Amended Application for a Large Wind Energy Conversion System Site Permit

Dodge County Wind, LLC Project

Dodge and Steele Counties, Minnesota

MPUC Docket Number: IP6981/WS-20-866

January 12, 2022

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List of Abbreviations, Acronyms, and Definitions

Applicant	Dodge County Wind, LLC (DCW)
AADT	average annual daily traffic
ABPP	Avian and Bat Protection Plan
AC	alternating current
ACS	American Community Survey
ACSR	aluminum conductor steel reinforced
ADLS	Aircraft Detection Lighting System
AGL	above ground level
AKN	Avian Knowledge Network
AM	AM radio signals
AMA	Aquatic Management Area
AMSL	above mean sea level
ANSI	American National Standards Institute
BMP	best management practices
BWSR	Board of Water and Soil Resources
CEDA	Community and Economic Development Associates
Commission	Minnesota Public Utilities Commission
CON	Certificate of Need
CR	County Road
CREP	Conservation Reserve Enhancement Program
CRP	Conservation Reserve Program
CSAH	County State Aid Highway
dB	decibel
dBA	A-weighted decibel
DBS	Direct Broadcast Satellite
DCEM	Dodge County Emergency Management
DCW	Dodge County Wind, LLC
DOD	Department of Defense

EF	electric fields
E-MCP	Enhanced Measure-Correlate-Predict
EMF	electromagnetic fields
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FM	FM radio signals
GE	General Electric
GRE	Great River Energy
HUC	Hydrologic Unit Code
HVTL	high voltage transmission line
Hz	hertz
IEEE	Institute of Electrical and Electronics Engineers, Inc.
IPaC	Information for Planning and Consultation
IRAC	Interdepartmental Radio Advisory Committee
ISO	International Organization for Standardization
kV	kilovolt
kW	kilowatt
LGU	Local Government Units
LIDS	Lighting Intensity Dimming Solutions
LNTE	low-noise trailing edge
LWECS	large wind energy conversion system
MBS	Minnesota Biological Survey
MDA	Minnesota Department of Agriculture
MDH	Minnesota Department of Health
MERRA2	Modern-Era Retrospective Analysis for Research and Applications
MET tower	meteorological evaluation tower
MF	magnetic fields
mG	milligauss

MNDNR	Minnesota Department of Natural Resources
MnDOT	Minnesota Department of Transportation
MnUSA	Minnesota United Snowmobilers Association
MPCA	Minnesota Pollution Control Agency
MPUC	Minnesota Public Utilities Commission
MW	megawatt
NAC	Noise Area Classifications
NARUC	National Association of Regulatory Utility Commissioners
NASA	National Aeronautics and Space Administration
NEER	NextEra Energy Resources, LLC
NHIS	Natural Heritage Information System
NPDES	National Pollutant Discharge Elimination System
NR	Not Ranked
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NTIA	National Telecommunications and Information Administration
NWI	National Wetlands Inventory
O&M	operation and maintenance
OPGW	optical ground wire
OSA	Office of the State Archaeologist
PMT	pad-mounted transformer
Project	the 259-MW Large Wind Energy Conversion System
Project Site	the area in which the Dodge County Wind Project will be sited
PWI	Public Waters Inventory
PWP	Permanent Wetland Preserves
RD	rotor diameter
REC	recognized environmental conditions
RIM	Reinvest in Minnesota
ROCC	Renewable Operations Control Center
ROW	right-of-way

SCADA	supervisory control and data acquisition
SCEM	Steele County Emergency Management
SHPO	State Historic Preservation Office
SNA	Scientific and Natural Areas
SoDAR	sonic detection and ranging
SPCC	Spill Prevention, Control, and Countermeasure
SWPPP	Stormwater Pollution Prevention Plan
TI	turbulence intensity
TV	television
UDP	Unanticipated Discoveries Plan
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
V	volt
WCA	Wetland Conservation Act
WCFZ	worst-case Fresnel zones
WCS	Wildlife Conservation Strategy
WCS/ABPP	Wildlife Conservation Strategy / Avian and Bat Protection Plan
WECS	wind energy conversion system
WEST	Western EcoSystems Technology, Inc.
WMA	Wildlife Management Area
WNS	white nose syndrome
WPA	Waterfowl Production Area
WRP	Wetlands Reserve Program
ZVRT	zero voltage ride through

Completeness Checklist

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	1.0
(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 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	2.0

Minnesota Rule	Required Information	Application Section(s)
	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 height	9.1.8
(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

