Application for
a Large Wind Energy Conversion System
Site Permit

Dodge County Wind, LLC Project

Dodge and Steele Counties, Minnesota

MPUC Docket Number: WS-17-307

June 29, 2018

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TABLES

FIGURES

MAPS

APPENDICES

ACRONYM/TERM	DEFINITION
AADT	Average Annual Daily Traffic
AGL	Above Ground Level
ABPP	Avian Bat Protection Plan
AC	Alternating Current
ACSR	Aluminum Conductor Steel Reinforced
ANSI	American National Standards Institute
ASR	Antenna Structure Registration
Applicant or DCW	Dodge County Wind, LLC
BMPs	Best Management Practices; prevents soil erosion and sedimentation
Capacity	The capability of a system, circuit, or device for storing electronic charge
Phase Ia	Cultural Resources Literature Search – a large-scale review and compilation of known cultural resource data.
Phase I	Cultural Resources Reconnaissance Survey – physical inspection and identification of cultural resources within a specific area.
CON	Certificate of Need
CNHS	Community Noise and Health Study
CREP	Conservation Reserve Enhancement Program
CRP	Conservation Reserve Program
dB	Decibels
DBS	Direct Broadcast Satellite
DCEM	Dodge County Emergency Management
Distribution	Relatively low-voltage lines that deliver electricity to the retail customer's home or business
DNHs	Determinations of No Hazard

ACRONYM/TERM	DEFINITION
EF	Electric Fields
ELF	Extremely Low Frequencies
EMF	Electric and Magnetic Field
EWG	Exempt Wholesale Generator
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FPPA	Farmland Protection Policy Act
GE	General Electric
Generator	A machine by which mechanical energy is changed into electrical energy
GSU	Generator Step Up
Geotechnical	A science that deals with the application of geology to engineering
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.
IRAC	Interdepartment Radio Advisory Committee
kV	kilovolt
kV/m	Kilovolt per meter
kW	kilowatt
Leq	Equivalent Sound Level
LGU	Local Government Unit
LHVTL	Large High Voltage Transmission Line

ACRONYM/TERM	DEFINITION
LNTE	Low Noise Trailing Edge
LWECS	Large Wind Energy Conversion System
MBS	Minnesota Biological Survey
MERRA2	Modern-Era Retrospective Analysis for Research and Applications
MET	Meteorological Towers
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 Transmission System Operator
MN/DOT	Minnesota Department of Transportation
MMPA	Minnesota Municipal Power Authority
MPCA	Minnesota Pollution Control Agency
Commission	Minnesota Public Utilities Commission
MSL	Mean Sea Level
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
NEC	National Electric Code
NEMA	National Electrical Manufactures Association
NESC	National Electric Safety Code

ACRONYM/TERM	DEFINITION
NHIS	Natural Heritage Inventory System
NPDES	National Pollutant Discharge Elimination System
NRCS	National Resource Conservation Service
NRHP	National Register of Historic Places
NTIA	National Telecommunications and Information Administration
NWI	National Wetlands Inventory
O & M	Operations and maintenance facility
OPGW	Optical Ground Wire
OSA	Office of State Archaeologist
OSHA	Occupational Safety and Health Administration
POI	Point of Interconnection
PPA	Power Purchase Agreement
Project	DCW Project
PTC	Production Tax Credit
PWI	Public Waters Inventory
RES	Renewable Energy Standard
RIM	Reinvest in Minnesota
Rotor	The rotor consists of three blades mounted to a rotor hub
RD	Rotor Diameter: Diameter of the rotor from the tip of a single blade to the tip of the opposite blade
RERL	Renewable Energy Research Laboratory
ROW	Right-of-Way
SCADA	Supervisory Control and Data Acquisitions (communications technology)

ACRONYM/TERM	DEFINITION
SCS	Site Characterization Study
SHPO	Minnesota State Historic Preservation Office
SME	Subject Matter Expert
SMMPA	Southern Minnesota Municipal Power Agency
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
SWPPP	Storm Water Pollution Prevention Plan
TNW	Traditional Navigable Water
TV	Television
USACE	US Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
V	Volt
WCA	Wetland Conservation Act
WCFZ	Worst Case Fresnel Zone
Windlogics	Windlogics, Inc.
WMA	Wildlife Management Area
WNS	White Noise Syndrome
WPA	Waterfowl Protection Area
WRP	Wetlands Reserve Program

ACRONYM/TERM	DEFINITION
Yaw	To deviate erratically from a course (as when struck by a heavy sea); especially to move from side to side: to turn by angular motion about the vertical axis
ZVRT	Zero Voltage Ride Through

Minnesota Rule	Required Information	Application Section(s)
7854.0500	**SITE PERMIT APPLICATION CONTENTS**	
Subpart 1	Applicant	
(A)	A letter of transmittal signed by an authorized representative or agent of the applicant	Submitted Separately
(B)	The complete name, address, and telephone number of the applicant and any authorized representative	1.0
(C)	The signature of the preparer of the application if prepared by an agent or consultant of the applicant	Submitted Separately
(D)	The role of the permit applicant in the construction and operation of the LWECS	1.0
(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	4.7
(F)	The operator of the LWECS if different from the applicant	1.0
(G)	The name of the person or persons to be the permittees if a site permit is issued	1.0
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	2.0

Minnesota Rule	Required Information	Application Section(s)
	the 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. The applicant shall describe in the application how the proposed LWECS 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	Proposed Site	
(A)	The boundaries of the site proposed for the LWECS, which must be delineated on a United States Geological Survey Map or other map as appropriate	4.1, Maps 1 and 2
(B)(1)	Characteristics of the Wind at the Proposed Site: interannual variation	9.1.1
(B)(2)	Characteristics of the Wind at the Proposed Site: seasonal variation	9.1.2
(B)(3)	Characteristics of the Wind at the Proposed Site: diurnal conditions	9.1.3
(B)(4)	Characteristics of the Wind at the Proposed Site: atmospheric stability, to the extent available	9.1.4
(B)(5)	Characteristics of the Wind at the Proposed Site: turbulence, to the extent available	9.1.5
(B)(6)	Characteristics of the Wind at the Proposed Site: extreme conditions	9.1.6
(B)(7)	Characteristics of the Wind at the Proposed Site: speed frequency distribution	9.1.7
(B)(8)	Characteristics of the Wind at the Proposed Site: variation with	9.1.8

Minnesota Rule	Required Information	Application Section(s)
	height	
(B)(9)	Characteristics of the Wind at the Proposed Site: spatial variations	9.1.9
(B)(10)	Characteristics of the Wind at the Proposed Site: wind rose, in eight or more directions	9.1.10
(C)	Other meteorological conditions at the proposed site, including the temperature, rainfall, snowfall, and extreme weather conditions	9.1.11
(D)	The location of other wind turbines in the general area of the proposed LWECS	9.2, Map 11
Subpart 5	The applicant shall include in the application information describing the applicant's wind rights within the boundaries of the proposed site	7.0, Map 4
Subpart 6	Design of Project	
(A)	A project layout, including a map showing a proposed array spacing of the turbines	5.1, Map 3
(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	5.3, 5.3.1-5.3.5
(D)	A description and location of associated facilities	5.3, 5.3.1-5.3.5
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(A)	Demographics, including people, homes, and businesses	8.1, 8.1.1, 8.1.2
(B)	Noise	8.3, 8.3.1-8.3.3

Minnesota Rule	Required Information	Application Section(s)
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(D)	Public services and infrastructure	8.5, 8.5.1-8.5.4
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Minnesota Rule	Required Information	Application Section(s)
(Q)	Wildlife	8.19, 8.19.1-8.19.6
(R)	Rare and unique natural resources	8.19, 8.19.1-8.19.6
Subpart 8	Construction of project. The applicant shall describe the manner in which the project, including associated facilities, will be constructed	10.0-10.5
Subpart 9	Operation of project. The applicant shall describe how the project will be operated and maintained after construction, including a maintenance schedule	10.6
Subpart 10	Costs. The applicant shall describe the estimated costs of design and construction of the project and the expected operating costs.	10.7
Subpart 11	Schedule. The applicant shall include an anticipated schedule for 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 commercial operation.	10.8
Subpart 12	Energy projections. The applicant shall identify the energy expected to be generated by the project.	10.9
Subpart 13	Decommissioning and Restoration	
(A)	The anticipated life of the project	10.10.1
(B)	The estimated decommissioning costs in current dollars	10.10.2
(C)	The method and schedule for updating the costs of decommissioning and restoration	10.10.4
(D)	The method of ensuring that funds will be available for decommissioning and restoration	10.10.3
(E)	The anticipated manner in which the project will be decommissioned and the site restored	10.10.5

Minnesota Rule	Required Information	Application Section(s)
Subpart 14	Identification of other permits. The applicant shall include in the application a list of all known federal, state, and local agencies or authorities, and titles of the permits they issue that are required for the proposed LWECS.	11.0

1.0 APPLICANT INFORMATION

Dodge County Wind, LLC[1] (DCW or Applicant) respectfully submits this Application to the Minnesota Public Utilities Commission (Commission) for a Site Permit to construct and operate a large wind energy conversion system (LWECS) with a nameplate capacity of approximately 170 megawatts (MW) (Project). The Applicant is an independent power producer that will develop, construct, own, and operate the Project, which is located in the western part of Dodge County and the eastern part of Steele County, along with associated transmission facilities to be located in eastern Dodge County and western Olmsted 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 includes turbines, a project collector substation, collection lines, an operation and maintenance (O&M) building, permanent meteorological (MET) tower(s) and gravel access roads. The Project is projected to start construction in the second quarter of 2019, with commercial operations anticipated to commence by December 31, 2019.

The Project will interconnect to the transmission grid through an approximately 23 mile (Route A is approximately 21 miles in length and Route B is approximately 26 miles) 345 kilovolt (kV) generation tie line, which will begin at the Project's collector substation in Dodge County and end at the Southern Minnesota Municipal Power Agency (SMMPA) Byron Substation at the western edge of Olmsted County. DCW is seeking a Route Permit for the generation tie line in Docket No. TL-17-308. The Project also requires a Certificate of Need (CON). Thus, DCW is requesting a CON for the LWECS and the associated large high voltage transmission line (LHVTL) in Docket No. CN-17-306. The Route Permit and CON applications are being filed in their respective dockets concurrently with the submission of this Application.

DCW, as a member of the NextEra Energy, Inc. (NextEra) family of companies, benefits from the capabilities developed within its network of affiliated companies, which combine to make the affiliates of NextEra the world's largest generator of renewable energy from the wind and sun. For example, WindLogics, Inc. (WindLogics) is a Minnesota-based affiliate of DCW. WindLogics has decades of experience in providing engineering, technical analysis, and consulting services in the field of studying, modeling, and forecasting meteorological air flow, including scientific analysis of wind resources, wind-modeling services, and climate-prediction services in support of wind-farm development. Among other contributions, WindLogics supported the development the optimization of the array and **Section 9** of this Application. Additional internal capacities, including engineering and construction, environmental, legal, and

[1] Dodge County is a wholly-owned indirect subsidiary of NextEra Energy Resources, LLC (NEER). NEER is a global leader in development and operation of renewable energy resources, with a total generating capacity of 14,255 MW of wind generation in operation as of December 31, 2017.

regulatory, land acquisition services, and project management, have also supported the Project. This internal team is also supplemented by qualified technical consultants.

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 formerly operating 26.3 MW Buffalo Ridge Wind Energy Center in Lincoln County; (2) the 98.2 MW Mower County wind facilities in Mower County; and (3) the to be decommissioned 102.8 MW Lake Benton II project in Pipestone County.

The authorized representatives for the Applicant are:

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2.0 CERTIFICATE OF NEED

Concurrently with the filing of this Application, DCW is applying for a CON in Docket No. CN-17-306. Given that the project is over 50 MW, it qualifies as a "large energy facility," as defined in Minnesota Statutes § 216B.2421, subd. 2(1). Accordingly, pursuant to Minnesota Rules 7849.0200 and Minnesota Statutes § 216B.243, subd. 4, DCW is required to obtain a CON to construct and operate the Project. On April 20, 2017, DCW filed with the Commission a Petition for Exemption from Certain Certificate of Need Application Requirements, and, also, filed the CON Notice Plan. The Commission approved the requested filing exemptions and the CON Notice Plan on July 7, 2017. The approved Notice Plan was then implemented on June 5, 2018. With these pre-filing requirements completed, the CON application is being submitted concurrently with this Application so that the CON and Site Permit can be considered at the same time.

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

3.0 STATE POLICY

Pursuant to Minnesota Statutes § 216F.03, 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 § 216E.03, subd. 7 and Minnesota Rules Chapter 7854. Therefore, project design, wind resource, and technical information are provided in accordance with applicable law 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* (DOC, 2010).

4.0 PROJECT DESCRIPTION

4.1 Project Description and Location

The Project is located in western Dodge County and eastern Steele County in southeastern Minnesota, immediately southwest of Dodge Center and north of Blooming Prairie, Minnesota. Transmission facilities for the Project will also be located in Dodge County and in western Olmsted County.

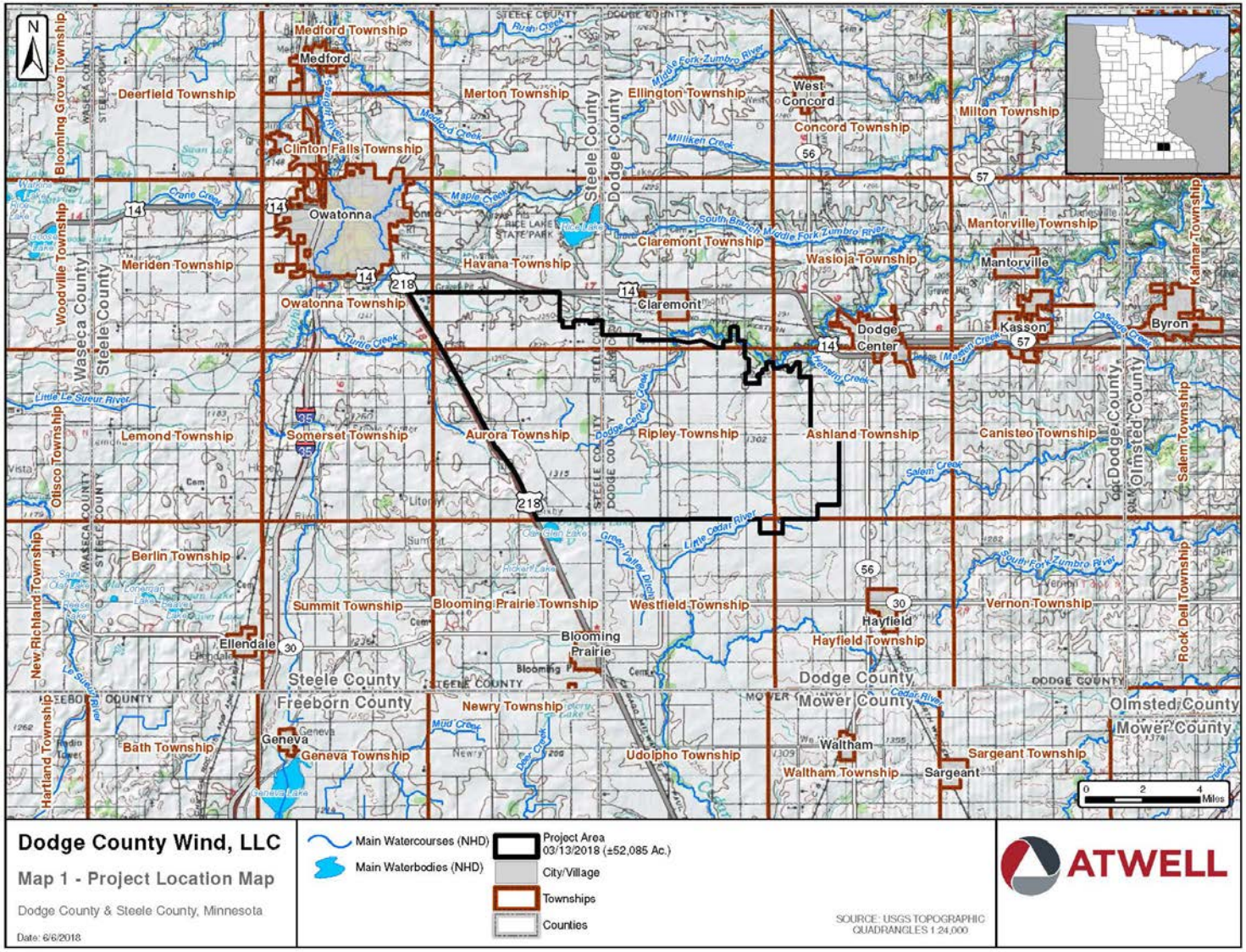
In 2014, DCW began its evaluation of this area as a potential suitable site for a wind project. Since 2014, the Applicant has studied, among other things, the environmental compatibility of the Project site and the potential wind resource of Project site. Over time, DCW has adjusted Project boundaries and reduced the overall boundary size to minimize the potential impact on the environment and land use, as well as to reflect the participation of landowners in the Project. The Project is proposed to be sited in proximity to the Byron Substation and transmission infrastructure with a voltage of 345 kV in order to maximize the deliverability of the wind resource and to comply with the requirements of the PPA. To this end, the collector substation is sited on the eastern edge of the Project Area to minimize the length of the gen-tie line. The Project Area is set forth in **Figure 1,** below, and on **Maps 1 (Project Location) and 2 (Project Area and Facilities).**

Table 1 below lists the Township, Range, and Sections in which the Project is located.

Table 1: Project Location

County Name	Township Name	Township	Range	Sections
Steele	Aurora	106N	19W	1-17, 21-28, 34-36
Steele	Havana	107N	19W	26-36
Steele	Owatonna	107N	20W	25, 36
Dodge	Ashland	106N	17W	6, 7, 18-20, 29-32
Dodge	Claremont	107N	18W	31-35
Dodge	Hayfield	105N	17W	6
Dodge	Ripley	106N	18W	1-36
Dodge	Westfield	105N	18W	1

Figure 1: Project Location



4.2 Size of the Project Area in Acres

DCW plans to site the Project equipment and facilities within the Project Area as shown on **Map 2 (Project Area and Facilities).** The estimated size of the wind Project Area is 52,085 acres (81.4 square miles) of mostly agricultural land. The size of the Project Area allows some siting flexibility in the event turbine locations currently identified prove to be unsuitable and provides sufficient room for the required setbacks and buffering of sensitive features. The siting of the turbines, collector substations, collector lines, MET towers, and O&M facility will be within the Project Area.

4.3 Related Capacity

The rated capacity of the Project is approximately 170 MWs at the interconnection point, the existing SMMPA Byron 345 kV Substation.

4.4 Number of Turbine Sites

The Project's total capacity of approximately 170 MW will be generated using 62 General Electric (GE) 2.5 MW wind turbines and 8 GE 1.715 MW wind turbines.[2] The current turbine layout includes 70 primary turbines required for the Project with 6 alternative turbine locations identified. A maximum of 70 turbines are proposed for construction, with the inclusion of alternative locations to provide for flexibility in the event development or constructability issues are encountered. The current wind turbine array is set forth in **Map 2 (Project Area and Facilities)**.

4.5 Meteorological Towers

The Applicant anticipates installing up to two permanent MET towers within the Project Area that will remain operational for the duration of the Project. Permanent MET towers will be free standing, made of galvanized steel with medium intensity dual LED day and night lights as required by the Federal Aviation Administration (FAA), and will have the capability to have acoustic recording equipment installed on them. Additional information on the permanent MET towers is provided in **Section 6.3.2**.

4.6 Percent of Wind Rights Secured

As of the date of filing, DCW has site control agreements with landowners for approximately 15,500 acres and 78% of the land required for successful construction and operation of the Project. At this stage, DCW is continuing to negotiate easements with landowners for the development of the Project. **Section 7** provides more details on the wind rights secured.

[2] The eight GE 1.715 MW turbines are being used to take advantage of Production Tax Credit eligibility.

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 DCW with wind rights. Many factors influence the best placement of project infrastructure including site topography, environmental and land constraints, proximity to residences, turbine technology, engineering, landowner preferences, and siting criteria such as the setback requirements set forth in **Table 2**. The precise turbine placement and project layouts have not been finalized and are 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 preliminary site layout is shown on **Map 3 (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), applicable regulations and agency guidance, and NEER's internal setback standards and avoidance of sensitive features. **Table 2** summarizes the Commission's setback standards applicable to the Project based on the 2007 standards and lists setbacks required by the Commission in recent permits. The Project is designed to meet these setback standards. For example, consistent with the 3 rotor diameter (RD) by 5 RD LWECS setback (*i.e.*, the 3 RD X 5 RD setback) requirement, properties not participating in the Project will have turbines set back at least 1,014 feet (309 meters) (3 RD) from their property in non-prevailing wind directions and at least 1,690 feet (515 meters) (5 RD) from their property in prevailing wind directions for the GE 1.715 MW turbine model. Additionally, properties not participating in the Project will have turbines set back at least 1,142 feet (348 meters) (3 RD) in non-prevailing wind directions and at least 1,903 feet (580 meters) (5 RD) in prevailing wind directions for the GE 2.5 MW turbine model.

Remnant grassland habitats, wetlands, streams, floodplains, sites of biodiversity significance, and other sensitive features are present within the Project Area. As discussed in **Section 8** of this Application, siting of project infrastructure largely avoids sensitive environmental features.

Table 2: Wind Turbine Setback Requirements

Wind Facility and Collector Lines Setback Categories	Setback Conditions as Represented in Recent Site Permits	Related to Setback Condition
WIND ACCESS BUFFER	Wind turbine towers shall not be placed less than five (5) RD on prevailing wind directions and three (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.	

Wind Facility and Collector Lines Setback Categories	Setback Conditions as Represented in Recent Site Permits	Related to Setback Condition
INTERNAL 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 three (3) RD in non-prevailing wind directions and five (5) RD on prevailing wind 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.	
NOISE	Greater of 1000 feet (305 meters) for participating residents and for non-participating residents or compliance with noise standards established as of the date of this permit by the Minnesota Pollution Control Agency (MPCA) at all times at all appropriate locations. The noise standards are found in Minnesota Rules chapter 7030. https://www.revisor.mn.gov/rules/?id=7030.0030 https://www.revisor.mn.gov/rules/?id=7030.0040 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 residences or other receptors in place as of the time of construction, but not with respect to such receptors built after construction of the towers.	A greater than 1,000 foot (305 meter) setback is necessary in certain cases to minimize noise and shadow flicker concerns.
ROADS	Wind turbine and MET towers shall not be located closer than 250 feet (76 meters) from the edge of the nearest public road (ROW) right-of-way.	
PUBLIC LANDS	Wind turbines and associated facilities including foundations, access roads, underground cable, and transformers, shall not be located in public lands, including Waterfowl Production Areas, Wildlife Management Areas, Scientific and Natural Areas, or in county parks, and wind turbine towers shall also comply with the setbacks of WIND BUFFER ACCESS.	
WETLANDS	Wind turbines and associated facilities including foundations, access roads, underground cable, and transformers, shall not be placed in public waters wetlands, as defined in Minnesota Statutes section 103G.005, subdivision 15a, 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), the United States Army Corps of Engineers (USACE), and local units of government as implementers of the Minnesota Wetland Conservation Act.	
METEOROLOGICAL TOWERS	Permanent towers for meteorological equipment shall be free standing. Permanent meteorological towers shall not be placed less than 250 feet (76 meters) from the edge of the nearest public road ROW and from the boundary of the Permittee's site	

Wind Facility and Collector Lines Setback Categories	Setback Conditions as Represented in Recent Site Permits	Related to Setback Condition
	control, or in compliance with the county ordinance regulating meteorological towers in the county the tower is built, whichever is more restrictive. MET 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	The Permittee shall not place wind turbines or associated facilities 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. https://www.revisor.mn.gov/rules/?id=8800.0100 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 (MN/DOT), Department of Aviation, and FAA. The Permittee shall notify owners of all known airports within six (6) miles of the Project prior to construction. https://www.revisor.mn.gov/rules/?id=8800.1900	
FOOTPRINT MINIMIZATION	The Permittee shall design and construct the LWECS 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	The Permittee shall place all supervisory control and data acquisition (SCADA) communication cables underground and within or adjacent to the land necessary for turbine access roads unless otherwise negotiated with the affected landowner(s).	
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	

Wind Facility and Collector Lines Setback Categories	Setback Conditions as Represented in Recent Site Permits	Related to Setback Condition
	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 Permittee must fulfill, comply with, and satisfy all Institute of Electrical and Electronics Engineers, Inc. (IEEE) standards applicable to this Project, including but not limited to, IEEE 776 [Recommended Practice for Inductive Coordination of Electric Supply and Communication Lines], IEEE 519 [Harmonic Specifications], IEEE 367 [Recommended Practice for Determining the Electric Power Station Ground Potential Rise and Induced Voltage from a Power Fault], and IEEE 820 [Standard Telephone Loop Performance Characteristics] provided the telephone service provider(s) have complied with any obligations imposed on it pursuant to these standards. Upon request by the Commission, the Permittee shall report to the Commission on compliance with these standards.	

5.2 Description of Turbines and Towers

The Project will use 62 GE 2.5 wind turbines with 116-meter (381-foot) blades and 89-meter (291-foot) towers and 8 GE 1.715 wind turbines with 103-meter (338-foot) blades and 80-meter (262-foot) towers. 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 utilize 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.

Table 3: Wind Turbine Characteristics

Design Features	GE 2.5 Wind Turbine	GE 1.715 Wind Turbine
Nameplate Capacity	2.5 MW	1.715 MW
Hub Height	89 m (291 ft)	80 m (262.4 ft)
Rotor Swept Area	10,660 m² (114,743 ft²)	8,332 m² (89,685 ft²)
Total Height (ground to fully-extended blade tip)	148.3 m (486.5 ft)	131.5 m (431.3 ft)
Rotor Diameter	116 m (381 ft)	103 m (338 ft)
Design Life	Design criteria contemplates 20 yrs	Design criteria contemplates 20 yrs
Cut in Wind Speed	3 m/s (10 ft/s)	3 m/s (10 ft/s)
IEC Wind Class	S	S
Cut Out Wind Speed	30 m/s (98 ft/s) in 600 sec time interval	22 m/s (72 ft/s) in 600 sec time interval
Rotor Speed	8-15.7 RPM	10 – 17 RPM
Tip Speed	81.7-85.4 m/s (268.0-280.18 ft/s)	54-92 m/s (177-301.8 ft/s)
Sound at Turbine	Lw = 110 dBA	Lw = 107.5 dBA
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)
Generation	2.5 MW per turbine	1.7 MW per turbine
Tower	Multi-coated, conical tubular steel with safety ladder to the nacelle. Rest platforms each section.	Multi-coated, conical tubular steel with safety ladder to the nacelle and a fall arresting safety system.

Design Features	GE 2.5 Wind Turbine	GE 1.715 Wind Turbine
Nacelle Bedplate	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
Supervisory Control and Data Acquisition	Each turbine equipped with SCADA controller hardware, software and database storage capability	Each turbine equipped with SCADA controller hardware, software and database storage capability
FAA Lighting	Yes, per FAA permitting	Yes, per FAA permitting
Foundation	Per Manufacturer specifications - Spread Foot or pier foundation-TBD	Per Manufacturer specifications -Spread Foot or pier foundation-TBD

Source: GE manufacture 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 untrasonically 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

Construction of the project will include up to 70 wind turbines, each with its own step-up transformer pad-mounted outside at the base of unit. Energy from the turbines will be routed through both underground and above ground electrical collection systems that will deliver power

to the Project collector substation. This power will be stepped up at the Project's collector substation from the collection line voltage of 34.5 kV to the gen-tie transmission line voltage of 345 kV. The entire collection system will be designed to meet applicable requirements of the National Electric Safety Code (NESC), National Electric Code, ANSI, National Electrical Manufacturers Association, and Occupational Safety and Health Administration (OSHA) standards. 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 (Project Area and Facilities)**.

