Buffer (feet)	PWI Unique Feature ID	Length within the Site (miles)
Public Water Watercourse	Mud Creek	50	67033a	2.35
Public Water Watercourse	Beaver Creek	50	67041a	13.64
Public Water Watercourse	Unnamed Stream	50	67042a	2.02
Public Water Watercourse	Unnamed Stream	50	67048a	0.65
Public Water Watercourse	Unnamed Stream	50	67049a	1.03
Public Water Watercourse	Unnamed Stream	50	67050a	4.47
Public Water Watercourse	Springwater Creek	50	67051a	9.38
Public Water Watercourse	Unnamed Stream	50	No ID	0.02
			Total:	**33.56**

Section 303(d) of the Clean Water Act requires each state to list streams and lakes that are not meeting their designated uses because of excess pollutants every two years. Two recorded waterbodies within the Site are listed as impaired by the MPCA (MPCA 2020a). Both Beaver Creek and Mud Creek fail to meet one or more of the established water quality standards including E. Coli and/or failing to meet one or more bioassessment standards for macroinvertebrates and fish.

8.17.2 Designated Wildlife Lakes and Special Waters

The MNDNR commissioner may formally designate lakes for wildlife management under the authority of Minn. Statutes Chapter 97A.1012(a) after notice and a hearing. There are no lakes within or adjacent to the Site. There are also no identified outstanding resource value waters or trout streams within the Site (MNDNR 2020e).

8.17.3 FEMA Floodplains

Floodplains of rivers/ streams may provide beneficial habitat for sensitive flora and fauna species. These areas also frequently contain wetland habitats. FEMA floodplain data (FEMA 2020) map

100-year floodplain within the Site along Beaver Creek. See **Map 9 (FEMA Floodplain)** and **Appendix F (FEMA Floodplain Panels)**.

Potential Impacts

Permanent impacts to rivers and streams may occur in relation to the installation of permanent culverts that would allow continual roadway access to turbine locations without impeding natural hydrology of the landscape. Temporary impacts may result from the installation and removal of temporary culverts/crossings below the ordinary high-water mark to allow for access throughout the Project and temporary sedimentation from construction runoff. Temporary impacts to surface waters may also occur when collection lines are installed beneath waterway surfaces. During this process, temporary dewatering of the feature may be required to ensure the collection line is safely and correctly installed. Collection line installment across waterways will be done through horizontal directional drilling (boring) and is not anticipated to directly impact steams on-site of the Project. The Applicant will work with the USACE and MNDNR to ensure all proper permits, licenses, and approvals are obtained for surface water crossings. Permanent impacts to lakes and floodplains are not expected to occur from the development of the Project.

Mitigation Measures

An NPDES permit will be obtained by the Applicant from the MPCA for the construction of the Project, and a SWPPP will be created prior to the start of Project construction. To protect surface waters from erosion resulting from construction activities, Walleye Wind will employ BMPs consistent with the MPCA's (2000) *Stormwater Best Management Practices Manual* to ensure that excavated material is contained, exposed soil is protected, restored material is stabilized, and disturbed areas are revegetated with appropriate plant species. Use of BMPs will also ensure that access roads and drainage ways will be designed in a manner that allows water to flow unrestricted from upper portions of the watershed to lower portions of the watershed. Significant adverse Project-related impacts to surface waters and/or floodplains are not anticipated because of design considerations and the implementation of stormwater BMPs. In some cases, temporary (annual) seed may be used to help prevent erosion. A BMP Selection Summary extracted from the MPCA's (2000) *Stormwater Best Management Practices Manual* is presented in the following **Table 35**.

Table 35: BMP Selection Summary

BMP Category	Grade or Trigger	BMP to Use
Erosion Prevention	Throughout	Vegetation preservation
		Vegetative buffers
		Scheduling
		Surface roughening
		Erosion control blanket
		Tackifiers

BMP Category	Grade or Trigger	BMP to Use
		Mulch
		Hydromulch
		Sediment fencing
Slope Breakers	5%–15% slope (300-foot spacing)	Straw wattles
		Waterbars
		Straw bale check dams
Sediment Barrier	At waterbody crossings	Sediment fencing
		Straw wattles
		Low water crossings
		Vegetative buffers
		Straw bale check dams

The type of BMP implemented will vary depending upon site conditions such as slope gradients and the susceptibility of soil to wind and water erosion. The aforementioned BMPs will not only be employed to protect topsoil and minimize soil erosion but will also protect surface water quality and floodplain resources from direct and indirect impacts.

While dewatering is not anticipated, it may be necessary in conjunction with deep foundation installation. Sediment basins and filters can help filter the dewatered water before it is discharged as a surface water within an upland. Dewatering would be conducted in a manner such that the velocity of the discharged water would not cause scouring of the receiving area. If the receiving area is a structural BMP (*i.e.*, basin or sump), the design of the BMP should be based on the anticipated flow from the dewatered area. Should dewatering be necessary, Walleye Wind will implement mitigation measures to address dewatering and ensure sediment laden water will not be directly discharged to surface waters. Such mitigation measures may include the following:

- Constructing a temporary sediment trap for water discharge pretreatment;
- Use of a portable sediment containment system such as dumpsters;
- Application of natural based flocculent technology such as chitosan in sediment traps or a series of ditch checks to contain sediment;
- Discharge water through a series of fiber logs or a rock weeper into a large, vegetated buffer area;
- Provide energy dissipation and erosion control BMPs at all discharge points; and
- Utilize a dewatering bag to ensure discharged water does not contribute sedimentation to receiving waters.

Reclaimed topographic conditions will be similar to pre-disturbance conditions after construction. The reclaimed landscape will blend with the surrounding contours, maintain natural hydrology, and erosion prevention will occur through proper grading and the establishment of permanent vegetation. If impacts to surface waters, public waters, or 100-year floodplains are unavoidable, the Applicant will apply for the necessary permits prior to construction and will work with the applicable regulatory agency to minimize impacts. Permits will be completed and submitted with the preconstruction filings. Also, in Section **8.18** there is additional information regarding regulatory agencies and the potential use of mitigation methods for the impacts to water features.

8.18 Wetlands

The Site contains both isolated wetlands and wetlands associated with watercourses. Wetlands within the Site primarily consist of freshwater emergent wetlands concentrated along streams, with a smaller amount of riverine wetlands, and some mapped shrub/scrub and forested wetlands are also scattered throughout the landscape (**Map 10; Wetlands Inventory)**. Based on the analysis and interpretation of aerial images, some wetlands within the Project's primarily agricultural settings appear to exhibit anthropogenic disturbance. It was also determined, based on this interpretation, that all wetlands within the Site would fall under the USACE's jurisdiction.

USFWS NWI data (USFWS 2020a) indicates the Site contains approximately 1,656-acres of wetlands (approximately 5.3% of the total acreage). The majority of the water resources mapped are freshwater emergent and riverine wetlands. Freshwater emergent wetlands are wetlands where rooted, upright, emergent plants such as *Equisetum* and *Scirpus spp.* account for at least 30% of the areal coverage of wetland vegetation. Riverine wetlands are "all wetlands and deepwater habitats contained within a channel" (Cowardin et al. 1979). Wetland types and their associated acreages are illustrated in **Table 36**.

Table 36: NWI Wetland Type and Acreage

NWI Type	Acres	Percent of site
Freshwater Emergent Wetlands	1,367.3	4.4%
Freshwater Forested/ Shrub Wetland	220.2	0.7%
Freshwater Pond	32.4	0.10%
Riverine	25.8	0.10%
Total	**1655.7**	**5.33%**

There are no calcareous fens identified within or adjacent to the Site or within Rock County. Calcareous fens are rare and distinctive wetlands characterized by non-acidic peat with a constant supply of calcium and magnesium bicarbonate rich groundwater. This specialized environment is dominated by a calcium-loving plant community. The closest mapped calcareous fen is located approximately 16-miles east of the Site in Nobles County. Due to the specialized nature of fens, it is unlikely to find associated habitat within the Site (MNDNR 2016a).

In the State of Minnesota, some wetlands are designated as PWI Wetlands. All PWI Wetlands are identified as Types 3, 4, and 5 as defined by the USFWS Circular 39 (BWSR n/d) and are 10-acres or more in size in rural areas and 2.5-acres in size in incorporated areas. There are no PWI wetlands within the Site.

In the State of Minnesota, agencies representing three levels of government (federal, state and local) regulate certain activities that affect wetlands, lakes, and watercourses. Any wetland listed in the PWI is protected by the Minnesota Public Waters Work. A public waters work permit must be obtained from the MNDNR for work affecting the course, current, or cross-section of public waters, including public waters wetlands. Most other wetlands not listed in the PWI are regulated under the Minnesota Wetland Conservation Act of 1991 (WCA). The WCA is administered by the Minnesota BWSR and is implemented by Local Government Units (LGUs). The LGU administering the WCA within the Site is Rock County. Generally, an LGU Replacement Plan is required by the WCA for an impact that wholly or partially drains or fills a wetland. Wetlands are also federally protected under Section 404 of the Clean Water Act. A wetland permit from the USACE is required when discharging dredged or fill material into jurisdictional wetland and/or non-wetland Waters of the United States. A permit and/or pre-construction notification may also be required by the local watershed district depending upon the location, size and type of impact.

Potential Impacts

Turbines and MET towers will be sited in upland, higher elevation areas to maximize the wind resource and, as such, are likely to avoid wetlands and surface waters that are typically found at lower elevations. Access roads and Project infrastructure will be designed and sited to avoid or minimize permanent impacts to wetlands to the greatest extent feasible. Temporary impacts to wetlands may occur based on construction corridors. Field work to delineate wetlands is ongoing so that wetland areas can be avoided. Wetland and watercourse delineations began last fall and are scheduled to be completed during the 2020 growing season. Final report will be submitted within the preconstruction filings. In the event that permanent wetland impacts cannot be avoided during the siting of Project infrastructure, Walleye Wind will coordinate with the appropriate agencies including USACE, WCA, and the Soil and Water Conservation District of Rock County.

Mitigation Measures

During the design phase of the Project, measures have and will continue to be taken to avoid impacts to wetland areas, where possible, and to minimize impacts to wetlands in cases where the impacts cannot be avoided. Results of the wetland desktop analysis and micrositing field event were considered by Walleye Wind to avoid siting Project components in wetlands, where feasible. Wetland delineations will be completed prior to construction to identify wetland boundaries and to further avoid impacts. In some cases, a narrower construction easement may be considered to minimize impact. Wetlands near areas of construction activity will be marked to ensure that construction crews avoid these areas. Directional drilling of collector and communication lines may be utilized to avoid or reduce the amount of acreage where wetland impacts occur. Consistent with the MPCA's (2000) *Stormwater Best Management Practices Manual,* Walleye Wind will

implement BMPs to protect topsoil, minimize soil erosion, and protect wetland resources from direct and indirect impacts. Minimizing soil erosion near wetlands helps to protect the wetland water quality, reduces the likelihood for fill of the wetland, and helps to maintain the integrity of the wetland. Wetland soils and moderately to steeply sloped ground can also be subject to sheet and rill erosion or slumping. Depending on site specific needs, employment of seasonal construction scheduling, retaining stumps if tree clearing occurs, temporary timber matting, erosion control blankets, mulch, straw bales, rolls, tackifiers (*i.e.*, chemical compounds that increase the stickiness of adhesives so as to help seed or soil stay in place), temporary seeding, hydromulch, or sediment fencing may be used to manage soil erosion.

A SWPPP and NPDES permit will be obtained prior to construction. BMPs will be employed to ensure that excavated material is contained, exposed soil is protected, restored material is stabilized, and disturbed areas are revegetated with non-invasive species. Significant adverse Project-related impacts to wetlands are not anticipated because of design considerations to avoid such areas and the implementation of stormwater BMPs where impacts cannot be avoided. Compensatory mitigation may be required if certain state and/or federal impact thresholds are surpassed. Currently, compensatory mitigation is not anticipated for the development of the Project.

8.19 Vegetation

The Site is located within the Inner Coteau Moraines (251Bc) subsection of the North Central Glaciated Plains (251B) section of the Prairie Parkland Province. Vegetation types in this subsection before European settlement of the area consisted primarily of tallgrass prairie (MNDNR 2020j). Today, this subsection consists primarily of row crop agricultural land.

The Site, therefore, is within a largely rural landscape dominated by agriculture. According to the 2016 National Land Cover Database (Yang et al. 2018; MRLC Consortium 2019), land cover/land use within the Site includes primarily cultivated crops (87%) and pastures/hay (6%). Land not developed or under agricultural use is relatively limited. Other land cover types (*e.g.*, deciduous forest, wetlands, grasslands, open water, and barren land) account for low percentages of the Site (approximately 2.5% total).

The 2016 National Land Cover Database (Yang et al. 2018; MRLC Consortium 2019) indicates the Project contains limited forest cover. Approximately 87-acres of deciduous forest (less than 0.5%) are mapped within the Site.

In addition to farmed fields, agricultural regions also include idle lands, pastures, and grasslands/herbaceous habitats. Approximately 1,796-acres of pastures (approximately 6%) and approximately 384-acres (approximately 1.2%) of grassland/herbaceous habitat are mapped within the Site.

The grasslands and herbaceous category define areas dominated by graminoid or herbaceous vegetation, which are not subject to intense management such as tilling but can be used for grazing. Conversely, the pastures and hay category defines areas of grasses, legumes, or grass-legume

mixtures planted for livestock grazing or production of seed or hay crops, typically on a perennial cycle (Homer et al. 2015). Areas used as pastures, those not actively farmed, and buffer strips (*i.e.*, vegetated strips along streams that protect surface water from agricultural runoff) can have the ecological functions of grasslands. Grassy habitats are important features in agricultural landscapes, because they provide critical cover, foraging, and nesting habitat for wildlife and potentially federally- and state-threatened or endangered species. However, these areas only comprise a small percentage of the overall Site.

See **Table 37** below for a listing and percentage of all land uses with the Site (**Map 6; Land Cover**.)

Table 37: Land Cover Types and Relative Abundance in the Site

Land Cover Type	Acres	Percent within the Site
Cultivated Crops	27,040	86.95%
Pasture / Hay	1,796	5.78%
Developed, Open Space	1,122	3.61%
Grassland / Herbaceous	384	1.24%
Emergent Herbaceous Wetlands	250	0.80%
Developed, Low Intensity	279	0.90%
Deciduous Forest	87	0.28%
Developed, Medium Intensity	71	0.23%
Barren Land (Rock/Sand/Clay)	32	0.10%
Open Water	18	0.06%
Shrub/Scrub	10	0.03%
Developed, High Intensity	6	0.02%
Total	**31,095**	**100.00%**

Sites of Biodiversity Significance

The Minnesota Biological Survey (MBS) identifies 39 Sites of Biodiversity Significance that are located within or partially within the Site and within 1-mile of the Site. A total of 27 sites are located completely or partially within the Site itself (**Map 12; Unique Natural Features**). The MBS uses four classifications denoting the level of biological diversity to rank sites. These

rankings are "outstanding," "high," "moderate," and "below". Refer to **Table 38**, below, for more information on these rankings, which is extracted from the MNDNR (MBS 2020).

Table 38: Sites of Biodiversity Significance (MBS 2020)

Classification	Description
Below	Sites lack occurrences of rare species and natural features or do not meet MBS standards for outstanding, high, or moderate rank. These sites may include areas of conservation value at the local level, such as habitat for native plants and animals, corridors for animal movement, buffers surrounding higher-quality natural areas, areas with high potential for restoration of native habitat, or open space.
Moderate	Sites contain occurrences of rare species, moderately disturbed native plant communities, and/or landscapes that have strong potential for recovery of native plant communities and characteristic ecological processes.
High	Sites contain very good quality occurrences of the rarest species, high-quality examples of rare native plant communities, and/or important functional landscapes.
Outstanding	Sites contain the best occurrences of the rarest species, the most outstanding examples of the rarest native plant communities, and/or the largest, most ecologically intact or functional landscapes.