Minnesota Rule	Required Information	Application Section(s)
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
(D)	A description and location of associated facilities	5.3
Subpart 7	Environmental Impacts	
(A)	Demographics, including people, homes, and businesses	8.1
(B)	Noise	8.3
(C)	Visual impacts	8.4
(D)	Public services and infrastructure	8.5
(E)	Cultural and archaeological impacts	8.6
(F)	Recreational resources	8.7
(G)	Public health and safety, including air traffic, electromagnetic fields, and security and traffic	8.5.1, 8.8, 8.9, 8.10
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(P)	Vegetation	8.20

Minnesota Rule	Required Information	Application Section(s)
(Q)	Wildlife	8.21
(R)	Rare and unique natural resources	8.22
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
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(A)	The anticipated life of the project	Appendix K
(B)	The estimated decommissioning costs in current dollars	Appendix K
(C)	The method and schedule for updating the costs of decommissioning and restoration	Appendix K
(D)	The method of ensuring that funds will be available for decommissioning and restoration	Appendix K
(E)	The anticipated manner in which the project will be decommissioned, and the site restored	Appendix K
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

The contents and organization of this document follow guidelines for a Site Permit Application under the Minnesota Administrative Rules (Minn. R.) Chapter 7854. To assist readers of individual sections, all acronyms are defined at first use in each section.

Dodge County Wind, LLC[1] (DCW or Applicant) respectfully submits this Application to the Minnesota Public Utilities Commission (Commission or MPUC) for a Site Permit to construct and operate the DCW Wind Project with an up to nameplate capacity of 259 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 Mower County. Given the size of the Project, it qualifies as a large wind energy conversion system 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 building, permanent meteorological evaluation towers (MET towers), Aircraft Detection Lighting System towers, and gravel access roads. Construction is projected to start in the second quarter of 2023, with commercial operations expected to commence by December 2023.

Concurrent with this filing, DCW will be submitting a Route Permit Application for a 161 kilovolt transmission line in Docket No. IP6981/TL-20-867, and a Certificate of Need Application in Docket No. IP6981/CN-20-865.

DCW, as a member of the NextEra Energy, Inc. family of companies, benefits from the capabilities developed within its network of affiliated companies, which combine to make the world's largest generator of renewable energy from the wind and sun. For example, NextEra Analytics, Inc. is a Minnesota-based affiliate of DCW with decades of experience providing engineering, technical analysis, and consulting services in support of wind farm development. NextEra Analytics specializes in studying, modeling, and forecasting meteorological air flow, including scientific analysis of wind resources, wind-modeling services, and climate-prediction services. Among other contributions, NextEra Analytics supported the process of optimizing the array and **Section 9** of this Application. Additional internal capacities, including engineering and construction, environmental, legal, regulatory, land acquisition services, and project management, have also supported the Project. This internal team is supplemented by qualified technical consultants.

[1] Dodge County Wind, LLC is an indirect wholly owned subsidiary of NextEra Energy Resources, LLC (NEER). NEER, through its affiliates, operates approximately 18 gigawatts of wind energy through more than 135 facilities across North America.

Although the Applicant does not own or have a direct financial interest in any other wind farms located in Minnesota, NextEra Energy Resources, LLC has indirect ownership and financial interests in:

- The 62.3-MW Marshall Solar Energy Project in Lyon County (in operation);
- The 109-MW Buffalo Ridge Wind Project (approved by Commission) in Lincoln County;
- The 109.7-MW Walleye Wind Project (under review by Commission) in Rock County;
- 78.8-MW of the Minnesota Community Solar Gardens Project in various counties (in operation); and
- The 15-MW Gopher Battery Storage Project in Anoka County (in operation).

The authorized representatives for the Applicant are:

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January 10, 2022

2.0 CERTIFICATE OF NEED

Concurrent to filing this Application, Dodge County Wind, LLC (DCW or Applicant) is applying for a Certificate of Need (CON) in Docket No. IP6981/CN-20-865. Given that the Project is over 50 megawatts (MW), it qualifies as a "large energy facility," as defined in Minnesota Statutes Chapter 216B.2421, subdivision 2(1). Accordingly, pursuant to Minnesota Rules 7849.0200 and Minnesota Statutes Chapter 216B.243, subdivision 4, DCW is required to obtain a CON to construct and operate the Project.