5.3.1 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. The transformer impedance will be optimized based on the facility power output requirements and feeder circuit-breaker interrupting ratings and internal fuses. Protection for the transformer and wind turbine is provided by a switch breaker at the turbine bus cabinet electrical panel, which is located inside the tower. The pad-mounted transformers are interconnected on the 34.5 kV voltage side to underground cables to form an electrical collection system.

5.3.2 Electrical Collection System

The project will utilize 34.5 kV electrical power lines to collect power from the turbines and transmit it to the DCW collector substation. The entire collection system will be direct buried underground cable. The underground cables are installed in a trench that is approximately three to four feet (approximately 0.9 to 1.2 meters) deep. Underground paths will typically take the shortest path to create less impact to the surrounding areas. Based on preliminary soil resistivity results within the Project Area, it is anticipated that native soil will be used as backfill material.

5.3.3 Collector Substation

The DCW collector substation will step-up the collection voltage from 34.5 kV to the 345 kV gen-tie line voltage so that the electricity generated can be reliably and efficiently interconnected to the surrounding power grid. The basic elements of the collector substation are a control building, transformer, reactive equipment, metering equipment, circuit breakers, relaying equipment, high-voltage bus work, steel support structures, and overhead lightning suppression conductors. DCW will lease or purchase up to five acres to construct the new DCW collector substation on existing agricultural land along 140th Avenue in Ripley Township. The substation equipment will be installed on concrete foundations and will consist of a graveled footprint area

of up to one acre, an eight-foot (2.4 meter) chain link perimeter fence with the top foot (0.3 meters) of the fence being barbed wire, and an outdoor lighting system.

5.3.4 Interconnection

As explained in DCW's Route Permit application (Docket No. TL-17-308), the interconnection study for the Project has been completed with Midcontinent Independent System Operator, Inc. (MISO) in coordination with SMMPA. The anticipated upgrades at the Byron Substation will include a new take-off structure, breaker, bus work, and ancillary equipment. All utility protection and metering equipment will meet SMMPA standards for parallel operations. The construction manager will work closely with SMMPA engineers to ensure proper interconnection protection is established.

5.3.5 Gen-Tie Line

As explained in DCW's Route Permit application (Docket No. TL-17-308), DCW is proposing the construction of a single circuit 345 kV alternating current (AC) high voltage generation tie line. The AC generation tie line consists of 3 separate phases of conductors. The proposed line will use multiple sub-conductors, often referred to as "bundled" conductors, which are typically used in higher voltage lines, such as the one proposed as part of this Project. DCW is proposing the use of aluminum conductor steel reinforced cable. These cables are stranded steel cores surrounded by strands of aluminum. Other conductor types will be evaluated during detailed design to ensure the most optimal conductor is selected. Single circuit lines consist of 3 phases, also known as a circuit, and typically 1 to 2 shield wires. Each energized wire will be carried at the end of an insulator designed to ensure proper electrical clearance. Structure configuration utilized for the gen-tie project will be optimized during the detailed design process based on system requirements, design constraints, voltage of transmission, and cost effects.

DCW proposes to use 345 kV single circuit monopole structures for the majority of the gen-tie project. Steel structures will be either weathering or galvanized steel. The structures will be placed using spans that range between approximately 500 (approximately 152 meters) to 1,200 feet (approximately 335 meters), with an average span of approximately 1,000 feet (approximately 305 meters). Structures are anticipated to maintain clearances within a typical 150-foot (46-meter) ROW. Single pole structures are typically direct embedded and backfilled with select fill and compacted to provide adequate strength. Angle and terminal structures utilize guying with anchors to support large transverse and longitudinal loading. Specialty structures may also be required in areas of environmental sensitivity or where construction conditions require their use.

DCW anticipates the use of optical ground wire (OPGW) as shield wires. Shield wires are installed above the electrical phases to prevent damage from lightning strikes. The OPGW is also used to carry communication signals between substations.

DCW will design the Project to meet or surpass all applicable local and State building codes, as well as NESC requirements. DCW will run required evaluations with the FAA to ensure all structure heights are acceptable and documented for local registered runways.

6.0 DESCRIPTION AND LOCATION OF ASSOCIATED FACILITIES

Map 2 (Project Area and Facilities) shows the proposed locations of wind turbines, underground collection lines, crane walk paths, access roads, MET towers, the O&M facility, and other associated facilities. DCW's Route Permit application (Docket No. TL-17-308) contains detailed descriptions of the transmission route and facilities necessary to interconnect the Project to the transmission grid.

6.1 Transmission and Project Substations

A 345 kV gen-tie line will deliver the output of the Project from the collector substation described in **Section 6.1.1** to SMMPA's 345 kV Byron Substation, which is the point of interconnection for the Project. The 345 kV gen-tie line interconnection request is MISO queue position No. J441 and currently is in the February 2017 Definitive Planning Phase cycle, which is anticipated to conclude in May 2019. DCW intends to execute a provisional generation interconnection agreement with MISO in the fall of 2018 timeframe.

6.1.1 DCW Collector Substation (new)

DCW proposes to construct a new collector substation approximately seven miles southwest of the city of Dodge Center, Minnesota. DCW has executed an option with a landowner to purchase up to ten acres where it proposes to construct the new DCW Collector Substation. The DCW Collector Substation graveled footprint is anticipated to be no larger than 1 acre, but more detailed design engineering will confirm the size based on equipment needs.

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 channel into the wind farm collection system, which in turn will feed into the new DCW 34.5 kV collector substation. The DCW collection substation will then step up the 34.5 kV collection system voltage to the 345 kV gen-tie line voltage and deliver the Project's output to the SMMPA Byron substation.

The new collector substation will include 34.5 kV and 345 kV busses, transformers, circuit breakers, reactive equipment, 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.

6.1.2 Byron Substation (existing)

As described in DCW's Route Permit application (Docket No. TL-17-308), there are currently four transmission lines that terminate at the Byron Substation: two owned by Northern States Power, and two owned by SMMPA. The proposed DCW 345 kV gen-tie line approaches Byron from the west and will need to cross the existing transmission lines owned by Northern States Power Company. DCW will continue to coordinate with Northern States Power to develop

crossing details. A photo showing where the 345 kV Dodge County gen-tie line will enter the SMMPA Byron Substation is included with this Application as **Appendix A (Byron Interconnection)**.

The 345 kV expansion at the existing SMMPA Byron Substation is anticipated to include a new take-off structure, breaker, bus work, and ancillary equipment to satisfy the requirements of the system impact study.

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 Project's collector substation through approximately 52 miles of underground 34.5 kV collector lines. The underground collection line cable installation will be buried approximately 36 to 48 inches underground. A warning tape will be laid atop the cables in the trenches to alert people to the presence of the cables should any digging occur near the cables following their installation. Any communication lines routed that do not include a collection line will include a warning tape and tracer cable. **Map 2 (Project Area and Facilities)** shows the preliminary design of the underground collection cables.

6.3 Other Associated Facilities

6.3.1 O&M Facility

An O&M facility will be constructed within the Project Area to serve as a center for the Project's O&M efforts, provide Project access and storage, and house the SCADA system. The O&M facility will provide office space for the crews, as well as a shop/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 is anticipated to be approximately 2 acres and will include an access road, parking lot and O&M building. The O&M building will be approximately 7,500 square feet (697 square meters) and will house Project equipment with a parking lot adjacent to the building. DCW will dig a new well and install a new septic system for sanitary needs.

6.3.2 Permanent Meteorological Tower

As stated in **Section 4.5**, the Applicant anticipates installing up to two permanent MET towers within the Project Area that will remain operational for the duration of the Project. The precise locations of permanent MET towers in the Project Area have yet to be determined and will be based upon the final locations of the wind turbines and proper operation of wind assessment equipment. All towers will be no closer than 250 feet (76 meters) from the edge of road ROW

and from the boundaries of DCW's site control. Consistent with typical Commission site permit requirements, the permanent MET towers will be free-standing and will not use guy wires. The MET towers will be approximately 295 feet (90 meters) tall.

The MET towers 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 meteorological towers is expected to be approximately 400 by 400 feet (122 by 122 meters) 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 towers will be self-supporting monopole structures. FAA Determinations of No Hazard will be obtained for each tower location prior to installation and each location will have appropriate lighting and marking as required by the FAA.

6.3.3 Turbines Access Roads and Temporary Laydown/Staging Areas

Each turbine will have a low-profile gravel access road to connect the turbine with the public road network or private access roads. DCW will design all access roads to serve the Project in an efficient manner, with the needs of landowners and comments from local authorities considered. The roads will be all-weather gravel construction and approximately 16 feet (approximately 5 meters) wide once the wind project is operational. The approximate length of permanent access roads to be installed is 22 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 feet (14 meters). Drainage culverts will be installed as appropriate.

The Project will also require grading of a temporary laydown area of approximately 15 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 agricultural areas 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 Project Area.

6.4 Associated Facilities Permitting

As explained, the Dodge County 345 kV Route Permit application will be reviewed in Docket No. TL-17-308, while the CON application for the LWECS and associated LHVTL will be reviewed in Docket No. CN-17-306. These applications are being submitted concurrently with this Application so all three applications can be considered together in the context of the overall

Project. Following the issuance of the LWECS Site Permit from the Commission, DCW will be responsible for obtaining all other applicable permits, approvals, and licenses associated with the construction of the Project. **Table 56** provides a summary of the permits and approvals that may be required.

7.0 WIND RIGHTS

DCW has substantially completed securing landowner agreements for wind rights and property easements necessary to support the Project. The overall area within the Project Area consists of approximately 52,000 acres. To date, DCW has executed and recorded landowner agreements for nearly 15,500 acres within the Project Area, which is approximately 78% of the land required to complete the Project. DCW remains in negotiation with a number of landowners within the Project Area and anticipates acreage being added to the Project's leased lands before construction. Current participating and non-participating parcels and landowners are shown on **Map 4 (Parcel Land Status)**. The secured easement agreements will ensure access for construction and operation of the Project, and identify the obligations and responsibilities of the landowners and DCW. 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 provides an analysis of the potential impacts of the Project, proposed mitigation measures, and any adverse environmental effects that cannot be avoided. The Applicant has consulted with entities, including but not limited to the MNDNR, United States Fish and Wildlife Service (USFWS), USACE, the Minnesota Board of Water Resources, Minnesota Historical Society, Dodge County, and Steele County. A detailed list of agencies and entities contacted and coordinated with is set forth in **Appendix B (Agencies Contacted Regarding Project)**, and the correspondence received from the agencies is included in **Appendix C (Agency Correspondence and Responses)**.

Analysis of the Project Area has been underway since 2014. Over this duration, DCW has used the study findings and agency input to inform appropriate siting of Project infrastructure.

With respect to MNDNR, DCW initially requested MNDNR review of a larger wind resource area than the current Project boundary. The larger wind resource area contained several sensitive areas, including the Dodge Center Creek Corridor, the McMartin Wildlife Management Area, the Oak Glen Wildlife Management Area, Oak Glen Lake, and surrounding Wetland Conservation Act protected wetlands. MNDNR's review of this original boundary indicated that the preliminary project risk level to avian species was moderate (see MNDNR letter dated May 27, 2014 in **Appendix C**). Avian and bat surveys were conducted on this larger area between 2014 and 2016 and these studies followed the USFWS Wind Energy Guidelines and MNDNR Guidance for Commercial Wind Energy Projects.

In February 2017, MNDNR reviewed the second boundary for the project and commented that the revised boundary was acceptable and the project risk level was low (see email from MNDNR - Kevin Mixon dated February 16, 2017 in **Appendix C**). In April 2017, DCW met with MNDNR and USFWS to review the avian and bat data collected for the Project to date. The USFWS recommended a second year of eagle studies, which Dodge County has completed. MNDNR recommended surveys for the Henslow's sparrow and loggerhead shrike, which were completed in 2017. Both USFWS and MNDNR confirmed additional bat acoustic studies were not warranted.

In May 2017, the project boundary shifted west into Steele County to address landowner preferences and wind resource. Sensitive environmental resource areas continued to be avoided. MNDNR expressed concern regarding forested, unfragmented woodlot areas within the Project boundary. In response, DCW sited project infrastructure to avoid these woodlot areas. DCW continues to coordinate with MNDNR and USFWS.

8.1 Demographics

The Project is located in southeastern Minnesota in an agricultural/rural region within Dodge and Steele counties. The 2010 census population for Dodge County was 20,087 (U.S. Census Bureau 2010a), while the U.S. Census 2016 American Community Survey (ACS) population estimate for Dodge County was 20,361, representing an increase of approximately 1.4% (U.S. Census Bureau 2018a). The county seat of Dodge County is Mantorville, located approximately seven miles northeast of the Project Area. The 2010 census population for Steele County was 36,576 (U.S. Census Bureau 2010b), while the U.S. Census 2016 ACS population estimate for Steele County was 36,541, representing an decrease of approximately 0.1% (U. S. Census Bureau 2018a). The county seat of Steele County is Owatonna, located approximately one mile northwest of the Project Area.

Table 4 shows the U.S. Census Bureau 2012-2016 ACS demographic profile data for Minnesota, Dodge and Steele counties, and townships within the Project Area including: Ashland, Claremont, Hayfield, Ripley, Westfield, Owatonna, Havana, and Aurora (U. S. Census Bureau 2018b). The demographic profile summarizes some of the population and economic characteristics of the counties and townships in which the project is located.

Table 4: Population and Economic Characteristics

Location	Population	Housing Units (Occupied)	Per Capita Income	Families Below Poverty Line (%)
Minnesota	**5,450,868**	**2,135,310**	**$33,225**	**6.9%**
Dodge County	**20,361**	**7,583**	**$30,495**	**4.5%**
Ashland Township	350	128	$38,668	0.0%
Claremont Township	489	191	$34,806	3.2%
Hayfield Township	431	142	$44,010	0.8%
Ripley Township	215	91	$44,782	5.8%
Westfield Township	436	167	$32,250	3.1%
Steele County	**36,541**	**14,354**	**$28,736**	**8.0%**
Aurora Township	505	198	$34,976	0.0%
Havana Township	666	243	$31,148	6.2%
Owatonna Township	585	291	$34,636	5.6%

U.S. Census Bureau, 2012-2016 American Community Survey 5-Year Estimates

According to the ACS 2012-2016 estimates, educational services, health care, and social assistance accounted for 24.8% of jobs statewide in Minnesota, followed by manufacturing at 13.5% and retail trade at 11.2%. According to the ACS 2012-2016 estimates, educational services, health care, and social assistance accounted for 32.5% of jobs in Dodge County, followed by manufacturing at 14.0% and retail trade at 8.9%. According to the ACS 2012-2016 estimates, manufacturing accounted for 24.4% of jobs in Steele County, followed by educational

services, health care and social assistance at 18.4%, and retail trade at 12.1% (U. S. Census Bureau 2018b).

8.1.1 Potential Impacts

During the construction of the Project, approximately 200 temporary construction personnel will be required. While some of these workers will be from the local area, a large portion will likely be from outside the region and will only remain in Dodge and Steele counties over the duration of construction (approximately 5-7 months). During the operations phase of the Project, which is expected to be 30 years, approximately 5 permanent O&M staff will support Project operations locally. Due to the temporary nature of the 200 construction personnel and the limited amount of permanent O&M staff, the Project is not anticipated to significantly change the demographics of the Project Area or Dodge and Steele counties.

8.1.2 Mitigation Measures

No mitigation measures 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

8.2.1.1 Adopted Comprehensive Plans

Local municipalities 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, DCW has reviewed the most recently adopted comprehensive plans of Dodge County and Steele County and plans for communities adjacent to the Project including Dodge Center, Owatonna, Claremont, Hayfield, and Blooming Prairie. **Table 5** provides an inventory of governing bodies within and adjacent to the Project Area, along with their respective comprehensive plans, if available.

Table 5: Comprehensive Plan Inventory for Local Governments

Governing Body	Name of Plan	Year Adopted/Updated	Associated Development Plan(s)
Dodge County	County Wide Comprehensive Plan	2001	Dodge County Zoning Ordinance, Chapter 16; Comprehensive Water Management Plan
Steele County	Steele County Comprehensive Land Use Plan	2007	Steele County Zoning Ordinance, Section 15; Steele County Water Plan; Transportation Plan
City of Owatonna	Owatonna Development Plan	2006	Owatonna, MN Code of Ordinances, Chapter 157; Stormwater Management Plan; Steele County Transportation Plan
City of Claremont	None Adopted	N/A	Claremont City Code, Chapter 4
City of Hayfield	None Adopted	N/A	Zoning Ordinance
City of Blooming Prairie	Blooming Prairie Comprehensive Plan	2017	Zoning Ordinance, Land Use Plan, Capital Improvement Plan
City of Dodge Center	City of Dodge Center Comprehensive Plan	Unknown	Dodge Center City Code, Chapter 4
Ashland Township	None Adopted	N/A	N/A
Claremont Township	None Adopted	N/A	N/A
Hayfield Township	None Adopted	N/A	N/A
Ripley Township	None Adopted	N/A	N/A

Governing Body	Name of Plan	Year Adopted/Updated	Associated Development Plan(s)
Westfield Township	None Adopted	N/A	N/A
Aurora Township	None Adopted	N/A	N/A
Havana Township	None Adopted	N/A	N/A
Owatonna Township	None Adopted	N/A	N/A

The Dodge County Comprehensive Plan describes sustainable goals for the county's economic development (Dodge County 2001). The Applicant understands that Dodge County is in the process of updating its Comprehensive Plan. The overall vision or focus of Dodge County citizens is on a continued high quality of life for all residents with long term goals of citizen participation and cooperation, protecting and preserving agricultural land, rural tax reform, job skills training that supports public education and economic development, greater public investments in County infrastructure, livable community design as the County experiences further growth, conservation of natural resources, and sustainable development.

The primary goals of the Steele County Comprehensive Land Use Plan (2007) include the protection of agricultural areas from encroachment of incompatible uses, protection of the agricultural economy and community, promoting orderly development in a manner which does not degrade the natural environment, providing a decision making guide for managing growth which will serve the best interest of current and future citizens, and making the most efficient and economical use of public funds and investments. The Steele County Comprehensive Land Use Plan emphasizes the importance of promoting orderly development within or near population centers, while preserving and protecting the county's farmland and natural resources (Steele County 2007).

The nearby cities of Blooming Prairie, Dodge Center, Owatonna, Claremont, and Hayfield all have established local zoning and/or comprehensive plans. However, all project infrastructure will be sited outside of and set back from these neighboring jurisdictions.

The proposed DCW Project is consistent with Dodge and Steele counties' respective comprehensive plan goals to conserve farmland and natural resources and support economic and sustainable development. The proposed DCW Project will be compatible with the rural and agricultural character of the counties.

8.2.1.2 County or Local Ordinances

Dodge County has adopted regulations and performance standards for a wind energy conversion system (WECS) that can be found in Chapter 16 of the Dodge County Zoning Ordinance. Dodge County regulates WECS with a rated capacity of less than 5,000 kW or 5 MW, considered by the State of Minnesota to be small WECS, and regulates the installation, operation, and decommissioning of WECS within Dodge 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 (Dodge County 2017b). According to Chapter 216F, a LWECS means any combination of WECS with a combined nameplate capacity of 5,000 kW or more, and one in which a permit under Chapter 216F is the only site approval required for the location of an LWECS. The County may assume responsibility, upon written notice to the Commission, for processing applications for permits required under Chapter 216F for WECS with a combined nameplate capacity of up to 25 MW. Additionally, a county may adopt standards for LWECS that are more stringent than Commission standards and the Commission shall consider and apply those more stringent standards when reviewing an application for LWECS, unless the Commission finds good cause not to apply the standards. Given that the planned nameplate capacity of the Project is greater than 5 MW, the regulations and performance standards adopted by Dodge County for WECS do not apply. The Dodge County performance standards and setbacks for commercial WECS vary from the Commission's permit standards and are set forth in **Table 6**.

Steele County has also developed performance standards for WECS, which can be found in Section 15 of the Steele County Zoning Ordinance (Steele County 2015). These performance standards apply to micro WECS projects (≤1 kW and ≤40 feet (12 meters) total height), non-commercial WECS projects (≤40 kW and >1 kW), and commercial WECS projects (*i.e.*, ≥100 kW and ≥200 feet (61 meters) total height). Commercial WECS projects are permitted as a conditional use within the Agricultural (A-1), Interim Agricultural (A-2), Single Family Residential (R-1), High Density Residential (R-2), General Business (B), and General Industrial (I) zoning districts, and are not permitted in the Conservation (C) and Shoreland districts. Construction or operation of an O&M facility and/or a project temporary construction yard is also classified as a conditional use in all zoning districts (Steele County 2015). The Steele County performance standards and setbacks for commercial WECS vary from the Commission's permit standards and are set forth in **Table 6**.

The commercial WECS setback requirements are outlined in Section 16.51 of the Dodge County Zoning Ordinance and Section 1527 of the Steele County Zoning Ordinance. The proposed Project would satisfy each county's established minimum setback requirements applicable to commercial WECS projects. The following table provides a comparison of the Dodge and Steele County setbacks to the Commission's setbacks.

Table 6: Comparison for Local Government and Commission Setbacks

Wind Facility and Collector Lines Setback Categories	Setback Conditions as Represented in Recent Site Permits	Dodge County (Section 16.51)	Steele County (Section 1527)
WIND ACCESS BUFFER	Wind turbine towers shall not be placed less than five (5) RD on prevailing wind directions and three (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.	Same	5 times the rotor diameter or total height, whichever is greater, from neighboring property lines
SOUND	Greater of 1000 feet (305 meters) for participating residents and non-participating residents or compliance with noise standards established as of the date of this permit by the MPCA at all times at all appropriate locations. The noise standards are found in Minnesota Rules chapter 7030. https://www.revisor.mn.gov/rules/?id=7030.0030 https://www.revisor.mn.gov/rules/?id=7030.0040 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.	Minimum of 750 feet (229 meters) (for participants) and 1000 feet (305 meters) for non-participants) or compliance with noise standards, whichever is greater	Minimum of 750 feet (229 meters) from neighboring dwellings
ROADS AND OTHER ROWs	Wind turbine and meteorological towers shall not be located closer than 250 feet (76 meters) from the edge of the nearest public road ROW.	250 feet (76 meters) or 1.1 times total height from the property line, ROW or easement, whichever is greater	The total height or minimum front yard setback from the district (Agricultural = 100 ft. (30 meters), whichever is greater
PUBLIC LANDS	Wind turbines and associated facilities including foundations, access roads, underground cable, and transformers, shall not be located in public lands, including Waterfowl Production Areas, Wildlife Management Areas, Scientific and Natural Areas, or in county parks, and wind turbine towers shall also comply with the setbacks of WIND BUFFER ACCESS REQUIREMENT.	Same	N/A
WETLANDS	Wind turbines and associated facilities including foundations, access roads, underground cable, and transformers, shall not be placed in public waters wetlands, as defined in Minnesota Statutes section 103G.005, subdivision 15a, 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 MNDNR, USACE, and local units of government as implementers of the Minnesota Wetland Conservation Act.	No turbines, towers, or associated facilities shall be located within any type of wetland.	N/A
METEOROLOGICAL	Permanent towers for meteorological equipment shall	The greater of 250	Total height of the

Wind Facility and Collector Lines Setback Categories	Setback Conditions as Represented in Recent Site Permits	Dodge County (Section 16.51)	Steele County (Section 1527)
TOWERS	be free standing. Permanent meteorological towers shall not be placed less than 250 feet (76 meters) 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. Meteorological towers shall be placed on property the Permittee holds the wind or other development rights. Meteorological towers shall be marked as required by the FAA. There shall be no lights on the meteorological 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.	feet (76 meters) or 1.1 times the height of the tower (1.2 times the height for nonparticipating residences). Guy wires must meet the setback.	tower
AVIATION	The Permittee shall not place wind turbines or associated facilities 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. https://www.revisor.mn.gov/rules/?id=8800.0100 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 MN/DOT, Department of Aviation, and FAA. The Permittee shall notify owners of all known airports within six (6) miles of the Project prior to construction. https://www.revisor.mn.gov/rules/?id=8800.1900	Same	N/A
FOOTPRINT MINIMIZATION	The Permittee shall design and construct the LWECS 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).	N/A	N/A
COMMUNICATION CABLES	The Permittee shall place all SCADA communication cables underground and within or adjacent to the land necessary for turbine access roads unless otherwise negotiated with the affected landowner(s).	N/A	N/A
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	Collector lines should be buried, and should be located in the back side of the right of way.	All collector and feeder lines shall be buried where reasonably feasible. Power lines located in the public road ROW shall comply with the requirements of the road authority.

Wind Facility and Collector Lines Setback Categories	Setback Conditions as Represented in Recent Site Permits	Dodge County (Section 16.51)	Steele County (Section 1527)
	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 Permittee must fulfill, comply with, and satisfy all IEEE standards applicable to this Project, including but not limited to, IEEE 776 [Recommended Practice for Inductive Coordination of Electric Supply and Communication Lines], IEEE 519 [Harmonic Specifications], IEEE 367 [Recommended Practice for Determining the Electric Power Station Ground Potential Rise and Induced Voltage from a Power Fault], and IEEE 820 [Standard Telephone Loop Performance Characteristics] provided the telephone service provider(s) have complied with any obligations imposed on it pursuant to these standards. Upon request by the Commission, the Permittee shall report to the Commission on compliance with these standards		Any power line running adjacent to a public ROW, but not located within the public ROW shall be set back at least 90 feet (27 meters) from the centerline of the public road.
PUBLIC CONSERVATION LANDS		WIND ACCESS BUFFER REQUIREMENT	N/A
PLANNED CITY EXPANSION		The greater of 1,000 feet (305 meters) or WIND ACCESS BUFFER REQUIREMENT	N/A
OTHER EXISTING TURBINES AND INTERNAL SPACING		WIND ACCESS BUFFER REQUIREMENT	WIND ACCESS BUFFER REQUIREMENT
URBAN EXPANSION AND RURAL RESIDENTIAL DISTRICT		The greater of 1,000 feet (305 meters) or WIND ACCESS BUFFER REQUIREMENT	N/A
MN/DOT MICROWAVE BEAM PATH CORRIDOR		No turbines to be located within the MN/DOT Microwave Beam Path Corridor	N/A
SUBSTATIONS AND ACCESSORY		When not located in public ROW,	Use the structural set back from roads and

Wind Facility and Collector Lines Setback Categories	Setback Conditions as Represented in Recent Site Permits	Dodge County (Section 16.51)	Steele County (Section 1527)
FACILITIES		meet zoning district requirements or a minimum of 100 feet (31 meters), whichever is greater [Agricultural = 50 ft. (15 m) from roads, 25 ft. (8 m) from property lines)]	property lines of the non-participating owners,
NATIVE PRAIRIE	Wind turbines and associated facilities 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.	Same	N/A
SAND AND GRAVEL OPERATIONS	Wind turbines and associated facilities shall not be located within active sand and gravel operations, unless otherwise negotiated with the landowner.	No turbines, towers, or associated facilities in active sand and gravel operations.	N/A

8.2.1.3 Current and Future Zoning

The Dodge County Zoning Ordinance and Steele County Zoning Ordinance only apply to unincorporated areas of Dodge and Steele counties. Each neighboring city has its own ordinance (Owatonna, Claremont, Dodge Center, Hayfield, and Blooming Prairie); however, the entire Project Area occurs outside of incorporated areas and all project infrastructure will be sited at least one mile from incorporated areas of Dodge and Steele counties. Additionally, all Project infrastructure has been located at least one mile from all identified urban expansion areas.