The aforementioned rankings are used to communicate native biodiversity significance to natural resource professionals, state and local government officials, and the public as well as to guide conservation and management of the State's natural resources.

No areas within the Site were ranked as High or Outstanding. Three areas throughout the Site have been ranked by MBS as Moderate, including public and private lands (**Map 12; Unique Natural Features**). Twenty-four sites within the Site have been ranked as Below by MBS. **Table 39,** below, shows MBS Sites of Biodiversity Significance (including acreage) that occur within the Site.

Table 39: Sites of Biodiversity Significance within the Site

Sites of Biodiversity Significance	Number of Sites Within the Site	Acres
Below	24	1,156.1
Moderate	3	295.8
High	0	0
Outstanding	0	0

Native Plant Communities

MNDNR Natural Heritage Information System (NHIS) data indicated two small areas of native community types within the Site and surrounding 1-mile area: Seepage Meadow/Carr, Tussock Sedge Subtype (WMs83a1) and Dry Hill Prairie (Southern) (UPs13d). Seepage Meadow/Carr communities are wetland communities commonly found within areas with groundwater seepage such as streams, drainage ways, and bases of slopes. Within the Tussock Sedge subtype, vegetation is dominated by tussock sedge (*Carex stricta*) (Aaseng et al. 2011). One area of Seepage Meadow/Carr Sedge Subtype community it mapped within the Springwater WMA, which abuts the northern boundary of the Site. Dry hill prairie communities are typically dominated by grass species but are also known for high densities of forbs. Common plant species include prairie phlox (*Phlox pilosa*), northern bedstraw (*Galium boreale*), and the small shrub wolfberry (*Symphoricarpos occidentalis*) (MNDNR 2020l). One area of Dry hill prairie community is mapped along E County Road 4 near Beaver Creek in southern portions of the Site.

MNDNR has assigned a biodiversity rank to these communities as well. **Table 40**, below, provides the acreage and biodiversity ranking associated with the plant community present in the Site.

Table 40: Native Plant Community Types within the Site

Native Plant Community Type	Acreage within the Site by Biodiversity Rank	
	Moderate	Below
Dry Hill Prairie (Southern) (UPs13d)	1.4	0

Native Prairie

Native prairies comprise one of many native communities found within southwestern Minnesota. Currently, much of the prairie habitat within southwestern Minnesota has been lost due to the prevalence and spread of agricultural practices. Disturbances from livestock grazing can also lead to the loss of native communities as livestock can further the spread of introduced/non-native grass species such as Kentucky bluegrass (*Poa pratensis*) and smooth brome (*Bromus inermis*) which can outcompete native species. Additionally, routine suppression of woody growth through frequent fires is needed to prevent succession of these native prairie communities into forested habitats.

MNDNR monitors the location of intact native prairies as a subset of native plant community types. The Site contains only 1.4-acres of native Dry Hill Prairie that overlaps with an MBS site (Beaver Creek 28) ranked as Moderate. High-quality prairie habitat is not likely to be present within the Site. Site surveys were conducted in May of 2020 to confirm the absence of prairie habitat within construction corridors for the Site. These surveys will be coordinated with the MNDNR and submitted with the preconstruction filings.

Potential Impacts

Vegetation will be removed during construction and installation of Project infrastructure to allow for construction of turbine pads, access roads, MET tower, substation, and O&M facilities. The vast majority of Project infrastructure will be located in agricultural fields. As shown in **Table 41,** below, most (approximately 51.5 of the 53.2 acres) of permanent impacts will be in cultivated cropland.

Temporary vegetation impacts will occur during the construction of access roads, crane walks, turning radii, equipment laydown areas, construction area, collection line installation, and/or intersection improvements (**Table 42**). As with the permanent impacts, most of the temporary impacts to vegetation (approximately 870 of the 900 acres) are also anticipated to occur on cultivated cropland. Impacts were estimated based on preliminary site layouts and include impacts of all 55 turbine locations, including alternate locations. Construction of the Project will not impact the entirety of the construction areas as detailed; these calculations are provided to show the worst-case scenario. Additionally, limited tree clearing may be required for the construction of permanent infrastructure or temporary construction activities (*e.g.*, collection line ROW).

Project infrastructure will be sited to avoid identified native plant communities. Impacts to these features would result in a greater impact than to cropland as they contain the highest quality natural vegetation and potential habitat for species within an ecologically fragmented region. There are no permanent impacts to Biodiversity Sites ranked as Moderate.

Table 41: Summary of Estimated Permanent Impacts to Vegetation (Acres)

Land Cover Type	Turbines	Alt. Turbines	Access Roads	Alt. Access Roads	O&M Facility/ Substation	MET Tower	Total
Cultivated Crops	10.0	2.7	22	6.9	9.8	0.1	51.5
Developed, Open Space	-	-	0.7	0.2	0.3	-	1.2
Developed, Low Intensity	-	-	0.1	-	-	-	0.1
Grassland/ Herbaceous	-	-	-	-	-	-	0.0
Emergent Herbaceous Wetlands	-	-	-	-	-	-	0.0
Deciduous Forest	-	-	-	-	-	-	0.0
Hay/Pasture	-	-	0.2	-	-	-	0.2
Sites of Biodiversity (Below)	-	-	0.2	-	-	-	0.2
Sites of Biodiversity (Moderate)	-	-	-	-	-	-	0.0
Total	**10.0**	**2.7**	**23.2**	**7.1**	**10.1**	**0.1**	**53.2**

Table 42: Summary of Estimated Temporary Impacts to Vegetation (Acres)

Land Cover Type	Turbines	Alt. Turbines	Access Roads	Alt. Access Roads	Collection*	Alt. Collection *	Laydown Yard	Crane Paths	Alt. Crane Paths	MET Towers	Total
Cultivated Crops	257.5	71.3	61.8	19.6	194.9	39.0	17.9	223.8	19.6	3.6	**909.0**
Developed, Open Space	-	-	2.2	0.6	5.5	1.1	-	4.2	1.2	-	**14.8**
Developed, Low Intensity	0.2	-	0.2	-	0.6	0.1	0.2	0.2	-	-	**1.5**
Developed, Medium Intensity	-	-	-	-	0.1	-	-	-	-	-	**0.1**
Grassland/ Herbaceous	-	-	-	-	0.5	0.1	-	-	-	-	**0.6**
Emergent Herbaceous Wetlands	-	-	0.1	-	0.7	0.1	-	-	-	-	**0.9**
Hay/Pasture	1.6	-	0.5	-	5.3	1.1	-	0.9	-	-	**9.4**
Deciduous Forest	-	-	0.1	-	0.1	-	-	-	-	-	**0.2**
Open Water	-	-	-	-	-	-	-	-	-	-	**0**
Sites of Biodiversity (Below)	0.5	-	0.6	-	2.9	0.6	-	0.7	-	-	**5.3**
Sites of Biodiversity (Moderate)	-	-	-	-	0.4	0.1	-	-	-	-	**0.5**
Total	**259.8**	**71.3**	**65.5**	**20.2**	**211**	**42.2**	**18.1**	**229.8**	**20.8**	**3.6**	**942.3**

*Temporary collection corridors depicted on the maps show all potential collection corridors, but the actual collection line trench total will be approximately 35 miles for primary turbines and 7 miles for alternate turbines. This is what was utilized for estimated temporary impacts.

Mitigation Measures

Walleye Wind has and will continue to plan the Project to avoid direct permanent and temporary impacts to natural areas, including wetlands, native plant community types, and MBS Sites of Biodiversity Significance within the Site, including native prairies, to the extent feasible. Additionally, Walleye Wind will avoid impacts to conservation land such as WMAs. Based on landcover mapping, nearly all (97%) of Project permanent development is planned in lands currently under crop cultivation. Additionally, access roads will utilize existing roads or paths and will avoid grasslands, shrubland, and wooded areas to the greatest extent practicable.

Minimal temporary impacts to vegetation within agricultural drainages, grasslands, shrublands, and wetlands from temporary grading and other construction activities (*e.g.*, topsoil stripping, trenching, temporary turning radius, etc.) are expected. Following construction, these temporary vegetation impacts will be restored to previous conditions. Walleye Wind will coordinate with the local NRCS office to ensure the reseeding of these areas is with locally sourced native mixes and will use BMPs to limit the transfer of invasive species during construction such as washing construction vehicles. In the event that invasive weeds are detected within the revegetated areas, control of these weeds will be conducted through properly timing, cutting, and using targeted herbicide consistent with the herbicide BMPs published by the MnDOT and the MDA (MDA 2020b; MN/DOT 2020b).

Impacts to native prairies are not anticipated. Walleye Wind conducted field surveys in May 2020 to confirm the presence of native prairie within the current Project construction easement and no native prairie was identified. Surveys will continue final project design, and Walleye Wind will prepare a prairie protection and management plan in consultation with the MNDNR. The plan will be completed and submitted with the preconstruction filings. The prairie protection plan will detail efforts to avoid impacts to prairies through site design and BMPs should work within native plant communities be necessary. Additionally, any impacts expected to occur to MBS Sites of Biodiversity Significance will be coordinated with the MNDNR, as appropriate.

8.20 Wildlife

8.20.1 Wildlife Resources

The USFWS Land-based Wind Energy Guidelines were issued, on March 23, 2012, to provide a structured and scientific approach to assessing and addressing wildlife concerns during all stages of land-based wind energy development (USFWS 2012). The guidelines use a tiered approach that provides for an iterative decision-making process for collecting information, with each tier increasing in the detail of research and information. The tiered approach allows a developer to evaluate the potential risk associated with developing a project at a given location and provides the opportunity for evaluation and decision-making at each step of a project to enable the developer to abandon or proceed with development or to collect additional information. The tiers are briefly outlined as follows:

- Tier 1: Preliminary, landscape-level evaluation of a site or sites for habitat for species of concern using readily and publicly available sources of information.
- Tier 2: Site characterization that involves detailed site and database research, as well as a site reconnaissance visit by a qualified biologist.
- Tier 3: Field studies to document wildlife conditions at the site and predict Project impacts. These can include avian point count surveys, raptor nest surveys, eagle surveys, and bat acoustical monitoring.
- Tier 4: Post-construction mortality monitoring.
- Tier 5: Other post-construction studies that the developer, in conjunction with USFWS, may deem important on-site.

Wildlife species, including avian and bat species, with the potential to exist within and nearby the Site, were determined through Tier 1, Tier 2, and Tier 3 studies. **Table 43** provides a summary of the wildlife studies that have been completed for the Project. These studies are provided in **Appendix G (Wildlife Studies), Appendix H (Site Characterization Study), and Appendix I (Wildlife Conservation Strategy)**.

An additional Avian Use Study for the current Site is also currently underway. Final results of the study will be included in the Wildlife Conservation Strategy (WCS).

Table 43: Tier 1, 2, and 3 Wildlife Studies

Subject	Title	Report Date	Prepared By:
Site Characterization Study	Site Characterization Study Report for the Walleye Wind Energy Project	April 2016	Western EcoSystems Technology, Inc.
Raptor Nest Survey	Raptor Nest Survey Results for Walleye Wind Project	May 25, 2016	Western EcoSystems Technology, Inc.
Acoustic Survey - Bats	Bat Acoustic Survey for the Walleye Wind Project	February 2, 2017	Western EcoSystems Technology, Inc.
Raptor Nest Survey	2018 Raptor Nest Survey Report	August 15, 2018	Western EcoSystems Technology, Inc.
Bat Survey	Bat Activity Surveys for the Walleye Wind Project	March 2019	Western EcoSystems Technology, Inc.

Subject	Title	Report Date	Prepared By:
Site Characterization Study	Site Characterization Study Report for the Walleye Wind Project	April 2019	Western EcoSystems Technology, Inc.
Avian	Avian Use Study	May 2019	Western EcoSystems Technology, Inc.
Site Characterization Study	Tier 2 Site Characterization Study Walleye Wind Project Rock County, Minnesota	June 2020	Environmental Consulting & Technology, Inc.
Wildlife Conservation Strategy/Avian and Bat Protection Plan	Wildlife Conservation Strategy	June 2020	Environmental Consulting & Technology, Inc.
Raptor Nest Survey	Aerial Nest Survey Report	June 2020	Environmental Consulting & Technology, Inc.

Results of Tier 1, Tier 2, and Tier 3 Studies[9]

Tier 1 and Tier 2 Site Characterization Studies (SCS) were completed by Western EcoSystems Technology, Inc. (WEST) in April 2016 and 2019 for areas initially being considered for the Project. The 2016 study contemplated facilities being sited in South Dakota since that time, the site has been adjusted to be only in Minnesota. To the Applicant's knowledge there is no active project within the old South Dakota boundary. Following the finalization of the current Site, ECT completed an additional SCS for the Site and a surrounding 1-mile buffer in June 2020. Information for this 2020 study was gathered through MNDNR and USFWS database research, additional publicly available desktop resources, and a site visit by a qualified biologist in November 2019. Each Tier of the USFWS Land-based Wind Energy Guidelines offers a set of questions to help evaluate the potential risk of developing a project in a given location. Tier 1 questions help determine potential environmental risk at the landscape scale, while Tier 2 questions help to determine potential environmental risk at the Project scale (USFWS 2012). The conclusion for the 2020 SCS prepared by ECT confirmed that suitable habitat sensitive species,

[9] All Project infrastructure, turbines, and the Site are located in Rock County, Minnesota. The information collected for the Project's study areas that extend into South Dakota is presented for informational purposes consistent with guidance set forth in the *Minnesota Department of Commerce, Energy Facility Permitting Application Guidance for Site Permitting of Large Wind Energy Conversion Systems in Minnesota* (Minnesota DOC 2019).

including bald eagles and listed bat species, are limited within the vicinity of the Site and the Site was suitable for development as a Wind Energy site. For additional detail on the SCS see **Appendix H (Site Characterization Study)**.

Birds

Publicly available data from eBird indicates that 258 species have been recorded in Rock County, Minnesota and 282 species have been recorded within bordering Minnehaha County, South Dakota (eBird 2020). These data also show that many Minnesota threatened and endangered (T & E) avian species, including the state endangered horned grebe and state threatened Wilson's Phalarope, have been documented within the vicinity of the Site/1-mile buffer. Data also indicated that bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*), protected under the Bald and Golden Eagle Protection Act of 1940, have observances within the vicinity of the Site.

Breeding Bird Survey (BBS) data from the Ash Creek BBS route, located approximately 3 miles east of Site, had a total of 115 breeding and nonbreeding bird species (Pardieck et al. 2018). Minnesota Breeding Bird Survey (MBBA) reports a total of 105 species with confirmed, probable, or possible breeding status in Rock County, Minnesota (Pfannmuller et al. 2017). Additionally, South Dakota Breeding Bird Survey also lists a total of 200 species within confirmed, probable, or possible breeding status in Minnehaha County, South Dakota to the west of the Site (South Dakota Department of Game, Fish & Parks 2012a).