On May 7, 2021, DCW filed with the Minnesota Public Utilities Commission (MPUC or Commission) a Petition for Exemption from Certain CON Application Requirements. The Commission approved the requested filing exemptions on July 13, 2021. The Commission also approved DCW's Notice Plan on July 21, 2021. The Notice Plan indicated a potential capacity of up to 280 MW. This Application more specifically requests approval of a Project, as discussed herein, with an up to nameplate capacity of 259 MW.

As explained in the DCW CON application, DCW has executed a 30-year power purchase agreement with Great River Energy (GRE) for the entire output of the Project. The output of the Project will assist GRE in maintaining compliance with the Renewable Energy Standard established in Minnesota Statutes Chapter 216B.1691, and delivering reliable and affordable wholesale electricity to the regional electricity market and its member-owner cooperatives. Thus, the Project will serve as a significant renewable generation addition to assist GRE exceed its RES requirements, and achieve its own voluntary renewable energy goals.

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 impacts on land resources and the environment. Also, as required, the Application addresses the Site Permit criteria set forth in Minnesota Statutes § 216E.03, subdivision 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, Application Guidance for Site Permitting of Large Wind Energy Conversion Systems in Minnesota* (MDOC 2019a).

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.

In 2014, Dodge County Wind, LLC (DCW or Applicant) began its evaluation of this area as a potential suitable site for a wind project. Since 2014, the Applicant has studied the environmental compatibility as well as the potential wind resource of the Project Site. Over time, DCW has adjusted and reduced project boundaries to minimize the potential impact on the environment and existing land use, as well as to reflect the participation of landowners in the Project. The current Project Site (see **Figure 1**) is slightly different than the Project Site submitted in Docket No. IP-6981/WS-17-307, which was withdrawn in 2019 due to significant interconnection costs. The new point of interconnection (the Pleasant Valley Substation owned by Great River Energy) and route submitted in Docket No. IP6981/TL-20-867 does not have the same interconnection costs issues.

Table 1 lists the Township, Range, and Sections in which the Project is located. The Project Site is shown in **Figure 1** and on **Map 1 – Project Site Location (Appendix A - Maps)**. DCW plans to site the project equipment and facilities within the Project Site as shown on **Map 2 - Project Site and Facilities (Appendix A)**. **Map 2** also provides detail to allow landowners in the vicinity of the Project to identify their property in relation to Project infrastructure. **Appendix B - Receptors** provides detail regarding the relationship of residences (receptors) to the proposed Project wind turbine locations. Included with **Appendix B** is a list of landowner addresses that correspond to the mapped receptor numbers. This provides for a cross-reference of residences (receptors) to landowner addresses. Note that some receptor numbers do not correspond to a landowner address when this information is not publicly available.