Map 5 (Zoning) shows the zoning in Dodge and Steele counties for the Project Area. The portions of the Project Area within Dodge County primarily occur in the county-zoned Agricultural District. Federal Emergency Management Agency (FEMA) floodplains and associated 300 foot (91 meter) shoreland buffers are present in the Project Area as shown on the county zoning maps. As proposed, the Project adheres to Dodge County's zoning requirements.

The portions of the Project Area within Steele County are primarily zoned as Agricultural. Some scattered parcels are zoned Rural Residential and Conservation. As proposed, the Project adheres to Steele County's zoning requirements.

The City of Owatonna is within Steele County and is the largest urban area in the vicinity of the Project Area. The City of Owatonna's total population as a portion of the total Steele County population has grown from 63.1% to 70.0% from 1990 to 2010 (City of Owatonna 2006, U.S. Census Bureau 2010a). One of the primary land use objectives included in the Owatonna

Development Plan is to discourage unnecessary urban sprawl into the valuable agricultural areas surrounding the city and to encourage the county and townships to maintain a policy of protecting agricultural uses (City of Owatonna 2006). In Dodge County, the town of Claremont is approximately one mile north of the Project boundary and is the closest incorporated area to the Project. The 2010 Census population for the town of Claremont was 548, while the U.S. Census 2016 ACS population estimate is 616 (U.S. Census Bureau 2018b). The proposed Project would be compatible with the rural, agricultural character of Dodge and Steele counties and the goals and policies regarding urban growth set forth in the county and city comprehensive plans.

8.2.2 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 (PWP) Program. These programs have varying requirements including length of time parcels are protected, annual lease rate, and type of habitat protected.

Review of the Project Area identified two CREP easements and one RIM-WRP easement (BWSR 2018). Refer to **Table 7** below for additional details on these parcels.

Table 7: Conservation Easements

Conservation Program	Acreage	Location	Expiration Year
CREP	37 acres	Steele County near the northern boundary of the Project Area.	Not shown/ May be perpetual
CREP	8 acres	Dodge County within the southeast corner of the Project Area.	2052
RIM-WRP	21 acres	Steele County near the northern boundary of the Project Area. Adjacent to CREP Parcel	Not shown/ May be perpetual

Review of data within one mile of the Project Area revealed one 124 acre RIM-WRP property located just outside the northern boundary of the Project Area and one expired conservation easement (expired 1997) located just outside the western boundary of the Project Area. This easement was approximately 43 acres in size (BWSR 2018) .

DCW will continue to work to obtain information on CRP easements within the Project Area. Should any CRP easements be identified, DCW will review and determine if the easements occur in areas where project infrastructure is planned and the Applicant will try to avoid these areas to the extent practicable.

8.2.3 Potential Impacts

The Project is consistent with Dodge and Steele counties' zoning requirements and comprehensive plans. The Project Area occurs primarily within county-zoned agricultural districts but also includes floodplain, shoreland overlay, conservation, and rural residential areas. The Steele County Zoning Ordinance Section 1527.03 allows for the construction and operation of commercial scale wind energy facilities within the agricultural, rural residential, interim agricultural, general business, and industrial zoning districts as a conditional use. While some areas in the Project Area within Steele County are zoned conservation, no turbines or associated facilities are proposed within the conservation district. Chapter 8 of the Dodge County Zoning Ordinance allows for the construction and operation of a WECS within the Agricultural District as a conditional use. While some portions of the Project Area occur within the Shoreland Overlay District (SH) and Floodplain Overlay District (FP), no turbines or associated facilities are proposed within these overlay districts. Should facilities be sited or construction activities be planned in the FP or SH district, the Applicant would coordinate with Dodge County to address applicable requirements.

DCW is not likely to impact future zoning and expansion of incorporated areas near the Project Area. DCW has sited all Project infrastructure at least one mile from incorporated areas to minimize potential impacts on future urban growth. Development of the Project will allow continued agricultural use of the Project Area.

Temporary and permanent impacts to current land use are anticipated to occur from the construction of the Project. As the Project is primarily located within the Agricultural Districts of Dodge and Steele counties, land use primarily consists of agricultural activity, including row cropping and livestock production. Temporary and permanent impacts to agricultural activities will include the removal of land from row crop production and pasture during the construction and operation of the Project. Additionally, temporary and permanent impacts to pastureland are expected to be minimal and restricted to removing small amounts of land from use.

8.2.4 Mitigation Measures

The locations of the CREP and RIM/WRP easements have been incorporated into Project planning so that these locations will be avoided and not disturbed by Project activities. No Project infrastructure or construction easements will be located in CREP or PWP areas. Refer to **Map 6 (Public Land Ownership & Recreation)**. CRP easements will be located in coordination with participating landowners. If CRP easements are determined to be present, the locations will be incorporated into Project planning 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. Additional mitigation for impacts to existing land use are further described in **Sections 8.16**, **8.17**, **8.18**, **10.2**, **10.3**, and **10.5**.

8.3 Sound

Sound levels are measured and quantified using the logarithmic decibel (dB) scale. The decibel scale is logarithmic to accommodate the wide range of sound intensities found in the environment. Every 3-dB change in sound level represents a doubling or halving of sound energy and a change in sound levels of less than 3 dB is imperceptible to the human ear.

A sound level meter (SLM) that is used to measure sound is a standardized instrument per ANSI S1.4-1983 (R2006). 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. These sound levels are reported in decibels designated as "dBA". 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 a large 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 L_n, 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% 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% 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 under relatively steady sound level conditions.
- L_{90} is the sound level exceeded 90% 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}, the equivalent level, 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 equivalent level is designated 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 is subject to sound level requirements in Minn. R. Ch. 7030 for Noise Pollution Control. These rules are enforced by the MPCA through the use of Noise Area Classifications (NAC) that are defined in subpart 2 of Section 7030.0050 in terms of land use. The noise standards for each NAC applicable to this project are defined in subpart 2 of Section 7030.0040 as shown below in **Table 8**.

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

Noise Area Classification	Daytime		Nighttime	
	L50	L10	L50	L10
1	60	65	50	55
2	65	70	65	70
3	75	80	75	80

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 L50 sound level limit of 50 dBA in this analysis.

8.3.1 Description of Resources

An ambient sound level survey was conducted to characterize the current acoustical environment in the community surrounding and within the Project Area. Existing sound sources include: vehicles on Highway 14 (including trucks) and on other local roads, occasional trains to the north of the Project Area, wind, dogs, rustling vegetation, occasional distant aircraft, livestock and farm equipment, and geese along with other birds.

Ambient sound levels were measured at six locations for one week following methodology in the LWECS Guidance document based on a preliminary wind turbine layout. Short-term measurements were performed at two additional locations to the west of the Project Area. These locations were submitted in a protocol to the MN DOC on March 14, 2018. **See Map 7 (Sound Level Measurement Locations)** for a review of all measurement locations with respect to the Project. Result summaries of the long-term and short-term measurements are provided in **Table 9** and **Table 10**, respectively. Further details of the measurement locations, methodology, and sound levels are provided in **Appendix D (Pre-construction Sound Analysis)**.

Table 9: Long-term Ambient Sound Level Summary

Long-term Measurement Location	Sound Pressure Level (dBA)			
	Min L_{10}	Max L_{10}	Min L_{50}	Max L_{50}
L1	41	61	29	55
L2	27	69	20	53
L3	19	58	18	53
L4	21	53	19	49
L5	26	60	20	56
L6	29	57	26	52

Table 10: Short-term Ambient Sound Level Summary

Short-term Measurement Location	Sound Pressure Level (dBA)			
	Daytime L_{10}	Nighttime L_{10}	Daytime L_{50}	Nighttime L_{50}
S1	53	53	41	28
S2	33	33	28	29

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 sound level analysis for the Project conservatively includes 75 wind turbines, of which five (5) are considered alternate locations. Of these 75 wind turbines, 67 wind turbines are GE 2.5-116 LNTE units and eight are GE 1.7-103 LNTE units. Sound power levels from GE technical reports for the GE 2.5 and GE 1.7 wind turbines, which were provided by Atwell, were used to assign worst-case sound power levels to each of the modeled wind turbines. In addition to the wind turbines, there will be a collector substation associated with the Project located in Dodge County. One 225 megavolt-ampere transformer is proposed for the substation. According to the specification sheet provided by the proponent, the sound pressure level for this unit will be 75 dBA. Epsilon has estimated octave band sound power levels using the broadband sound pressure level provided and techniques in the Electric Power Plant Environmental Noise Guide (Edison Electric Institute), Table 4.5 Sound Power Levels of Transformers.

There are 694 receptors within 2 miles of the Project area and these were input into the Cadna/A model. These receptors were modeled as discrete points at a height of 1.5 meters (4.9 feet) above ground level to mimic the ears of a typical standing person and were all assigned as NAC 1. Participation status for each modeling receptor was assigned. All modeling receptors are identified on **Map 8 (Sound Level Modeling Locations)** and are distinguished as either participating, participation pending, or non-participating. Any non-"LSE" parcel in Dodge County closer than the 5 RD by 3 RD setbacks required by the LWECS has been assigned a "participation pending" status. Additionally, any parcel located in Steele County closer than the 5 RD setback (5 RD by 5 RD) has been assigned a "participation pending" status.

Several modeling assumptions inherent in the ISO 9613-2 calculation methodology, or selected as conditional inputs by Epsilon, were implemented in the Cadna/A model to ensure conservative results (i.e., higher sound levels). No uncertainty factor was provided by the wind turbine manufacturer for the GE 2.5-116; however, an uncertainty factor of 2.0 dBA was provided for the GE 1.7-103 unit. This uncertainty was assumed for the GE 2.5-116 unit based the GE 1.7-103 uncertainty factor and prior experience with wind turbine sound modeling. Therefore, 2 dBA was added to the sound power level for each modeled wind turbine.

8.3.2 Potential Impacts

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.

The highest predicted worst-case sound level from the Project wind turbines is below the 50 dBA limit at all modeled NAC 1 receptors as shown in **Table 11**. Modeled sound level isolines are presented on **Map 9 (Sound Level Modeling Results)**. The highest L_{50} sound level is 47 dBA at non-participating receptor #210. Nighttime measurements showed non-wind-turbine ambient L_{50} broadband sound levels range from 25 to 56 dBA when ground-level wind speeds were at or below 11 mph and winds at hub height corresponded to conditions in the modeling. These measured sound levels exceeded 50 dBA at five (5) of the six (6) locations during the measurement program. Ambient sound levels in the Project Area fluctuate due to sound sources such as ground-level winds and vegetation rustle, both of which can cause ambient sound levels to exceed the MPCA L_{50} nighttime limit of 50 dBA. The highest predicted worst-case Project Only L_{50} sound level at a modeling receptor is 47 dBA, and, therefore, is below the most restrictive MPCA sound limit of 50 dBA. Appendix D (Pre-construction Sound Analysis) provides further details of the sound modeling analysis.

Table 11: Summary of Sound Assessment

Modeling Scenario	Maximum Modeled L50 Sound Pressure Level (dBA) at NAC 1 Receptors			
	All Receptors	Participating	Participation Pending	Non-Participating
Project Only	47	46	46	47

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.

Low frequency and infrasound are present in the environment due to other sources besides wind turbines. For example, refrigerators, air conditioners, and televisions generate infrasound and low frequency sound. 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 (ISO) 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.

A detailed infrasound and low frequency noise measurement program of wind turbines was conducted from 2013-2015 by the Ministry for the Environment, Climate and Energy of the Federal State of Baden-Wuerttemberg, Germany (Herrmann et al. 2016). The conclusions of the German study were:

> Infrasound and low-frequency noise are an everyday part of our technical and natural environment. Compared with other technical and natural sources, the level of infrasound caused by wind turbines is low. Already at a distance of 150 m (~500 ft), it is well below the human limits of perception. Accordingly, it is even lower at the usual distances from residential areas. Effects on health caused by infrasound below the perception thresholds have not been scientifically proven. Together with the health authorities, we in Baden-Württemberg have come to the conclusion that adverse effects relating to infrasound from wind turbines cannot be expected on the basis of the evidence at hand.

The Massachusetts Department of Environmental Protection (MA DEP) and the Massachusetts Department of Public Health (2016) commissioned an expert panel who found that: "Claims infrasound from wind turbines directly impacts the vestibular system have not been demonstrated scientifically. Available evidence shows that the infrasound levels near wind turbines cannot impact the vestibular system."

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 2013). 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.

Low frequency and infrasound has also been studied extensively in Japan. Tachibana et al. conducted extensive measurements of 34 wind farms nationwide and concluded that infrasound from wind turbines is not audible/sensible, and that wind turbine noise is not a problem in the infrasound region (Tachibana et al. 2014).

As noted in the 2011 National Association of Regulatory Utility Commissioners (NARUC) report (NARUC 2011), "the widespread belief that wind turbines produce elevated or even harmful levels of low frequency and infrasonic sound is utterly untrue as proven repeatedly and independently by numerous investigators."

8.3.3 Mitigation Measures

DCW 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 as much as possible, while also meeting the other constraints of the project design and regulatory requirements.

Compliance with MPCA noise standards will be accomplished, in part, by including in its design a 1,400 setback from residences. Also, consistent with the 3 RD by 5 RD setback LWECs requirement and Dodge County Zoning Ordinance requirements, turbines in Dodge County will be set back from non-participating properties by a setback of at least 1,014 feet (309 meters) or 3 RD in the non-prevailing wind direction and at least 1,690 feet (515 meters) or 5 RD in the prevailing wind direction for the GE 1.715 MW turbine model. Additionally, turbines will be set back from non-participating properties at least 1,142 feet (348 meters) (3 RD) in non-prevailing wind directions and at least 1,903 feet (580 meters) (5 RD) in prevailing wind directions for the GE 2.5 MW turbine model. Consistent with the 5 RD by 5 RD setback for Steele County Zoning Ordinance requirements, turbines in Steele County will be setback from non-participating properties by a setback of at least 1,690 feet (515 meters) or 5 RD for the 1.715 MW turbine model and at lease 1,903 feet (580 meters) or 5 RD for the GE 2.5 MW turbine model.

The Applicant will also conduct a post-construction sound level measurement program to evaluate compliance with respect to MPCA noise standards.

8.4 Visual Impacts

8.4.1 Description of Resources

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 the landscape. Individual observers will have differing opinions on the aesthetic appeal of a region and impacts that may alter the quality. Those likely to be viewing the proposed Project include permanent observers (residents) and temporary observers (motorists, tourists, or recreationalists passing by or using the area intermittently). Residents within and in the vicinity of the Project Area are expected to have a higher sensitivity to the potential aesthetic impacts than temporary observers as they will look at the Project more frequently than those individuals periodically passing through the area.

The general topography of the Project Area is described as undulating, rolling relief with approximate elevations between 1,210 and 1,354 feet above mean sea level (MSL). Refer to **Map 10 (Topographic Map)**. The Project Area generally has lower elevations in the central and northwestern sections with higher elevations in the southeast and southwest. Agricultural fields, farmsteads, and gently rolling topography visually dominate the Project Area. The landscape can generally be classified as rural open space.

Vegetation within the Project Area is predominantly agricultural crops, pasture, wooded shelter belts surrounding residences, and riparian areas. The main agricultural crops grown in this region include corn, soybeans, and hay. Settlement in this area of Dodge and Steele counties includes residential and farm buildings scattered along rural county and township roads. There are 285 residences located within the Project Area and an additional 245 residences located within one mile of the Project Area. Some of the residences located outside of the Project Area but within one mile are associated with the town of Claremont, which is located north of the Project Area.

The main visual focal points within the Project Area 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. Five cemeteries are found within the Project Area: the Aurora Lutheran Cemetery, Saint John's Lutheran Cemetery, German Methodist Episcopal Cemetery, the Aurora Township Cemetery, and the Thompson Cemetery.

Existing WECSs are visible to the southwest, east, and southeast of the Project Area. Three commercial wind farms (Oak Glen Wind, G. McNeilus, and Pleasant Valley) are located within ten miles of the Project Area and contain turbines of various heights and rotor diameters.

- The Oak Glen Wind farm is located less than a mile southwest of the Project Area and contains 24 turbines that generate 1.8 MW each.
- The G. McNeilus WECS is located approximately one mile east of the Project Area and contains 41 turbines that generate 0.9 MW, 0.95 MW, 1.5 MW and 1.65 MW.
- The Pleasant Valley WECS is located approximately six miles southeast of the Project Area and contains 100 turbines that generate 2.0 MW each.

MET towers associated with these wind facilities may also be present on the landscape. Generally, the Pleasant Valley, Oak Glen, and McNeilus WECSs contain similar or slightly smaller sized turbine models to those proposed in this Project, with total heights ranging from approximately 345 feet (approximately 105 meters) to approximately 475 feet (approximately 145 meters) (See **Map 11 (Existing Turbine Location)**).

One existing transmission line, the Great River Energy (GRE) Al Corn to West Owatonna 161 kV, intersects a small portion of the Project Area along its northern boundary in Steele County (approximately 0.6 miles); no other transmission lines are present within the Project Area. An additional approximately 161 miles of existing transmission lines are located within ten miles of the Project Area ranging from 4 kV to 161 kV in size. Refer to **Map 2 (Project Area and Facilities)**. A 75 kV transmission line, the Adams to Helena, is proposed by others within the Project Area parallel to the western Project Area boundary. As described in greater detail in docket TL-17-308, DCW proposes to construct approximately 23 miles of 345 kV generation tie

line between the Project Substation and the Byron Substation. Existing transmission lines create existing visual impacts to the Project Area and its vicinity.

The Federal Communication Commission (FCC) Antenna Structure Registration (ASR) database identifies no antenna structures within the Project Area, but six existing antenna structures are located within two miles of the Project Area creating existing visual impacts within the vicinity of the Project Area. An additional 28 existing antenna structures exist within ten miles from the Project Area.

8.4.2 Visual Impacts

Project infrastructure, including turbines, the 345 kV overhead generation tie line (discussed in further detail in Docket No TL-17-308), the collector substation, and the O&M building will create new manmade features throughout the landscape. The primary visual impact associated with wind farms are the turbine structures as they can typically be seen from a greater distance than other project infrastructure.

The two turbine models proposed for the Project, the GE 2.5 MW and GE 1.715 MW, are similar in appearance with three blades, a hub and a monopole, but differ in RD size and the number of turbines (See **Table 12**). In general, the larger the RD, the fewer turbines are required to produce the same energy output.

Table 12: Rotor Diameter and Number of Turbines

Turbine Model	Total Height (meters/feet)	Rotor Diameter (meters/feet)	Ground Clearance (meters/feet)	Number of Turbines	Number of Alternate Turbines
GE 2.5 MW	148.3/486.5	116/381	32/105	62	6
GE 1.715 MW	131.5/431.3	103/338	28.5/93.5	8	0

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 those with 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 feet (60 meters) above MSL because they have the potential to obstruct air navigation. DCW 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 recreationalists 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 Project Area. Further information regarding the public lands and snowmobile trails in relation to the Project Area is found in **Section 8.7**.

Wind turbines will alter the visual surroundings of the landscape within and near the Project Area. Wind turbines are not currently present within the Project Area; however, wind turbines occur within the regional vicinity of the Project Area. 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 windmills, silos, and grain elevators; or
- As adding a positive aesthetic quality to the landscape.

The topography in the vicinity of the Project is generally flat and the vegetation is low, and the Project will be visible to residents of the area and to people traveling north and south along Minnesota 56, and east and west along US Hwy 14, and northwest and southeast along US Hwy 218 (refer to **Map 1 (Project Location Map)**). The installation of wind turbines will not significantly alter the character of the regional landscape given the presence of existing wind farms in the vicinity; however, the degree of visual impact will vary based on the type of observer and individual preference.

The Project includes a new collector substation with a graveled footprint anticipated to be no more than an acre in size. The collector substation will include 345 kV buses, transformers, circuit breakers, reactive equipment, steel structures, a control building, metering units, and air break disconnect switches. A 345 kV generation tie line will exit the collector substation. The Project collector substation's general vicinity currently includes farmsteads, overhead transmission lines, distribution lines, a railroad, and wind turbines. 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 be not result in additional visual impacts, since all collection lines will be buried 36-48 inches below the surface.

The O&M facility will provide office space for the crews, as well as a shop/storage area for spare parts and vehicles. It will also house the central monitoring equipment for the Project where the turbines are monitored and controlled. The footprint of the facility is anticipated to be approximately 2 acres and will include an access road, parking lot and O&M building. The O&M facility will be a one-story structure with an attached garage for vehicle storage and

maintenance. Similar to the substation, residents located near the O&M facility are expected to have a higher sensitivity to the potential aesthetics impacts than temporary observers.

Visual alterations of the land use related to temporary construction activities, such as equipment staging and laydown areas, crane paths, and the installation of underground collection lines. These visual alterations would be short-term, because after the completion of construction the alteration will be converted back to cropland or replanted with grasses and vegetation native to the area. The increase in traffic and human activity within the Project Area would also be short-term.

8.4.3 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. While indoors, 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 (see **Appendix E**). The worst-case annual duration of shadow flicker was calculated based on the following modeling inputs:

- Proposed wind turbine locations. The modeling analysis included 75 wind turbines (70 proposed + 5 alternates).
- Wind turbine dimensions, i.e., rotor diameter and hub height. A combination of GE 2.5 and GE 1.7 wind turbines are proposed for this Project.
- Discrete modeling points, i.e., sensitive receptors. These locations are consistent with the NAC 1 receptors modeled in the sound level analysis. All modeling receptors and participation status are presented in **Map 12 (Shadow Flicker Modeling Locations)**. 694 receptors are included in the analysis.
- 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-meter (66 feet) spacing was used for this grid.
- 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 (2,012 m) from each wind turbine in the model for the proposed layout.

- Shadow flicker durations were only calculated when the angle of the sun was at least 3° above the horizon.
- The terrain height contour elevations for the modeling domain were generated from elevation information derived from the National Elevation Dataset (NED) developed by the U.S. Geological Survey.
- 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.

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 Minneapolis-St. Paul, Minnesota from the National Oceanic and Atmospheric Administration's National Centers for Environmental Information shown in **Table 13**.

Table 13: Monthly Sunshine Probability Values

Month	Possible Sunshine
January	53%
February	59%
March	57%
April	56%
May	62%
June	67%
July	74%
August	69%
September	62%
October	51%
November	37%
December	38%

- Annual operational hours per wind direction sector were provided by NEER. 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 97% of the year. **Table 14** shows the distribution of operational hours for the 16 wind directions.

Table 14: Operational Hours per Wind Direction Sector

Wind Sector	Operational Hours
N	322
NNE	238
NE	229
ENE	199
E	286
ESE	335
SE	391
SSE	675
S	1,176
SSW	859
SW	501
WSW	358
W	483
WNW	826
NW	1,068
NNW	535
Annual	**8,481**

The modeled worst-case annual shadow flicker duration ranged from 0 hours, 0 minutes per year to 101 hours, 5 minutes per year. The maximum worst-case flicker was at a participating receptor (#64). The maximum modeled worst-case annual flicker at a non-participating receptor (#170) is 89 hours, 6 minutes.

Map 13 (Shadow Flicker Modeling Results) presents expected shadow flicker durations as isolines overlaid aerial imagery. The predicted expected annual shadow flicker duration ranged from 0 hours, 0 minutes per year to 34 hours, 57 minutes per year. The maximum expected flicker was at a pending participation receptor (#410). The maximum expected flicker at a non-participating receptor (#173) was 27 hours, 26 minutes. The majority of the receptors (536) were predicted to experience no annual shadow flicker. 102 locations were predicted to experience some shadow flicker but less than 10 hours per year. The modeling results showed that 51 locations would be expected to have 10 to 30 hours of shadow flicker per year. Five (5) receptors are expected to have over 30 hours of flicker per year, none 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 E (Shadow Flicker Analysis)** provides further details of the shadow flicker study and results for the Project.

Table 15: Predicted Shadow Flicker Impacts at Participating Residents

Statistic	Duration (hrs:mins/yr)
Maximum Shadow Flicker - Worst Case	101:05
Maximum Shadow Flicker - Expected Case	34:07

Table 16: Predicted Shadow Flicker Impacts at Participation Pending Residents

Statistic	Duration (hrs:mins/yr)
Maximum Shadow Flicker - Worst Case	93:08
Maximum Shadow Flicker - Expected Case	34:57

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

Statistic	Duration (hrs:mins/yr)
Maximum Shadow Flicker - Worst Case	89:06
Maximum Shadow Flicker - Expected Case	27:26

Based on the current design and operation of typical modern wind turbines, shadow flicker is not a cause of epileptic seizures. According to the Epilepsy Foundation (Epilepsy Foundation 2013), "Generally, flashing lights most likely to trigger seizures are between the frequency of 5 to 30 flashes per second (Hertz)." The wind turbines for this Project have a maximum rotational speed of 17.0 rpm which corresponds to a shadow flicker frequency of 0.9 Hz. This frequency is well below the frequency identified by the Epilepsy Foundation; therefore, the triggering of epileptic seizures is not a concern with this Project.

8.4.4 Mitigation Measures

The use of 62 GE 2.5 MW turbines helps to mitigate the visual impact of the Project by minimizing the number of turbines. DCW will 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, SNAs or WPAs;
- Turbines will be illuminated to meet the minimum requirements of FAA regulations for obstruction lighting of wind turbine projects;
- Electric collection lines will be buried to minimize above-ground structures within the Project Area;
- 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. DCW 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.

8.5 Public Services and Infrastructure

The Project is located in rural southeastern Minnesota (see **Map 1 (Project Location)**). A network of roads and utilities provide access, electricity, water supply, and telephone service to rural residences, farmsteads, small industry, and unincorporated areas. Two railroad tracks, operated by Canadian Pacific, are found on the northern and eastern borders of the Project Area. Water wells and septic systems are typically used within the Project Area to provide household needs.

The nearest city to the Project Area, Owatonna, is one mile away and has its own fire and police departments, which service much of the western portion of the Project Area within Steele County. Blooming Prairie, located four miles south of the Project Area, maintains a police department and a volunteer fire department that will service the southern portion of the Project Area within Steele County. The cities of Claremont and Dodge Center, located one mile north and two miles northeast of the Project Area in Dodge County, use the Dodge County Sheriff's Department for police services. Claremont has its own full time fire department, while Dodge

Center uses volunteers to staff their fire department. The city of Hayfield, located three miles southeast of the Project Area, has limited public infrastructure services and uses a volunteer fire department and Dodge County Sheriff's Department for police services. Emergency response centers are located nearby in Owatonna for Steele County and in Mantorville for Dodge County, and dispatch all 911 calls for their respective counties, including for fire, medical, and police emergencies.

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.

8.5.1 Traffic and Roads

Existing road infrastructure within the Project Area consists of county and township roads that typically follow section lines, as well as farmstead driveways and farming access roads. Though not in the Project boundary, U.S. Highways 218 and 14 are the main access routes into the Project and to nearby communities. 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 Project Area are found in **Table 18**.