Avian Studies and Raptor Nest Surveys

One Tier 3 Avian Use Survey and two Raptor Nest Surveys were previously conducted by WEST within the vicinity of the Site. The Avian Use study was conducted monthly from January 29, 2018-December 17, 2018 and followed both USFWS and MNDNR guidance. WEST documented a total of 673 large bird observations and 935 small bird observations. No federally listed threatened or endangered species were observed during surveys or incidentally. However, 16 sensitive avian species were documented. Twelve of these species were designated as species of greatest conservation need (SGCN) (MNDNR 2016b), while three of these species: American white pelican (*Pelicanus erythrorhynchos*), Franklin's gull (*Leucophaeus pipixcan*), and short-eared owl (*Asio flammeus*) were also designated as Minnesota species of special concern (MNDNR 2013). The bald eagle was also documented (Kreger and Suehring 2019). WEST concluded that avian usage and mortality rates from the Project would likely be similar to usage and mortality rates observed at other Minnesota wind energy facilities (Kreger and Suehring 2019).

In 2019, ECT developed an Avian Use Study plan to provide an ornithological baseline dataset for the Site. This one-year pre-constructions study plan includes eagle use surveys conducted across all ecological season/survey periods (i.e., spring, summer, fall, and winter) and general avian migration surveys conducted during the spring and fall migration periods. The study plan commenced in late August 2019 and will continue through mid-August 2020. Due to Project siting changes, the study plan was adjusted in November 2019 to ensure that adequate survey coverage

is provide in keeping with agency guidelines. Preliminary results from the August 2019-March 2020 survey period indicated that occurrences of both bald and golden eagles within the Site as well as one state threatened species, the loggerhead shrike (*Lanius ludovivianus*), and five Minnesota special concern species: greater prairie-chicken (*Tympanuchus cupido*), American white pelican, Franklin's gull, peregrine falcon (*Falco peregrinus*), and lark sparrow (*Chondestes grammacus*).A single juvenile golden eagle was also observed with the Site in the Fall of 2019.

On March 24-25, 2016 and April 17-19, 2018 WEST conducted aerial-based raptor nest surveys to help evaluate the potential impacts of Project construction on raptors within preliminary Project boundaries. Surveys within the preliminary Site and 1-mile buffer documented all potential raptor nests, including bald eagles, while the surveys up to the 10-mile buffer focused only on identifying potential bald eagle nests. Raptor nest surveys were conducted from a helicopter via transects through the preliminary Site. Nest surveys in 2016 identified two known active bald eagle nests approximately 9-10 miles southwest of the Site along the Sioux River in South Dakota. Additional raptor nest surveys by WEST in 2018 also indicated three active nests and one occupied inactive nest within the 10-mile of the Site. The identified occupied nests included the same two eagle nests identified during the 2016 surveys along the Big Sioux River to the southwest of the current Site (Pickle, Rittenhouse, and Kreger 2016). WEST also identified five unidentified raptor nests that appeared consistent in size and structure of bald eagle nests. Three of these potential bald eagle nests were documented more than 6/5 miles to the east and southeast of the reviewed Project area along the Rock River. The other two identified nests were also located over 6.5 miles from the Project but were document to the southwest along the Big Sioux River. One (1) unidentified raptor nest was classified by WEST as occupied, inactive and the other four (4) nests were classified by WEST as inactive (Kreger and Suehring 2018). No Eagle nests were recorded within the Site during nest surveys in 2016 or 2018.

Following revision of the Site layout, ECT conducted aerial nest surveys of the current Site between February 26-29, 2020. These aerial helicopter surveys evaluated 0.5-mile transects within the revised Site boundary as well as 1-mile transects within a 10-mile buffer. A follow-up ground-based survey was also conducted on April 1, 2020 to ascertain species of unknown nests identified within the Site during the aerial survey.

The surveys indicated a total of 88 nest structures within the Site including red-tailed hawk and great horned owl nests. This total includes nests identified in during both the 2016 and 2018 aerial surveys conducted by WEST and represents the currently available raptor nest structures within the vicinity of the Site. No federally or state-listed threatened or endangered raptor species were observed nesting within the Site or the associated buffers during this survey. A total of 10 active bald eagle nests were observed during the Spring 2020 surveys within 10-miles of the current Site, five of which were newly identified nests not previously observed in 2016 or 2018. One alternate nest was also identified within the 1-mile buffer to the east of the Site. This nest was considered previously active but was determined failed by an ECT avian biologist in follow up surveys in May 2020. One (1) historic potential bald eagle nest was also identified by WEST in 2018

approximately 8.5 miles southwest of the current Site. However, this nest was not relocated during surveys in 2020. No bald eagle nests were observed within the Site.

Mammals

Many common mammal species are likely to utilize the Site, including white-tailed deer (*Odocoileus virginianus*), raccoon (*Procyon lotor*), coyote (*Canis latrans*), red fox and gray fox (*Vulpes fulva* and *Vulpes urocyon*), Virginia opossum (*Didelphis virginiana*), gray squirrel (*Sciurus carolinensis*), fox squirrel (*Sciurus niger*), thirteen-lined ground squirrel (*Spermophilus tridecemlineatus*), striped skunk (*Mephitis mephitis*), short-tailed weasel (*Mustela erminea*), and badger (*Taxidea taxis*). The larger mammal species are most likely to utilize the wooded areas and uncultivated grassland areas that are present within the Site, while the smaller mammal species are likely to use those areas as well as the cultivated areas within the Site.

Bats

The Site is within the range of several bat species including northern long-eared bat (*Myotis septentrionalis*), evening bat (*Nycticeius humeralis*), eastern red bat (*Lasiurus borealis*), little brown myotis (*Myotis lucifugus*), hoary bat (*Lasiurus cinereus*), silver-haired bat (*Lasionycteris noctivagans*), tri-colored bat (formerly known as the eastern pipistrelle [*Perimyotis subflavus*]), and big brown bat (*Eptesicus fuscus*). Some bat species in Minnesota and/or South Dakota are abundant or widely distributed throughout both states; others are occasional or uncommon; such as the evening bat which is known for being rare in eastern South Dakota and has only had documentation of a single individual within the state of Minnesota (MNDNR 2020c; 2016c; South Dakota Bat Working Group 2004).

General acoustic bat surveys were conducted by WEST in the spring, summer, and fall of 2016 at stations within the Site and a surrounding 1-mile buffer located in cropland habitat, representing potential turbine locations, and forest edge habitat containing features attractive to bats. Approximately 77% of bat passes at the cropland station were classified by WEST as low-frequency, which potentially includes species such as big brown bats, hoary bats, or silver-haired bats. However, only 23% of the bat passes at the cropland station were identified as high frequency, which potentially includes species such as the eastern red bat, little brown bat, or the northern long-eared bat. WEST's bat biologists reviewed the high-frequency passes and determined that no protected bat species calls (northern long-eared bat) were identified during the 2016 survey (Bishop-Boros, Solick, and Kreger 2017).

Additional general acoustic bat surveys were conducted by WEST in the summer and fall of 2018 at the forest edge and cropland stations within the general vicinity of the Site and 1-mile buffer. Within the cropland stations, peak bat activity was recorded during the summer during the middle of July, with 88.7% of the bat passes identified as low frequency and 11.2% of bat passes identified as high frequency (Kreger, Hyzy, and Solick 2019). In March 2020, WEST conducted further analysis into the high frequency passes recorded to determine the potential for northern long-eared bat to occur within the Site and 1-mile buffer. A qualified bat biologist reviewed a potential

northern long eared-bat call recorded during the 2018 survey period. The biologist determined that the call did not have the diagnostic features of a standard northern long-eared bat call and was most likely a feeding buzz emitted by an eastern red bat or an evening bat. No acoustic evidence of northern long-eared bats was observed during the 2018 surveys within the vicinity of the Site.

Refer to **Section 8.21** for a discussion on federally or state-designated conservation concern species, including northern long-eared bat.

Reptiles and Amphibians

A variety of reptiles and amphibians may be present within the Site, such as the American toad (*Anaxyrus americanus*), Cope's gray treefrog (*Hyla chrysoscelis*), western chorus frog (*Pseudacris triseriata*), painted turtle (*Chrysemys picta*), snapping turtle (*Chelydra serpentine*), wood turtle (*Glyptemys insculpta*), common and plains garter snake (*Thamnophis sirtalis* and *Thamnophis radix*), milk snake (*Lampropeltis triangulum*), redbelly snake (*Storeria occipitomaculata*), and smooth green snake (*Opheodrys vernalis*). Most of the species listed here live in habitats associated with wetlands, streams, and ditches or can be found in the margins of these features. A few of the species (*e.g.*, wood turtle and garter snakes) may be found in open areas, such as grasslands or fallow agricultural fields.

8.20.2 DNR Waterfowl Feeding and Resting Areas

Migratory Waterfowl Feeding and Resting Areas (MWFRA) are select state waters that protected waterfowl from disturbance. No waters within or adjacent to the Site have been designated by MNDNR area as waterfowl feeding or resting areas. However, the Rock County Waterfowl Production Area is located approximately 6 miles northeast of the Site boundary along the Rock River east of Blue Mounds State Park and is managed by the Windom Wetland Management District (WMD) (USFWS 2020c).

8.20.3 Important Bird Areas

The National Audubon Society's Important Bird Areas (IBA) Program identifies, designates, and monitors what is believed to be important places for avian species. IBAs do not have legal status and are not reviewed by public entities prior to being established.

The Prairie Coteau Complex IBA is a designated IBA of state importance within Rock County. The Prairie Coteau Complex IBA is located approximately 2 miles northeast of the Site boundary at its closest point. The Prairie Coteau IBA is recognized for providing grasslands and prairie habitats for 71 Minnesota SGCN. This IBA is known to support populations of T&E species including the Minnesota state-endangered Henslow's sparrow (*Ammodramus henslowii*) and loggerhead shrike (Audubon Minnesota 2015).

The majority of the Site and 1-mile buffer is currently under agricultural use. Suitable grassland habitat is likely limited to idle fields, roadsides, and small areas of managed/protected lands (*i.e.*, MNDNR WMAs, CREP registered properties). Though high-quality habitat associated with this

IBA in the vicinity of the Site may attract sensitive avian species to the region, species are less likely to utilize lands within the Site itself.

Potential Impacts

The Site is dominated by agricultural lands. Wildlife habitat such as grasslands, wetlands, and forested areas have been avoided during Project siting. Impacts on general wildlife species (mammals, reptiles, and amphibians) are anticipated to be low. Further impacts on species sensitive to wind energy facilities (*i.e.*; birds and bats) are further discussed below.

Birds

Given the agricultural landscape, avian species most likely to use the Site include those most commonly found in cultivated fields, pasturelands, and disturbed lands. Additionally, several avian species have the potential to migrate through the region of the Site including raptor species. Several factors influence the migratory pathways of raptors, including weather and geographical features such as ridgelines and the shorelines of large bodies of water (Seeland et al. 2012). Given the lack of major topographic features across the Site, raptor migration is not expected to be more pronounced in the Site compared to the surrounding region.

Year-round waterfowl habitat within the Site and the surrounding 1-mile buffer is limited. Aerial review indicates that seasonal wetlands likely occur throughout agricultural fields within the Project. These ephemeral wet areas are noteworthy because they can provide a critical resource to migrant shorebirds, waterfowl, and other avian species within the region. These areas could provide adequate stopover locations but comprise only a small portion of the Site (approximately 43%). Impacts to seasonal wetlands within the Project is not likely to have a significant effect on the amount of suitable waterfowl habitat within the vicinity of the Project. Additionally, the Project has been designed to limit development to upland and agricultural areas to the greatest extent practicable, reducing impacts to waterfowl that may use the Project.

Data from three previously developed WECSs in southern Minnesota including, Prairie Rose, Big Blue, Grand Meadow, Oak Glen, Odell, and Buffalo Ridge showed bird mortality rates detailed in **Table 44**, below.

Table 44: Avian Fatality Rates at Minnesota Wind Farms

	Avian Mortality Rate	Year of Study	Study Citation
Prairie Rose	0.44 birds/ MW/ study period	2014	(Chodachek, Adachi, and DiDonato 2015)
Big Blue	0.20 birds/MW/study period	2014	(Chodachek et al. 2015)

	Avian Mortality Rate	Year of Study	Study Citation
Grand Meadow	0.00 birds/MW/study period	2014	(Chodachek et al. 2015)
Oak Glen	0.57 birds/MW/study period	2014	(Chodachek et al. 2015)
Odell	6.14 birds/MW/study period	2016-2017	(Chodachek and Gustafson 2018)
Buffalo Ridge	1.46-5.93 birds/MW/year	1996-1999	(Johnson et al. 2000)

Migratory birds and passerines accounted for the majority of avian mortalities at Minnesota WECs, which is consistent with Strickland et al. (Strickland et al. 2011) who suggest that passerines are the most common mortality reported at wind energy facilities. Differences in study design, statistical modeling, and site-specific characteristics can make direct comparisons between wind projects difficult; however, bird mortality rates at the Project are anticipated to be comparable to previously mentioned WECSs (**Table 43**) due to similar avian species composition, land cover, land use, and location within the region (Kreger and Suehring 2019).

No potential Project impacts on MWFRAs or IBAs are anticipated. As a result, no mitigation measures are planned for these areas.

Bats

Suitable summer roosting habitat for bat species is limited within the Site and surrounding 1-mile buffer *(i.e.*, lack of large tracks of forested habitat). In April 2020, ECT conducted a thorough aerial review of mapped National Land Cover Database forested areas to identify additional forested areas within the Site. The results of this desktop review indicated a total of 362 acres (approximately only 1.16% of the Site) of forest within the Site. The identified forests areas are and is present mostly as small isolated woodlots which are less than 10 acres, limiting suitability for bat species. Additionally, Surveys conducted by MNDNR indicate that there is no known hibernaculum within Rock County (MNDNR and USFWS 2019).

Most bat mortalities at wind energy facilities in North America are composed of tree-roosting bats such as hoary bat, eastern red bat, and silver-haired bat (Arnett et al. 2008). Most bat mortalities at wind energy facilities in the Midwest are documented to be higher during the fall migratory period (late August through October), when bats travel through the landscape between summer roosts and winter hibernacula (Arnett et al. 2008; Johnson 2004). Reported estimates of bat

mortality at wind energy facilities through North America average 17.20 mortalities/MW/year (Smallwood 2013). Among these studies, bat mortality rates at wind farms located specifically in the Midwest have ranged from 0.40 to 32.0 bat fatalities/MW/year (Taber D. Allison and Ryan Butryn 2019). Bat mortality rates reported for Minnesota specific wind energy facilities range from 0.41 to 8.56 bats/MW/year (**Table 45)** which are less compared to these averages listed above. Post-construction mortality surveys for these wind projects in Minnesota average 2.3 bats/MW/year (**Table 45**). During these studies, there were no federally listed bat species, such as northern long-eared bat, identified.

Table 45: Bat Fatality Rates at Minnesota Wind Farms

	Bat Mortality Rate	Year of Study	Study Citation
Lakefield	0.87 bats/MW/year	2016	(Chodachek et al. 2017)
Prairie Rose	0.41 bats/ MW/ study period	2014	(Chodachek, Adachi, and DiDonato 2015)
Big Blue	2.25 bats/ MW/ study period	2014	(Chodachek et al. 2015)
Grand Meadow	1.05 bats/ MW/ study period	2014	(Chodachek et al. 2015)
Oak Glen	2.03 bats/ MW/ study period	2014	(Chodachek et al. 2015)
Odell	8.56 bats/ MW/ study period	2016-2017	(Chodachek and Gustafson 2018)
Buffalo Ridge	0.76-2.72 bats/MW/year	1996-1999	(Johnson et al. 2000)

Pre-construction bat acoustic monitoring conducted by WEST in 2016 and 2018 indicated that bat activity within portions of the Site was highest in mid to late summer (July-August), corresponding with the beginning of the fall migratory period. Additionally, WEST found that unidentified *Myotis* species of bats (either little brown or northern long-eared bats) made up only 23% activity at the Site in 2016 and only 11% of bat activity at the Site in 2018 (Bishop-Boros, Solick, and Kreger 2017, Kreger, Hyzy, and Solick 2019). While the occurrence of these species at the Site may increase the likelihood of mortality due to turbine collisions, *Myotis* species mortalities have generally been reported in low proportions at active wind energy projects in North America (Arnett et al. 2008). Further, additional analysis of bat calls of the Site determined that no high frequency calls belonged to northern long-eared bats. Further, bat monitoring survey results at the Site show that tree-roosting bat species such as hoary and silver-haired bats accounted for 77% and 88.7% of bats detected throughout the 2016 and 2018 monitoring periods respectively (Bishop-Boros,

Solick, and Kreger 2017; Kreger, Hyzy, and Solick 2019). Most bat fatalities within the Site will likely consist of tree-roosting species, of which none that commonly range within Minnesota are listed as federally T&E.