Table 1: Project Location

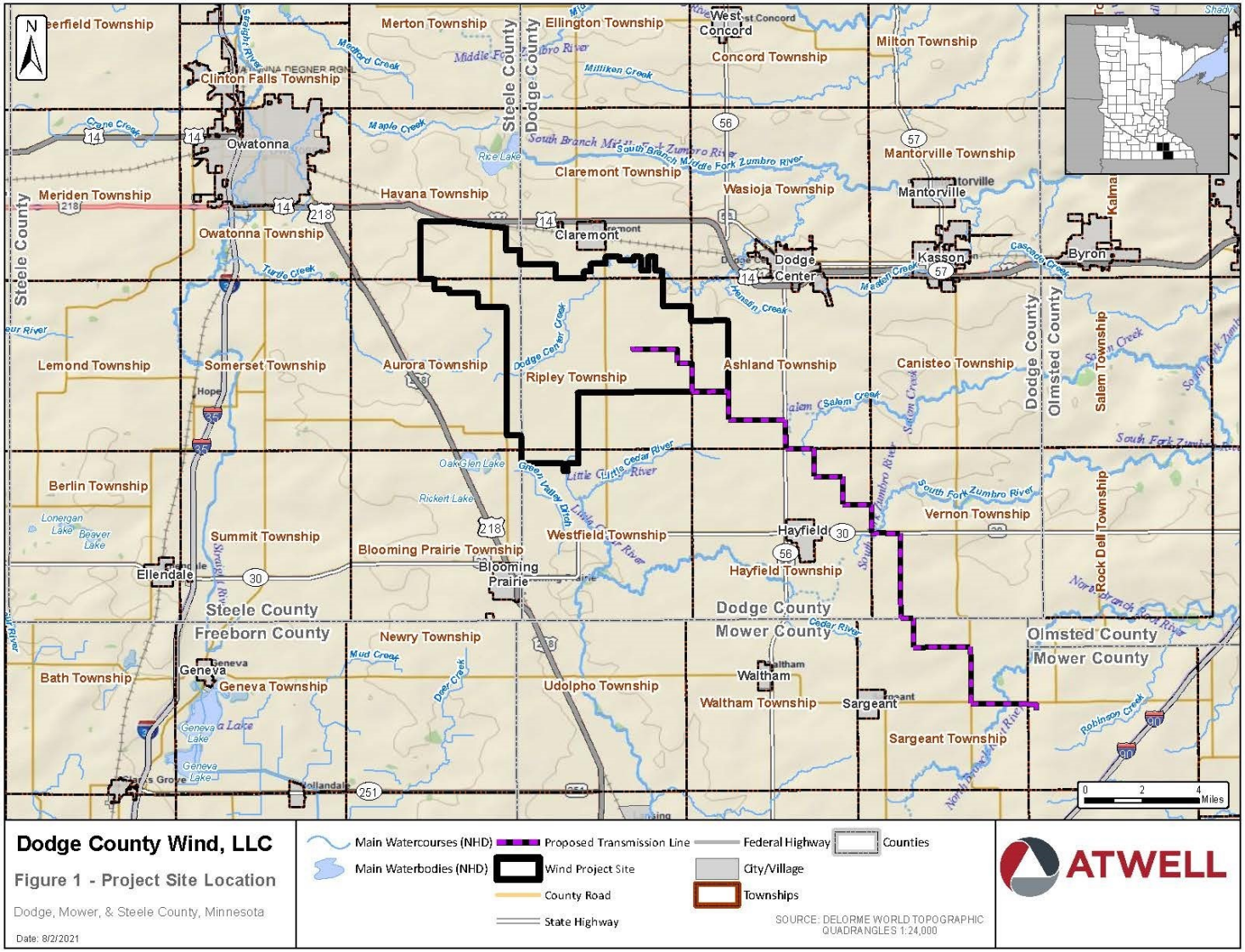
County Name	Township Name	Township	Range	Sections
Steele	Aurora	106N	19W	1–4, 11–13, 24, 25, 36
Steele	Havana	107N	19W	25–28, 33–36
Dodge	Ashland	106N	17W	7, 18, 19
Dodge	Claremont	107N	18W	31–35
Dodge	Ripley	106N	18W	2–24, 29–32
Dodge	Westfield	105N	18W	5, 8

4.2 Size of the Project Site in Acres

The estimated size of the Project Site is 28,348 acres (44.3 square miles) of mostly agricultural land. The size of the Project Site provides sufficient room for the required setbacks and buffering

of sensitive features. The turbines, collector substation, collection lines, meteorological evaluation towers (MET towers), Aircraft Detection Lighting System towers, and operation and maintenance facility will be located within the Project Site.

Figure 1: Project Site



4.3 Rated Capacity

The rated capacity of the Project is anticipated to be an up to 259 megawatts (MW) at the interconnection point.

4.4 Number of Turbine Sites

The Project's total capacity of up to 259 MW will be generated using 11 General Electric (GE) 2.52 MW wind turbines and 68 GE 3.4 MW wind turbines. A maximum of 79 turbines are proposed for construction. The current wind turbine array is shown in **Map 2 - Project Site and Facilities**.

4.5 Meteorological Evaluation Towers

The Applicant anticipates installing up to two permanent MET towers within the Project Site that will remain operational for the duration of the Project. Note that **Map 2 - Project Site and Facilities** includes locations for three potential MET tower locations, but the built Project would include only up to two METs. Permanent MET towers will be free standing and made of galvanized steel with medium-intensity dual LED day and night lights as required by the Federal Aviation Administration. 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 10,335 acres (91.2 percent) of the 11,366 acres of land required for successful construction and operation of the Project. DCW is continuing to negotiate easements with landowners for the development of the Project. **Section 7** provides more details on the wind rights secured.

5.0 PROJECT DESIGN

5.1 Description of Project Layout

The Project optimizes the available wind resource while minimizing impacts to existing land use and the environment. The Project is sited where landowners are willing to provide Dodge County Wind, LLC (DCW or Applicant) 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, local zoning considerations, landowner preferences, and the wind energy conversion facility siting criteria, including the Minnesota Public Utilities Commission (MPUC or Commission) setback requirements summarized in **Table 2**. Turbine placement and project layouts have been sited to avoid constraints identified by environmental surveys, land acquisition efforts, and micro-siting review.

Grassland habitat, wetlands, streams, floodplains, Sites of Biodiversity Significance, and other sensitive features are present within the Project Site. As discussed in **Section 8** of this Application, siting of project infrastructure largely avoids sensitive environmental features.