Table 18: Summary of Roadways within Project Boundary

Road Type	Approx. Miles Within Project Boundary
Federal Highways	0
State Highways	0
County Highways/Roads	53
Township Roads	109

Traffic within the Project Area has been summarized in **Table 19** below based upon MN/DOT data (MN/DOT 2016). Dodge County CSAH 10 has the highest Average Annual Daily Traffic (AADT) count with 540 vehicles per day, using 2013 data, while the lowest count was at County Road Y in Dodge County with 25 vehicles per day, using 2013 data. The remainder of roads within the Project Area contained traffic counts between 40 and 390 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 Project Boundary	Traffic Volume	Year Data Collected
Steele County	CR 157	4.96	125/185	2011/2011
Steele County	CR 159	2.64	305	2011
Steele County	CSAH 4	2.37	145	2011
Steele County	CSAH 6	5.56	285/385	2011/2015
Steele County	CSAH 16	6.77	380/325/185	2011/2015/2015
Steele County	CSAH 47	0.28	160	2015
Dodge County	CR O	3.06	40	2013
Dodge County	CR J	3.46	40	2013
Dodge County	CR W	3.01	40	2013
Dodge County	CR Y	2.01	25	2013
Dodge County	CSAH 1	3.16	270	2013
Dodge County	CSAH 3	6.23	350/390	2013/2013
Dodge County	CSAH 5	5.80	280/360	2013/2013
Dodge County	CSAH 6	5.30	30/170	2013/2013
Dodge County	CSAH 10	3.49	235/540	2013/2013

Source: Minnesota Department of Transportation, (2016), Office of Transportation Data & Analysis, Traffic Volume Program, 2016 AADT Product

8.5.2 Telecommunications and Other Related Resources

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 F**; WindLogics 2018). The NTIA provided the Project information to the Interdepartmental Radio Advisory Committee (IRAC) which includes 20

federal agency members. Confirmation was received on August 10, 2017 that no IRAC member agencies had issues with turbine placement in the Project Area (see **Appendix C (Agency Responses)**).

Telephone

Telephone service in the Project Area is provided to farmsteads, rural residences, and businesses by Alltel Communications, AT&T, CenturyLink, CenturyLink Business, Charter Spectrum, Cox Communications, Sprint, T-Mobile Time Warner Cable, U.S. Cellular, and Verizon Communications. Telephone service is provided both through landlines and wireless signals. Refer to **Table 20** for a summary of FCC licensed signals within the vicinity of the Project Area.

Microwave Beam Paths

The Electromagnetic Interference Analysis (WindLogics 2018) examined microwave beam paths in the vicinity of the Project Area and identified nine microwave beam paths that cross into the Project Area. An additional microwave beam path was identified near the Project Area. The beam paths are owned and operated by Union Pacific Railroad Company, the State of Minnesota, Radio Link Internet, and T-Mobile License LLC. WindLogics 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 to account for the blade length, enables turbines to be sited such that impacts to microwave beam paths are avoided (**Map 14 – Microwave Beam Path Map**). Refer to **Table 20** for a summary of FCC-licensed signals within the vicinity of the Project Area.

AM/FM Radio

The Electromagnetic Interference Analysis (WindLogics 2018) did not identify AM or FM radio towers within the Project Area (WindLogics 2018). There are 11 AM towers and 13 FM towers within 15.5 miles of the Project Area. The AM towers include call signs KDHL, KQAQ, KOWZ, and KRFO. The FM towers include call signs KRUE, K228DR, KCJL-LP, KWWK, K252DM, KOWZ-FM, KRCH, K280EC, KRFO-FM, K289AM, K292GU, and KBGY.

Fixed Land Mobile Stations

Land mobile stations will be used within the Project Area 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 designed with multiple transmitters to provide redundancies that allow their signal to broadcast through wind turbines.

Table 20: Summary of FCC-Licensed Signals in and within the Vicinity of the Project Area

Communication System Type	Number of Signals
AM (AM Radio Signals)	11
FM (FM Radio Signals)	13
Microwave (Radio Wave Transmission)	10
Cellular	13

8.5.3 Other Local Infrastructure and Services

One natural gas pipeline owned and operated by Northern Natural Gas Company exists in the northwest corner of the Project Area. There are no existing high voltage transmission lines within the Project Area. One transmission line, the GRE Al Corn to West Owatonna 161 kV line, is located adjacent to the northeast corner of the Project Area near Claremont along the northern section of the Project Area. There are no substations located within the Project Area or within one mile of the Project Area. Approximately 161 miles of existing transmission lines are located within ten miles of the Project Area. Additionally, there are electric distribution lines owned by Steele-Waseca Cooperative and Peoples Energy Cooperative throughout the Project Area, providing electricity to residents and businesses. This electric distribution infrastructure consists of both overhead and underground conduits.

Two railroads are located within the Project Area. The Canadian Pacific Railway operates both lines which border the northern and western edge of the Project boundary.

8.5.4 Television

The Electromagnetic Interference Analysis (WindLogics 2018) determined that digital or analog television towers are not located within the Project Area. There are 34 licensed television towers within approximately 62 miles of the Project, including 14 towers that are within 31 miles of the Project Area and are likely to be broadcasting to the region. Most of the television towers within approximately 62 miles of the Project Area are low power stations or translator stations that have limited range and would not be expected to experience reception interference. Six full power towers (call signs KXLT-TV, KSMQ-TV, KAAL, KIMT, KYIN, and KTTC) have a possibility of experiencing reception interference if the Project is in line-of-sight. These towers are located between 16 and 34 miles from the Project.

Table 21: Digital Television Signals In the Vicinity of the Project Area

Call Sign	Station	Licensee	Signal Strength (kw)
K48KJ-D	48	Three Angels Broadcasting Network, Inc.	1.5
DK43DH	43	Televiev Systems of Minnesota	1.47
DK53DI	53	Televiev Systems of Minnesota	1.47
DK55FJ	55	Televiev Systems of Minnesota	1.47
DK57EU	57	Televiev Systems of Minnesota	1.47
DK61EU	61	Televiev Systems of Minnesota	1.47
K52HH	52	MS Communications, LLC	0.004
K40JT	40	Trinity Broadcasting Network	10.7
KXLT-TV	46	Sagamorehill of Minnesota License, LLC	220
K56HW	56	Trinity Broadcasting Network	75
K58GC	58	Three Angels Broadcasting Network, Inc.	29
K25NK-D	25	Three Angels Broadcasting Network, Inc.	15
KSMQ-TV	20	KSMQ Public Service Media, Inc.	319.2
KAAL	36	KAAL-TV, LLC	620
KIMT	42	NVT Mason City Licensee, LLC	800
KYIN	18	Iowa Public Broadcasting Board	533
KTTC	10	KTTC License	43.1
KILW-LD	28	DTV America Corporation	6
KWJM-LD	15	DTV America Corporation	6
KMQV-LD	49	DTV America Corporation	6
K21KF-D	21	Cooperative Television Association of Southern Minnesota	3

Call Sign	Station	Licensee	Signal Strength (kw)
K47MI-D	47	Cooperative Television Association of Southern Minnesota	3
DK34JZ-D	34	South Central Electric Association	0.17
K14KD-D	14	South Central Electric Association	3
K23FY-D	23	Cooperative Television Association of Southern Minnesota	3
K27FI-D	27	South Central Electric Association	3
K29IF-D	29	Blue Earth-Nicollet-Faribault Cooperative Electrical Association	3.1
K31EF-D	31	South Central Electric Association	3
K35IU-D	35	South Central Electric Association	3
K40JS-D	40	Blue Earth-Nicollet-Faribault Cooperative Electrical Association	3
K49JG-D	49	Blue Earth-Nicollet-Faribault Cooperative Electrical Association	3
K51KB-D	51	South Central Electric Association	3
K43JE-D	43	Three Angels Broadcasting Network, Inc.	10.82
W47CO-D	47	State of Wisconsin – Educational Communications Board	1.6

8.5.5 Potential Impacts

Traffic and Roads

Temporary impacts are expected to public roads during the construction phase of development as materials, personnel, and equipment will be brought in via existing U.S. Highways, county roads, and township roads. U.S. Highways 218 and 14 are the main access routes into the Project Area and would likely be used as corridors to bring materials and equipment to the Project site; however, the exact routes will be determined closer to construction and in coordination with local jurisdictions as appropriate. The maximum amount of construction traffic is expected to be

approximately 500 trips per day during peak construction. Local roads can accommodate this traffic as the functional capacity of a two-lane paved rural highway is in excess of 5,000 vehicles per day. However, some minor, short-term traffic delays within and near the Project site may occur during turbine and equipment delivery and construction activities.

Additionally, permanent public road and intersection improvements, as well as temporary access road approaches and turning radii, are required to link the Project access roads to the existing road network and for transportation and turbine component delivery during the construction phase of the project. 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.

During operations, only the 5 maintenance crew workers will utilize roads within the Project Area for regular inspections and maintenance. Nearby county roads have AADTs between 25 and 540 and traffic is not expected to noticeably increase during the operations phase of the Project.

Telephone

The Electromagnetic Interference Analysis (WindLogics 2018) indicates that interference would not occur to cellular telecommunications. However, 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.

Microwave Beam Paths

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.

AM/FM Radio

The Electromagnetic Interference Analysis (WindLogics 2018) indicated that interference to AM or FM signals are expected to be minimal. 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, KRFO, is located 1.6 miles from the Project Area and has a wavelength of 0.13 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. Two FM towers (KCJL-LP and KRFO-FM) are located less than 2.5 miles from the Project area, but the closest wind turbines would be located over 2.9 and 4.3 miles from the FM towers.

Fixed Land Mobile Stations

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.

Television

The Electromagnetic Interference Analysis (WindLogics 2018) examined impacts to television (TV) service. While impacts to television reception are still not well known, interference is expected to be limited to areas near a turbine that is within line-of-site between a transmitting tower and a TV receptor, areas near the edge of TV station reception, and in areas of complex topography. Impacts to low power stations and translator stations are not anticipated to occur because those stations have a limited range. Full power TV stations would have the potential to experience impacts if the wind farm is located in the line-of-site of the TV tower. Six full power TV towers (call signs KXLT-TV, KSMQ-TV, KAAL, KIMT, KYIN, and KTTC) could possibly experience reception degradation if the Project is in the line-of-sight between the towers and their receptors.

Other Local Infrastructure and Services

As there are no substations or high voltage transmission lines within the Project Area. Additionally, the natural gas pipeline and two railroads within the Project Area will not be crossed by Project infrastructure and no Project facilities or activities are planned in the vicinity of these features. Thus, no impacts to these existing infrastructures or services are anticipated. Potential impacts to electric distribution lines consist entirely of incidental physical damage from construction equipment during the construction of the Project.

8.5.6 Mitigation Measures

Traffic and Roads

Turbines have been sited based on consistent county and Commission standards, and, therefore, there will have a setback from roads of no less than 1.1 times the height of the turbine in Dodge

County and no less than the height of the turbine in Steele County. DCW has also located turbines to minimize traffic congestion along major highways that border the Project. Prior to construction, DCW 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. DCW 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. DCW will require that the general contractor be in contact with the relevant road authorities during construction.

Telephone

In order to avoid potential physical impacts to underground telecommunication lines, all 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 identified during or after construction, DCW will address these impacts on a case-by-case basis.

Microwave Beam Paths

A non-federal and federal electromagnetic interference study has been performed for the project site. The results were taken into account in the wind turbine array design by quantifying turbine exclusion zones (WCFZ). WCFZ are quantified for each fixed point to point microwave beam depending on its path, distance, and frequency. A buffer of half the turbine rotor diameter plus 10 meters is placed around each beam's 2nd Fresnel zone. Turbines are located outside of these buffers to mitigate any impact on the signal. The Telecommunications Study conducted by WindLogics (2018) is attached as **Appendix F**

AM/FM Radio

AM/FM Radio Stations within 10 miles of the Project Area are located in Owatonna and may not be close enough to the Project Area to typically experience impacts to reception. DCW 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

In the unlikely event that land mobile licenses experience impacts to coverage due to the Project, DCW 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.

Television

WindLogics conducted an Electromagnetic Interference Analysis (WindLogics 2018) for the Project and concluded that TV interference is expected to be limited to areas near a turbine that are within the line-of-site between a transmitting tower and a TV receptor. In the unlikely event that TV interference is reported following Project construction, DCW 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 DCW on a case-by-case basis, and if reported DCW will:

- Log the report and determine if the interference is Project related;
- Meet with the landowner and the local communications technician to determine the status of the affected television reception equipment;
- Discuss with the landowner 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 landowner's election, DCW will either install the recommended equipment or enter into an agreement to reimburse the landowner for the cost of comparable DBS service;
- If the landowner chooses DBS service, DCW will consider the matter closed upon installation of the satellite dish;
- If the landowner elects antenna and/or amplifier installation and later reports continued interference issues, DCW 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, DCW will propose an agreement that reimburses the landowner 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 DCW and the landowner are unable to reach an agreement to resolve interference-related issues, DCW will report the concern as an unresolved complaint and defer to the Commission's dispute resolution process to resolve the matter.

Other Local Infrastructure and Services

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, DCW will address these issues on a case-by-case basis.

8.6 Cultural and Archaeological Resources

8.6.1 Sites Potentially Affected

The Project is located in portions of the Southeast Riverine and Prairie Lakes archaeological Regions. The Southeast Riverine archeological Region covers most of southeastern Minnesota, including all of Dodge County. The Prairie Lakes archaeological Region covers most of southwestern and south central Minnesota and includes portions of Steele County (Hudak et al. 2002). The majority of the Project Area is located in the Southeast Riverine archaeological Region. Archaeological resources are predominantly concentrated along the Mississippi River and its tributaries in this area and expected resource locations would be near water sources on bluff tops and terraces. Archaeological resources are uncommon in the interior uplands of the area.

The Applicant began investigating cultural resources concerns for the Project in February 2017. Following a review of cultural resource records available at the Minnesota State Historic Preservation Office (SHPO) and the Office of State Archaeologist (OSA) in February 2017 and May 2017, a Phase Ia Cultural Resources Literature Review (desktop study) was conducted for the Project Area and within a mile of the Project Area as delineated at that time. The report is included in **Appendix G (Phase Ia Cultural Literature Review)**. Since the time of the Phase Ia Cultural Resources Literature Review, the Project Area shifted slightly, but within a mile of the area originally evaluated. Thus, additional review has not been conducted. The summary of cultural resources herein utilizes the findings from the Phase Ia Cultural Literature Review but is summarized based upon the current Project Area.

The Literature Review identified eight architectural resources within the Project Area and an additional 24 architectural resources within one mile of the Project Area (**Table 22** and **Table 23**, respectively) for a total of 32 documented resources. Within the Project Area, the Thompson Farmstead (ST-HAV-038) and the Pichner Farmstead (ST-HAV-034) have been officially determined eligible for listing on the National Register of Historic Places (NRHP) under Criterion C by the SHPO. The Thompson Cemetery (ST-HAV-036) and a farmstead (ST-HAV-023) are also located in the Project Area and have been recommended not eligible for the NRHP. Very little information is within the record for two schools located within the Project Area (ST-AUR-003 and ST-AUR-006). The remaining two resources (ST-HAV-004, and ST-HAV-008) located within the Project Area have very little information available, are unevaluated for NRHP eligibility and do not appear on current aerial imagery; which suggests that they may have been demolished.

Table 22: Previously Reported Architectural Resources within Project Area

County	Architecture Inventory Number	Property Name	Location	NRHP Eligibility Recommendation
Steele	ST-AUR-003	District School No. 13	T106N, R19W, Sec. 15	Unevaluated
Steele	ST-AUR-004	School	T106N, R19W, Sec. 15	Unevaluated
Steele	ST-AUR-006	School	T106N, R19W, Sec. 25	Unevaluated
Steele	ST-HAV-008	St. John's Evangelical Lutheran Church	T107N, R19W, Sec. 36	Unevaluated, Possibly Demolished
Steele	ST-HAV-023	Farmstead	T107N, R19W, Sec. 27	Recommended Not Eligible
Steele	ST-HAV-034	Pichner Farmstead	T107N, R19W, Sec. 26	Officially Eligible – Criterion C
Steele	ST-HAV-036	Thompson Cemetery	T107N, R19W, Sec. 27	Recommended Not Eligible
Steele	ST-HAV-038	Thompson/Ripka Farmstead	T107N, R19W, Sec. 26	Officially Eligible – Criterion C

Resources associated with six farmsteads, which are located within one mile of the Project Area, have been determined eligible or recommended eligible for listing on the NRHP. A segment of the Minnesota Central Railroad in Owatonna Township (ST-ONA-018) has been officially determined eligible for listing on the NRHP by the SHPO. This segment is located approximately 0.5 mile north of the Project Area. Very little information is contained within the records for the church (DO-WSF-001) located within one mile of the Project Area, and as a result, it is considered unevaluated for NRHP eligibility. Three architecture resources, Stark's Creamery, a farmstead (DO-CLT-002), and District School No. 68, have very little information available and are unevaluated for NRHP eligibility. Stark's Creamery and District School No. 68 do not appear on current aerial imagery, which suggests that they may have been demolished. The remaining 14 architectural resources within one mile of the Project Area include 11 farmsteads, two cemeteries, and a residence that have been recommended not eligible for listing on the NRHP.

Historic properties listed on the NRHP, Minnesota State Historic Sites Network, and the Minnesota State Register of Historic Places are not located within the Project Area or within one mile of the Project Area.

Table 23: Previously Reported Architectural Resources within 1-Mile of Project Area

County	Architecture Inventory Number	Property Name	Location	NRHP Eligibility Recommendation
Dodge	DO-CLC-042	Farmstead	T107N, R18W, Sec. 28	Not Eligible
Dodge	DO-CLT-002	Farmstead	T107N, R18W, Sec. 29	Unevaluated
Dodge	DO-CLT-014	Arendts Farmstead	T107N, R18W, Sec. 25	Recommended Eligible
Dodge	DO-CLT-031	Lehmann Farmstead	T107N, R18W, Sec. 29	Officially Eligible – Criterion C
Dodge	DO-CLT-032	Mahlmann Farmstead	T107N, R18W, Sec. 25	Recommended Not Eligible
Dodge	DO-CLT-046	Farmstead	T107N, R18W, Sec. 29	Recommended Not Eligible
Dodge	DO-CLT-047	Lehmann Farmstead	T107N, R18W, Sec. 32	Officially Eligible - Criterion C
Dodge	DO-CLT-048	Claremont Hillside Cemetery	T107N, R18W, Sec. 33	Recommended Not Eligible
Dodge	DO-CLT-049	St. Francis de Sales Cemetery	T107N, R18W, Sec. 33	Recommended Not Eligible
Dodge	DO-CLT-051	Farmstead	T07N, R18W, Sec. 33	Recommended Not Eligible
Dodge	DO-CLT-052	McMartin House	T107N, R18W, Sec. 33	Recommended Not Eligible
Dodge	DO-WAS-012	Taylor Farmstead	T107N, R17W, Sec. 32	Unevaluated

County	Architecture Inventory Number	Property Name	Location	NRHP Eligibility Recommendation
Dodge	DO-WAS-037	Arendts Farmstead	T107N, R17W, Sec. 31	Recommended Not Eligible
Dodge	DO-WSF-001	Church	T105N, R18W, Sec. 4	Unevaluated
Steele	ST-HAV-001	Stark's Creamery	T107N, R19W, Sec. 35	Unevaluated, Possibly Demolished
Steele	ST-HAV-004	District School No. 68	T107N, R19W, Sec. 36	Unevaluated, Possibly Demolished
Steele	ST-HAV-024	Nelson Farmstead	T107N, R19W, Sec. 21	Officially Eligible – Criterion C
Steele	ST-HAV-025	Tollefson Farmstead	T107N, R19W, Sec. 22	Recommended Not Eligible
Steele	ST-HAV-026	Farmstead	T107N, R19W, Sec. 23	Recommended Not Eligible
Steele	ST-HAV-027	Farmstead	T107N, R19W, Sec. 23	Recommended Not Eligible
Steele	ST-HAV-029	Natzel Farmstead	T107N, R19W, Sec. 24	Recommended Not Eligible
Steele	ST-HAV-035	Dunker Farmstead	T107N, R19W, Sec. 30	Officially Eligible – Criterion C
Steele	ST-HAV-050	Farmstead	T107N, R19W, Sec. 24	Recommended Not Eligible
Steele	ST-ONA-018	Minnesota Central Railroad Owatonna Twp. Segment	T107N, R18W, Sec. 23	Officially Eligible –Segment of a Linear Historic District

The Literature Review did not identify previously inventoried archeological sites within the Project Area, but 18 archaeological sites were identified within one mile of the Project Area (**Table 24**). Of these 18 sites located within one mile of the Project Area: one site may be

eligible for listing on the NRHP (however, the entire site has not been evaluated to determine NRHP eligibility); three sites have been recommended Not Eligible for listing on the NRHP; and the remaining 14 sites are unevaluated for listing on the NRHP.

Table 24: Previously Reported Archaeological Sites Identified within 1-Mile of the Study Area

County	State Site Number	Site Name	Site Type	Cultural Affiliation	NRHP Eligibility Recommendation
Dodge	21DO0013	Unnamed	Single Artifact	Pre Contact	Unevaluated (Likely not eligible)
Dodge	21DO0014	Unnamed	Artifact Scatter	Pre-Contact: Paleoindian, Archaic, and Initial Woodland Traditions	Portion of Site Not Eligible_- Remainder of Site Unevaluated
Dodge	21DO0015	Unnamed	Unknown	Pre Contact	Unevaluated
Dodge	21DO-n	Hallowell	Ghost Town	Historic	Unverified Historic Reference
Steele	21ST0019	Unnamed	Lithic Scatter	Pre Contact	Unevaluated
Steele	21ST0020	Unnamed	Lithic Scatter	Pre Contact	Unevaluated
Steele	21ST0021	Unnamed	Artifact Scatter, Lithic Scatter	Pre-Contact: Paleoindian, Late Woodland	Unevaluated
Steele	21ST0022	Unnamed	Lithic Scatter	Pre Contact	Unevaluated
Steele	21ST0023	Unnamed	Artifact Scatter, Lithic Scatter	Pre-Contact: Archaic Prairie Tradition	Unevaluated
Steele	21ST0024	Unnamed	Lithic Scatter	Pre-Contact: Late Woodland	Unevaluated

County	State Site Number	Site Name	Site Type	Cultural Affiliation	NRHP Eligibility Recommendation
Steele	21ST0025	Unnamed	Lithic Scatter	Pre-Contact: Paleoindian, Late Woodland	Unevaluated
Steele	21ST0026	Unnamed	Lithic Scatter	Pre-Contact	Recommended Not Eligible
Steele	21ST0027	Unnamed	Single Artifact	Pre-Contact	Recommended Not Eligible
Steele	21ST0028	Unnamed	Single Artifact	Pre-Contact	Recommended Not Eligible
Steele	21ST0034	Eaker 1	Lithic Scatter	Pre-Contact	Unevaluated
Steele	21ST0035	Eaker 2	Lithic Scatter	Pre Contact	Unevaluated
Steele	21ST0036	Eaker 3	Lithic Scatter	Pre Contact	Unevaluated
Steele	21ST0040	Polacek	Lithic Scatter	Pre-Contact	Unevaluated

Four archaeological leads were also identified during the Literature Review. Three of these leads (21ST-e, 21Do-j, and 21DO-r) are located within the Project Area (**Table 25**) and the fourth is located within one mile of the Project Area. These four archaeological leads are unverified references to historical ghost towns and have not been surveyed by an archaeologist to provide a basis for NRHP eligibility. It is unclear if features of the ghost towns still remain.

Table 25: Previously Reported Archaeological Leads Identified within the Project Area

County	State Site Number	Site Name	Site Type	Cultural Affiliation	NRHP Eligibility Recommendation
Steele	21ST-e	Aurora	Ghost Town	Historic	Unverified Historic Reference
Dodge	21DO-j	Ashland	Ghost Town	Historic	Unverified Historic Reference
Dodge	21DO-r	Venture	Ghost Town	Historic	Unverified Historic Reference

8.6.2 Potential Cultural and Archaeological Impacts

While DCW will design the Project to avoid identified archaeological 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 Project Area. Construction within the turbine footprint, access roads, and cable trenching could incidentally unearth or directly impact unanticipated buried archaeological resources. In addition, construction of turbines may impact view shed integrity from existing architecture inventory resources.

8.6.3 Mitigation Measures

DCW will avoid impacts to previously recorded archaeological and any discovered significant architectural resources to the extent practicable during all phases of the Project, including development mircositing, construction, and operation. DCW will conduct a Phase I archaeological survey prior to Project construction for Project related ground disturbance locations. The survey protocol will be designed in cooperation with the SHPO and/or OSA, as applicable. If significant archaeological resources are identified during the Phase I 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 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 SHPO and/or the OSA.

While there are no state regulations which require an UADP, DCW will prepare such a plan. Should Project construction and/or operation inadvertently encounter previously undocumented archaeological resources or human remains, the discoveries will be reported to the 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.

8.7 Recreational Resources

8.7.1 Description of Resources

Dodge and Steele Counties provide a variety of recreational opportunities including hiking, fishing, hunting, camping, and nature viewing. Information from the USFWS, MNDNR, Dodge County, and Steele County was reviewed to identify recreational resources in the vicinity of the Project Area. As shown on **Map 6 (Public Land Ownership & Recreation)**, there are two WMAs, one WPA, and one SNA within the Project Area and an additional 19 WMAs, four

WPAs, two SNAs, one AMA, four county parks, and one state park within ten miles of the Project Area. There are also approximately 28.4 miles of snowmobile trails are located within the Project Area.

The 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 2018b). There are two (2) WMAs within the Project Area comprising approximately 79 acres of the Project Area as shown in **Table 26**. There are 19 additional WMAs located within ten miles of the Project Area as shown in **Table 26**.

Table 26: Wildlife Management Areas within Ten Miles of the Project Area Boundary

Distance from Project Area Boundary (mi)	WMA Name	General Location Relative to Project Area	WMA Area (Acres)
0.0	Marsh Wren WMA	Entirely within Project Area	40.2
0.0	Aurora WMA	Within Project Area, and extending to the west	38.6 (within Project Area) 600.5 (outside of Project Area)
0.0	Oak Glen WMA	Abuts Project Area	87.6
0.3	McMartin WMA	North of Project Area	37.5
2.5	Vorce WMA	North of Project Area	39.9
3.0	Bud Jensen WMA	East of Project Area	102.5
3.4	Somerset WMA	Northwest of Project Area	439.8
2.8	Naylor WMA: Main Unit	North of Project Area	270.4
3.6	Wasioja WMA	Northeast of Project Area	10.8
3.7	Pogones Marsh WMA	South of Project Area	112.6
3.1	Naylor WMA: Naylor	North of Project Area	37

Distance from Project Area Boundary (mi)	WMA Name	General Location Relative to Project Area	WMA Area (Acres)
	Pond Unit		
4.1	Teapail WMA	Northeast of Project Area	15.3
4.7	Pheasants Forever WMA	Northeast of Project Area	296.8
6.6	Vernon WMA	Southeast of Project Area	85.4
7.3	Prairie Rose WMA	Northwest of Project Area	118
8.0	Schletty WMA: Easment Unit	Northeast of Project Area	1.1
8.1	Schletty WMA: Main Unit	Northeast of Project Area	13.3
8.1	Wo Wacintanka WMA	South of Project Area	558
8.6	Swan WMA	Northwest of Project Area	238.4
8.7	Little Fawn WMA	Northwest of Project Area	20.3
9.3	Tri-cooperative WMA	East of Project Area	47

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 2017d). There is one SNA within the Project Area, Hythecker Prairie, which consists of approximately 39.4 acres as shown in **Table 27**. Additionally, two SNAs are located within ten miles of Project Area as shown in **Table 27**.