Impacts on bats as a result of Project construction and operation are not expected to differ markedly from previous studies in agricultural settings within Minnesota (**Table 43**). The Prairie Rose Wind Farm, located approximately 9.2 miles north of the Site, has a similar landscape to the proposed Project. Publicly available post-construction data indicate that the Prairie Rose facility has casualty rates of 0.41 bat/MW/study period (Chodachek et al. 2015a). The fatality rates for the Project are expected to be comparable to the Prairie Rose Wind Farm. Specifically, impacts to northern long-eared bats due to the Project are expected to be negligible based on the lack of suitable habitat (362 acres of wooded habitat and all isolated woodlots are less than 10 acres in size), no northern long-eared bats being identified in previous acoustic bat surveys for the Site, and no northern long-eared bats were identified at other Minnesota wind facilities during numerous post-construction fatality monitoring surveys. Walleye Wind has also sited Project infrastructure to avoid areas of forested habitat to the greatest extent practicable. In areas where forests cannot be avoided, Walleye Wind has also agreed to avoid clearing trees from June 1 to July 31 so as to avoid the pup season. Walleye Wind will also coordinate with MNDNR and USFWS regarding potential minimization measures such as the feathering of turbine blades up to the manufacturer set the cut-in speed at night between April 1 – October 31.

Mitigation Measures

The Applicant has carefully sited the Project to avoid or minimize impacts to wildlife and sensitive areas within the site. In addition to the careful siting and continued Project planning, the Applicant will implement the following measures during final selection of the turbine locations and Project development, construction, and operation:

- Walleye Wind has prepared a Wildlife Conservation Strategy/Avian and Bat Protection Plan (WCS/ABPP). The WCS/ABPP incorporates standards for minimizing impacts to avian and bat species during construction and operation of the Project. The WCS/ABPP was developed in a manner consistent within the USFWS WEG. A draft WCS/ABPP is attached to this Application as **Appendix I (Wildlife Conservation Strategy)**. The WCS/ABPP is considered a living document and will continue to be updated as development activities continue and are finalized.
- Maintain required setback distances from WMAs, AMAs, NWRs, WPAs, SNAs, and state parks to reduce risk to waterfowl and grassland-associated birds when siting turbines in the Site.
- Construct wind turbines using tubular monopole towers to discourage birds from nesting and perching.
- Light turbines in accordance with FAA requirements.
- Avoid or minimize disturbance of individual wetlands or drainage systems during Project construction. Wetland delineations and micro-siting of turbines are being conducted and

will be completed prior to construction to identify limits of wetland boundaries and to avoid placement of turbines in sensitive wildlife habitat.

- Avoid and minimize siting turbines in mapped native prairie, native plant communities, and MBS Sites of Biodiversity Significance ranked moderate, high or outstanding.
- Avoid or minimize the placement of turbines in high-quality grassland or pasture areas that may act as native grasslands for breeding grassland bird species.
- Avoid or minimize the placement of turbines in previously undisturbed shrub/scrub vegetation types that may provide additional habitat for breeding birds.
- Protect existing trees and shrubs by avoiding tree removal for turbines, access roads, and underground collector lines.
- Prepare a Prairie Protection and Management Plan in coordination with the MNDNR.
- Voluntarily comply with activity and cutting restrictions (June 1-July 31) outlined in the USFWS 4(d) rule for wooded habitat impacts within the Site.
- Maintain water and soil conservation practices during construction through the implementation of construction BMPs. These practices include silt fencing, temporary reseeding, permanent seeding, mulching, filter strips, erosion blankets, grassed waterways, and sod stabilization.
- Coordinate with local NRCS staff to revegetate non-cropland and pasture areas disturbed during construction or operation of the wind facility with native seed mixes appropriate to the region.
- Control the introduction of invasive species to natural plant communities, as designated by the Minnesota USDA (MDA) (MDA 2020a; 2020b) through the implementation of BMPs:
  - These BMPs include limiting invasive species spread *via* maintenance equipment and vehicles *via* early detection of invasive species;
  - Cleaning mowers and bladed equipment;
  - Minimizing disturbance to native areas;
  - Limiting traffic through weed-infested areas;
  - Frequently inspecting equipment storage areas for weeds; and
  - In the event that invasive weeds are detected in areas where Project disturbance occurs, control through proper timing, cutting and using targeted herbicide consistent with the herbicide BMPs published by the MnDOT and MDA (MDA 2020b; MN/DOT 2020c).
- Complete the additional year of avian studies that are currently underway consistent with USFWS Eagle Conservation Plan Guidance. This will provide a more complete understanding of eagle and threatened/endangered species avian use within the Project.
- Avoid impacts to streams with USFWS designated critical habitat for the Topeka shiner (See **Section 8.21** for additional discussion about Topeka Shiner).
- Avoid siting turbines within 1.6 miles of known bald eagle nests.
- Walleye Wind will coordinate with MNDNR regarding potential minimization measures, such as the feathering of turbine blades up to the manufacturer set cut-in speed at night between April 1 – October 31. Of note, this operational strategy is only known to minimize

risks to bat species. Curtailment to manufacturer's recommended cut-in speed is not anticipated to affect avian mortalities.

- Conduct Tier 4 post-construction monitoring in order to better understand bird and bat impacts that are attributable to the Project operation and adjust operations as appropriate based on the level of mortality observed.

The Applicant is committed to minimizing avian and wildlife impacts within the Site and will implement measures to avoid and minimize impacts to sensitive wildlife species and habitat. Walleye Wind continues to coordinate with USFWS and MNDNR regarding appropriate mitigation measures for wildlife impacts.

8.21 Rare and Unique Natural Features

The Site was evaluated for the potential presence of special status species and habitat through desktop review of available online databases including but not limited to the USFWS IPaC tool and the NHIS. Because the Site is ecologically arbitrary, a surrounding 1-mile buffer area, was also reviewed for potential occurrences of rare and unique features. While the entire Site is located within Rock County, Minnesota, the 1-mile buffer area utilized in evaluating resources extends into Minnehaha County, South Dakota since the Site boundary is on the Minnesota/South Dakota state line. No Project facilities will be located in South Dakota.

8.21.1 Threatened and Endangered Species[10]

Federally Threatened and Endangered Species

The USFWS provides distribution lists of federally listed threatened, endangered, and candidate species on a county-by-county basis. These county lists indicate that Rock County and adjacent portions of Minnehaha County are within the range (*i.e.*, has documented records and/or has the potential to harbor critical habitat for the designated species) of one federally endangered and five federally threatened species (USFWS 2020b). In the state of Minnesota, the prairie bush clover is also listed as state threatened. The Dakota skipper and western prairie fringed orchid are also listed and endangered within Minnesota. See **Table 46** below for the USFWS IPaC results. USFWS IPaC results also indicated that designated critical habitat for the Topeka shiner is within the Site.

[10] All Project infrastructure, turbines, and the Site are located in Rock County, Minnesota. The information collected for the Project's study areas that extend into South Dakota is presented for informational purposes consistent requirements set forth in the *Minnesota Department of Commerce, Energy Facility Permitting Application Guidance for Site Permitting of Large Wind Energy Conversion Systems in Minnesota* (Minnesota DOC 2019).

Table 46: Federally Listed Species Known to Occur in Rock County

Common Name	Scientific Name	Federal Status*	Suitable Habitat	Potential to Impact
Northern long-eared bat	*Myotis septentrionalis*	LT	Summer roosts within forest systems often associated within riparian areas for foraging. Overwinters within cave systems.	Low
Red Knot	*Calidris canutus rufa*	LT	Shoreland habitats including tidal flats, mudflats, and open sandy beaches	Low
Topeka Shiner	*Notropis topeka*	LE	Prefer slow-moving waters of midsize prairie streams including oxbows and tributaries outside of the main river channel	Low
Dakota Skipper	*Hesperia dacotae*	LT	Moist bluestem prairies as well as upland dry prairies	Low
Prairie Bush-clover	*Lespedeza leptostachya*	LT	Commonly found within mesic to dry-mesic prairies with coarse-textured soils of gravel and sand	Low
Western Prairie Fringed Orchid	*Platanthera praeclara*	LT	Remnant prairies and sedge meadow habitats with limited livestock grazing	Low

*LE =federally endangered, LT= federally threatened
Source: (USFWS 2020b; MNDNR 2013; South Dakota Department of Game, Fish & Parks 2016).

Northern long-eared bat

The northern long-eared bat (*Myotis septentrionalis*) is a migratory bat species that forages and travels within forested habitat, including upland forest, lowland forest, forested linear elements such as tree-lined hedgerows and stream corridors, and occasionally adjacent and interspersed emergent wetlands, old fields, and agricultural fields (USFWS 2014b). During summer, this species roosts singly or in colonies in cavities, underneath bark, crevices, or hollows of both live and dead trees and/or snags (typically 3 inches or greater diameter at breast height [DBH]) in upland and lowland woodlots and tree-lined corridors (USFWS 2014b). This species occurs throughout Minnesota and is known to overwinter within caves and mine systems of the state

(MNDNR 2020k). In South Dakota, the northern long-eared bat is more common along the western boundary of the state near the Black Hills, but it has also been observed within eastern regions of the state (South Dakota Bat Working Group 2004). Based on publicly available records, the closest known northern long-eared bat hibernacula are located within Kasota, Oshawa, and Traverse Townships in Le Sueur County, over 120 miles northeast of the Site. There are no known maternity roost trees or hibernacula within Rock County for northern long-eared bat (MNDNR and USFWS 2019).

Red Knot

The red knot (*Calidris canutus rufa*) is a species of shorebird most commonly found along tidal flats shores of large water bodies during migratory and winter periods. The red knot breeds outside of Minnesota within the tundra of the Arctic (Audubon Society 2020). Red knots are rare within the state of Minnesota and are most commonly seen near Duluth, Minnesota approximately 300 miles northeast of the Site. In southern Minnesota, some red knots have been known to use sewage treatment plants in the southern portion of the state. In South Dakota, this species is considered uncommon and sporadic, with observations mainly known from LaCreek NWR in southwestern South Dakota and Lake Preston in eastern South Dakota located approximately 259 miles southwest and 60 miles northeast of the Site respectively (USFWS 2014c).

Topeka Shiner

The Topeka shiner (*Notropis topeka*) is a small fish found within river systems of the central prairie region of the U.S., including Minnesota and South Dakota. Topeka shiners are typically found within small to mid-sized rivers with perennial, or year-round flow, but have been known to tolerate intermittent streams, oxbows, and side-channel habitats during dry times such as summer months or times of drought. Topeka shiners breed within pool areas of streams and have been known to spawn in areas surrounding green sunfish (*Lepomis cyanellus*) and orange spotted sunfish (*Lepomis cyanellus*) nests as well as in areas of rubble and boulder substrates (USFWS 2004).

Several large perennial streams systems including Springwater Creek, Beaver Creek, Little Beaver Creek, and Mud Creek cross through the Site and adjacent lands. Portions of these stream systems and their associated tributaries have been designated by USFWS as critical habitat for the Topeka Shiner (USFWS 2004).

Dakota Skipper

The Dakota skipper (*Hesperia dacotae*) is a threatened species of butterfly historically found from northeast Illinois to southern Saskatchewan, Canada. Currently, much of the Dakota skipper's preferred habitats of moist bluestem prairie and upland tallgrass prairie habitat has been lost to the spread of agriculture within the region (USFWS 2014a). Designated critical habitat for the Dakota skipper is not located within the vicinity of the Site. The closest area of designated critical habitat is located in Pipestone County, Minnesota approximately 23 miles north of the Project near Holland, Minnesota (USFWS 2018).

Prairie Bush-clover

Prairie bush clover (*Lespedeza leptostachya*) is a federally threated species of clover endemic to the tallgrass prairie region of the Upper Mississippi River Valley (USFWS 2009). This species is most commonly found within areas of thin soils over limestone, sandstone, and quartzite bedrocks (USFWS 1988). Large populations of prairie bush clover are known to occur within northern Iowa and Southern Minnesota within the Des Moines River and Little Sioux River Basin (USFWS 1988). Within Minnesota, prairie bush clover populations are found within the southwestern portions of the state near the Des Moines River Valley (MNDNR 2020k).

Western Prairie Fringed Orchid

Western prairie fringed orchid (*Platanthera praeclara)* grows within a variety of grassland systems including tallgrass prairies and meadows as well as along old fields and un-mowed roadside ditches (USFWS 2003). Within Minnesota, populations of western prairie fringed orchid are known to occur within 10 counties, including Rock County as well as Pipestone County and Nobles County which border Rock County to the north and east, respectively. Historic populations within Houston, Freeborn, and Kandiyohi Counties are assumed to have been extirpated (MNDNR 2020k).

State Threatened and Endangered Species

Under MNDNR license agreement LA-930, on January 8, 2020, ECT accessed the NHIS rare features database to review element occurrence records of T&E species known within the Site and surrounding 1-mile buffer.

The NHIS data for Rock County, Minnesota and the South Dakota Game Fish & Parks (SD GFP) list for Minnehaha County, South Dakota identified one state endangered and one state threatened species with the potential to occur within or near the Site. In addition, NHIS data identified three species of special concern, one watch list species, and five mussel species. One Minnesota listed special concern species, the Topeka shiner, is also federally listed as endangered. Though the identified mussel species are not listed as state T&E species in Minnesota, MNDNR tracks mussel populations throughout the state through the Minnesota Statewide Mussel Survey (MNDNR 2020i). Mussel occurrence records documented by NHIS within the Site and 1-mile buffer may indicate high water quality and suitable aquatic habitat for T&E species. The NHIS maintains that the database is not an exhaustive inventory, and, thus, does not represent all occurrences of rare features within the state. Ecologically significant features for which the NHIS has no records may exist within the Site. **Table 47** below provides a summary of NHIS identified species within known occurrences within and adjacent to the Site.