The Project will interconnect at the existing Pleasant Valley Substation owned by Great River Energy (GRE) and located in Mower County. This Pleasant Valley Substation can accommodate generation capacity of more than the proposed up to 259 MW, and, therefore, DCW intends to build all 79 proposed turbines, subject to micro-siting and permitting limitations. Thus, DCW has not included any alternative turbine locations in the Application. The preliminary site layout is shown on **Map 3 - Turbine Layout and Constraints (Appendix A)**.

Table 2: Minnesota Public Utilities Commission Wind Turbine Setback Requirements

MPUC Wind Facility and Collector Lines Setback Categories	MPUC Setback Conditions as Represented in Recent Site Permits
Wind Access Buffer	Wind turbine towers shall not be placed less than five (5) rotor diameter (RD) in prevailing wind directions and less than three (3) RD in 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.
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 1,000 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.
Roads	Wind turbine and meteorological evaluation towers (MET towers) shall not be located less than 250 feet (76 meters) from the edge of the nearest public road right-of-way (ROW).

MPUC Wind Facility and Collector Lines Setback Categories	MPUC Setback Conditions as Represented in Recent Site Permits
Public Lands	Wind turbines and associated facilities, including foundations, access roads, underground cable, and transformers, shall not be located on public lands (including Waterfowl Production Areas, Wildlife Management Areas, and Scientific and Natural Areas) or in county parks, and wind turbine towers shall comply with the required wind access buffer setbacks.
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 U.S. Army Corps of Engineers, and local units of government as implementers of the Minnesota Wetland Conservation Act.
Meteorological Evaluation Towers (MET Towers)	Permanent towers for meteorological equipment shall be free standing. Permanent MET towers shall not be placed less than 250 feet (76 meters) from the edge of the nearest public road ROW or from the boundary of the Permittee's site control. MET tower placement will be in compliance with the county ordinance regulating MET towers in the county in which the tower is built, whichever is more restrictive. MET towers shall be placed on property for which the Permittee holds the wind or other development rights. MET towers shall be marked as required by the Federal Aviation Administration (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.

MPUC Wind Facility and Collector Lines Setback Categories	MPUC Setback Conditions as Represented in Recent Site Permits
Aviation	The Permittee shall not place wind turbines or associated facilities in a location that could create an obstruction to the 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 (MnDOT), Department of Aviation, and FAA. The Permittee shall notify owners of all known airports within 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 DCW Wind Project so as to minimize the amount of land impacted. 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 public ROW, the Permittee shall obtain approval from the governmental unit responsible for the affected ROW.

MPUC Wind Facility and Collector Lines Setback Categories	MPUC Setback Conditions as Represented in Recent Site Permits
	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.

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 (MPUC 2008) and the *Application Guidance for Site Permitting of Large Wind Energy Conversion Systems in Minnesota* (MDOC 2019a); applicable regulations and agency guidance; and DCW's internal standards for setbacks and avoidance of sensitive features. **Section 8.2.1.2** provides a discussion of applicable standards associated with local zoning. **Table 2** summarizes the Commission's setback standards applicable to the Project and lists setbacks required by the Commission in recently issued permits. The Project is designed to meet the Commission setback standards and to be consistent with the three (3) rotor diameter (RD) by five (5) RD wind farm setback requirement (*i.e.,* the 3 RD × 5 RD setback requirement) specific to each turbine model, as follows:

- For the General Electric (GE) 2.52 megawatt (MW) turbine model, properties not participating in the Project will have turbines set back at least 1,146.7 feet (349.5 meters) (3 RD) in non-prevailing wind directions and at least 1,911.1 feet (582.5 meters) (5 RD) in prevailing wind directions.
- For the GE 3.4 MW turbines, properties not participating in the Project will have turbines set back at least 1,378 feet (420 meters) (3 RD) in non-prevailing wind directions and 2,296.6 feet (700 meters) (5 RD) in the prevailing wind directions.

As described further in **Section 8.2.1.2**, the Project is also designed in Steele County to meet the County's 5 RD by 5 RD setback. Therefore, in Steele County, for the GE 2.52 MW turbine model, properties not participating in the Project will have turbines set back at least 1,911.1 feet (582.5 meters) (5 RD) in all directions. For the GE 3.4 MW turbines in Steele County, the Project will have turbines set back at least 2,296.6 feet (700 meters) (5 RD) in all directions.