Table 27: Scientific and Natural Areas within Ten Miles of the Project Area Boundary

Distance from Project Area Boundary (mi)	SNA Name	General Location Relative to Project Area	SNA Area (Acres)
0.0	Hythecker Prairie	Entirely within Project Area	39.4
4.6	Iron Horse Prairie	South of Project Area	37.2
7.3	Clinton Falls Dwarf Trout Lily	Northwest of Project Area	18.7

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 2018a). State AMAs were not identified within the Project Area. However, one AMA, the Naylor AMA, is located approximately three miles north of the Project Area. Additionally, other lakes, ponds, and rivers used for recreational purposes appear present within the Project Area and within ten miles of the Project Area.

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 2015). There is one WPA within the Project Area and an additional four WPAs are located within ten miles of the Project Area and are displayed in **Table 28**.

Table 28: Waterfowl Production Areas within Ten Miles of the Project Area Boundary

Distance from Project Area Boundary (mi)	WPA Name	General Location Relative to Project Area	WPA Area (Acres)
0.0	Dodge Center Creek WPA	Entirely within Project Area	138.3
3.9	Straight Creek WPA	Southwest of Project Area	325.2
4.6	Straight Creek WPA	Southwest of Project Area	20.4

Distance from Project Area Boundary (mi)	WPA Name	General Location Relative to Project Area	WPA Area (Acres)
6.4	Straight River Marsh WPA	Southwest of Project Area	166.7
6.9	Straight River Marsh WPA2	Southwest of Project Area	16.1

Parks and public trails are also types of publically-managed lands that provide outdoor recreational opportunities to the public. There are no federal, state, or city parks located within the Project boundary; however, Rice Lake State Park is located approximately 1.5 miles north of the Project Area and four county parks are located within ten miles of the Project Area and are displayed in **Table 29**.

Table 29: County Parks within Ten Miles of the Project Area

Distance from Project Area Boundary (mi)	County Park Name	General Location Relative to Project Area	County Park Area (Acres)
4.8	Plowville Historic Site	Northeast of Project Area	0.2
6.2	Seminary Park	Northeast of Project Area	1.0
6.8	Crane Creek Park	Northwest of Project Area	4.7
7.1	Hope School Park	West of Project Area	2.0

Snowmobiling is a popular recreational activity throughout Minnesota, with state designated trails traversing most of the state. Although the trails are state designated, most snowmobile trails are monitored and maintained by the local snowmobile clubs. Several snowmobile trails are present within the Project Area and account for approximately 28.4 miles of trail. As shown on **Map 6 (Public Land Ownership & Recreation)**, these trails traverse the eastern side and the middle portion of the Project Area, just west of the Steele and Dodge County line, with offshoots to the northeast and west. 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.

8.7.2 Potential Impacts

Although several public and recreational lands are located within and adjacent to the Project Area, 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, and county parks. However, turbines located within the viewshed of natural areas and lands managed by the MNDNR may affect the aesthetic quality of those areas.

Wind turbines will be visible from various vantage points within the public lands and snowmobile trails within and adjacent to the Project Area, but the exact degree of impact to the viewshed will vary based on the location of and type of observer and individual preference. Further information regarding potential visual impacts to public lands in relation to the Project Area is found in **Section 8.4**.

Construction sounds and equipment may also temporarily diminish the aesthetic quality and scenery of the snowmobile trails. The Project may also require the temporarily closing or relocating of part of the snowmobile trails to ensure the safety of construction personnel and recreationalists during construction activities. These aforementioned impacts will be temporary as they should only occur during the construction of the Project.

8.7.3 Mitigation Measures

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, Dodge County requires WECS to be setback from snowmobile trails (*i.e.*, other ROWs) of either 250 feet (76 meters) or 1.1 times the total height of the structure, whichever is greater (Dodge County 2017: Chapter 16.51.4). Steele County does not have a setback from snowmobile trails. The Applicant will design the Project in both Steele and Dodge counties consistent with this Dodge County setback as feasible, 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. Additional mitigation measures related to potential visual impacts to public lands and recreational resources in relation to the Project Area are found in **Section 8.4.4**. The Applicant has initiated coordination with the snowmobile clubs and will continue to coordinate with the clubs regarding construction timing to minimize temporary impacts and ensure the safety of construction workers and recreationalists.

8.8 Public Health and Safety

8.8.1 Electromagnetic Fields and Stray Voltage

The term electromagnetic fields (EMF) 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 ELF), EMF is separated into electric fields (EFs), measured in kilovolts per meter (kV/m), 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 electromagnetic fields associated with the wind farm. Electromagnetic fields associated with the 345 kV generation tie line are addressed under Docket TL-17-308.

8.8.1.1 Electric Fields

The 34.5 kV underground power cable used in wind farm 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 construction 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 wind farm collection system.

8.8.1.2 Magnetic Fields

A MF is produced by the flow of current through a conductor or cable. DCW's 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 48 inches below grade. This method of installation causes the magnetic fields produced by each cable to be largely cancelled out by the fields produced by the other cables, resulting in relatively low magnetic fields 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 Generator Step-Up transformer at 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 34.5kV system. **Table 30** shows maximum calculated MF values for the collection system home run cables. Home run cables are the largest cables carrying the most current within the collection system design. The values in **Table 30** represent the maximum possible MF values, at a height of one (1) meter (3.3 feet) 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 30**.

Table 30: Estimated Magnetic Fields (mG)

Structure Type	System Condition	Current (Amps)	Distance to Proposed Centerline								
			-100' (-31 m)	-75' (-23 m)	-50' (-15 m)	-25' (-8 m)	0'	25' (8 m)	50' (15 m)	75' (23 m)	100' (31 m)
Home run cable (34.5kV)	Normal	498	0.16	0.25	0.63	2.12	36.02	2.12	0.63	0.25	0.16

8.8.1.3 Stray Voltage

Stray Voltage is defined by 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. DCW's collector circuits are inherently balanced, so no appreciable neutral to earth voltage is expected. Additionally, there will be no connection between DCW's collection system and the local distribution system, and, therefore, no stray voltage from the electrical system is anticipated to impact the existing electrical system.

8.8.2 Potential Impacts

Extensive research has been conducted by the National Institute of Environmental Health 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). EMFs from underground

electrical collection and feeder lines dissipates 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 magnetic fields often dissipate significantly within approximately three feet (approximately 0.9 meters) 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.

8.8.3 Mitigation Measures

Based upon current research regarding EMFs, and the separation distances being maintained between transformers, turbines and collector lines from public access and occupied homes, EMFs associated with the Project are not expected to have an impact on public health and safety. 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.

8.8.4 Aviation

A review of the FAA National Airspace Systems Resources database and the AirNAV Aviation Information database revealed nine active registered airports and six active heliports located within 20 miles of the Project Area (AirNav 2018). Details about these airports are set forth in **Table 31**. The public airports nearest the project are Dodge Center Airport (3.35 miles east of the Project Area) and Owatonna-Degner Regional Airport (5.90 miles northwest of the Project Area).

Table 31: Airports within 20 Miles of the Project Area

Airport Name	City	County	Distance (Miles)	Runway Information	Runway Elevation (ft)
Dodge Center Airport (Public)	Dodge Center	Dodge	3.35	Concrete/ Turf	1,304/ 1,295 (397/394 m)
Allina Hospital & Clinic Owatonna	Owatonna	Steele	4.60	Concrete	1,162 (354

Airport Name	City	County	Distance (Miles)	Runway Information	Runway Elevation (ft)
Heliport					m)
Agri Helicopter Incorporated Heliport	Owatonna	Steele	5.14	Turf	1,184 (361 m)
Owatonna-Degner Regional Airport (Public)	Owatonna	Steele	5.90	Concrete/ Asphalt	1,145/ 1,139 (349/347 m)
Underland Airstrip (Private)	Medford	Steele	8.07	Turf	1,145 (349 m)
Petes Airport (Private)	Dexter	Mower	15.71	Turf	1,337 (408 m)
District One Hospital Heliport	Faribault	Rice	16.82	Concrete	1,060 (323 m)
Saint Olaf Hospital Heliport	Austin	Mower	17.64	Concrete	1,201 (366 m)
Mayo Clinic Heliport	Rochester	Olmsted	17.7	Concrete	1,166 (355 m)
Austin Municipal Airport (Public)	Austin	Mower	18.20	Concrete	1,231 (375 m)
Waseca Municipal Airport (Public)	Waseca	Waseca	18.48	Asphalt	1,127 (344 m)
Charlton Building Heliport	Rochester	Olmsted	19.00	Concrete	1,086 (331 m)
Albert Lea Municipal Airport (Public)	Albert Lea	Freeborn	19.4	Asphalt/ Asphalt	1,261/ 1,257 (384/383 m)
Rochester International Airport (Public)	Rochester	Olmsted	19.52	Concrete/ Concrete	1,304/ 1,315 (398 m)

Airport Name	City	County	Distance (Miles)	Runway Information	Runway Elevation (ft)
Faribault Municipal Airport	Faribault	Rice	19.97	Asphalt/ Turf	1,060/ 1,055 (323/322 m)

(AirNav 2018)

There are no registered public airports located within the Project Area. The closest registered airport is the Dodge Center Airport located approximately 3.35 miles (5.39 kilometers) away from the northeastern extents of the Project boundary. This is a public-use airport with one concrete runway and one turf runway which require permission prior to landing. Runway 16/34 is concrete and is 4,500 feet (1,372 meters) in length, and runway 4/22 is turf and is 2,383 feet (726 meters) in length (AirNav 2018). Due to the agricultural use within the region, small private runways may be associated with crop dusting activities within or near the Project Area.

Aviation Towers

The electromagnetic interference analysis (WindLogics 2017) did not identify active aviation towers within the Project Area. Aviation towers provide radio communications related to air traffic. Ten aviation towers are located within 15.5 miles (25 kilometers) of the Project Area. The aviation towers have the call signs WGE2, WRLB2051, WRLA2017, WRLG, 2026, WPZQ973, WJZ8, WRLL2041, WQSR490, WRLO2040, and WRNV2064.

8.8.5 Potential Impacts

Under 14 CFR Part 77.9, all structures exceeding 200 feet (61 meters) 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 MN/DOT prior to developing the Project to ensure the safety of airspace within Minnesota. A permit from MN/DOT is required for any of the following (MN/DOT 2018b):

- Structure is greater than 500 feet (152 meters) AGL;
- Structure is more than 200 feet (61 meters) AGL within three nautical miles of an airport and increasing by 100 feet (31 meters) for each additional mile out to six miles or 500 feet (152 meters);
- 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, DCW contracted with Capitol Airspace Group to conduct an Obstruction Evaluation for the Project Area. The summary of that evaluation is detailed below.

Obstacle clearance surfaces overlying the Project range from 1,599 to 1,849 feet (487 to 564 meters) above MSL and are associated with instrument approach procedures and minimum flight altitudes for various aviation flight instruments and techniques to ensure the safety of aviation activities. Proposed wind turbines that exceed these obstacle clearance surfaces (*i.e.*, surface elevation + turbine height > 1,599 to 1,849 feet above MSL) would require an increase in the FAA documented minimum flight altitudes within the Project Area. If the FAA determines one or the sum of these impacts to constitute a substantial adverse effect, it could result in a determination of hazard.

The USGS elevation data indicates that instrument approach procedures could limit wind turbines in very small northwestern and northeastern sections of the study area. Minimum vectoring altitudes and minimum IFR altitude sectors could limit wind turbines in a very small western section of the Project Area.

If the FAA accounts for a planned instrument runway at Dodge Center Airport, it could result in lower height constraints than those identified above. These lower surfaces could limit wind development in the northeastern section of the study area.

In addition, a military training route overlies the Project, and, thus, siting of turbines will need to be coordinated with the military training route for the Air National Guard.

Crop dusting activity usually occurs during daylight hours with good visibility, allowing pilots to have a clear line of site with obstacles. Therefore, impacts to crop dusting activities are expected to be minimal.

Aviation Towers

While no harmful interference is expected for the aviation towers; DCW 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.

8.8.6 Mitigation Measures

DCW will apply to the FAA for a determination of No Hazard for each wind turbine and MET tower prior to turbine and MET tower construction. In order to avoid potential impacts to air traffic, the Applicant will mark and light the turbines to comply with FAA requirements. DCW

submitted the proposed location of the turbines and associated Project facilities to the FAA in early June, 2018 for an aeronautical study and will work closely with the FAA to ensure the above potential concerns are addressed properly and appropriate mitigation measures are implemented. In addition, during the FAA review process for the determination of the No Hazard, the Department of Defense will review the Project, and the applicant will coordinate with the Department of Defense to ensure the Project does not adversely affect the military training route.

Aviation Towers

DCW will continue to coordinate with the FAA in regards to potential interference with aviation towers. If the FAA determines the Project will result in impacts to aviation towers, DCW will work with the FAA to minimize and mitigate for the impacts.

8.8.7 Safety and Security

The Project is located in predominately rural areas of Dodge and Steele counties. Emergency management response services within the Project Area are provided by the Dodge County Sheriff and the Steele County Emergency Manager, respectively (Dodge County 2017a; Steele County 2017). Each county has a plan for preparedness, response, recovery, and mitigation, and works closely with local, state, and federal officials to educate, prepare for, respond to, and recover from disasters and large-scale emergencies.

8.8.8 Potential Impacts

Potential safety and security impacts associated with the construction of the Project include human emergencies and accidents, natural hazards, hazardous materials incidents, and traffic accidents. Potential safety and security impacts associated with the operation of the Project, though rare, include the potential of falling ice, unauthorized access to electrical and mechanical components of turbines, turbine malfunction, and turbine collapse.

8.8.9 Mitigation Measures

DCW will integrate current engineering standards with applicable regulatory requirements throughout the project design. As the project enters construction, adaptive management strategies for safety and security impacts identified in **Section 8.8.8** will be incorporated as on-going improvements within the project. The Applicant will actively work with the Dodge County Emergency Management (DCEM) and Steele County Emergency Management (SCEM) offices and other agencies to prepare an emergency management plan for the Project to respond to emergencies, natural hazards, hazardous materials incidents, human-made problems (*e.g.*, fire, etc.), and related incidents. Additionally, DCW will work closely with the each county's planning office to ensure adequate assignment of 911 addresses for coordination of emergency responses.

DCW will develop a site O&M manual as well as a health and safety training plan for the Project, which will include contacts, education and training materials, and action plans and procedures to reduce the potential for safety and security issues. In addition, during construction and operation of the Project, access to sensitive site areas such as the POI stations will be restricted through control measures, including the use of keyed locks and fencing, to protect against unauthorized access to the Project's facilities and subsequent exposure to potential hazards. Additionally, contracted security services will be employed through construction to ensure the security of construction equipment and facilities. The site team will work with landowners individually to ensure any specific security concerns they may have are being addressed to their satisfaction.

Safety and security measures will be implemented by DCW for the protection of personal property and of personal injury. These measures include:

- Wind turbine locations will be registered with DCEM and SCEM for emergency responses and procedures related to the Project;

- Project turbines and towers will comply with the setback standards established by the Commission, Dodge County, and Steele County;

- Proper health and safety training of construction and maintenance contractors will occur;

- DCW will engage contractors who demonstrate a strong safety culture including management commitment and engagement, safe work policies and programs, employee involvement, and historic safe work performance indicators;

- Contractors will be required to implement safe work requirements that meet or exceed OSHA requirements, applicable permits, applicable equipment manufacture and technical work instructions and any other prudent safety practices, methods, and/or standards prudently and generally engaged in or observed by the majority of construction contractors for similar work. Contractors are expected to exercise reasonable judgement and implement work in a manner consistent with applicable laws, rules and regulations, as well as applicable permits to achieve an accident and injury free work place; and

- In the event that local residents need emergency services during Project construction, construction will cease and any impeding construction equipment and vehicles will be relocated so that emergency vehicles and services may easily access the emergency location. During operation, the Project will not interfere with emergency services.

8.9 Hazardous Materials

8.9.1 Description of Resources

The predominant land use in the Project Area is agriculture. Potentially hazardous materials within the Project Area 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. Farmsteads within the Project Area may have lead-based paint, with asbestos associated with shingles or insulation, or lead polychlorinated biphenyls in transformers. In addition, in rural areas trash or junk piles are a common occurrence.

The MPCA "What's In My Neighborhood?" database (MPCA 2018) of known and potential sources of soil and ground water contamination was reviewed for the Project Area. The MPCA database indicated that a total of 105 sites are listed within the Project Area, 64 of which are listed as active. Of these sites, there are 91 feedlots, six construction stormwater sites, five industrial stormwater permit sites, two multiple program sites, and one vacant house (MPCA 2018).

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

8.9.2 Potential Impacts

Prior to construction, the Applicant will conduct an American Society for Testing and Materials conforming Phase I Environmental Site Assessment to identify and avoid existing recognized environmental conditions (RECs) within the Project Area, 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 Project spills and/or leaks to occur. The primary concerns associated with these potential spills and/or leaks are the potential impacts to surface and ground water resources and the potential for soil contamination within the Project Area.

8.9.3 Mitigation Measures

Information from the Phase I Environmental Site Assessment will be used to identify and avoid, if necessary, any identified RECs. If RECs cannot be avoided, appropriate remediation, if required, will be conducted to avoid potential concerns associated with RECs. 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, hazardous materials stored outdoors will be stored within secondary containment. 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 impacts are avoided.

8.10 Land-Based Economies

8.10.1 Description of Resources

Land use within the Project Area is primarily agricultural and is the use that accounts for approximately 45,530 acres, or approximately 87% of the Project Area, as shown in **Map 15 (Land Cover)**. An additional 5% of land is indicated as hay/pasture/herbaceous land cover, much of which is used for livestock grazing (Homer et al. 2015). According to the 2012 USDA Agricultural Census Report, over 80% of the land in Dodge County (roughly 225,418 acres) was used for agriculture on approximately 621 farms. Corn, soybeans, and wheat are the primary crops grown in Dodge County, while swine and cattle are the predominant livestock raised in the county. The market value of agricultural products sold in the county for 2012 was approximately $288.1 million, with crop markets at approximately $177.6 million and livestock markets at approximately $110.5 million (USDA 2014).

In Steele County, approximately 86% of land is used for agricultural purposes. Roughly, 237,986 acres are used for agricultural purposes on approximately 796 farms. The market value of agricultural products sold in Steele County in 2012 was approximately $293 million, with crop markets comprising $196 million and livestock markets comprising $97 million (USDA 2014).

Approximately 42% of the total Project Area is classified as prime farmland, while approximately 52% is classified as prime farmland, if drained. Additionally, approximately 2.1% of land within the Project Area is not prime farmland and approximately 3.5% is considered farmland of statewide importance (NRCS 2018).

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 MPCA's "What's In My Neighborhood" map search tool, there are 608 registered feedlots in Dodge County and 627 registered feedlots in Steele County. Roughly, 91 of the aforementioned registered feedlots are in the Project Area (MPCA 2016a).

8.10.2 Potential Impacts

The Project is not expected to significantly impact agricultural land use or the general character of the area. While an average 0.7 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 an 80-foot diameter of permanent impact at each turbine location (including the concrete foundation and gravel ring around the foundation), 16-foot wide permanent access roads, approximately two acres for O&M facility, and one acre for the substation. The primary permanent impact to active agricultural land will be the reduction of crop production on a total of approximately 49 acres of cultivated crop in the Project Area (refer to Section 8.18.2). Collector lines will not result in permanent impacts as they will be installed entirely underground below the plow zone. 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 32** summarizes the impacts to prime farmland for turbines, access roads, the O&M facility, and the Project substation.

Table 32: Summary of Permanent Prime Farmland Impacts

Prime Farmland Type	Turbines	Access Roads	O&M Facility	Substation	Total
All Areas Prime Farmland	4.42	18.81	1.71	0.77	**25.94**
Prime Farmland if Drained	3.42	22.43	0.01	0.00	**25.86**
Farmland of Statewide Importance	0.00	0.09	0.00	0.00	**0.09**
Not Prime Farmland	0.20	0.14	0.00	0.00	**0.34**
TOTAL	**8.04**	**41.47**	**1.72**	**0.77**	**52.00**

Temporary impacts to farmland 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 impact calculations utilized the following: a 300-foot wide construction easement around each turbine location (for crane pads, equipment storage, soil stock piling, etc.), 200-foot wide construction easements for access roads (for equipment delivery and staging), 50-foot wide construction easements for collection lines and crane paths, five acres for the substation, two acres for the O&M (same as the permanent impact), and 15 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 worst case scenario. Refer to **Table 33**, below.

Table 33: Summary of Temporary Prime Farmland Impacts

Prime Farmland Type	Turbines	Access Roads	O&M Facility	Substation	Collection	Laydown Yard	Crane Paths	Total
All Areas Prime Farmland	213.05	182.76	1.71	2.64	65.88	6.34	23.19	**495.56**
Prime Farmland if Drained	235.81	237.47	0.01	2.37	116.41	8.66	27.45	**628.18**
Farmland of Statewide Importance	0.01	1.05	0.00	0.00	2.69	0.00	0.00	**3.76**
Not Prime Farmland	5.17	1.05	0.00	0.00	0.03	0.00	0.08	**6.34**
TOTAL	**454.05**	**422.34**	**1.72**	**5.01**	**185.01**	**15.00**	**50.72**	**1,133.84**

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. Stray voltage is discussed in **Section 8.8.1**.

8.10.3 Mitigation Measures

Only the land for the turbines and associated pads, substation, O&M facility, certain electrical equipment, and 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 49 acres of agricultural land will not result in the loss of agricultural-related jobs or net loss of income. Additionally, revenue lost from the removal of land from agricultural production will be offset by lease payments to landowners according to their respective contracts with DCW.

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 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 to ensure farmland is restored in accordance with the lease agreement between the landowner and DCW. 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**.

8.10.4 Forestry

There are no economically important forestry resources within the Project Area. According to 2011 Land Cover Data, approximately 5.4% of the Project Area consists of wooded areas (CG Homer et al. 2015). Most wooded areas within the Project Area consist of shelterbelts or small woodlands surrounding active farmsteads or streambanks. The western portion of the Project Area generally contains more and larger contiguous woodlot areas in comparison to the remainder of the Project Area. In coordination with MNDNR, DCW has sited Project infrastructure to avoid larger, continuous woodlots, including woodlots MNDNR indicated were of potential concern. According to the 2011 National Landcover Database – Land Use-Land Cover dataset (Homer et al. 2015) 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.

8.10.5 Mining

Quarries, gravel, and sand pits exist throughout Dodge and Steele counties, but are largely inactive, abandoned or their use is limited to a private landowner. Based on review of MN/DOT County Pit Maps and USGS topographic maps for the Project Area, three (3) active pits are located in the southwestern portion of the Project Area in Steele County (MN/DOT 2002; USGS 2014). Refer to **Map 16 (Site Geology)**. Review of aerial imagery indicates that one of these pits, located northwest of the intersection of SE 68th Street and SE 89th Avenue, is likely

abandoned/inactive and has been returned to agriculture. The other two sites are located near the southwestern boundary of the Project Area, approximately 2.5 miles from the nearest proposed turbine location. Project infrastructure will not be located within sand or gravel operations.

8.10.6 Potential Impacts

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. DCW may request to use aggregate from mining operations for use during construction. DCW will coordinate with the local mining operations, as appropriate.

8.10.7 Mitigation

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

8.11 Tourism

Dodge County offers tourism opportunities throughout the year. In 2015, annual leisure and hospitality expenditure in Dodge County was approximately $11.9 million, which equated to about 441 tourism-related jobs in the county (MNDEED 2017). Generally, tourism in Dodge County focuses on promoting the area's parks, art, and hospitality facilities as well as recreational activities. Local community events include the Dodge Center Harvest Fest, Mantorville Marigold Days, Zumbro Bend Rendezvous, Dodge County Relay for Life, Claremont Hog Fest, Festival in the Park, Dodge County Free Fair, and West Concord Survival Days.

Annual leisure and hospitality expenditure in Steele County in 2015 was approximately $72.7 million, which equated to about 1,566 tourism-related jobs in the county (MNDEED 2017). Owatonna offers such tourism draws as the Reptile and Amphibian Discovery Zoo and the Village of Yesteryear, in addition to outdoor recreational activities.

As shown in **Section 8.7**, there are two WMAs, one WPA, and one SNA within the Project Area and an additional 19 WMAs, four WPAs, two SNAs, one AMA, four county parks, and one state park within ten miles of the Project Area. Three WMAs, one WPA, and one SNA occur within the Project boundary. These public resources provide tourism opportunities including biking, camping, wildlife watching, hunting, fishing, and snowmobiling. Refer to **Map 6 (Public Land Ownership & Recreation)**.

Snowmobiling is a popular activity in Dodge and Steele counties with several trails offering a potential tourism draw. Approximately 75 miles of snowmobile trails are found throughout Dodge County and another 175 miles of trails in Steele County. Approximately 28.4 miles of trail run through the Project Area (Dodge County 2013). A local group called the Dodge Center

Sno-Seekers Snowmobile Club was incorporated in 1972 to develop and maintain a connecting trail system throughout Dodge County (Minnesota United Snowmobilers Association 2018).

8.11.1 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 8.7.2**, there are three snowmobile trails that are present within the Project Area and one just outside the western Project boundary. 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.

8.11.2 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 8.4.4**.

8.12 Local Economies

According to the ACS 2012-2016 estimates, educational services, health care, and social assistance accounted for 24.8% of jobs statewide in Minnesota, followed by manufacturing at 13.5% and retail trade at 11.2% (U. S. Census Bureau 2018b). The ACS 2012-2016 also estimates that educational services, health care, and social assistance accounted for 32.5% of jobs in Dodge County, followed by manufacturing at 14.0% and retail trade at 8.9%, and estimates that manufacturing accounted for 24.4% of jobs in Steele County, followed by educational services, health care, and social assistance at 18.4% and retail trade at 12.1% (U. S. Census Bureau 2018b).

8.12.1 Potential Economic Impacts

Overall, the Project will have a moderately positive impact on the region by adding infrastructure, temporary and permanent jobs, increasing the counties' 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. Approximately 200 construction and 5 full time O&M jobs are expected as part of the Project. Some jobs may be filled by existing local or regional workers. DCW plans to use some local contractors and suppliers, where feasible, for portions of construction which will contribute to the overall economy of the region. 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 49 acres will be removed from agricultural production or its current land use for the length of the Project. DCW 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.

8.12.2 Tax Payments and Local Spending

Wind energy infrastructure in the Project Area will provide long-term positive economic benefits to local landowners, the state, and the local economy of southeastern Minnesota. Landowners in the Project Area will benefit from annual lease payments, while, in accordance with state and county law, DCW will pay property tax and production taxes on the land and energy production to local governments. For example, 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 an annual Wind Energy Production Tax ranging from approximately $60,000 to $700,000 in the first year, and between $570,000 and $700,000 annually after the first year in Dodge County, and approximately $15,000 to $160,000 in the first year, and between $130,000 and $160,000 annually after the first year in Steele 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 Dodge and Steele counties 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 services. Patronage at hotels and restaurants, the purchase of consumer goods and services by the various workers, as well as the purchase of materials such as fuel, concrete, and gravel from local vendors will generate revenue for local business. It is anticipated that the largest increase in economic activity would be located near the Project, between Owatonna and Rochester, Minnesota.