Table 47: NHIS Species Recorded within the Site and surrounding 1-mile area

Common Name	Scientific Name	Status* (MN/SD /FED)	Habitat Requirements	Potential for Impact‡	Element Category
Threeridge	*Amblema plicata*	-/-/-	Variety of stream habitat including small to streams to large river systems with various currents. Most often prefers areas of sand and gravel substrates.	Moderate	Mussel
Cylindrical Papershell	*Anodontoides ferussacianus*	-/-/-	Silt substrates of shallow waters	Moderate	Mussel
Short-eared owl	*Asio flammeus*	SC/-/-	Found with a variety of open community habitats including prairies, pastures, sedge meadows, and peatlands. Prefers areas with large spaces of habitat.	Moderate	Bird
Western Foxsnake	*Elaphe vulpina*	W/-/-	Forest edge habitats. May also use manmade structures such as barns and sheds.	Low	Reptile
White heelsplitter	*Lasmigona complanata*	-/-/-	Found in medium to large rivers as well as open waters such as lakes and bays. Prefers quiet currents and substrates of mud and fine sand.	Moderate	Mussel
Mudwort	*Limosella aquatica*	SC/-/-	Most commonly occurs along edges of lowland prairie pools and rock outcrops.	Moderate	Plant
Northern River Otter	*Lontra canadensis*	-/ST/-	Riparian areas and wetland margins with vegetation for foraging. Commonly den within beaver dens, fall trees, and logjams.	Low	Mammal
Topeka Shiner	*Notropis topeka*	SC/ -/LE	Prefers slow-moving waters of midsize prairie streams including oxbows	Low	Fish

Common Name	Scientific Name	Status* (MN/SD /FED)	Habitat Requirements	Potential for Impact‡	Element Category
			and tributaries outside of the main river channel.		
Giant Floater	*Pyganodon grandis*	-/-/-	Mud substrates of pools, creeks, and rivers.	Moderate	Mussel
Lined Snake	*Tropidoclonion lineatum*	SC/SE/-	Variety of habitats including prairies/grasslands and residential properties.	Low	Reptile
Lilliput	*Toxolasma parvums*	-/-/-	Sands, gravel, and mud of shallow lakes, ponds, and rivers.	Moderate	Mussel

*SE = state endangered, ST = state threatened, SC = state special concern, W = state watch list (state monitored but no legal protection), LE = federally endangered, LT = federally threatened

‡Potential for impact based on preliminary review and does not preclude the need for further review of potential impacts if suitable habitat is targeted for development or during focused Tier 3 surveys.

Source: (MNDNR NHIS 2020; South Dakota Department of Game, Fish & Parks 2016).

Northern River Otter

The northern river otter (*Lontra canadensis*) is listed as threatened in South Dakota. This species occurs in a variety of habitats but is mostly associated with areas with abundant riparian vegetation. Typically, northern river otters' den within beaver bank dens, fallen trees, and logjams (South Dakota Department of Game, Fish & Parks 2012b). Within the Northern Great Plains of Minnesota and South Dakota, river otters are generally limited to stream and river systems with abundant populations of beaver. Beaver dams provide suitable ponds and lakes for otter foraging and access to water in winter (South Dakota Department of Game, Fish & Parks 2012b).

Once common throughout North America, otter populations have declined due to the loss of habitat from wetland loss and degradation, as well as overhunting and harvest. Populations of northern river otters are known from the Big Sioux River in South Dakota, approximately 16 miles west of the Site /1-mile buffer (South Dakota Department of Game, Fish & Parks 2012b). In Minnesota, river otters are more commonly found within the northern areas of the state, but have been known to occur within southern river systems as well (MNDNR 2020m).

Lined Snake

The lined snake (*Tropidoclonion lineatum*) is a small snake most commonly found in undisturbed prairie habitats along woodland edges and corridors (South Dakota Herps 2020). The nearest South Dakota populations of lined snake are located along the Big Sioux River corridor and Palisades State Park 13 and 3 miles east of the Site /1-mile buffer respectively (South Dakota Herps 2020). Within Minnesota, populations of lined snake are only known to occur with Blue

Mounds State Park located approximately 4 miles northeast of the Project /1-mile buffer (MNDNR 2020k).

Bald and Golden Eagles

Bald eagle occurrence in Rock County, Minnehaha County, and the regional vicinity of the Site is well documented (eBird 2020). Two public occurrence records have been indicated within southern portions of the Site. Most of the occurrence records for bald eagles within the Site are along Interstate 90, but there is likely a detection bias of observers traveling along the interstate. One record from 2011 indicated two birds, approximately 0.50 miles east of intersection of Interstate 90 and 60th Avenue. The other record from 2014, is located approximately 1.50 miles west of the intersection of Interstate 90 and 60th Avenue (eBird 2020).

Bald eagle breeding has been documented in 700 locations within Minnesota and it is estimated that approximately 1,300 nests occur within the state (MNDNR 2020b). A nest survey conducted by MNDNR in 2005 indicated large numbers of eagle nests within Chippewa National Forest (150 nests) over 280 miles northeast of the Site (MNDNR 2006). Within Rock County, a greater number of bald eagle observations have been recorded near Blue Mounds State Park near the vicinity of the Site and 1-mile buffer (eBird 2020). Additionally, the Rock River, located approximately 5 miles east of the Site at its nearest point, likely attracts foraging bald eagles within the region.

Bald eagles will nest in non-forested areas if there are large enough trees to hold the nest (Buehler 2000). Previous studies conducted by WEST in 2016 indicated that there are two known active bald eagle nests within the 10-mile buffer, southwest of the Site along the Big Sioux River in South Dakota (Pickle, Rittenhouse, and Kreger 2016). Additional raptor nest surveys by WEST in 2018 also indicated the same two eagle nests identified during the 2016 surveys along the Big Sioux River to the southwest of the current Site. These nests were both considered active during the 2018 survey period. (Kreger and Suehring 2018). The 2018 survey also identified one additional active bald eagle nest and one inactive bald eagle nest within 10-miles of the site. Five unidentified raptor nests that appeared consistent in size and structure of a bald eagle nests, were also identified during the 2018 aerial survey. Three of these potential bald eagle nests were documented more than 6.5 miles east and southeast of the reviewed Project area along the Rock River. The other two identified nests were also located over 6.5 miles from the Project area but were documented to the southwest along the Big Sioux River. One of the unidentified raptor nest was classified by WEST as occupied, inactive and the other four nests were classified by WEST as inactive (Kreger and Suehring 2018).

Following revisions of the Site layout and boundary, ECT conducted aerial nest surveys of the current Site boundary between February 26-29, 2020. These aerial helicopter surveys evaluated 0.5- mile transects within the Site as well as 1-mile transects within a 10-mile buffer. A follow-up ground based survey was also conducted on April 1, 2020 to ascertain species of unknown nests identified within the Site during the aerial survey. A total of 10 active bald eagle nests were observed during the Spring 2020 surveys within 10-miles of the current Site, five of which were

newly identified nests not previously observed in 2016 or 2018. One alternate nest was also identified within the 1-mile buffer to the east of the Site. This nest was considered previously active but was determined failed by an ECT avian biologist in follow up surveys in May 2020. One historic potential bald eagle nest was also identified by WEST in 2018 approximately 8.5 miles southwest of the current Project area boundary. However, this nest was not relocated during surveys in 2020. No bald eagle nests were observed within the Site during the 2016, 2018, or 2020 surveys.

Winter habitat suitability is defined by food availability, presence of roost sites that provide protection from inclement weather, and absence of human disturbance (Buehler 2000). Large concentrations of overwintering bald eagles have been documented in Minnesota near Red Wing and Wabasha, Minnesota approximately 200 miles northeast of the Site (MNDNR 2020b). Though southwestern Minnesota has smaller concentrations of bald eagles than other parts of the state, publicly available data indicate that bald eagles have been observed within and near the Site during the winter months (December- February) especially along sections of Interstate 90 and the Rock River corridor (eBird 2020).

Golden eagles do not breed in Minnesota or South Dakota and occur infrequently during the winter and migratory periods (Kochert et al. 2002). One observation of a golden eagle has been reported within the vicinity of the Site, near Blue Mounds State Park, just outside the eastern 1-mile buffer boundary (eBird 2020). A single juvenile golden eagle was also observed with the Site during Tier 3 surveys on October 24, 2019. The timing of this observation is consistent with the migratory window for this species. However, this individual was observed at a 200-m flight height, and therefore no golden eagle risk minutes were recorded.

8.21.2 Native Plant Communities

The MNDNR defines native plant communities as communities in which native plants have not been greatly altered by human activity or by introduced organisms (*e.g.*, invasive species) (MNDNR 2020l). The MNDNR has mapped rare and unique native plant communities as part of its NHIS database. These native plant communities have the potential to provide habitat for rare species of flora and fauna. Data available from the NHIS indicated one small areas of native community types within the Site (MNDNR NHIS 2020): Dry Hill Prairie (Southern) (UPs13d). One additional native community type is also located within the 1-mile buffer: Seepage Meadow/Carr, Tussock Sedge Subtype. This mapped community is located with the Springwater WMA that is adjacent to the northern Site boundary. Refer to **Table 48** and **Map 12 (Unique Natural Features)**.

MNDNR ranks Seepage Meadow/Carr communities as vulnerable to extirpation within Minnesota (MNDNR 2020l). Seepage Meadow/Carr communities are wetland communities commonly found within areas with groundwater seepages such as streams, drainage ways, and bases of slopes. One small 0.54-acre area within the 1-mile buffer is mapped as Seepage Meadow/Carr community.

Dry Hill Prairie (Southern) (UPs13d) communities are typically dominated by grass species but are also known for high densities of forbs. Common plant species include prairie phlox (*Phlox pilosa*), northern bedstraw (*Galium boreale*), and the small shrub wolfberry (*Symphoricarpos occidentalis*) (MNDNR 2020l). Native Prairies within the Site are limited to one 1.37-acre area within southern portions of the Site near Beaver Creek, Minnesota. Avoidance of native prairie communities within the Site and 1-mile buffer should limit impacts to T&E species that may utilize these areas.

Table 48: NHIS Native Plant Communities Recorded within 1-Mile of the Site Boundary

Native Plant Community Type	Number of NHIS Records within the Site	Number of NHIS Records within 1-Mile of the Site Boundary	Year of Most Current Observation
Seepage Meadow/Carr, Tussock Sedge Subtype	0	1	2008
Dry Hill Prairie (Southern)	1	0	2007

The majority of the identified native plant communities were last observed in the field between 2007 and 2008 and are present in either wetland or grassland habitats. For additional details regarding native plant communities, please refer to **Section 8.19.**

8.21.3 Minnesota Areas of Biodiversity Significance

NHIS indicated that 39 areas throughout the Site and the adjacent area of the 1-mile buffer have been reviewed by MBS and assigned a rank of Moderate or Below (MNDNR NHIS 2020). No areas within the Site or 1-mile buffer were ranked as High or Outstanding.

Five areas throughout the Site and surrounding 1-mile buffer have been ranked by MBS as Moderate including public and private lands, one Moderate ranked area is associated within portions of the Springwater WMA in the northern portion of the 1-mile buffer.

The remaining 34 ranked sites entirely or partially within 1-mile of the Site have been ranked as Below by MBS, including portions of the Rooster Ridge WMA located within the Site southwest of the City of Beaver Creek. These areas may serve as wildlife corridors, but likely lack high quality or suitable habitat for rare or T&E species. Refer to **Section 8.19** for further discussion on Sites of Biodiversity Significance.

Potential Impacts

Federal Species

Northern long-eared Bat

Forest cover is scarce within and adjacent to the Site (approximately 362 acres) and is present mostly as small isolated woodlots which are less than 10 acres. The absence of large tracts of high-quality woodlands and/or floodplain forests within the Site limit the likelihood of northern

long-eared bats occurring within the Site and 1-mile buffer. Additionally, previous acoustic surveys did not indicate northern long-eared bat within the region, including portions of the Site and surrounding 1-mile buffer (Kreger, Hyzy, and Solick 2019; Bishop-Boros, Solick, and Kreger 2017).

Under the final Section 4(d) rule of the Endangered Species Act, incidental take of the northern long-eared bat is prohibited if it occurs from:

1) Tree removal activities within 0.25 miles of known hibernaculum; or
2) Tree removal activities within 150 of known maternity root trees during June 1-July 31 within the White Nose Syndrome (WNS) zone which comprises all counted affected by WNA and an additional 150-mile radius around those counties.

The Site is located within the known range of northern long-eared bat and the WNS zone as indicated by USFWS. However, no known hibernaculum or maternity roosts are known with the vicinity of the Site. Walleye Wind has also sited Project facilities to avoid impacts to forested area and will follow agency recommended tree clearing guideline within the Site to avoid incidental take of the northern long-eared bat.

Red Knot

Wetland areas comprise a minimal portion, approximately 3%, of the Site. Additionally, these wetland areas are predominately limited to emergent riparian areas along streams, seasonally flooded agricultural areas, and the Beaver Creek waste management ponds located approximately 0.30 miles north of the intersection of I-90 and 60th Avenue. Large lakes containing mudflats that would provide suitable shoreland habitat for the red knot are not present within the Site. It is unlikely that the red knot would be found within the Site.

Topeka Shiner

NHIS data indicated known occurrences of Topeka shiner throughout the Site within larger streams and their tributaries with the most recent records being from 2006 (MNDNR NHIS 2020). Avoidance of impacts to stream systems to the extent practicable, and particularly critical habitat, will limit impacts to Topeka shiner within the Site.

Dakota Skipper

Based on available NHIS mapping, native prairie habitat within the Site is isolated to a few areas of remnant prairies along railroads ROWs and WMAs. Dakota skippers are sensitive to habitat degradation and almost always absent from overgrazed or otherwise degraded prairies (USFWS 2014a). On-site surveys in November 2019 and May 2020, indicated that available grassland habitat of the Project is comprised mostly of grazed pasturelands, further limiting the availability of suitable habitat for the Dakota skipper within the Site. It is unlikely that Dakota skipper would occur within the Site.

Prairie Bush Clover

Functional grassland habitat within the Site and 1-mile buffer are limited to only a few small areas along railroad ROW and MNDNR WMAs. Grasslands within the Site and 1-mile buffer are not likely to provide suitable habitat for prairie bush clover. It is unlikely that prairie bush clover would occur within the Site.

Western Prairie Fringed Orchid

NHIS data did not indicate occurrences of the western prairie fringed orchid within or adjacent to the Site (MNDNR NHIS 2020). Though western prairie fringed orchid may occur within undisturbed fallow fields, on-site surveys indicated that pastures and fields within the Project were observed to be frequently disturbed/grazed. Suitable habitat for the western prairie fringed orchid species is likely limited to only a few small areas within WMAs and mapped prairies along railroad ROWs.

State Listed Species

The Project /1-mile buffer may contain suitable habitat for the species included in the NHIS results and the SD GFP list (**Table 47**). The Project and 1-mile buffer are generally dominated by land under agricultural use such as row crops and open cattle pastures not undisturbed grasslands/prairies and various aquatic habitats, such as wetlands, streams, and open water, which are more suitable habitats for these species. Appropriate planning and strategic siting of turbines, roads, and infrastructure to avoid disturbing undeveloped habitats (*e.g.*, grasslands or wetland pockets) or constructing new crossings across large ditches had been implemented during Project design to reduce or eliminate the potential risks to state-listed species if found within these remnant habitats.

Northern River Otter

Studies of suitable stream systems for river otters within adjacent areas of South Dakota indicated that stream systems with high levels of phosphorus and nitrogen as well as high turbidity, were generally associated with agricultural areas and unsuitable for the northern river otter (Kiesow and Dieter 2005). Additionally, the largest stream system within the vicinity of the Project /1-mile buffer is the Rock River approximately 3 miles east near the City of Luverne, Minnesota. The northern river otter is more likely to occur within the areas of the Rock River than the Project /1-mile buffer due to the greater probability for larger wetland areas to occur along the Rock River than within streams of the Project.

The dominant agricultural landscape of the Project /1-mile buffer may influence suitability of streams and rivers; thus, the likelihood of river otters occurring within the Project /1-mile buffer is low. Also, though the river otter is state-listed as threatened within South Dakota, this species is not afforded protection under Minnesota T&E species laws. Project development will occur within the Project in Minnesota and not in South Dakota.

Lined Snake

Undisturbed prairie and woodland habitat are limited within the Project /1-mile buffer, reducing the likelihood of the lined snake to occur on-site. Additionally, though listed in South Dakota as an endangered species, this species is not afforded protection under Minnesota T&E species laws. Impacts from Project development to lined snake populations within the vicinity of the Project /1-mile buffer, if present, are not anticipated.