5.2 Description of Turbines and Towers

The Project will use eight GE 3.4 MW wind turbines with 140-meter (459.3-foot) RD and 81-meter (265.7-foot) hub height, 60 GE 3.4 MW wind turbines with 140-meter (459.3-foot) RD and 98-meter (321.5-foot) hub height, and 11 GE 2.52 MW wind turbines with 116.5-meter (382.2-foot) RD and 90-meter (295.3-foot) hub height. The characteristics for these turbines are summarized in **Table 3**.

The selected turbines are three-bladed, have active yaw, and have wind turbine generators regulated by active aerodynamic control 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 turbines will use low-noise trailing edge (LNTE) serrations attachments on the turbine blades to reduce sound impacts. LNTE serrations will be the same color as the turbine blades and will cover approximately 20 to 30 percent of the trailing edge of the outboard blade length.

Table 3: Wind Turbine Model Characteristics

Design Feature	GE 2.52 MW Turbine	GE 3.4 MW Turbine	GE 3.4 MW Turbine
Nameplate Capacity	2.52 MW	3.4 MW	3.4 MW
Hub Height	90 m (295.3 ft)	81 m (292 ft)	98 m (321.52 ft)
Rotor Swept Area	10,660 m² (114,743 ft²)	15,394 m² (165,689 ft²)	15,394 m² (165,689 ft²)
Total Height (ground to fully extended blade tip)	148.3 m (486.5 ft)	151.0 m (495 ft)	168 m (551 ft)
Rotor Diameter	116.5 m (382 ft)	140 m (459.32 ft)	140 m (459.32 ft)
Design Life	Design criteria contemplates 20 years	Design criteria contemplates 20 years	Design criteria contemplates 20 years
Cut-in Wind Speed	3 m/s (10 ft/s)	3 m/s (10 ft/s)	3 m/s (10 ft/s)
IEC Wind Class	S	S	S
Cut-Out Wind Speed	32 m/s (105.0 ft/s) average in a 600-second time interval, 37 m/s (121.4 ft/s) average in a 30-second interval 41 m/s (134.5 ft/s) average in a 3-second time interval	26 m/s (98.4 ft/s) average in a 600-second interval, 31 m/s (114.8 ft/s) average in a 30-second interval, and 35 m/s (127.9 ft/s) average in a 3-second interval 36 m/s sampled every 1 second	26 m/s (98.4 ft/s) average in a 600-second interval, 31 m/s (114.8 ft/s) average in a 30-second interval, and 35 m/s (127.9 ft/sec) average in a 3-second interval 36 m/s sampled every 1 second
Rotor Speed	7.4–15.7 RPM	5.7–12.6 RPM	5.7–12.6 RPM
Tip Speed	81.7–85.4 m/s (268.0–280.18 ft/s)	77.7 m/s (254.9 ft/s)	77.7 m/s (254.9 ft/s)
Sound at Turbine	Lw = 105.5 dBA with LNTE	Lw = 106 dBA with LNTE	Lw = 106 dBA with LNTE

Design Feature	GE 2.52 MW Turbine	GE 3.4 MW Turbine	GE 3.4 MW Turbine
Power Regulation	Blade pitch controls power; controls included for zero voltage ride through (ZVRT) and enhanced reactive power (0.9 power factor)	Blade pitch controls power; controls included for ZVRT and enhanced reactive power (0.9 power factor)	Blade pitch controls power; controls included for ZVRT and enhanced reactive power (0.9 power factor).
Generation	2.52 MW per turbine	3.4 MW per turbine	3.4 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; rest platforms each section	Multi-coated, conical tubular steel with safety ladder to the nacelle; rest platforms each section
Nacelle Bedplate	Cast iron bedplate with fabricated extension to support the generator	Cast iron bedplate with fabricated extension to support the generator	Cast iron bedplate with fabricated extension to support the generator
Main Bearings	Roller bearings	Roller bearings	Roller bearings
Supervisory Control and Data Acquisition (SCADA)	Each turbine is equipped with SCADA controller hardware, software, and database storage capability	Each turbine is equipped with SCADA controller hardware, software, and database storage capability	Each turbine is equipped with SCADA controller hardware, software, and database storage capability
FAA Lighting	Yes, per FAA permitting	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	Per manufacturer specifications—spread foot or pier foundation, TBD

Source: GE manufacturer specifications.