8.12.3 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. DCW 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, Dodge and Steele counties will experience an increase in tax revenues due to the Wind Energy Production Tax and property tax payments.

8.13 Topography

8.13.1 General Description

The general topography of the Project Area is described as undulating, rolling relief with approximate elevations between 1,220 and 1,340 feet (372 and 408 meters) above MSL. The Project Area generally has lower elevations in the central and northwestern sections with higher elevations in the southeast and southwest. Local slopes vary throughout the Project Area, and generally slope from the northeast, southeast, and southwest to the center of the Project Area (see **Map 10 (Topographic)**).

According to the MNDNR Ecological Classification System, the Project Area is located within the Oak Savanna Subsection (222Me) of the Minnesota and Northeast Iowa Morainal Section of the Eastern Broadleaf Forest Province. The Oak Savanna Subsection is generally characterized by gently rolling topography, Late Wisconsin end moraines, stagnation moraines, and few lakes (MNDNR 2017a).

8.13.2 Potential Impacts

Some limited, localized impacts to the topography within the Project Area will come from 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.

8.13.3 Mitigation Measures

DCW will implement construction Best Management Practices (BMPs) in accordance with the MPCA's *Stormwater Best Management Practices Manual* and the approved Project Stormwater Pollution Prevention Plan (SWPPP) to ensure erosion and sedimentation are minimized. A grading plan will be developed for the substation and O&M facility area. In addition, DCW will also avoid construction activities in areas with steep slopes (>10%). Following decommissioning of the Project, the site will be restored to its natural topographical contours to the extent possible.

8.14 Soils

8.14.1 General Description

Overall, the Project Area is largely comprised of four soil associations with similar characteristics. These include Skyberg-Maxfield-Clyde (s3623), Estherville-Dakota-Bixby-Biscay (s3620), Lester-Le Sueur-Cordova (s3503), and Kato-Canisteo (s3621) and are generally composed of silty clay loams that are moderately dark in color and occur on 0 to 6% slopes (see **Map 17 (Soils)**). These soil associations are generally deep, moderately well drained and are underlain by firm glacial till (USDA 1961). Soils in the Skyberg-Maxfield-Clyde soil association

have a layer of sand or gravel between the silty clay loam horizons of the subsoil and glacial till. There are seven additional soil associations within the Project Area that account for approximately 36% collectively, and are all generally composed of a moderately permeable silt loam on 0 to 15% slopes. All soil associations are listed in **Table 34** below.

Table 34: Soil Associations in Project Area

Soil Association	Area (Acres)	Percent of Project Area
Skyberg-Maxfield-Clyde (s3623)	14,256.37	27.37%
Estherville-Dakota-Bixby-Biscay (s3620)	7,308.34	14.03%
Lester-Le Sueur-Cordova (s3503)	5,854.46	11.24%
Kato-Canisteo (s3621)	5,658.46	10.86%
Skyberg-Maxfield-Kasson (s3622)	4,716.69	9.06%
Muskego-Lester-Hayden (s3505)	4,523.95	8.69%
Webster-Nicollet-Clarion-Canisteo (s1750)	4,471.26	8.58%
Readlyn-Racine-Maxfield-Kasson (s3624)	2,202.19	4.23%
Moland-Merton-Maxcreek-Canisteo (s3619)	1,533.75	2.94%
Waukee-Spillville-Radford-Lawler (s3638)	1,514.75	2.91%
Vlasaty-Sargeant (s3713)	44.80	0.09%

8.14.2 Potential Impacts

Construction and operation of the proposed Project will result in short and long-term impacts to soils within the Project Area. Short-term and minor 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. Refer to **Section 8.10.2** for additional information related to impacts related to prime farmland.

8.14.3 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, will be 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. By implementing these systems, plans and practices, measures will be taken to protect surface waters from direct and indirect impacts of sedimentation and erosion, 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.

8.15 Geologic and Groundwater Resources

8.15.1 General Description

Dodge and Steele Counties fall in the Ordovician System geology which was formed during the Paleozoic Era approximately 251 million years ago. Bedrock in this region is made up of alternating beds of limestone, sandstone, and shale but is composed largely of limestone. St. Peter Sandstone is the deepest layer of sandstone and varies in thickness from less than 200 feet to over 550 feet (61 to over 168 meters) (see **Map 16 (Site Geology)**). In Dodge County, the underlying formations trend closer to the surface in a northwestwardly direction. Iowan, Kansan, and Nebraskan glacial drift overlies the Paleozoic rock and makes up the present day surface of the Project Area. The average thickness of the glacial drift is generally around 100 feet (30.48 meters) (USDA 1961).

Glacial drift is largely composed of sand, gravel, sandstone and clay. In places, adequate supplies of groundwater for ordinary use can be obtained from the glacial drift itself or from the limestone where it is underlain by impervious beds of shale. Water from this area is moderately hard.

Groundwater in the region is supplied by the Upper Carbonate aquifer. The aquifer consists of several formations including limestone, dolomite, and dolomitic limestone of the Devonian Cedar Valley Limestone and the Ordovician Maquoketa Shale, Dubuque Formation and Galena Dolomite. The aquifer is underlain by shale, dolomitic limestone, and limestone of the Decorah Shale, the Platteville Formation and the Glenwood Shale that form an effective confining unit. Regional ground-water flow in the upper carbonate generally is outward toward the periphery of the aquifer, and ranges in thickness from a featheredge along its periphery to about 650 feet (198 meters) (Olcott 1992).

According to the Minnesota Department of Health's County Well Index online database (MDH 2017), wells are interspersed throughout the Project Area. Well depths within the Project Area

vary widely ranging between 30 feet to 465 feet (9 meters to 142 meters) deep, with most being in excess of 100 feet (31 meters) in depth (MDH 2017).

8.15.2 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 abidance of 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 resource 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.

8.15.3 Mitigation Measures

Construction and operation of the proposed Project is not expected to impact groundwater resources as well locations will be taken into account and turbines will be set back following state and county standards. Mitigation measures to address dewatering are summarized in **Section 8.16.5**.

8.16 Surface Water and Floodplain Resources

8.16.1 Lake, Rivers, Streams, and Ditches

The Project Area is located within the Upper Mississippi River Basin and is found within the Zumbro watershed (HUC8 07040004), the Upper Cedar watershed (HUC8 07080201) and the Cannon River watershed (HUC8 07040002) (EPA 2017). Within these drainage basins, numerous intermittent and ephemeral watercourses and a few perennial watercourses are scattered across the Project Area.

According to the USGS National Hydrography Dataset (NHD), the Project Area contains approximately 11.5 acres (0.0002%) of NHD waterbodies and approximately 93 miles of NHD watercourses (USGS 2017) (see **Map 18 (Surface Water)**). Several of the NHD watercourses are also designated Public Water Inventory (PWI) streams. Public waters are identified on PWI maps and are designated as public waters under MNDNR's Public Waters Permit Program (Revisor of Statutes, State of Minnesota 2016; see **Map 18 (Surface Water)**). Seven of these PWI streams have designated 50-foot (15-meter) protection buffer requirements according to the MN Buffer Law (MNDNR 2017b), including Dodge Center Creek and two associated tributaries

in the northcentral and northeast portions of the Project Area. In addition, a number of designated watercourses scattered throughout the Project Area have designated 16.5 foot (5.0 meter) protection buffer requirements. Protection buffers serve as a siting restriction near public water resources to aid in their protection from potential negative impacts. See **Table 35**, below, for a list of the public waters within the Project Area.

Table 35: Public Waters Inventory

PWI Type	PWI Feature Name	Protection Buffer (feet)	PWI Unique Feature ID	Length within Project Area (miles)
Public Ditch	Unnamed	16.5 (5.0 meters)	DODG_86	2.64
Public Ditch	Unnamed	16.5 (5.0 meters)	DODG_72	0.64
PW Altered Natural/Public Ditch	Unnamed Creek	16.5 (5.0 meters)	DODG_54	12.40
Public Ditch	Unnamed	16.5 (5.0 meters)	STEE_159	0.18
PW Altered Natural/Public Ditch	Unnamed	16.5 (5.0 meters)	DODG_78	2.22
PW Altered Natural/Public Ditch	Unnamed	16.5 (5.0 meters)	DODG_69	1.50
PW Altered Natural	Dodge Center Creek	50 (15 meters)	DODG_13412	0.19
PW Natural	Unnamed Creek	50 (15 meters)	DODG_27918	0.03
Public Ditch	Unnamed	16.5 (5 meters)	STEE_11	1.76
PW Natural	Dodge Center Creek	50 (15 meters)	DODG_7804	1.18
Public Ditch	Unnamed	16.5 (5.0 meters)	STEE_96	0.67
Public Ditch	Unnamed	16.5 (5.0 meters)	DODG_100	0.46
Public Ditch	Unnamed	16.5 (5.0 meters)	STEE_93	0.00
PW Altered Natural	Unnamed Creek	50 (15 meters)	DODG_13413	3.21
Public Ditch	Unnamed	16.5 (5.0 meters)	STEE_158	0.19
Public Ditch	Unnamed	16.5 (5.0 meters)	DODG_74	0.62
Public Ditch	Unnamed	16.5 (5.0 meters)	DODG_102	0.05
PW Altered Natural	Unnamed Creek	50 (15 meters)	DODG_13414	0.52
Public Ditch	Unnamed	16.5 (5.0 meters)	DODG_89	3.79
Public Ditch	Unnamed	16.5 (5.0 meters)	DODG_75	0.40

PWI Type	PWI Feature Name	Protection Buffer (feet)	PWI Unique Feature ID	Length within Project Area (miles)
PW Natural	Unnamed Creek	50 (15 meters)	DODG_3855	1.17
Public Ditch	Unnamed	16.5 (5.0 meters)	DODG_76	1.51
PW Natural	Unnamed Creek	50 (15 meters)	DODG_3854	2.04
			Total:	37.39

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 Project Area are listed as impaired by the Minnesota Pollution Control Agency (MPCA 2016b). Dodge Center Creek and Turtle Creek fail to meet one or more of the aforementioned water quality standards including turbidity, E. Coli, and/or failing to meet one or more bioassessment standards for macroinvertebrates.

8.16.2 Designated Wildlife Lakes and Special Waters

The MNDNR commissioner may formally designate lakes for wildlife management under the authority of Minn. Stat. § 97A.101 subdivision 2 (a) after notice and a hearing. There are no MNDNR designated wildlife lakes within the Project Area. There are also no identified outstanding resource value waters or trout streams within the Project Area (MNDNR 2015).

8.16.3 FEMA Floodplains

FEMA Flood Insurance Rate Maps have been created and are available for most of the Project Area, but the majority of base flood elevations have not been determined. There are 100-year flood plains (Zone A) for Dodge Center Creek and associated tributaries located within the northcentral portion of the Project Area (FEMA 2015). A large expanse of the Project Area that has agricultural watercourses has been determined as an area with minimal flood hazards (Zone C). A floodplain map is provided in **Map 19 (FEMA Flood Zone)**. FEMA Floodplain Panels are included in **Appendix H (FEMA Floodplain Panels)**.

8.16.4 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 consist of the installation and removal 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 via open cut methodology, if required. During this process, temporary dewatering of the feature may be required to ensure the collection line is safely and correctly installed. 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.

8.16.5 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. To protect surface waters from erosion resulting from construction activities, BMPs consistent with the MPCA Stormwater BMP Manual will be employed to ensure that excavated material is contained, exposed soil is protected, restored material is stabilized and disturbed areas are re-vegetated 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 Stormwater Best Management Practices Manual is presented in the following table.

Table 36: 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
		Mulch
		Hydromulch
		Sediment fencing
Slope Breakers	5%–15% slope (300-foot (91 meter) 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 control measure will vary depending upon 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 to a surface water within uplands. 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 occur, mitigation measures to address dewatering would include measures such as the following to ensure sediment laden water will not be directly discharged to surface waters. Reducing the turbidity of water can be addressed by the following measures:

- Constructing a temporary sediment trap for turbine 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, PWIs, or 100 year floodplains are unavoidable, the Applicant will apply for the necessary permits prior to construction and will work with officials to minimize impacts. Also, in **Sections 8.17.1** and **8.17.3** there is additional information regarding regulatory agencies and potential use of mitigation methods for the impacts to features.

8.17 Wetlands

8.17.1 Description of Resources

The Project Area contains both isolated wetlands and wetlands associated with watercourses scattered across the Project Area. The Project Area primarily contains freshwater emergent wetlands with some mapped shrub/scrub and forested wetlands dotting the landscape (see **Map 20 (National Wetland Inventory Update for Minnesota)**). Some wetlands within agricultural

settings appear to exhibit anthropological disturbance. Based on aerial photograph interpretation, a moderate number of the aforementioned wetlands would likely be considered jurisdictional Waters of the United States due to their proximity to the Straight River or the South Branch Middle Fork Zumbo River.

According to the USFWS National Wetland Inventory (NWI) database, the Project Area contains approximately 1,592 acres of mapped NWI wetlands and open water features (3.1% of the Project Area) (USFWS 2017b). Wetland types and their associated acreages are illustrated in **Table 37**.

Table 37: NWI Wetland Type and Acreage

NWI Type	Acres	Percent of Project Area
Freshwater Emergent Wetland (PEM)	1,186	2.3%
Freshwater Forested/Shrub Wetland (PFO/PSS)	337	0.7%
Freshwater Pond (Open Waters)	57	0.1%
Riverine Waters	12	0.0%
Total:	**1,592**	**3.1%**

There are no calcareous fens identified within or adjacent the Project Area. 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 3.7 miles north of the Project Area. Due to the specialized nature of fens, it is unlikely to find associated habitat within the Project Area (MNDNR 2016b).

In the State of Minnesota, some wetlands are designated as Public Water Inventory Basins (PWI Wetlands). All PWI Wetlands are identified as Types 3, 4, and 5 as defined by the USFWS Circular 39 (USFWS 1971) and are 10 acres or more in size in rural areas and 2.5 acres in size in incorporated areas. There is one Type 3 PWI wetland consisting of approximately 69.3 acres within the Project Area, as shown on **Map 20 (Surface Water)**. No project infrastructure is planned within this PWI Wetland, thus, the Project will avoid impacts to PWI Wetlands.

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 Permit. 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 Board of Water and Soil Resources and is implemented by Local Government Units (LGUs). The LGU administering the WCA within the Project Area are

the Soil & Water Conservation Districts of Dodge and Steele counties. 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.

8.17.2 Potential Impacts

Turbines and meteorological 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 easement extents. Field work to delineate wetlands is ongoing so that wetland areas can be avoided. In the event that permanent wetland impacts cannot be avoided during the siting of project infrastructure, DCW will coordinate with the appropriate agencies including USACE, WCA, and the Soil and Water Conservation Districts of Dodge and Steele counties.

8.17.3 Mitigation Measures

During the design phase of the Project, measures will be taken to avoid impacts to wetland areas, where possible, and to minimize impacts to wetlands in cases were the impacts cannot be avoided. Results of the wetland desktop analysis and micro-siting field event will be considered by DCW in an effort to avoid siting Project components in wetlands, where feasible. 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. If adverse impacts to wetlands are unavoidable, the impacts will be minimized. BMPs consistent with the MPCA Stormwater BMP Manual will be employed 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. In some cases, a narrower construction easement may be considered to minimize impact.

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 re-vegetated with non-invasive species. Significant adverse Project-related impacts to wetlands are not anticipated because of design considerations and the implementation of stormwater BMPs. 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.

8.18 Vegetation

8.18.1 Description of Resources

The Project Area is located within the Oak Savanna Subsection (222Me) of the Minnesota and Northeast Iowa Morainal Section of the Eastern Broadleaf Forest Province. Vegetation types in this subsection before European settlement of the area consisted primarily of burr oak savanna, but tallgrass prairie and maple-basswood forests were also common (MNDNR 2017a). Today, this subsection consists primarily of row crop agricultural land.

The 2011 National Landcover Database – Land Use-Land Cover dataset (Homer et al. 2015) indicates that the Project Area contains approximately 45,530 acres of cultivated land or about 87% of the Project Area. In addition to cultivated lands, agricultural regions typically also include idle lands, pastures, and grasslands. The 2011 National Landcover Database – Land Use-Land Cover dataset indicates that the Project Area contains approximately 619 acres of pastures, or 1.2% of the Project Area, and approximately 2,083 acres of grassland/herbaceous habitat or 4% of the Project Area (see **Map 15 (Land Cover)**). Grasslands and areas used as pastures, or areas that are not actively farmed, can have the ecological functions of grasslands. Several grasslands are present within the Project Area and occur along roadsides or ditches, or as uncultivated or fallow fields. These grassy areas can serve the same purpose as native prairie, providing valuable habitat for grassland nesting or foraging birds. The remaining land cover type within the Project Area consists primarily of developed/disturbed space.

Table 38: Land Cover Types and Their Relative Abundance in the Project Area

Land Cover	Sum of Area (Acres)	Percent of Project Area
Cultivated Crops	45,530.18	87.42%
Grassland	2,083.32	4.00%
Hay/Pasture	618.77	1.19%
Disturbed/Developed	2,689.73	5.16%

Land Cover	Sum of Area (Acres)	Percent of Project Area
Open Water	63.87	0.12%
Wetlands	481.63	0.92%
Deciduous Forest	609.97	1.17%
Shrub/Scrub	3.34	0.01%
Barren Land	4.23	0.01%
TOTAL	52,085.04	100%

Sites of Biodiversity Significance

The Minnesota Biological Survey (MBS) identifies 16 Sites of Biodiversity Significance that are located completely within or partially within the Project Area (see **Map 21 (Unique 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 39**, below, extracted from the MNDNR (**MNDNR 2016a**).

Table 39: Sites of Biodiversity Significance (MNDNR 2016a)

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.

Eight of the MBS Sites of Biodiversity Significance within the Project Area have been given a "below" biodiversity significance ranking, five sites are ranked as "moderate", and three sites are ranked as "high". **Table 40** below shows MBS Sites of Biodiversity Significance (including acreage) that occur within the Project Area.

Table 40: Sites of Biodiversity Significance within the Project Area

Site of Biodiversity Significance	Number of Sites Within Project Area	Acres
Below	8	355.99
Moderate	5	222.00
High	3	43.33
Outstanding	0	0

Native Plant Communities

Twenty native plant communities are located within the Project Area (see **Map 21 (Unique Features)**). Two native plant communities classified as Mesic Hardwood, Elm-Basswood-Black Ash-(Hackberry) Forest (MHs49a) (totaling 51.39 acres), ranked as a state vulnerable to extirpation (S3) community type and Condition "NR" (Not Ranked) are located within the northcentral portion of the Project Area along Dodge Center Creek. Two native plant communities classified as Southern Mesic Oak-Basswood forest (MHs38) (totaling 32.94 acres), with no state vulnerability ranking, are located within the Project Area; one is located near the western boundary of the Project Area and one is located within the northcentral portion along Dodge Center Creek. Two native plant communities classified as Elm-Ash-Basswood Terrace Forest (FFs59c) (totaling 54.77 acres) and ranked as state imperiled (S2) are located within the northcentral portion of the Project Area along Dodge Center Creek, southeast of Claremont; one has a condition of NR and the other is ranked as "D" (poor ecological integrity). Two native plant communities classified as Sugar Maple-Basswood- (Bitternut Hickory) Forest (MHs39a) (totaling 31.05 acres), ranked as S2 and condition NR, occur within the north central portion of the Project Area along Dodge Center Creek. The remaining twelve native plant communities within the Project Area are native prairies and are discussed in **Native Prairies**, below.

MNDNR has assigned a biodiversity rank to these communities as well. **Table 41** below provides the acreage and biodiversity ranking associated with the five plant community types present in the Project Area.

Table 41: Native Plant Community Types within the Project Area

Native Plant Community Type	Acreage within Project Area by Biodiversity Rank	
	High	Moderate
MHs49a – Elm, Basswood, Black Ash- (Hackberry) Forest	**51.39**	**N/A**
MHs38 – Southern Mesic Oak Basswood Forest	**N/A**	**32.94**
FFs59c – Elm-Ash-Basswood Terrace Forest	**53.51**	**1.27**
MHs39a – Sugar Maple – Basswood- (Bitternut Hickory) Forest	**31.05**	**N/A**
UPs23a – Mesic Prairie (Southern)	**16.16 acres**	**5.07 acres**
WPs54 – Southern Wet Prairie	**26.1 acres**	**N/A**
WPs54b – Wet Prairie (Southern)	**1.58 acres**	**N/A**

Native Prairie

As covered in the discussion on native plant communities, the MNDNR has mapped 12 native prairies within the Project Area. The 12 prairies consist of three different types. Eight of these prairies are classified as UPs23a - Mesic Prairie (Southern). The MNDNR describes this prairie type as grass dominated, but forb rich, occurring on somewhat poorly drained to well-drained loamy soils (MNDNR 2017e). Altogether, the Mesic Prairie (Southern) prairie type makes up approximately 16 acres within the Project Area.

Two prairies are classified as WPs54 – Southern Wet Prairie, and an additional two prairies are classified as WPs54b – Wet Prairie (Southern). These prairie types are very similar to each other, and MDNR describes both prairie types as grass dominated, but forb rich, occurring on

poorly drained to very poorly drained loam soils formed in lacustrine sediments, unsorted glacial till, or less frequently outwash deposits. Saturation typically persists in the lower part of the rooting zone for much of the season (MNDNR 2009). Differences in the grass and forb herbaceous communities between these two prairie types, though slight, account for the differing MNDNR classifications. Together, these four prairies make up approximately 28 acres within the Project Area.

8.18.2 Potential Impacts

Vegetation will be removed during construction and installation of Project infrastructure to allow for construction of turbine pads, access roads, substation, and O&M facilities. The vast majority of Project infrastructure will be located in agricultural fields. Less than 1% of the total Project Area will be permanently converted to sites for wind turbines or other Project infrastructure. **Table 42,** below, details anticipated permanent impacts to vegetation and unique vegetation types within the Project Area. Temporary vegetation impacts will occur during the construction of access roads, crane walks, turning radii, equipment laydown areas, construction easements around turbines, collection line installation, and/or intersection improvements. Refer to **Table 42**, below, for details on potential temporary impacts to vegetation by the Project. Of note, construction of the Project will not likely impact the entire construction easements as detailed; these calculations are provided to show worst case scenario. Additionally, limited tree clearing may be required for the construction of permanent infrastructure or temporary construction activities (*e.g.*, collection line right-of-way).

As ground will be disturbed by equipment deliveries from different geographic areas, introduction of noxious weeds may occur, though DCW will work collaboratively with all Project construction parties to minimize and prevent the introduction of invasive species.

Project infrastructure will be sited to avoid Sites of Biodiversity Significance that are ranked as high or outstanding and designated 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. Currently, all temporary and permanent construction easements and infrastructure do not intersect with Sites of Biodiversity Significance ranked as high or outstanding or native plant communities. However, approximately 0.65 acres of Sites ranked as below will be temporarily impact and 0.02 acres will be permanently impacted. These Sites of Biodiversity Significance will be field verified as to whether these sites meet the criteria for these rankings will occur as project details are developed. DCW will coordinate with MNDNR regarding potential impacts to these areas. Direct permanent and temporary impacts to other natural areas will be minimized and avoided, where feasible.

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

Land Cover Type	Turbines	Access Roads	O&M Facility	Substation	Total
Cultivated Crops	8.03	38.72	1.72	0.77	**49.47**
Developed, Open Space	0.00	1.44	0.00	0.00	**1.44**
Developed, Low Intensity	0.00	0.05	0.00	0.00	**0.05**
Developed, Medium Intensity	0.00	0.11	0.00	0.00	**0.11**
Herbaceous	0.02	0.86	0.00	0.00	**0.88**
Emergent Herbaceous Wetlands	0.00	0.28	0.00	0.00	**0.28**
Native Plant Community	0.00	0.00	0.00	0.00	**0.00**
Sites of Biodiversity (Below)	0.00	0.02	0.00	0.00	**0.02**
Total	**8.04**	**41.49**	**1.72**	**0.77**	**52.00**

Table 43: Summary of Estimated Temporary Impacts to Vegetation (Acres)

Land Cover Type	Turbines	Access Roads	O&M Facility	Substation	Collection	Laydown Yard	Crane Paths	Total
Cultivated Crops	451.37	382.31	1.72	4.52	175.48	13.22	49.17	**1,077.79**
Developed, Open Space	0.00	24.34	0.00	0.49	4.20	1.78	1.55	**32.36**
Developed, Low Intensity	0.00	0.91	0.00	0.00	0.33	0.00	0.00	**1.24**
Developed, Medium Intensity	0.00	0.79	0.00	0.00	0.19	0.00	0.00	**0.98**
Herbaceous	2.67	11.60	0.00	0.00	4.13	0.00	0.00	**18.40**

Land Cover Type	Turbines	Access Roads	O&M Facility	Substation	Collection	Laydown Yard	Crane Paths	Total
Emergent Herbaceous Wetlands	0.00	2.36	0.00	0.00	0.68	0.00	0.00	**3.04**
Deciduous Forest	0.00	0.02	0.00	0.00	0.00	0.00	0.00	**0.02**
Native Plant Community	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
Sites of Biodiversity (Below)	0.00	0.47	0.00	0.00	0.18	0.00	0.00	**0.65**
Total	**454.05**	**422.81**	**1.72**	**5.01**	**185.19**	**15.00**	**50.72**	**1,134.49**

8.18.3 Mitigation Measures

DCW has planned the Project 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 Project Area, including native prairies, to the extent feasible. Additionally, DCW will avoid impacts to conservation land such as WMAs. Almost all of the turbines are planned entirely in lands currently under crop cultivation. Access roads are expected to impact agricultural fields, and, potentially, grassed areas associated with roadsides and ditches, while DCW's access road will avoid grasslands, shrubland, and wooded areas when feasible. Access road construction or collection line installation may result in some temporary impacts to agricultural drainages, grasslands, shrublands, and wetlands from temporary grading and other construction activities (*e.g.*, topsoil stripping, trenching, temporary turning radius, etc.). These temporary vegetation impacts will be restored to previous conditions. DCW will coordinate with the local NRCS office to ensure the reseeding of these areas is with locally sourced native mixes. DCW will identify potentially affected native prairies and prepare a prairie protection and management plan in consultation with the MNDNR. The prairie protection plan will detail efforts to avoid impacts to prairies through site design. Additionally, any impacts expected to occur to MBS Sites of Biodiversity Significance will be coordinated with MNDNR, as appropriate. DCW will implement BMPs for all Project construction entities entering the Project Area to control and prevent the introduction of invasive species as designated by the Minnesota Department of Agriculture (including county-level noxious weed designations by Steele County) (MDA 2017b, c). These BMPs include limiting invasive species spread via maintenance equipment and vehicles through early detection of invasive species, minimizing disturbance to native areas, limiting traffic through weed-infested areas, and frequent

inspection of equipment storage areas for weeds. In the event that invasive weeds are detected within the Project Area, control of these weeds will be conducted through properly timing, cutting, and using targeted herbicide consistent with the herbicide BMPs published by the MN/DOT and MDA (MDA 2017a, MN/DOT 2017b).

8.19 Wildlife Resources

The USFWS Land-based Wind Energy Guidelines were issued on March 23, 2012 to provide a structured and scientific approach to wildlife concerns during all stages of land-based wind energy development (USFWS 2012). The guidelines use a tiered approach to collecting information, with each tier increasing in the detail of research and information. The tiered approach 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.