Bald Eagle

Forested areas in which bald eagles nest account for less than approximately 1% of the Site (Yang et al. 2018; MRLC Consortium 2019). Limited open bodies of water and water bodies, in which bald eagles use for feeding also comprise only a small portion of the Site and 1-mile buffer. Though bald eagles have been observed nesting within 1-mile, lands within the Site are unlikely to provide the same quality habitat as forested areas along large river systems like the Big Sioux and Rock Rivers. Additionally, all turbines have been sited over 1.6 miles from all active eagle nests within the vicinity of the Project, reducing adverse impacts to this species.

Golden Eagle

Limited, potential grassland and herbaceous habitats comprise approximately 1% of the Site (Yang et al. 2018; MRLC Consortium 2019). Some golden eagles in the eastern extent of their range will nest in forested landcover; however, forested areas only comprise approximately 1% of the Site (Yang et al. 2018; MRLC Consortium 2019). Given the rarity of the golden eagle within the region and the lack of suitable habitat, it is unlikely that golden eagles would frequently use the Site.

Native Plant Communities

Two native plant communities are located within the Site. Walleye Wind had sited Project infrastructures such as turbines, collection lines, access roads, crane walks, and other associated facilities to avoid areas of native plant communities. Impacts on native plant communities are not anticipated.

Minnesota Sites of Biodiversity Significance

No areas of Outstanding or High-ranking Sites of Biodiversity Significance are located within the Site. Impacts to sites ranked as Moderate and Below within the Site are further discussed previously in **Section 8.19**. Walleye Wind has sited Project facilities to avoid or minimize ranked sites within the Site.

Mitigation

As noted in **Section 8.20** above, the Applicant has carefully sited the Project to avoid or minimize impacts to wildlife and sensitive areas within the Site and has committed to a variety of measures to be implemented throughout development, construction operation to further minimize any potential impacts to these resources. The mitigation discussion below builds upon and provides additional details to the measures already discussed in **Section 8.20**.

Federally-Listed Species

Northern Long-eared bat

Bat mortality at any given WECS can be highly variable (Kunz et al. 2007). Various studies have shown that wind turbine bat mortality appears to pose the greatest threat to migratory, foliage-roosting bat species such as the eastern red bat and hoary bat, and cavity-roosting silver-haired bat (collectively referred to as "tree bats"). Furthermore, the highest bat mortalities have consistently been reported during late summer and early fall (Arnett et al. 2008; Kunz et al. 2007).

According to the pre-construction bat monitoring results (Bishop-Boros, Solick, and Kreger 2017; Kurta and Rockey 2013) bat activity within the Site was highest during the late summer (July-August), consistent with previous studies. WEST found that unidentified *Myotis* species of bats (either little brown or northern long-eared bats) made up only a small portion (11.2%) of activity within the Site in 2018. Additionally, further analysis of acoustic calls did not indicate the presence of northern long-eared bat within the region of the Site. While the occurrence of other species at the Site may increase the likelihood of mortality due to turbine collisions, *Myotis* species mortalities have generally been reported in low, variable proportions at active wind energy Projects in North America (Arnett et al. 2008) and surveys suggest that these species are rare within the Site. Further, bat monitoring survey results at the Site show that big brown bats, hoary and silver-haired bats were also detected during the 2016 and 2018 monitoring period. Using Bat Passes Per Night (annual average) as an indicator of bat activity at the Site, WEST concluded that overall bat use at the Site would be comparable to other wind energy projects located in landscapes similar to that of the Site.

Walleye Wind will coordinate with MNDNR and USFWS regarding potential minimization measures such as the feathering of turbine blades up to the manufacturer set cut-in speed at night between April 1 – October 31. Additionally, Walleye Wind has developed a WCS/ABPP that will establish standards for minimizing impacts to avian and bat species during construction and operation of the Project.

Topeka Shiner

Although Topeka shiner has the potential to occur within the Project, Walleye Wind has sited facility infrastructure such as turbine pads and access roads to avoid stream crossings. Additionally, collection lines will be bored underneath stream systems within the Site to avoid direct impacts to Topeka shiner. If crane walks are to occur close to or within waterways that may have Topeka shiner occurrences, Walleye Wind will employ BMPs, where practicable, to ensure that impacts to any potential Topeka shiner populations are minimized. Impacts resulting from crane walks and collection line installation would be temporary and stream banks/beds would be restored to pre-crossing conditions. Walleye Wind will coordinate with MNDNR & USFWS regarding further minimization measured for the Topeka shiner on-site of the Site.

State Listed Species

Given the highly agricultural landscape of the Site is it unlikely that state T&E, special concern, or watch-list species occur within the Site. Nevertheless, Walleye Wind has sited the Site to avoid natural areas (*e.g.*, native communities, grasslands, wetlands, forests, and riparian areas) to the greatest extent practicable to avoid impacts to these species if they are present.

Bald Eagles

The Avian Use Study completed by WEST (Kreger and Suehring 2019) documented raptor use (including bald eagles) to be relatively low within the study area (1-5 to 2.8% frequency). The nearest bald eagle nests are located over four miles from the closest portion of the Site. Turbines have been sited to avoid impacts to known bald eagle nests. Additionally, Walleye Wind has developed a WCS/ABPP that establishes standards for minimizing impacts to eagles and other avian species during construction and operation of the Project.

Native Plant Communities and Minnesota Sites of Biodiversity Significance

Even though no impacts to native plant communities are anticipated, Walleye Wind will still develop a Native Prairie Protection Plan that will address steps taken to avoid impacts to native prairie habitats and mitigation plans should impacts be deemed unavoidable. In addition, the Project will also implement BMPs during construction of the Project to limit impacts to Site of Biodiversity Significance.

9.0 SITE CHARACTERIZATION

9.1 Description of Resources

To simulate wind flow patterns for the Site, Analytics performed a detailed modeling process consisting of a mesoscale model to simulate the large-scale weather patterns, as well as a wind flow model to resolve small scale terrain and land features. The model output was then adjusted to on-site conditions using meteorological data normalized to long-term climatic means using the Analytics Enhanced Measure-Correlate-Predict (E-MCP) methodology.

In addition to a thorough meteorological analysis of the site, Analytics used archived weather data resources and physics-based numerical simulations (weather models) to calculate wind flow patterns at the site for an arbitrary full calendar year. Further analysis was performed utilizing multiple long-term data points from the Modern-Era Retrospective Analysis for Research and Applications (MERRA2) data set compiled by the National Aeronautics and Space Administration (NASA), which were processed together using the E-MCP methodology to estimate long-term characteristics of the wind resource. The results of the E-MCP processing phase provide a thirty-year normalized time-series representative of the long-term wind distributions at the site, which then is applied to wind turbine manufacturer's turbine power curves. This combination of meteorological modeling and normalization provides the best available assessment of the long-term wind resource at the site.

Analytics' analysis employed data from two MET towers and one WindCube Light Detecting and Ranging (LiDAR) location (all located within the Site or near vicinity), which are indicated below in **Table 49**. The data was collected in ten-minute intervals at each location for an average of one year.

The meteorological analysis supports the site as a strong candidate for wind energy potential with high wind speeds due to low roughness and moderate shear. Based on the measured data, the overall average wind speed at the turbine locations is 8.25 m/s at hub height with seasonal variations ranging from 7.00 m/s to 9.09 m/s. The highest wind resource is present during the winter month evenings, while the weakest wind resource is present during the summer month days. There is a strong bimodal distribution of winds at the site with prevailing directions out of the south and northwest.

Table 49: MET Tower/LiDAR Information

MET Tower / LiDAR	Location	Period of Record	Duration (mos.)	Meas. Heights (m)
M0923	43.581310, -96.423270	7/2018 - 10/2019	14.6	26,60
M0924	43.551770, -96.399115	10/2018 - 7/2019	8.1	26,60
L5080	43.713397, -96.390130	12/2016 - 1/2018	12.6	78,98

9.1.1 Interannual Variation

Interannual variation is the variation in expected annual wind speeds over the timeline of the Project. There is a strong correlation between Walleye Wind's MET tower data and the long-term reference data sets available through the NASA's MERRA2 reanalysis program. Based on the analysis of measured and model data in the Site, the annual variance of wind speed is expected to be 0.04 m/s.

9.1.2 Seasonal Variation

Seasonal variation is represented by the change in wind resource throughout the year. **Table 50** shows the estimated average seasonal variation of wind speed based on long-term data. The winter months of October through April are expected to have the highest wind speeds, and the summer months of May through September are expected to have the lowest wind speeds.

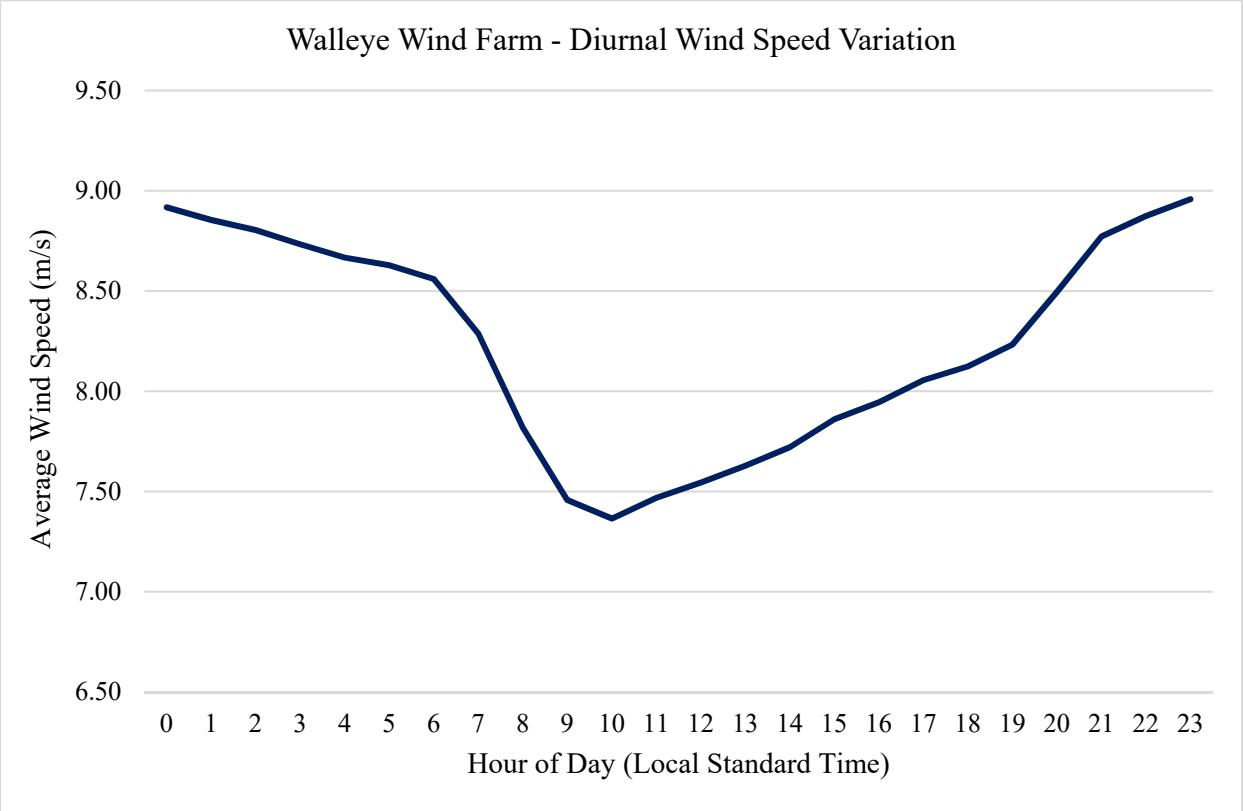
Table 50: Average Wind Speed

Month	Wind Speed (m/s)
January	8.52
February	8.54
March	8.73
April	9.09
May	8.47
June	7.72
July	7.06
August	7.00
September	8.19
October	8.54
November	8.63
December	8.47
Annual Average	**8.25**

9.1.3 Diurnal Variation

Diurnal variation represents the changes in wind resource throughout the day. **Figure 3** shows the annual average diurnal variation in wind speeds at the Site. While the diurnal variability fluctuates as a function of season, the wind speeds are generally higher during the night and weaker during the day.

Figure 3: Diurnal Wind Speed Variation



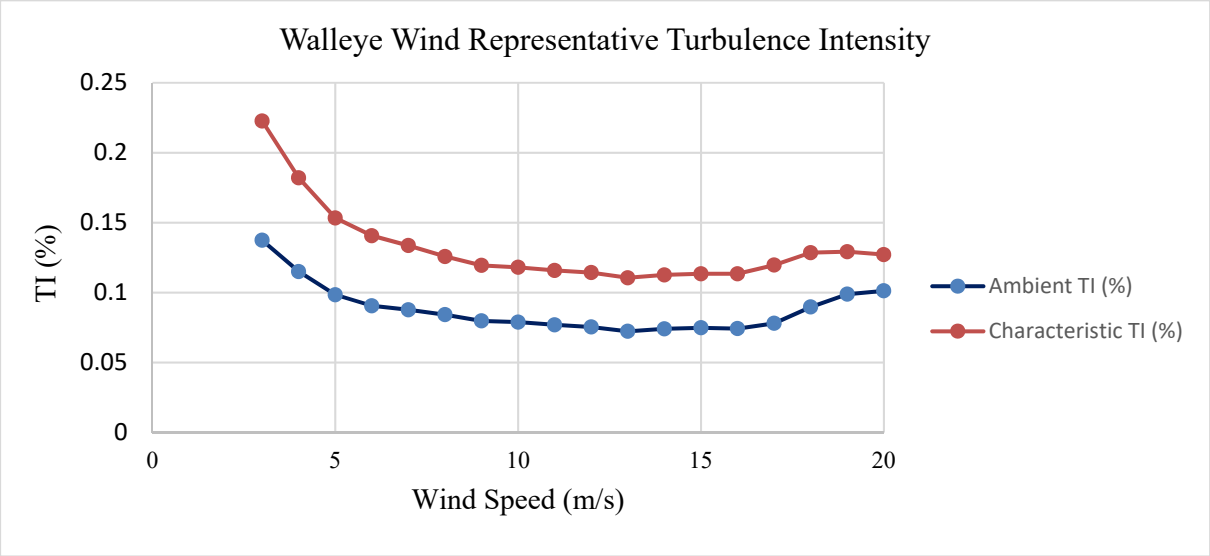
9.1.4 Atmospheric Stability

The thermal stability of the atmosphere fluctuates with respect to time of day, season, and instantaneous meteorological conditions. Generally, stability classes characterize the magnitude of vertical temperature gradient with unstable conditions associated with highly mixed atmospheric layer and stable conditions associated with stratified conditions. Among other things, atmospheric stability affects wind power production by dictating the amount of vertical wind shear. The thermal stability in the Site is expected to be slightly stable based on on-site measurements and global reanalysis data.

9.1.5 Hub Height Turbulence

Turbulence intensity can be defined as the measured standard-deviation of wind speed over the mean wind speed for some time period. It is common to report turbulence intensity as a function of incremental wind speed bins. For 15 m/s wind speeds at Site, the ambient turbulence intensity at the site is 7.48% and the characteristic turbulence intensity is 11.35% at hub height (114 m). These measurements are based upon wind data measured from the MET towers present at the site. The 10-minute measurements of turbulence intensity as a function of wind speed bin are shown below in **Figure 4**. Turbulence intensity values are derived from the MET tower most representative of the turbine locations. Overall, the turbulence intensity for the site is considered to be reasonable for the region and terrain.