Each turbine comprises a foundation, tower, nacelle, hub, and three blades. The turbine towers are composed of cylindrical, tapered steel and typically consist of three to four sections joined together via factory-fabricated welds that are automatically controlled and ultrasonically inspected during manufacturing per American National Standards Institute (ANSI) specifications. Wind turbine surfaces are coated for protection against corrosion, generally in 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 signals 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 79 wind turbines, each with its own step-up transformer mounted on a pad outside at the base of the unit. Energy from the turbines will be routed through underground collection systems that will deliver power to the DCW collector substation (DCW substation). This power will be stepped up at the project's collector substation from the collection line voltage of 34.5 kilovolts (kV) to the transmission line voltage of 161 kV. The entire collection system will be designed to meet applicable requirements of the National Electrical Safety Code. 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 detailed description of the proposed electrical system. The preliminary electrical collection layout is provided on **Map 2 - Project Site and Facilities**.

5.3.1 Transformers

Power from the turbines is fed through a breaker panel at the turbine's base inside the tower. The panel is interconnected to a pad-mounted transformer (PMT). For the GE 2.52 MW turbine model, the PMT steps up the voltage from 690 volts (V) to 34.5 kV. The PMTs for the GE 3.4 MW model have a low-voltage winding that is tapped in two places, 1,000 V and 690 V, both of which are stepped up to 34.5 kV. Protection for the transformer and wind turbine is provided by a switch breaker at the turbine bus cabinet electrical panel, which is inside the tower. The PMTs are interconnected on the 34.5 kV side to underground cables to form an electrical collection system.

5.3.2 Electrical Collection System

The Project will utilize 34.5 kV underground electrical power lines to collect power from the turbines and transmit it to the DCW collector substation. The entire collection system will be direct buried cable. The underground cables will be installed in a trench that will be approximately 3 to

4 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.

5.3.3 Collector Substation

DCW proposes to construct a new collector substation approximately 7 miles southwest of the city of Dodge Center, Minnesota. The DCW collector substation will step up the collection voltage from 34.5 kV to 161 kV for the transmission line, 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, two transformers, reactive equipment (if needed), metering equipment, circuit breakers, relay equipment, high voltage bus work, steel support structures, and overhead lightning suppression conductors. DCW has an option agreement with a landowner to purchase up to 10 acres for the construction of the new collector substation on existing agricultural land along 140th Avenue in Ripley Township. The DCW collector substation area will be graveled, will cover up to 2 acres, and will have an outdoor lighting system controlled by switches that will be activated only when project personnel are present. The lights installed on the DCW collector substation will be turned downward. A 7-foot-high (2.14-meter-high) chain-link perimeter fence will surround the area; an additional 1 foot (0.3 meters) of barbed wire will be mounted on top of the chain-link, for a total height of 8 feet. The substation equipment will be installed on concrete foundations. The maximum foundation depth will be 20 feet.

The new DCW collector substation will include 161 kV busses, up to two generator step-up unit transformers, circuit breakers, reactive equipment, steel structures, a control building, metering units, and air-break disconnect switches. Typical utility-grade ceramic/porcelain or composite/polymer insulators designed and constructed in accordance with ANSI C29 will be utilized on the systems. Preliminary schematics of the DCW collector substation and a representative photograph of the proposed DCW collector substation are provided in **Appendix C**.

5.3.4 Interconnection

The Project will interconnect at the existing Pleasant Valley Substation owned by GRE and located in Mower County. DCW has executed a 30-year power purchase agreement with GRE for the entire output of the Project. The interconnection to the Pleasant Valley Substation will be considered under the Midcontinent Independent System Operator (MISO) Surplus Interconnection process, which, in turn, provides DCW with greater certainty that there is sufficient capacity to cost-effectively interconnect. The interconnection to the transmission grid for the Project is currently under evaluation by MISO. DCW is submitting a Route Permit Application for the transmission line simultaneous with this Site Permit Application in Docket Number IP6981/TL-20-867.

5.3.5 Transmission Line

As shown in Figure 1, DCW is proposing the construction of a single circuit 161 kV alternating current (AC) high voltage transmission line (HVTL) for approximately 24.3 miles of the Project. For the remaining 2.5 miles, DCW proposes to construct a double circuit 161 kV AC HVTL, as

this portion of the transmission line will be co-located with an existing transmission line owned by GRE. The AC transmission lines would comprise three separate phases of conductors. DCW is proposing the use of aluminum conductor steel reinforced (ACSR) cable or ACSR twisted pair cable for the Project. These cables are stranded steel cores surrounded by strands of aluminum. Other conductor types or sizes may be evaluated during detailed design.