Appendix I (Wildlife Studies) and **Appendix J (Site Characterization Study)** contains a copy of the completed wildlife studies conducted for the Project.

Results of Tier 1 and Tier 2 Studies

A Tier 1 and Tier 2 Site Characterization Study (SCS) was completed for the Project Area in March 2017 (Atwell 2017a). Information for this study was gathered through MNDNR and USFWS database research, additional resources and a site visit by a qualified biologist in January 2017. 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). For additional detail on the SCS see **Appendix J (Site Characterization Study)**.

8.19.1 Potential and Observed Wildlife Usage

Various studies conducted for the Project provide information on existing wildlife. **Table 44** provides a summary of the Tier 3 wildlife studies that are completed for the Project. These

studies are provided in **Appendix I (Wildlife Studies).** A Year 2 Avian Use Study is currently underway. The following section includes a discussion on general wildlife within the area as well as wildlife that is considered threatened, endangered or of special concern.

Table 44: Tier 3 Wildlife Studies

Study Type	Completed by	Year
Acoustic Bat Use Study	Normandeau Associates, Inc.	2014
Year 1 Avian Use Study	HDR	2017
Bald Eagle and Raptor Nest Aerial Survey	Atwell, LLC	2017
Targeted Loggerhead Shrike & Henslow's Sparrow Inventory Survey	Atwell, LLC	2017

Birds

Nearly two years of avian use point count surveys have been conducted in order to document species presence and overall avian use of the Project Area consistent with the methodology described in the USFWS Land-based Wind Energy Guidelines (USFWS 2012) and the Eagle Conservation Plan Guidance: Module 1 (USFWS 2013). Results of the Year 1 Avian Use Study are discussed herein as the Year 2 Avian Use Study is underway with results expected in June of 2018. Based on the results of the Year 1 Avian Use Study, 16,112 individual birds comprised of 144 species were recorded. Passerines were the most abundant species group of birds recorded during surveys, accounting for more than 84% of all birds observed. Seven species of raptor were observed and low overall raptor use of the study area at 0.4 birds per survey was documented. Red-tailed hawks (*Buteo jamaicensis*) and northern harriers (*Circus hudsonius*) were the most frequently observed raptors with 49 and 28 observations, respectively (HDR 2017).

Birds observed during the Year 1 Avian Use Study include waterfowl (Canada goose [*Branta canadensis*], mallard [*Anas platyrhynchos*], northern shoveler [*Anas clypeata*]), upland game birds (ring-necked pheasant [*Phasianus colchicus*] and mourning dove [*Zenaida macroura*]), raptors (bald eagle [*Haliaeetus leucocephalus*], red-tailed hawk, American kestrel [*Falco sparverius*]) and many songbirds (blackbirds, sparrows, swallows) (HDR 2017). These species are very similar to those observed during pre-construction surveys at the nearby existing Lakefield and Pleasant Valley WECSs (Westwood 2010, WEST 2011). The 144 species recorded within the Project Area makeup approximately 55% of the recorded species within Dodge and Steele counties based on Avian Knowledge Network (AKN) data (AKN 2018).

No federal threatened or endangered species were observed during the surveys. One state threated or endangered species, the Henslow's sparrow (state endangered) was documented within the Project Area during the Year 1 Avian Use Study (HDR 2017). The Henslow's sparrow was incidentally noted utilizing an isolated patch of restored grassland habitat in the east-central portion of the Project Area (see **Map 21 (Unique Features)**). Three special status species were documented during the course of the Year 1 Avian Use Study including: Franklin's gull (*Leucophaeus pipixcan*; Minnesota special concern), Acadian flycatcher (*Empidonax virescens*; Minnesota special concern), and bald eagle (Bald and Golden Eagle Protection Act). Both the Franklin's gull and Acadian flycatcher were noted a small number of times during the spring migratory period only, and no evidence was observed that these species breed within the study area. Over the 216 hours of surveys, the Year 1 Avian Use Survey documented 63 bald eagle flight minutes with 18 of these minutes occurring with the rotor swept zone (defined in the study as 20-150 meters (66-492 feet) above ground level and within 800 meters (2,625 feet)of the survey point) (HDR 2017).

Avian Wetland Utilization Surveys were conducted as part of the Year 1 Avian Survey effort and documented waterbird usage of two wetland sites within the study area between March 16, 2016 and September 26, 2016 (HDR 2017). These surveys documented 21,243 individual birds representing 18 different waterbird species. The most commonly observed species were redhead (*Aythya americana*) and ring-necked duck (*Aythya collaris*; 25% and 13% of all observations, respectively).

As documented in the Year 1 Avian Use Survey, eagle and raptor nest surveys were initiated in March of 2015 and were conducted up to five-miles from the study area via a ground-based survey effort. These ground-based surveys documented three bald eagle nest sites within five miles of the study area (HDR 2017). Per the guidance outlined by USFWS in the Eagle Conservation Plan Guidance: Module 1 (USFWS 2013), an updated aerial eagle and raptor nest assessment for a revised study area and an associated 10-mile buffer during March of 2017 (Atwell 2017b; **Map 21 (Unique Features)**).

As indicated in the Bald Eagle and Raptor Nest Aerial Survey report (Atwell 2017), concentrations of eagles were noted in the late afternoon and evening at several locations within 10 miles of the study area. These observations prompted an additional targeted and brief ground-based effort. During the evenings of March 19 and 20, 2017, March 10 and 11, 2018, and April 11 and 12, 2018, the presence of two widely separated roost locations were identified:

- Rice Lake Roost – 10 birds the night of March 20, 2017; approximately 4.4 miles north of the Project Area. No eagles were noted at this location on the evening of March 11, 2018 or on April 11, 2018; and
- Cedar River – 17 birds the night of March 19, 2017; approximately 8.8 miles south of the Project Area. Follow-up effort on March 10, 2018 indicated five eagles utilizing this

location and subsequently only one eagle was noted on this location the evening of April 12, 2018.

The 2017 updated aerial raptor nest survey identified 79 potential raptor nests of three raptor species within 10 miles of the study area. The density of available raptor nest structures was notably lower within the study area when compared to the adjacent 10 miles (Atwell 2017b). An addendum to the raptor nest survey report was prepared to document the findings for an expanded study area which resulted in identifying four more raptor nest structures to the west of the Project Area in Steele County.

To date, no bald eagle nests have been identified in the Project Area. The 2017 raptor nest report and addendum indicates the presence of seven bald eagle nests, five of which were active, within 10 miles of the study area.

Mammals

Many common mammal species are likely to utilize the Project Area, 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 Project Area, while the smaller mammal species are likely to use those areas as well as the cultivated areas within the Project Area.

Bats

The Project Area is within the range of several bat species including little brown bat (*Myotis lucifugus*), big brown bat (*Eptesicus fuscus*), silver-haired bat (*Lasionycteris noctivagans*), eastern red bat (*Lasiurus borealis*), and the hoary bat (*Lasiurus cinereus*). Although these bats are fairly common within Minnesota and the range of these bats overlaps the general vicinity of the Project Area, the preferred habitat of these species is not abundant within and in the vicinity of the Project Area. The little brown and big brown bats utilize lakes and streams for foraging, and caves, streams, and human structures for roosting. Silver-haired, eastern red and hoary bats are forest-dwelling species. Relatively little of these habitats are present within the Project Area. The Applicant received a letter on May 26, 2017 from MNDNR outlining a portion of the Project Area that may have higher bat use (specifically the west-central portion of the Project Area) and MNDNR requested that turbines not be sited in this area. In response, the Applicant re-sited turbines outside of the west-central portion of the Project Area identified by MNDNR as a potential concern.

According to a Project bat study, (Normandeau Associates, Inc. 2014) overall bat use in the Project vicinity is considered moderate. It is important to note that the Normandeau 2014 bat study area encompassed a large portion of wooded riparian habitat to the north of the current Project Area, and as such encountered bats in that habitat at higher rates than would be expected in less forested landscapes, such as that within the current Project Area. The Normandeau 2014 bat study documented low levels of bat activity during the Spring 2014 monitoring period, with bat activity gradually increasing through the summer and peaking at moderate levels during the Fall 2014 monitoring period. These results indicate that bats are likely migrating through the Project Area, and, as a result, higher levels of bat activity were noted during the fall migratory period. The migratory species detected during the summer seasons are most likely resident in the area. Acoustic data of *Myotis* species bats (little brown and northern long-eared bat [*Myotis septentrionalis*]) had relatively high levels of activity throughout the 2014 monitoring season, and it is likely that these bats are resident at unknown densities within the region surrounding the Project Area. Current post-construction monitoring at active wind energy facilities within the Great Plains and eastern United States indicates that migratory tree bats are at greatest risk to mortality from turbine collision during the fall migratory period (Erickson et al. 2002).

Refer to **Section 8.19.2** 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 Project Area, 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 wetlands, streams, and ditches. 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.

8.19.2 Rare and Unique Natural Features

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 Dodge and Steele counties are within the range (*i.e.*, has documented records and/or has the potential to harbor critical habitat for the designated species) of the federally threatened northern long-eared bat and prairie bush-clover (*Lespedeza leptostachya*). In the state of Minnesota, the prairie bush clover is also listed as state threatened. See **Table 45** below for the USFWS IPaC results (USFWS 2018a). No federally designated critical habitat is present within the Project Area or its vicinity.

Table 45: Federally Listed Species Known to Occur in Dodge and Steele Counties

Species	Federal Status
Northern Long-eared Bat	Threatened
Prairie Bush Clover	Threatened

Northern long-eared bat

Northern long-eared bats have a broad geographic range that encompasses much of the eastern and northern portions of the United States, but the species' has declined extensively largely due to white nose syndrome (WNS), a fungal disease that has affected several bat populations (USFWS 2015a, 2015b). The northern long-eared bat was listed as federally threatened by the USFWS on May 4, 2015, primarily because of the threat posed by WNS. The decision to list the bat as threatened with an interim 4(d) rule provides protection to address conservation needs of this bat species. All of Minnesota falls within the 4(d) rule zone (USFWS 2018b). For areas in the United States where WNS affects bat populations, the conservation measures provided in the interim 4(d) rule exempt "take" (defined under the Endangered Species Act as harming, harassing, or killing of protected species) as a result from certain activities (*i.e.*, forest management, maintenance of utility ROW, tree/shrub removal for prairie maintenance, and limited tree-removal activities, etc.) (USFWS 2015a). The closest known occurrences of WNS to the Project lie within Goodhue County, the county adjacent to Dodge County to the north, and Fillmore County, which is two counties away to the southeast of Dodge County (MNDNR 2017c).

The northern long eared bat is considered uncommon and is locally distributed in the majority of its current range. Dodge and Steele counties sit on the western edge of the designated forested region within the state of Minnesota. The southwestern portion of Dodge County abuts the designated non-forested region of the state while the southern half of Steele County marks the beginning of the non-forested region (Swingen et al. 2016). The Project Area contains very few wooded areas with the relative connectivity (*e.g.*, less than 1,000 feet (305 meters) separating adjacent woodlots) that northern long-eared bats commonly utilize during the summer (USFWS 2016). Based on acoustic data results from the Normandeau 2014 bat study, it is likely that the northern long-eared bat may utilize select locations within the Project Area and mortality is possible within the Project Area during migration. However, any possible mortality for northern long-eared bat is expected to reflect national trends of generally low mortality rates (E.B. Arnett and Baerwald 2013).

Northern long-eared bats migrate regionally between hibernacula and summer habitat (MNDNR and USFWS 2017). Studies have reported northern long-eared bat migration movements range

between 30 to 60 miles (USFWS 2016). Once northern long-eared bats arrive at summer habitat, forested areas greater than 1,000 feet (305 meters) from contiguous suitable habitat are not commonly utilized (USFWS 2016). According to the USFWS Resource Equivalency Model, a minimum of 46 acres of forested habitat is required to support a female northern long-eared bat during summer roosting activities (USFWS 2014).

Tree species within woodlots within the Project Area consist generally of cottonwood, American elm, oak, green ash, and black willow, and while several larger woodlots are present, the largest being approximately 60 acres, the average woodlot size is less than 3.5 acres. A review of USFWS records and MNDNR databases indicated that there are no known northern long-eared bat summer roost trees or hibernaculum within Dodge or Steele counties. The nearest documented northern long-eared bat summer roost tree to the Project is located in Fillmore County approximately 30 miles to the southeast and the nearest documented northern long-eared bat hibernaculum is located in Fillmore County approximately 25 miles to the southeast (MNDNR and USFWS 2018).

Due to the relatively small average woodlot size within the Project Area, high cropland concentration, location of the Project in relation to Minnesota's forested region, and locations of known summer roost trees and hibernacula, summer roost trees for northern long-eared bats are unlikely to be found within the Project Area.

In a Project meeting on April 13, 2017, USFWS indicated that because the northern long-eared bat is covered under the 4(d) rule of the Endangered Species Act, USFWS would defer to MNDNR regarding whether or not additional bat studies would be required for the Project. MNDNR correspondence on May 26, 2017 (refer to **Appendix C (Agency Responses)**) communicated that no further bat studies were needed.

Prairie bush clover

Prairie bush clover is a tallgrass prairie species endemic to the upper Mississippi River Valley region. Prairie bush clover is a sun dependent species that prefers moderately damp to dry tallgrass prairie habitat. Most of the habitat required for the persistence of the species has been degraded and continues to be threatened by conversion of pasture to farmland, overgrazing, herbicide application, as well as many other disturbance activities. Today, it is only known to occur in less than 100 locations across Iowa, Illinois, Minnesota, and Wisconsin, with the largest population occurring in southwestern Minnesota and northwestern Iowa (MNDNR 2017b). While the MNDNR county maps and the USFWS IPaC tools indicate that the species is found within Dodge County, Minnesota, the more spatially refined NHIS database review does not indicate any occurrence records within the Project Area or within one mile of the Project Area (MNDNR 2017a).

State Rare and Unique Features

The MNDNR provided a formal Natural Heritage Review letter for the Project on June 12, 2017 and has requested an update letter in June, 2018 (**Appendix C** (**Agency Responses)**). The updated Natural Heritage Review letter will be submitted upon receipt. The Natural Heritage electronic database for rare species was also reviewed. 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 Project Area.

MNDNR records indicate 47 records of 10 different types of rare plants or animals in the Project Area and within one mile. The mapped occurrences include three records of an invertebrate animal and 44 records of vascular plants (see **Table 46** below). Additionally, 50 occurrence records of 11 native plant community types were recorded (see **Table 47** below).

Table 46: NHIS Species Recorded within the Project Area and vicinity

Type	State Status	Scientific Name	Common Name	Number of Mapped Occurrences within the Project Area	Number of Mapped Occurrences within One Mile of Project Area Boundary	Year of Most Current Observation
Invertebrate animal	Special Concern	*Lasmigona compressa*	Creek Heelsplitter	2	1	1988
Invertebrate animal	Endangered	*Ammodramus henslowii*±	Henslow's Sparrow±	3±	0±	2017±
Vascular Plant	Special Concern	*Arisaema dracontium*	Green Dragon	0	2	2009
Vascular Plant	Threatened	*Arnoglossum plantagineum*	Tuberous Indian-plantain	1	2	1997
Vascular Plant	Threatened	*Asclepias sullivantii*	Sullivant's Milkweed	4	1	2009
Vascular Plant	Special Concern	*Baptisia bracteata var. glabrescens*	Plains Wild Indigo	1	2	2010

Type	State Status	Scientific Name	Common Name	Number of Mapped Occurrences within the Project Area	Number of Mapped Occurrences within One Mile of Project Area Boundary	Year of Most Current Observation
Vascular Plant	Special Concern	*Cypripedium candidum*	Small White Lady's-slipper	1	2	2014
Vascular Plant	Special Concern	*Eryngium yuccifolium*	Rattlesnake Master	10	9	2016
Vascular Plant	Endangered	*Juglans cinerea*	Butternut	0	1	2009
Vascular Plant	Threatened	*Platanthera flava var. herbiola*	Tubercled Rein Orchid	0	1	1999
Vascular Plant	Threatened	*Valeriana edulis var. ciliata*	Edible Valerian	3	4	2016

± Henslow's sparrow was not a species included in the NHIS records query for the Project; however, Tier 3 studies (HDR 2017; Atwell 2017c) documented this species at three locations within the Project Area and they are included in the table above.

Based on Project data and coordination with MNDNR, targeted sensitive grassland breeding bird surveys were conducted during June, 2017. These surveys confirmed the presence of Henslow's sparrows at two locations within the Steele County portion of the Project Area (see **Map 21 (Unique Features)**). In addition, this sparrow was documented at a third location in the Dodge County portion of the Project Area during the summer of 2016.

Native Plant Community

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. NHIS records indicate the presence of one Mesic Prairie (Southern) within one mile of the Project Area. Additional review of the MNDNR native plant community data identified a total of 11 native plant communities within one mile of the Project Area (six [6] of which are located within the Project Area; refer to **Table 47** and **Map 21 (Unique Features)**).

Table 47: NHIS Native Plant Communities Recorded within One Mile of the Project Area Boundary

Native Plant Community Type	Number of NHIS Records within the Project Area	Number of NHIS Records within One Mile of the Project Area Boundary	Year of Most Current Observation
Black Ash - (Red Maple) Seepage Swamp	0	1	2009
Elm - Ash - Basswood Terrace Forest	2	3	2010
Elm - Basswood - Black Ash - (Hackberry) Forest	2	2	2010
Mesic Prairie (Southern)	8	13	2010
Seepage Meadow/Carr	0	1	2009
Seepage Meadow/Carr, Tussock Sedge Subtype	0	2	2009
Southern Mesic Oak-Basswood Forest	2	3	2010
Southern Wet Prairie	2	0	2008
Southern Wet-Mesic Hardwood Forest	0	1	2010
Sugar Maple - Basswood - (Bitternut Hickory) Forest	2	3	2009
Wet Prairie (Southern)	2	1	2008

The majority of the identified native plant communities was last observed in the field between 2008 and 2010 and is present in either wetland or grassland habitats. For additional details regarding native plant communities, please refer to **Section 8.18.1**.

8.19.3 MNDNR Waterfowl Feeding and Resting Areas

No MNDNR Waterfowl Feeding and Resting Areas are located within or adjacent to the Project Area.

8.19.4 Important Bird Areas

No Important Bird Areas are located within or adjacent to the Project Area.

8.19.5 Potential Impacts

Field and desktop studies indicate that impacts to wildlife and wildlife habitat are expected to be minimal because grasslands, wooded areas, shrublands, and other areas identified as important to wildlife are limited within the Project Area and will largely be avoided through Project design. Minor impacts to grasslands, shrublands, and wetlands may occur.

Bird and bat mortalities that may occur at the Project during operations are unlikely to affect populations of most species, including species of conservation concern. However, impacts to birds and bats as a result of the Project are not expected to differ markedly from those reported by other previous studies in agricultural settings within Minnesota (Poulton 2010, WEST 2015, Westwood 2015).

Birds

Data from three previously developed WECSs in southern Minnesota including Lakefield, Prairie Rose and Buffalo Ridge showed bird mortality rates detailed in **Table 48**, below (Poulton 2010, WEST 2015, Westwood 2015).

Table 48: Avian Fatality Rates at Minnesota Wind Farms

Project	Avian Mortality Rate	Year of Study
Lakefield	1.07 birds/MW/year	2014
Prairie Rose	0.44 birds/ MW/ study period	2014
Buffalo Ridge	1.43-5.93 birds/MW/year	1996-1999

Migratory birds and passerines accounted for the majority of avian mortalities at Lakefield and Buffalo Ridge, which is consistent with Strickland et al. (2011) who suggests that passerines are

the most common mortality reported at wind energy facilities. Additionally, Westwood (2015) showed that migratory songbirds accounted for the majority of avian mortalities at Lakefield. Differences in study design, statistical modeling, and site-specific characteristics can make direct comparisons between wind projects difficult; however, it is likely that bird mortality rates at the Project will be comparable to previously mentioned WECSs (**Table 48**) due to similar avian species composition, land cover, land use, and location within the region. As such, bird mortality rates are not likely to significantly affect populations of most species, including species of a conservation concern.

The Year 1 Avian Use Study (HDR 2017) and the Year 2 Avian Use Study (Atwell 2017b) documented raptor use (including bald eagles) to be relatively low within the study area. The nearest bald eagle nests are over two miles from the closest Project turbines. Furthermore, it is possible that some of the grassland-dependent species (including species of conservation concern) observed during the avian use surveys could be displaced by construction and/or operation of the Project if turbines or associated infrastructure are placed in grassland areas. State endangered Henslow's sparrows were documented utilizing grassland type habitat at two locations within the west-central region of the Steele County portion of the Project Area (Atwell 2017c). Neither of these locations will be impacted by any proposed infrastructure, with the closest proposed turbine located approximately 1.0 miles from the isolated grassland parcel that the species was utilizing during June 2017.

Bats

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 (Kunz et al. 2007; Edward B. Arnett et al. 2008). Data from the three previously developed WECSs (Lakefield, Prairie Rose and Buffalo Ridge) showed bat mortality rates detailed in **Table 49**, below (Poulton 2010, WEST 2015, Westwood 2015).

Table 49: Bat Fatality Rates at Minnesota Wind Farms

Project	Avian Fatality Rate	Year of Study
Lakefield	20.19 bats/MW/year	2014
Prairie Rose	0.41 bats/ MW/ study period	2014

Project	Avian Fatality Rate	Year of Study
Buffalo Ridge	0.76-2.72 bats/MW/year	1996-1999
Buffalo Ridge	2.88 bats/MW/year	2001-2002

Bat mortalities recorded at Lakefield are consistent with findings of similar studies: solitary tree-roosting bats (eastern red and hoary bats) accounted for 65.3% of the bat carcasses found in search transects (Westwood 2015).

According to the pre-construction bat monitoring results (Normandeau Associates, Inc. 2014) bat activity within the Project Area was consistent with findings of similar studies that show bat activity highest in the fall. Bat activity at the Project Area was highest between August 12 and August 26 in the period coinciding with the fall 2014 migration season. Normandeau Associates, Inc. (2014) found that unidentified *Myotis* species of bats (either little brown or northern long-eared bats) made up a moderate proportion of activity at the Project Area. While the moderate occurrence of these species at the Project Area 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). Further, bat monitoring survey results at the Project Area show that hoary and silver-haired bats were also detected throughout the 2014 monitoring period. Using Bat Passes Per Night (annual average) as an indicator of bat activity at the Project Area, Normandeau concluded that overall bat use at the Project Area is considered "moderate" when compared to other wind energy projects located in landscapes similar to that of the Project Area. Results from the 2014 Normandeau study suggest that bat use patterns at the Project Area may be similar to the Lakefield, Prairie Rose, and Buffalo Ridge WECSs and other wind energy projects located in similar landscapes. As such, impacts to bats as a result of Project construction and operation are not expected to differ markedly from those reported by other previous studies in agricultural settings within Minnesota detailed above in **Table 49**. Specifically, impacts to northern long-eared bats are expected to be low based on the lack of suitable habitat and the high degree of fragmentation between the limited wooded habitat that is located within the Project Area (refer to **Section 8.19.2** for more in depth discussion about these findings as they relate to northern long-eared bat likelihood). DCW 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.

For further information about bats in relation to the Project, please refer to the Avian and Bat Protection Plan (ABPP) attached in **Appendix K (Avian and Bat Protection Plan)**.

Rare and Unique Natural Features

The majority of identified rare and unique natural features for the Project Area are vascular plants concentrated in the west-central portion of the Project Area (see **Appendix C (Agency Responses)**). MNDNR requested no turbines be sited in a defined west-central area and no turbines or other infrastructure have been placed in the area identified based on MNDNR's feedback. Furthermore, avoiding and limiting impacts to grassland and wetland areas through turbine siting and during construction will reduce the potential impacts to these rare and unique natural features (*e.g.*, prairie bush-clover and any other state listed plants).

Several of the species identified in the NHIS records are restricted to aquatic environments while others are restricted to species found in open grasslands and native prairies. These species, should they also be present in the Project Area, would not be expected to be impacted by the Project. Typical construction BMPs provide mitigation for potential impacts to aquatic species. The Project has been designed to avoid prairie and open grassland areas.

DNR Waterfowl Feeding and Resting Areas

Given the absence of DNR Waterfowl Feeding and Resting Areas within or in close proximity to the Project Area, no potential Project impacts to DNR Waterfowl Feeding and Resting Areas are anticipated. As a result, no mitigation measures are planned for DNR Waterfowl Feeding and Resting Areas.

Important Bird Areas

Given the absence of Important Bird Areas within or in close proximity to the Project Area, there are no potential impacts to Important Bird Areas as a result of the proposed project development. As a result, no mitigation measures are planned for Important Bird Areas.

8.19.6 Mitigation Measures

The Applicant has carefully sited the Project to avoid sensitive areas identified by MNDNR. This has included, among other efforts, the placing all turbines and project infrastructure outside of the west-central portion of the Project Area delineated by MNDNR in a letter dated May 26, 2017 (refer to **Map 21 (Unique Features)**). In addition to the careful siting and continued project planning that includes avoidance of sensitive features, the Applicant will implement the following measures to avoid potential impacts to wildlife and Rare and Unique Natural Features in the Project Area during selection of the turbine locations and Project development and operation:

- Avoid and minimize siting turbines in mapped native prairie, native plant communities, and MBS sites of biodiversity significance ranked moderate, high or outstanding;
- Maintain required setback distances from WMAs, WPAs, SNAs and state parks to reduce risk to waterfowl and grassland-associated birds when siting turbines in the Project Area;

- Avoid or minimize placement of turbines in high quality grassland or pasture areas that may act as native grasslands for breeding grassland bird species;
- Avoid or minimize 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;
- Avoid or minimize disturbance of individual wetlands or drainage systems during Project construction. Wetland delineations and micro-siting of turbines will be conducted prior to construction to identify limits of wetland boundaries and to avoid placement of turbines in sensitive wildlife habitat;
- The Applicant will prepare a prairie protection and management plan in coordination with the MNDNR;
- The Applicant will voluntarily comply with activity and cutting restrictions (June 1-July 31) outlined in the USFWS 4(d) rule for wooded habitat impacts within the Project Area;
- 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;
- Construct wind turbines using tubular monopole towers;
- Light turbines in accordance with FAA requirements;
- Coordinate with local Natural Resources Conservation Service (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 Department of Agriculture (MDA) (MDA 2018b, 2018a) 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 properly timing, cutting and using targeted herbicide consistent with the herbicide BMPs published by the MN/DOT and MDA (MDA 2018c; MN/DOT 2018a).
- Complete the second year of avian studies that are currently underway consistent with USFWS Eagle Conservation Plan Guidance and MNDNR's May 26, 2017 letter of recommendations for the Project. Results of this study are expected in June 2018. This

will provide a more complete understanding of eagle and threatened/endangered species avian use within the Project;

- Avoid impacts to grassland habitats identified as having confirmed records of the state endangered Henslow's sparrow between May 15 and July 15;
- Avoid siting turbines within 2 miles of known bald eagle nests;
- DCW 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 reduce 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;
- Implement the Project ABPP during construction and operation of the Project. The ABPP has been developed in accordance with the guidelines and recommendations set forth in the USFWS Land-based Wind Energy Guidelines (2012) and the Wind Turbine Guidelines Advisory Committee's Recommended Guidelines to the USFWS (2010). A draft ABPP is attached to this Application as **Appendix K (Avian and Bat Protection Plan)**. The ABPP will be updated following the results of the Year 2 Avian Use Study in June 2018.