Figure 4: Representative Turbulence Intensity



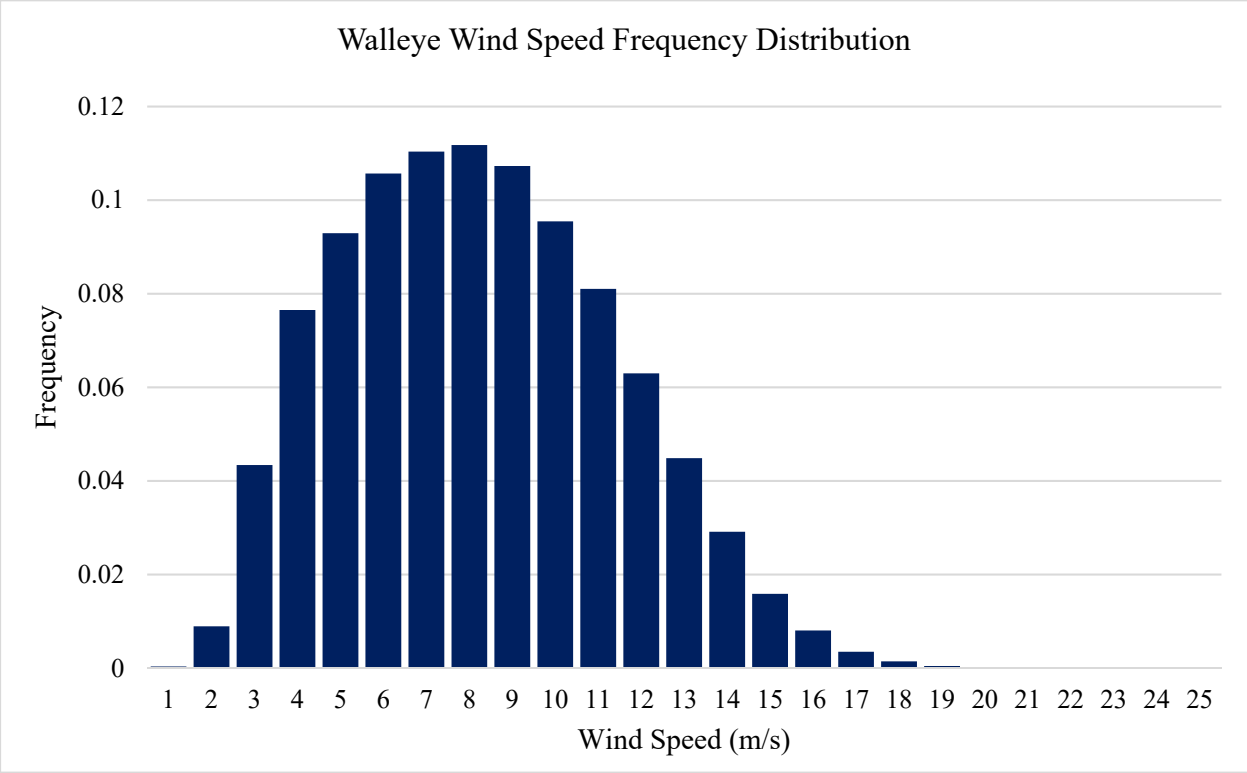
9.1.6 Extreme Wind Conditions

Long-term extreme winds were calculated at the site using an Independent Storms method and the Harris 1996 Gumbel-fit of the observed annual maximum wind speeds. Using this method, the maximum 50-year 10-minute mean wind speed for the Project is expected to be 34.7 m/s. This value is calculated from data collected from MET M0923, the MET tower most representative of the wind conditions of the regime with over a year of observed measurements.

9.1.7 Wind Speed Frequency Distribution

Figure 5 provides the anticipated long-term annualized wind speed frequency distribution for the Site, which is calculated from two on-site MET towers and one on-site LiDAR unit and is normalized to the 25 closest grid points from the NASA MERRA2 dataset. A majority of the winds occur between 4 m/s and 12 m/s.

Figure 5: Speed Frequency Distribution



9.1.8 Wind Variation and Height

Wind shear is the change in wind speeds with increasing elevation. Wind shear is calculated using the power law equation based on the relative distance from elevation. The equation used for calculating wind shear is v_2=v_1 (z_2/z_1)^α where v and z correspond to the wind speeds and heights at two levels and α is the shear coefficient. The shear coefficient can vary greatly due to geographical location and site-specific characteristics such as terrain roughness, elevation, and atmospheric stability. Shear values at each measurement location are shown in **Table 51**. Based upon data collected at the site, the representative wind shear at the site is 0.19.

Table 51: Measurement Speeds and Shears

Tower / LiDAR	Short-Term 90m Wind Speed (m/s)	Long-Term 90m Wind Speed (m/s)	Overall Shear
M0923	7.86	8.36	0.219
M0924	8.12	8.38	0.179
L5080	8.93	8.85	0.183

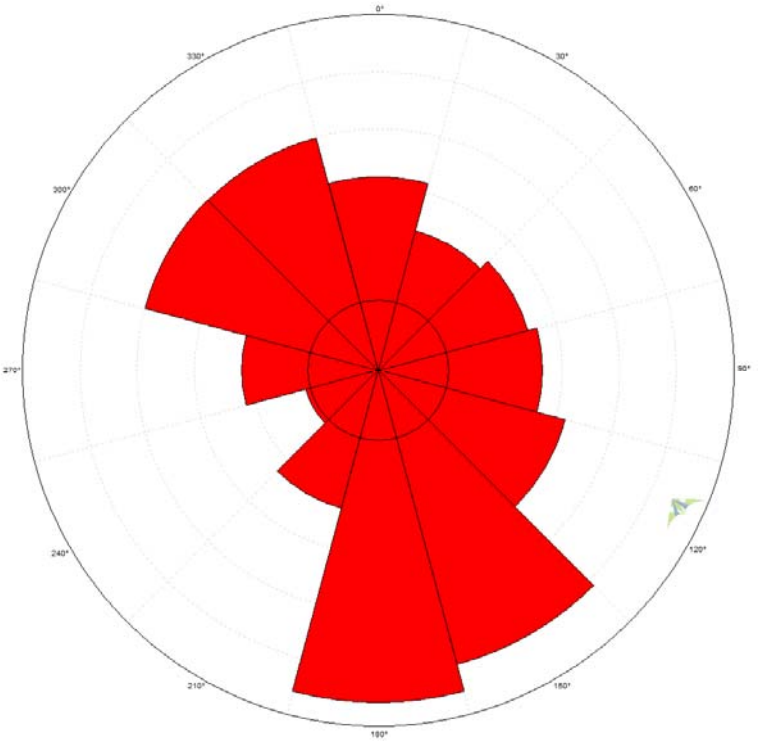
9.1.9 Spatial Wind Variation

As noted previously, the wind resource assessment is based on two MET towers and one LiDAR location. The mean expected spatial variation in wind speed across the Site is between 7.8 and 8.8 m/s based on the turbine locations and their respective hub heights.

9.1.10 Wind Rose

A wind rose displays a graphical representation of the prevailing wind directions and wind speeds gathered from measured data. **Figure 6** shows a representative wind rose, developed using the MET tower that is most representative of the site: M0923, located at the Site. The wind rose depicts a strong bimodal wind direction distribution at the site with prevailing winds out of the south and northwest, which is consistent with Minnesota's climate and seasonal variation. Energy production at the site can be expected to mainly occur in one of these two sectors.

Figure 6: Wind Rose from Meteorological Tower M0923



9.1.11 Other Meteorological Conditions

Based on Minnesota's northern latitude and location in the Upper Midwest, it is classified as having a continental climate. The Upper Midwest's temperate climate lies within a transition zone between the arctic and tropic characterized by strong seasonal variations in temperature. Pressure systems tend to move across Minnesota north towards the arctic during the spring and south towards the equator during the winter, resulting in a bimodal wind direction distribution. Minnesota's wind regime is primarily uniform across the entire state with prevailing winds out of the south and northwest, with the only exception being in areas close to Lake Superior. The highest

wind resource is present during the winter months, while the weakest wind resource is present during the summer months.

The Project location is susceptible to severe winter storms, and icing events. Minnesota regularly experiences below freezing temperatures every year during the fall, winter, and spring seasons. Other severe weather such as thunderstorms and tornados are possible but less frequent.

Topographical features also play a role in the wind regime that a site experience. Roughness length is used to describe the frictional drag imparted by the surface of the earth onto near-surface winds. Higher roughness values are associated with complex terrain, which disturbs air flow, while lower roughness values are associated with simple or smooth terrain that promotes air flow. Walleye Wind is located primarily on cultivated cropland and agricultural land with low roughness.

The Project will undergo a Mechanical Loads Assessment performed by GE to identify any potential issues with the site-specific climatic conditions. That analysis will take into consideration terrain complexity, wind speed distributions, turbulence intensity and other extreme weather and temperature conditions. The average temperature at the proposed site is 8.4° C, with minimum and maximum temperatures of -35.0° C and 41.5° C. Each turbine will be equipped with a cold weather package to mitigate hazards associated with extreme temperatures. The wind turbines will shut down at temperatures of below -30.0° C and above 40° C to mitigate the chances of catastrophic failures.

9.2 Other Nearby Wind Turbines, Within 10 Miles of Boundary

Based on data publicly available through the U.S. Wind Turbine Database (B.D. Hoen et al. 2020), there are two existing wind projects located northeast and southeast of the Site in Rock and Pipestone counties in Minnesota. The northern wind project, Prairie Rose Wind, is a commercial-scale wind project consisting of 119 wind turbines in Rock and Pipestone counties, Minnesota. The southeastern wind project, MinWind I and II, is a collection of four wind turbines in Rock County, Minnesota. Of the 123 wind turbines from these operating projects, 114 are located within a 10-mile extent around the Site, while 94 of these 123 turbines are located within 10 miles of a proposed turbine location for the Project. The seven wind turbines located within the Site itself are Perch Wind that were acquired by Walleye Wind in 2019 from RES as MinWind III-IX. These seven wind turbines are no longer operating and Walleye Wind plans to decommission these turbines in 2021.

10.0 PROJECT CONSTRUCTION

Numerous construction-related activities must be completed to enable the Project's commercial operation. In addition to the overall design and construction of the Project, there are many necessary pre-construction activities that must be performed such as ordering equipment on a project schedule with appropriate lead-times. The following provides a summary of key construction and pre-construction activities:

- Order all necessary components including towers, nacelles, blades, foundations, and transformers, etc.;
- Finalize turbine micro-siting;
- Complete survey to establish locations of structures and roadways;
- Complete geotechnical soil borings, testing, and analysis for proper foundation design and materials;
- Complete construction of access roads to be used for construction and maintenance;
- Construct temporary roadway improvements;
- Construct aboveground or underground collection and feeder lines and communication cables;
- Design and construct the metering station adjacent to the interconnection substation;
- Design and construct the collector substation;
- Determine potential upgrades to the interconnection substation as determined by MISO;
- Install tower foundations;
- Decommission the seven Perch Wind turbines;
- Place towers and set wind turbines;
- Complete Project backfeed and testing; and
- Commence commercial production.

As an initial step for construction of the Project, land will be graded where above-ground project infrastructure will be installed, including areas for the turbine pads, culverts, access roads, the Project substation, the O&M building, and additional facilities, as necessary. Depending upon final design, the temporary laydown area may also be graded. Up to 896 acres of temporary grading may be required for the Project (*i.e.*, cumulative temporary construction easements); however, construction of the Project will not likely require grading all of the construction easements and the actual acreage used is expected to be much less. Decommissioning of Perch Wind will occur during construction of Walleye Wind, following the process outlined in **Appendix J (Decommissioning Plan).** Typically, from the time grading begins the physical construction of the facility takes approximately 5 to 7 months, during which time the turbines are erected.

During construction, water and chemical applications are applied to roadways and construction areas for dust abatement. In high traffic areas, chemical applications, such as calcium chloride, can also be used to suppress dust. In the development of road use agreements with local road authorities, Walleye Wind will determine if the use of chemical applications is warranted for any

roadways within the Site. Water is typically applied in front of residences that are located along haul routes or that are in proximity to construction areas. Water is routinely and proactively applied in higher traffic and near residences so as to avoid public interference during construction and to abate dust.

During grading and excavation, topsoil is removed, typically to a depth of 8 to 12 inches, depending on local soil conditions. Topsoil is stockpiled for use during restoration and reseeding as discussed in **Section 10.5**.

10.1 Roads and Infrastructure

During construction, temporary roadway improvements are anticipated on some public roads within the Site. Existing state, county, and township roads will be used for the transportation of equipment, construction materials, and personnel to and from and within the Site. Temporary roadway improvements will be installed along specific routes as necessary to facilitate the movement of equipment. There will be turning radii installed at various intersections to allow for turbine component deliveries. The Applicant has initiated coordination with county roadway engineers and will continue to coordinate with the state, counties, and townships, as applicable, regarding the planned use of haul routes that may require road improvements or traffic control measures during the construction period. A road use agreement with local entities has been initiated and will be executed prior to construction. The Applicant will ensure that any overweight permits, road use permits, road maintenance agreements, or other approvals are secured.

During construction, the Applicant will perform routine maintenance and roadway repairs associated with upkeep needed or damage resulting from the Project activities.

10.2 Access Roads

Access roads are necessary to connect the public roadway network to each turbine location. A total of approximately 11.6 miles of permanent access roads will be necessary and permanent roadways will be gravel and approximately 16 ft (5 m) wide. Actual final lengths of access roads will be determined by final turbine road layout, environmental constraints, landowner preferences and other factors. After construction is complete, a gravel roadway will be installed around the entire base of each turbine so as to facilitate driving around turbine bases. This gravel roadway around each turbine base will be approximately 25 ft (8 m) wide.

The typical cross section of access roads will be dependent on terrain, grade, and drainage considerations. Access roads may incorporate geotechnical fabric and cement stabilization measures beneath the aggregate roadway cap. Also, if necessary, a final aggregate dressing may be placed on some of the turbine access roads.

The installation of access roads may require changes to gates, fences, or other existing landscape modifications. Modifications will be discussed with the landowners and gates and fences will be replaced or reconfigured in coordination with the landowner. Any damages to gates or fences resulting from construction or operation of the Project will promptly be repaired. Walleye Wind

will work with landowners to ensure the location of access roads minimizes adjacent land use disruptions to the extent practicable. Access roads will be designed and constructed to include appropriate drainage and culverts as necessary and permits for drainage and culvert installation will be obtained as required.

To facilitate crane movement and equipment delivery during construction, crane pathway locations will be finalized based upon final turbine and road layout, landowner requests, avoidance of environmental constraints, such as wetlands, sites of biological significance, prairies, sensitive habitat, and other factors.

Temporary construction roads of up to 50 ft (14 M) wide will be installed. Access roads widened for crane paths and equipment deliveries will be reduced to their permanent width of approximately 16 ft (5 m) upon completion of construction. Where temporary installations are removed, areas will be graded to natural contours, soil de-compaction and re-seeding will occur as described further in **Section 10.5**.

10.3 Associated Facilities

The Project will include construction of an O&M facility, installation of one permanent MET tower, an electrical collection system, and the Walleye Wind Substation.

The O&M facility will be located adjacent to the Walleye Wind Substation where approximately 10-acres will be purchased or leased. The footprint of the O&M facility is anticipated to be approximately 3,500 sf and with a fenced area to include a parking lot, oil containment area, etc. of up to one acre.

Walleye Wind anticipates installing one permanent self-supporting MET tower. The tower will be no closer than 250 ft from the edge of road ROW, as per **Table 2**, and from the boundaries of Walleye Wind's site control.

The electrical collector system will connect each wind turbine to the Walleye Wind Substation. The electricity from each turbine step up transformer is connected to the Walleye Wind Substation through approximately 35 miles of underground 34.5 kV collector lines. The substation equipment will be installed on concrete foundations and will consist of a graveled footprint area of approximately 20,000 sf. Within this area, there will be a chain link perimeter fence and an outdoor lighting system. The Walleye Wind Substation will have a fence, locked gate, and its own access road.