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

9.0 SITE CHARACTERIZATION

9.1 Description of Resources

To simulate wind flow patterns for the Dodge and Steele County, MN project site, WindLogics, a NEER affiliate, 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 WindLogics Enhanced Measure-Correlate-Predict (E-MCP) methodology.

In addition to a thorough meteorological analysis of the site, WindLogics used archived weather data resources and physics-based numerical simulations (weather models) to calculate wind flow patterns at the site for the year 2014. 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.

WindLogics' analysis employed data from six MET tower and two Triton SoDAR locations (all located within the Project Area or near vicinity), which are indicated below in **Table 50**. The data was collected in ten-minute intervals at each location for an average of two years.

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 7.9 m/s at hub height with seasonal variations ranging from 6.6 m/s to 8.5 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. Moderate turbulence and low extreme wind conditions at the site allow for suitable mechanical loads on the turbines.

Table 50: Met Tower/SoDAR Information

MET Tower / SoDAR	Location	Period of Record	Duration (mos.)	Meas. Heights (m)
4534	43.99526,-93.08350	01/2014-01/2018	49	58,40
4535	44.05296,-92.97690	12/2013-01/2018	50	58.40
4857	44.01302,-93.00410	02/2017-11/2017	10	59,40
4858	43.95838,-92.94090	02/2017-01/2018	12	59,40
4859	43.98161,-93.02690	02/2017-01/2018	12	59,40
4860	43.94919,-92.89200	02/2017-01/2018	12	59,40
579-0	43.93652,-93.01290	10/2013-09/2014	12	80,60
579-95	43.99390,-92.95540	11/2014-01/2018	35	100,80

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 DCW's meteorological 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 Project Area, the annual variance of wind speed is expected to be 0.07 m/s.

9.1.2 Seasonal Variation

Seasonal variation is represented by the change in wind resource throughout the year. **Table 51** shows the estimated average seasonal variation of wind speed based on long-term data. January has the highest average wind speed, 8.5 m/s, with the months of October through April showing the highest wind speeds, 8.2 to 8.5 m/s. Wind speed is lower during the months of June through September, with the lowest average wind speed, 6.6 m/s, occurring in August.

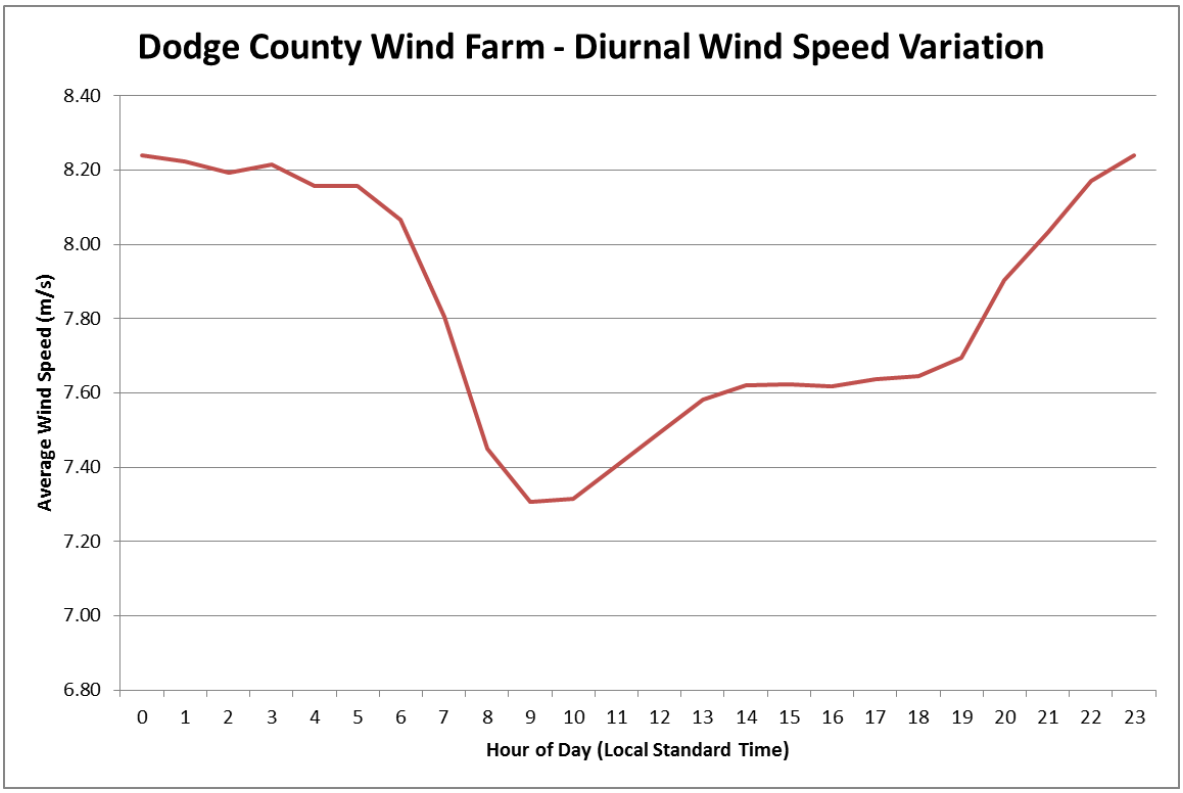
Table 51: Average Wind Speed

Month	Wind Speed (m/s)
January	8.5
February	8.4
March	8.2
April	8.3
May	8.0
June	7.2
July	6.6
August	6.6
September	7.7
October	8.2
November	8.3
December	8.2
Annual Average	**7.9**

9.1.3 Diurnal Variation

Diurnal variation represents the changes in wind resource throughout the day. **Figure 2** shows the annual average diurnal variation in wind speeds at the Project Area. 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 2: DCW Diurnal Wind Speed Variation



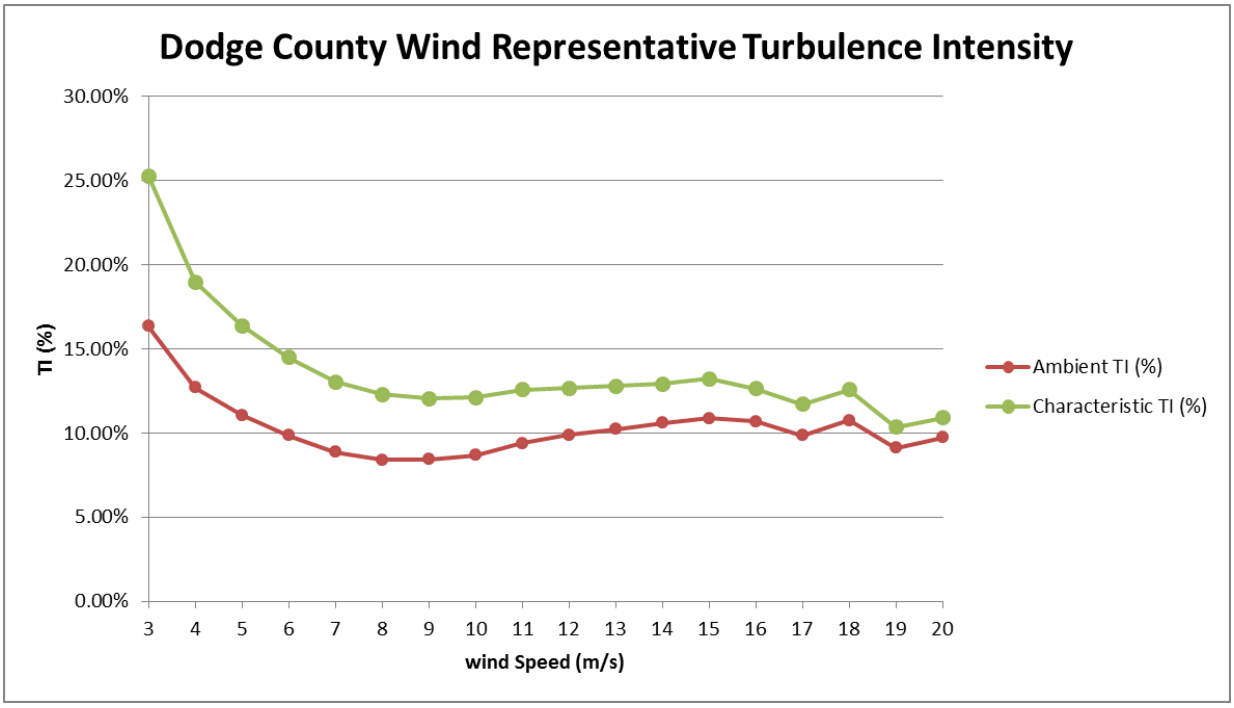
9.1.4 Atmospheric Stability

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 at DCW 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 Project Area, the ambient turbulence intensity at the site is 10.9% and the characteristic turbulence intensity is 13.2% at hub height (90m). 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 3**.

Figure 3: DCW Representative Turbulence Intensity



These values are taken from over four years of measurement data at M4534 and are representative of the site. Overall, the turbulence intensity for the site is reasonable for the region and terrain.

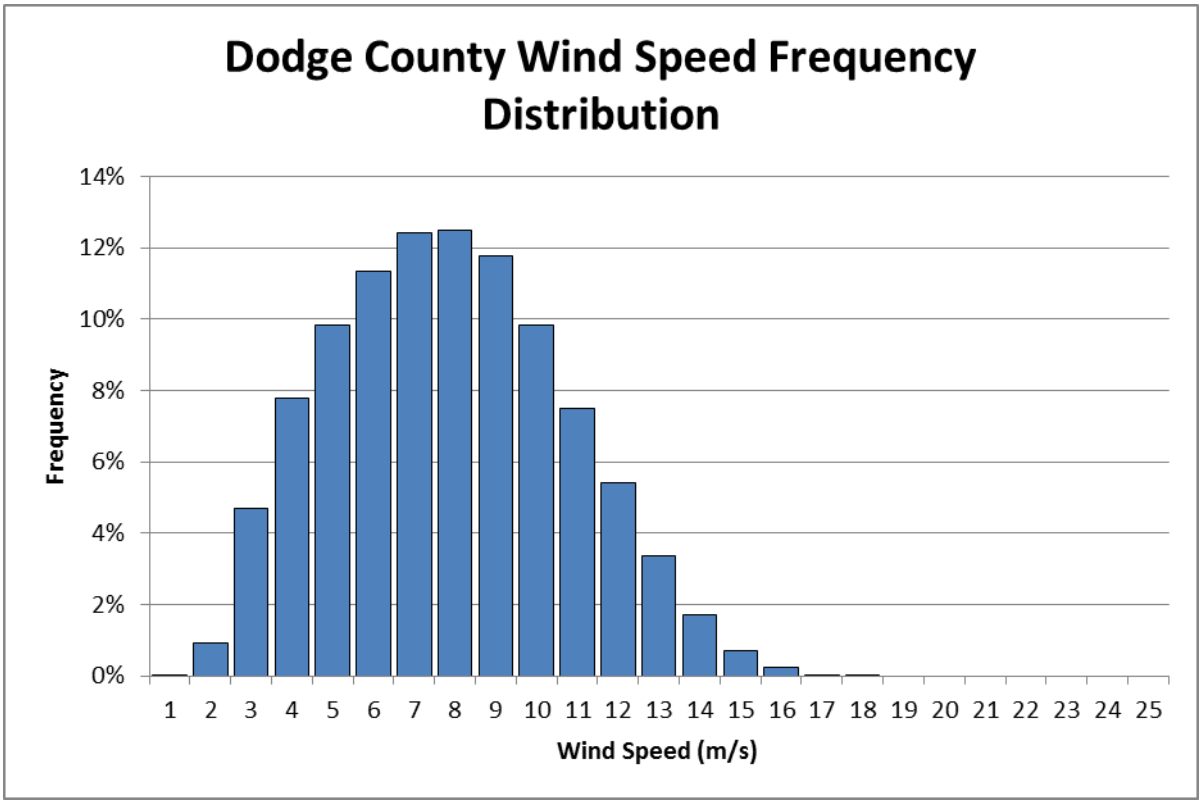
9.1.6 Extreme Wind Conditions

Long-term extreme winds were calculated at the site using a Periodic Maxima 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 and 3 second gust for the Project are expected to be 30.4 m/s and 34.1 m/s, respectively. These values are calculated from data collected from six MET towers and two SoDAR units at the Project site spanning an average of 2 years of measurements.

9.1.7 Wind Speed Frequency Distribution

Figure 4 provides the anticipated long-term annualized wind speed frequency distribution for the Project Area, which is calculated from six on-site MET towers and two on-site SoDAR units 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 4: DCW 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 $v_2 = v_1 \left(\frac{z_2}{z_1}\right)^{\alpha}$ 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 52**. Based upon data collected at the site, the representative wind shear at the site is 0.22.

Table 52: DCW Measurement Speeds and Shears

Tower / SoDAR	Short-Term 90m Wind Speed (m/s)	Long-Term 90m Wind Speed (m/s)	Overall Shear
4534	7.78	7.73	0.264
4535	7.78	7.73	0.200
4857	7.62	7.80	0.240
4858	8.08	8.16	0.218
4859	7.86	7.90	0.220
4860	8.13	8.21	0.205
579-0	8.19	7.99	0.221
579-95	8.29	8.05	0.227

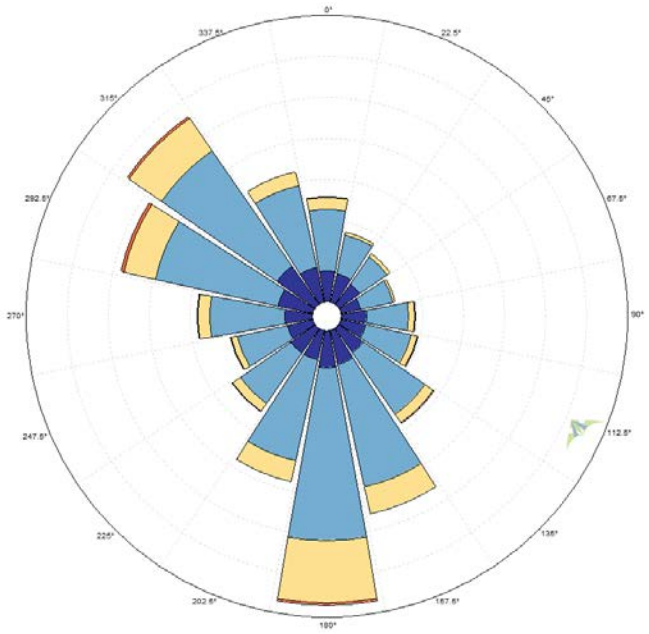
9.1.9 Spatial Wind Variation

As noted previously, the wind resource assessment is based on six MET towers and two SoDAR locations. The mean expected spatial variation in wind speed across the Project Area is between 7.5 and 8.1 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 5** shows a representative wind rose, developed using the six MET towers and two SoDAR locations located at the Project Area. 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 5: Wind Rose from Meteorological Tower 4534



9.1.12 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.

In addition, the geographic location of the Project 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 tend to be less frequent.

Topographical features also play a role in the wind regime that a site experiences. 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. DCW is located primarily on cultivated cropland and agricultural land with low roughness.

The Project will undergo a Mechanical Loads Assessment performed by General Electric 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 7.4° C, with minimum and maximum temperatures of -42.0° C and 39.6° 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

Based on data publically available through the FAA's database, there are three existing commercial-scale wind projects located west, east, and south of the Project Area in Steele, Dodge, and Mower counties. Oak Glen Wind is located to the west and consists of 24 wind turbines. G. McNeilus Wind is located directly adjacent to the east of the Project Area and consists of 41 wind turbines. Pleasant Valley Wind is located to the southeast of the project area and consists of 100 turbines. A total of 107 wind turbines from these operating projects are located within a 10-mile extent around the Project Area. Seventy-three of these 107 turbines are located within 10 miles of a proposed turbine location for the Project.

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;
- 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. Grading may also be employed at the temporary laydown area. Up to 1,135 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. 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, DCW will determine if the use of chemical applications is warranted for any roadways within the Project Area. 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, top soil 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**. In areas where excavation occurs, excavated soil is piled to heights of approximately 6 feet or less.

10.1 Roads and Infrastructure

During construction, temporary roadway improvements are anticipated on some public roads within the Project Area. Existing state, county, and township roads will be used for the transportation of equipment, construction materials, and personnel to and from and within the Project Area. 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. 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 22 miles of permanent access roads will be necessary and permanent roadways will be gravel and approximately 16 feet (5 meters) 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 feet (8 meters) wide. See **Figure 6**, below, for an image depicting access roads and the associated gravel rings.

Figure 6: Gravel Rings and Access Roads

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. DCW 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 roadways used during construction will be installed to a maximum of 45 feet (14 meters) in total width. Access roads widened for crane paths and equipment deliveries will be reduced to their permanent width of approximately 16 feet (5 meters) 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 up to two permanent MET towers, an electrical collection system, and the DCW collector substation. The 345 kV generation tie line that will connect the DCW substation with the Byron Substation is the subject of its own proceeding (Docket TL-17-308).

The O&M facility will be located adjacent to the substation where five acres will be purchased or leased in addition to the substation. The footprint of the O&M facility and associated parking area will be up to two acres.

DCW anticipates installing up to two permanent self-supporting MET towers. The towers will be no closer than 250 feet (76 meters) from the edge of road ROW and from the boundaries of DCW's site control.

The electrical collector system will connect each wind turbine to the Project substation. The electricity from each turbine step up transformer is connected to the Project's collector substation through approximately 52 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 up to approximately one acre. Within this area, there will be a chain link perimeter fence and an outdoor lighting system. No new gates or fences will be constructed other than at the collector substation, which will have an eight-foot high fence, locked gate, and its own access road.

The Project will also require grading of a main, preferably centrally-located, temporary laydown area of approximately 15 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

10.4.1 Foundation Design

DCW anticipates that the freestanding tubular wind turbine towers will be erected on reinforced concrete spread footing foundations. The bearing surface of the foundation will be at a depth up to approximately 12 feet (approximately 4 meters), with a total width of up to approximately 68 feet (approximately 21 meters). 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 45 tons of steel will be required in the design of the foundation for structural support. The concrete turbine foundations will require up to approximately 1,600 cubic yards of excavation depending on soil requirements and turbine size. The installed foundation concrete is anticipated to be up to approximately 600 cubic yards of material. Geotechnical data, turbine loads, and cost considerations will dictate the final design of the foundation at each site. Excavated soil will be used for backfill 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**.

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. 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. This may consist of re-grading, re-paving, enhancing the shoulder of the road or enhancing the segment of roadway in a manner agreed upon by the Applicant and 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 ripped up with a grader to decompact the soil. These areas will then be topped with topsoil and will also be 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 and Maintenance of Project

DCW, 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, 7 days a week. Once the Project shifts into operations, the local O&M crew will be comprised of approximately 5 primary staff who largely will be wind technicians (*i.e.*, technicians who 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 BMPs across the fleet.

Fleet O&M is focused on prevention rather than an event response philosophy. It is supported at the fleet level by production assurance engineers and wind fleet team major component subject matter experts. It is the O&M personnel responsibility to provide root cause and fleet risk analyses, as well as to provide mitigation planning to assure countermeasures are performed on a scheduled basis, which serves to maximize production.

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 $300 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 $2.5 million the first year and average approximately $750,000 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 31, 2019. The following schedule sets forth the milestones needed to meet the agreed on commercial operations date.

Table 53: Project Schedule

Activity	Estimated Completion
Certificate of Need Order	**May 2019**
Route Permit Order	**May 2019**
Site Permit Order	**May 2019**
Environmental Permits Received	**Feb 2019**
Other Permits/Approvals Received	**Feb 2019**
Land Acquisition	**Feb 2019**
Construction	**July-Dec 2019**
In-Service Date	**Dec 2019**

10.9 Energy Projections

A net capacity factor of approximately 38.1% to 46.5% is expected annually. The projected average annual output of approximately 621,233 MWh is anticipated for the Project.

10.10 Decommissioning and Restoration

10.10.1 Anticipated Life of the Project

The Project is expected to have an operational life of approximately 30 years, consistent with the term of the PPA for the Project.

10.10.2 Estimated Decommissioning Costs in Current Dollars

DCW estimates that decommissioning for the Project will cost approximately $54,000 to $55,000 per turbine.

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 four feet (1.2 meters) 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 to a location (within 10 miles (16 kilometers) roundtrip). 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 four feet (1.2 meters) 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.

10.10.3 Method of Ensuring that Funds are Available for Decommissioning

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.

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

Over the life of the Project, DCW will ensure funds to cover decommissioning costs will be maintained through a decommissioning bond established with the local communities. The local communities will provide an estimated worth of the property leased by DCW and DCW will establish a bond in that amount. The community will have access to the funds if remediation actions are required due to impacts from the Project. DCW has a contractual obligation with landowners for remediation of the properties back to a condition comparable to that of the property prior to the installation of the wind project.

10.10.5 Anticipated Methods of Site Decommissioning and Restoration

A decommissioning plan will be submitted at least fourteen days prior to the pre-operation meeting that will provide an itemized breakdown of costs of decommissioning all project components, which will include labor and equipment. The plan will identify cost estimates for the removal of turbines, turbine foundations, underground collection cables, access roads, crane pads, substation, and other project components. The plan may also include anticipated costs for the replacement of turbines or repowering the project by upgrading equipment. This plan will be implemented at end of the Permit term, unless the Applicant requests and is granted a longer or renewed term by the Commission.

As an overview, the decommission plan will include, but will not be limited to, the following:

- Removal of the turbine, tower, infrastructure and foundation to a level of 48 inches below grade and return the grade to a condition comparable to conditions prior to the construction of the Project:

- Turbine disassembly would be accomplished using large cranes similar to those used for installation. Components would be removed in reverse-order of installation, and placed either directly onto trucks for removal from the Project, or onto the ground near the turbine base for eventual loading onto trucks;

- Tower sections would be lowered to grade and cut into transportable sections for delivery to a scrap metal purchaser. Control cabinets in the base would be stripped of high value components and the balance turned over to a scrap company for haul and disposal. The options for wind turbine recycling are evolving and are expected to be very different at the time of Project decommissioning than they are currently;

- Foundations would be exposed using backhoes, bulldozers and other heavy earth moving equipment. Turbine foundations would be excavated to a depth sufficient to remove all anchor bolts, rebar, conduits, cable, and concrete to a depth of 48 inches below grade.

After removal of all noted foundation materials, the areas would be filled with clean compatible sub-grade material compacted to a density similar to the surrounding sub-grade material. All disturbed areas will be restored to pre-existing conditions and contours;

- Above-ground elements of the collection system, such as the overhead poles, junction boxes, and pad-mounted transformers would be removed and the materials would be disposed, recycled, or sold. Environmental and agricultural impacts are minimized by leaving the cables in place. The cables contain no materials known to be harmful to the environment. The cable installation would include a warning tape that would warn anyone that could be digging in the area of the cables both during and after project operation. The electrical collection system is primarily an underground facility, therefore, decommissioning of the facility would be minimal; and

- To perform the decommissioning activities, it may be necessary to return some roads to their construction stage conditions. This would allow for efficient crane access to the turbine sites and facilitate removal of the wind turbine components by truck. A road survey will be conducted to determine the condition of the roads prior to work decommissioning activities. During the decommissioning process, where necessary, roads will be cleared, compacted, graded, and maintained. Once decommissioning has been completed, the roads would be removed and reclaimed, unless the underlying landowner requests otherwise. This would likely include the removal of aggregate and any unnecessary culverts, de-compaction of the road base, and recontouring of larger cuts and fills.

Restoration activities would also include, but not be limited to, the following:

- Topsoil would be removed prior to removal of structures from all work areas and stockpiled and separated from other excavated material. The topsoil would be de-compacted to match the density and consistency of the immediate surrounding area. The topsoil would be replaced to original depth and original surface contours reestablished where possible. Any topsoil deficiency and trench settling shall be mitigated with imported topsoil consistent with the quality of the affected site; and

- All disturbed soil surfaces within agricultural fields would be seeded with a seed mix agreed upon with the landowner in order to maintain consistency with the surrounding agricultural uses. All other disturbed areas would be restored to condition, with forage density reasonably similar to surrounding conditions at the time of decommissioning. In all areas restoration shall include leveling, terracing, mulching, and other necessary steps to prevent soil erosion, to ensure establishment of suitable grasses and to control noxious weeds and pests, as required.

11.0 IDENTIFICATION OF OTHER POTENTIAL PERMITS

The Applicant identified in **Table 54** known or potentially required permits, reviews, and approvals for the Project.

Table 54: Other Potential Permits, Reviews, and Consultations

Regulatory Authority	Permit/Approval
FEDERAL	
Federal Energy Regulatory Commission	• Exempt Wholesale Generator Self Certification • Authorization to sell wholesale power at Market Based Rates
Federal Aviation Administration	• Form 7460-1 Notice of Proposed Construction or Alteration (Determination of No Hazard) • Form 7460-2 Notice of Actual Construction or Alteration
Federal Communications Commission	• Non-Federally Licensed Microwave Study • NTIA Communication Study
U.S. Army Corps of Engineers	• Clean Water Act Section 404 coordination (General, Individual, or Nationwide permit if required)
U.S. Fish and Wildlife Service	• Informal consultation under Section 7 of the Endangered Species Act
Environmental Protection Agency (region 5) (EPA) in coordination with the Minnesota Pollution Control Agency (MPCA)	• SPCC Plan
Federal Emergency Management Agency	• Coordination of Flood Plain Designation
STATE	
Minnesota Public Utilities Commission	• Site Permit for LWECS • Route Permit for high-voltage transmission line • Certificate of Need

Regulatory Authority	Permit/Approval
Minnesota Department of Labor and Industry	• Electrical Plan Review, Permits, and Inspections
Minnesota Department of Agriculture	• Informal coordination and preparation and/or approval of an Agriculture Impact Mitigation Plan
Minnesota State Historic Preservation Office	• Informal SHPO consultation for Cultural and Historical resources review including State and Natural Register of Historic Sites review
Minnesota Pollution Control Agency	• National Pollutant Discharge Elimination System/State Disposal System Permit (NPDES/SDS) – General Storm Water Permit for Construction Activity • License for a Very Small Quantity Generator of Hazardous Waste • SPCC Plan • Aboveground Storage Tank Notification Form • Clean Water Act Section 401 Water Quality Certification
Minnesota Department of Health	• Environmental Bore Hole approval for subsurface geotechnical studies • Plumbing Plan Review if required for O&M building • Water Well Permit if required for O&M building
Minnesota Department of Natural Resources	• Informal coordination for Endangered Species Statutes • Coordination on and/or approval of an Avian and Bat Protection Plan • General Permit for Water Appropriations, Dewatering • Wetlands/Waters coordination for Public Waters Work Permit and/or License to Cross Public Lands and Waters
Minnesota Department of Transportation	• Oversize/Overweight Permit for State Highways • Access Driveway Permits for MN/DOT Roads

Regulatory Authority	Permit/Approval
	• Tall Structure Permit • Utility Access Permit
LOCAL	
Dodge, Steele, and Olmsted County	• Roadway Access Permit • Drainage Permit • Working in Right-of-Way Permit • Overweight/Over-Dimension Permit • Utility Permit
Dodge/Steele/Olmsted County Soil and Water Conservation District	• Wetland Conservation Act Approvals
Townships	Right-of-way permits, crossing permits, road access permits, and driveway permits for access roads and electrical collection system, as needed
OTHER	
MISO	• Turbine Change Study • Generator Interconnection Agreement

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