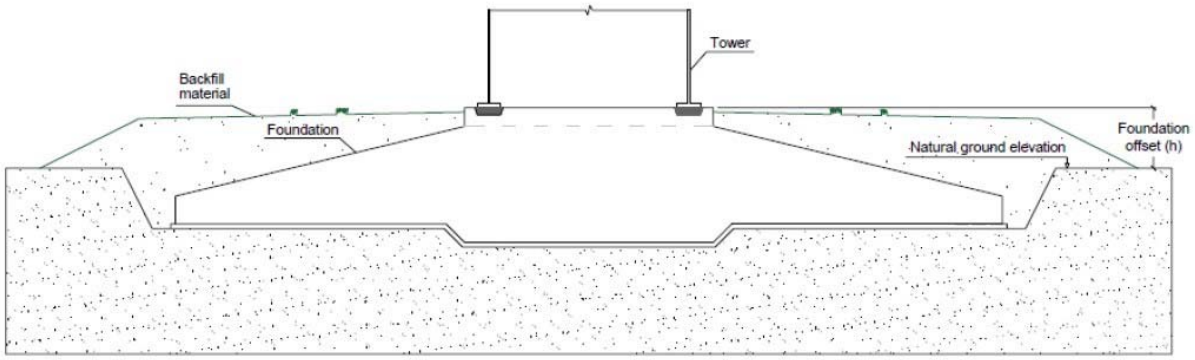
The Project will also require grading of a main temporary laydown area, preferably centrally-located, of approximately 18 acres to serve as: (1) a parking area for construction personnel; (2) a location for construction offices; and (3) staging area for turbine components, cable, pad mount transformers, junction boxes, and other material during construction. Other temporary staging areas may be needed for parking and unloading of large equipment deliveries.

All temporary staging areas will be sited in a location agreed upon by the Applicant and willing landowners. All affected areas will be restored in conjunction with the post-construction clean-up.

10.4 Turbine Site Selection and Foundation Design

Walleye Wind anticipates that the freestanding tubular wind turbine towers will be erected on reinforced concrete spread footing foundations (see **Figure 7**). The bearing surface of the foundation will be at a depth up to approximately 12 ft (approximately 4 m), with a total width of up to approximately 68 ft (approximately 21 m). The tubular steel tower will be connected to the concrete foundation through a base plate and high strength anchor bolts embedded in the concrete foundation. Approximately 32 tons of steel will be required in the design of the foundation for structural support. The concrete turbine foundations will require up to approximately 2,500 cubic yards of excavation depending on soil requirements and turbine size. Depending upon final design, up to 400 cubic yards of concrete will be required for each foundation. Geotechnical data, turbine loads, and cost considerations will dictate the final design of the foundation at each site. Excavated soil will be used for backfilling once turbine foundations are installed. Areas around the turbine are graded so that drainage will flow away from the base of the turbine. Excavated soil is also used in the construction of roads and is spread across construction areas as discussed further in **Section 10.5**.

Figure 7: Turbine Foundation Detail



10.5 Post-Construction Cleanup and Site Restoration

Following the installation of turbines and the turbine being mechanically complete (fully erected), gravel driveways will be placed around the turbine and left in place throughout the Project's life, see **Figure 2** above. All temporary road radius improvements and temporary culverts will be removed and restored as turbines reach mechanical completion. For any section of state, county, or township road used as a haul route, the roadway will be restored to its pre-construction state, or better, as negotiated in road use agreements with the responsible road authority.

Areas temporarily disturbed by construction activities will be re-graded to original contours. Excavated soil will be used as backfill and to support the construction of access roads, and the remaining soil will be spread over temporary construction areas. Where excavated soil is spread and grading occurs, topsoil will be placed atop the excavated soils and the areas will be revegetated, if required. In areas where soil compaction occurred from construction activities, areas will be decompacted, topped with topsoil, and revegetated as required.

Restored temporary construction areas will be reseeded unless the area is in a tillable agricultural field. In coordination with the landowner, areas within tillable agricultural fields where the landowner wants the land to be used again for agricultural purposes will be restored by the Applicant and then returned to agricultural use by the landowner. For reseeded areas, the seed mixture will be determined through coordination with local NRCS staff and consist of native seed mixes appropriate to the region. Reseeded areas (*i.e.*, in areas outside of tillable agricultural fields) will be monitored to confirm that the seeding resulted in revegetation. Additional seed will be applied as necessary. Storm water BMPs, such as silt fence and straw wattle, will not be removed until 70% revegetation/regrowth has occurred, unless the area is in a tillable agricultural field. If the area is in tillable agricultural field, a cover crop will be planted to minimize soil loss.

10.6 Operation of Project

Walleye Wind, through NEER affiliates and the use of contractors, will operate and maintain the Project consistent with North American Electric Reliability Corporation Reliability Standards. NEER affiliates will conduct operational monitoring of the Project through SCADA on a continual basis, 24 hours per day, seven days a week. Once the Project shifts into operations, the local O&M crew will be comprised of approximately 4 primary staff who largely will be wind technicians to carry out the maintenance on the turbines along with a site supervisor. These workers will work out of the Project O&M building.

Turbine critical parameters and overall performance are monitored on-site, and 24 hours a day at the Applicant's Renewable Operations Control Center (ROCC) in Juno Beach, Florida. The ROCC is an advanced technical facility, enabling remote operation and resetting of wind turbines. These unique capabilities allow the Applicant to undertake performance and reliability optimization through: (1) remote turbine operation and fault reset capability; (2) the use of advanced real-time equipment performance statistical modeling for advanced diagnostics; (3) benchmarking among similar components; and (4) replication of appropriate management practices across the fleet.

In addition, the large number of turbines in the NEER affiliate fleet allows for a sufficient spare part inventory at the fleet level to accommodate sharing across individual sites when spare parts are not available through the commercial supply system.

Scheduling of preventative maintenance service is based on wind forecast data in order to allow plant production to remain maximized. NEER's central O&M group of 700 dedicated personnel has been created to support the scheduled maintenance activity and optimize its execution based

on standardization, continuing process review, and improvement. Individuals can be pulled from this dedicated group at any time to conduct maintenance on the Project, as needed.

10.7 Costs

The capital expenditure for the Project is estimated to be $150 million. This includes all costs of development, design, and construction. General costs associated with Project operation, maintenance, initial spare parts, operating equipment and operating supplies will be $1.75 million the first year and average approximately $1.9 million per year over the following 29 years.

10.8 Schedule

Consistent with the terms of the PPA, the anticipated date of commercial operations is December 27, 2021. The following schedule (**Table 52**) sets forth the milestones needed to meet the agreed on commercial operations date.

Table 52: Project Schedule

	Estimated Completion
Land Acquisition	August 2020
Certificate of Need Order	July 2021
Site Permit Order	July 2021
Environmental Permits Received	March 2021
Other Permits/Approvals Received	March 2021
Construction	August 2021
In-Service Date	December 2021

10.9 Energy Projections

A net capacity factor of approximately 41.6% to 48.8% is expected annually. The projected average annual output of approximately 449,869 MWh is anticipated for the Project.

11.0 DECOMMISSIONING AND RESTORATION

Walleye Wind's decommissioning plan is found in **Appendix J (Decommissioning Plan)**. The draft plan will be updated, as needed, based on comments received during the permitting process. At the end of commercial operation, Walleye Wind will be responsible for removing wind facilities and removing the turbine foundations and underground structures to a depth of 4 ft below grade. Walleye Wind may seek to extend Project operations at the end of the site permit term, instead of decommissioning the Project, and may apply for an extension of the LWECS Site Permit. In this case, a decision may be made on whether to continue operation with existing equipment or to retrofit the turbines and power system with upgrades based on newer technologies.

The decommissioning of Perch Wind will include the dismantling and removal of all towers, turbine generators, transformers and overhead cables, buildings and ancillary equipment; and removal of foundations and underground cables to a depth of 4 ft. Wind turbine towers will be dismantled into sections utilizing cranes, starting at the top and lowered to ground level to be processed and moved offsite. The base will be disconnected from the foundation and moved offsite; the wind turbine blades will be lowered to ground level. The nacelle and hub will be dismantled and processed at ground level. All WTG components and material will be transported to the appropriate facilities for reconditioning, salvage, and/or disposal.

Walleye Wind will follow the outlined plan for decommissioning and restoration of the Project in **Appendix J (Decommissioning Plan)** for the decommissioning of the existing Perch Wind during the construction of Walleye Wind.

11.1 Anticipated Life of the Project

The anticipated Project life is approximately 30 years beyond the date of first commercial operation.

11.2 How the Project will be Disconnected from the Grid

The Walleye Wind Substation will be adjacent or very close to the interconnection switchyard within the Site. There will be a minimal amount of infrastructure needed to connect the two facilities, but any poles, conductors, switches, and lines associated with this interconnection link will be removed and hauled off-site to a recycling facility or disposal site. Underground infrastructure such as pole foundations will be removed down to 4 ft below grade. Pole foundation holes will be filled with a suitable clean compactable material. Topsoil will be applied to the areas and re-vegetated to pre-construction conditions. The existing interconnection Substation will continue to be owned by the NSP and is expected to remain in operation.

11.3 Description of Component Removal

The Project facilities associated with the Site that will be decommissioned to a depth of 4 ft below grade. Wind turbine generators, foundations, associated access roads, collection system, project substation, interconnection transmission line, O&M building, MET tower, and associated ADLS

or LIDS components will all be removed as part of the decommissioning. A detailed description of decommissioning and removal activities is included in **Appendix J (Decommissioning Plan)**.

11.4 Decommissioning, Abandonment, and Removal Conditions

All Project decommissioning and restoration activities will adhere to the requirements of governing authorities, and will be in accordance with all applicable federal, state, and local permits.

Prior to Walleye Wind commencing decommissioning activities there will be written notification sent to landowners, the PUC, and the Rock County Board of Commissioners advising of the Project's intent to decommission. Walleye Wind is to contact all participating landowners to determine their preference on removal or abandonment of infrastructure. For example, some landowners may prefer to leave access roads in place that benefit their farming activities. Electrical collection lines may also be left in place at the landowner's request to reduce disruption of their fields.

Removal and restoration obligations will be completed within 12 months after expiration of the Site Permit, or in the event that the Project, or any specific turbine, ceases operation for a period of one year, and in general accordance with the requirements of Minnesota Rules 7854.0500, subpart 13, and applicable County requirements.

The decommissioning and restoration process comprise removal of all above-ground structures; removal of below-ground structures to a depth of 4 ft; restoration of topsoil, revegetation and seeding; and a 2-year monitoring and remediation period. A detailed description of the decommissioning and removal activities is included in **Appendix J (Decommissioning Plan)**.

11.5 Site Restoration Objectives

Site restoration will begin with the de-compaction of topsoil that may have been compacted during decommissioning activities. All disturbed areas will be graded with onsite stockpiled topsoil, seeded, and restored to a condition similar to the original condition. All areas of restoration will include necessary steps to prevent soil erosion. A detailed description of the site restoration activities is included in **Appendix J (Decommissioning Plan)**.

11.6 Cost to Decommission

The decommissioning cost for the Project is estimated to be approximately $89,250 per turbine in 2020 dollars. This cost includes a partial offset from the salvage values of the towers, turbine components, and electrical equipment, see **Appendix J (Decommissioning Plan),** for detailed cost estimate. Walleye Wind will review and update the cost estimate of decommissioning and restoration for the Project every five years after Project construction.

The decommissioning estimate includes the following assumptions:

- Decommissioning estimates include dismantling of turbine components and transporting off site;
- Deduction for salvage value of the components;

- Tower foundations, transformer foundations, conduits and collection system would be removed to a depth of at least 4 ft (1.2 m) below existing grade;
- Foundations at each site would be graded to match surrounding contours and restored to conditions that will support surrounding vegetation;
- All aggregate base roads would be scarified, loaded and removed from site. The remaining subgrade would be de-compacted and graded to match existing and natural grade. The area would then be re-established to conditions to support the surrounding vegetation;
- Removal of the electrical collection system would include the removal of termination sections near transformers to a depth 4 ft (1.2 m) below the existing ground line; and
- After dismantling and excavating the Project, high value components will be removed for scrap value. The remaining materials will be reduced to transportable size and removed from the site for disposal. Materials will be disposed where disposal is permitted and where there is capacity for the disposal.

11.7 Method and Schedule for Revising Cost Estimates

The Permittee will submit a decommissioning plan to the Commission at least fourteen days prior to the pre-operation meeting and provide updates to the plan every five years thereafter. The plan will provide information identifying all surety and financial securities established for decommissioning and site restoration of the Project in accordance with the requirements of Minn. R. 7854.0500, subpart 13.

11.8 Decommissioning Assurance

Walleye Wind will establish a decommissioning bond with Rock County to serve as decommissioning assurance related to the Project. Further, the Project's decommissioning plan, decommissioning bond, and road use agreements will each be established with Rock County. To establish this decommissioning assurance structure, Walleye Wind has met with each township that encompasses the Project and all of those townships have agreed to sign resolutions allowing Rock County to be the holder of these financial obligations and agreements.

12.0 IDENTIFICATION OF OTHER POTENTIAL PERMITS

The Applicant identified in **Table 53** known or potentially required permits, reviews, and approvals for the Project.

Table 53: Potential Permits and Approvals

Regulatory Authority	Permit/Approval
FEDERAL	
FAA	Form 7460-1 Notice of Proposed Construction or Alteration (DNH)
	Form 7460-2 Notice of Actual Construction or Alteration
FCC	Non-Federally Licensed Microwave Study
USACE	Clean Water Act § 404 Permit (if needed)
	Wetland Delineation Approvals
USFWS	Informal coordination under Section 7 of the Endangered Species Act
EPA (region 5) (EPA) in coordination with the MPCA	SPCC
STATE	
Minnesota PUC	Certificate of Need
	LWECS Site Permit
MNDNR	General Permit for Water Appropriations, Dewatering (if needed)
	License to Cross Public Lands and Waters (if needed)
	Endangered Species Statutes – Permits and Coordination
	Avian and Bat Protection Plan Coordination
	Public Water Works Permit (if needed)
Minnesota Department of Labor and Industry	Electrical Plan Review, Permits, and Inspections
Minnesota Historical Society	Informal coordination through SHPO – State and National Register of Historical Sites review

MPCA	National Pollutant Discharge Elimination System/State Disposal System Permit (NPDES/SDS) – General Storm Water Permit for Construction Activity
	Spill Prevention Control and Countermeasure (SPCC) Plan
	Clean Water Act Section 401 Water Quality Certification and Antidegradation Assessment (if needed)
Minnesota Department of Health	Plumbing Plan Review (if needed)
	Water Well Permit
MnDOT	Oversize/Overweight Permit for State Highways
	Access Driveway Permits for MnDOT Roads
	Tall Structure Permit
	Utility Access Permit
OSA	Informal Coordination for archeological resources and sites
LOCAL	
Rock County	Zoning Permits – Conditional Use Permit
	Land Use Permits - Building Permits
	Interim Use Permits
	Roadway Access Permits
	Drainage Permits
	Working in ROW Permits
	Overweight/Over-Dimension Permits
	Utility Permits
	Floodplain Permit or Shoreland District Permitting
	WCA Approval
Townships (Beaver Creek, Springwater, Mound, Luverne, Martin, Clinton)	ROW Permits for Construction and Electrical Collection System
	Crossing Permits
	Road Access Permits

	Driveway permits
OTHER	
Tribal	Voluntary Coordination
MISO	Generator Interconnection Agreement

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