Single circuit lines consist of three phases and typically one to two shield wires. DCW anticipates the use of optical ground wire (OPGW) or 3/8-inch extra-high-strength steel conductor as the proposed shield wires. A shield wire is installed above the electrical phases to protect the line from lightning strikes. OPGW is also used to carry communication signals between substations.

DCW proposes to use 161 kV single circuit monopole structures for the 24.3 miles of single circuit 161 kV AC and 161 kV double circuit monopole structures for the remaining 2.5 miles of the Project that would parallel 310th Street. The double circuit segment would include the DCW proposed 161kV circuit and an existing GRE 161 kV circuit supported on new structures on the existing GRE transmission line centerline. Steel structures will be either weathering or galvanized steel. Spans between structures are not anticipated to exceed 900 feet (approximately 274 meters). The average span will be approximately 500 to 800 feet (152 to 244 meters). Structures are proposed not to exceed 160 feet above ground line depending on terrain, span length, structure configuration, and other crossings or constraints. Final pole heights will be determined during detailed design to maintain all required clearances. Single pole tangent-type structures will be direct embedded, unless deemed not feasible during detailed design. If it is not feasible to directly embed a pole, concrete piers may be used. Angle and terminal structures will be direct embedded and guyed where feasible, utilizing anchors to support loading of the line. If guying is not feasible due to environmental conditions, terrain, or other restrictions, self-supporting structures on concrete piers will be necessary. The specific design requirements for each structure will be confirmed once detailed survey work, soil sampling, and final route design has been performed.

DCW will design the Project to meet all applicable local and state building codes, as well as National Electrical Safety Code requirements. DCW will complete required evaluations with the FAA to ensure all structure heights are acceptable.

6.0 DESCRIPTION AND LOCATION OF ASSOCIATED FACILITIES

The following sections provide a description of facilities associated with the Dodge County Wind (DCW or Applicant) Project. **Map 2 - Project Site and Facilities** illustrates the proposed locations of wind turbines, underground collection lines, crane walk paths, access roads, meteorological evaluation towers (MET towers), the operation and maintenance (O&M) facility, and other associated facilities.

6.1 Transmission and Project Substations

A 161 kilovolt (kV) transmission line will deliver the output of the Project from the DCW collector substation described in **Section 6.1.1** to the Point of Interconnection at the existing Great River Energy (GRE) Pleasant Valley substation.

6.1.1 Dodge County Wind Collector Substation (New)

DCW has an option with a landowner to purchase up to 10 acres where it proposes to construct the new DCW collector substation and O&M facility (see **Section 6.3.1**). The graveled footprint of the DCW collector substation is expected to be no larger than 2 acres, but more detailed design engineering will confirm the size based on equipment needs.

A proposed aboveground 161 kV transmission line will interconnect the Project to the GRE Pleasant Valley substation in Mower County. DCW is submitting a Route Permit Application for the transmission line, simultaneous with this Site Permit Application, in Docket Number IP6981/TL-20-867.

6.2 Collection 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 DCW collector substation through approximately 71.5 miles of underground 34.5 kV collector lines. The underground collection line cable 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 that do not include a collection line will include a warning tape and tracer cable. **Map 2 - Project Site and Facilities** shows the preliminary design of the underground collection cables.

6.3 Other Associated Facilities

6.3.1 Operations and Maintenance

An O&M facility will be constructed within the Project Site to serve as a center for Project O&M activities, provide project access and storage, and house the supervisory control and data acquisition system. The O&M facility will provide office space for DCW 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 up to 7,500 square feet (697 square meters) and will house project equipment. A parking lot will be adjacent to the building. DCW will dig a new well and install a new septic system for sanitary needs or will tie into existing municipal facilities, if available.

6.3.2 Permanent Meteorological Towers

As stated in **Section 4.5**, the Applicant anticipates installing up to two permanent MET towers within the Project Site that will remain operational for the duration of the Project. The precise locations of the permanent MET towers have yet to be determined and will be based upon the final locations of the wind turbines and proper operation of wind assessment equipment. **Map 2 - Project Site and Facilities** shows the proposed locations of three potential permanent METs; however, only one or two locations will be built. All towers will be no less than 250 feet (76 meters) from the edge of road right-of-way and from the boundaries of DCW's site control. Consistent with typical Minnesota Public Utilities Commission (MPUC or Commission) Site Permit requirements, the permanent MET towers will be free standing and will not use guy wires. The MET towers will be approximately 322 feet (98 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 MET 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 lattice structures. Federal Aviation Administration (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 Turbine Access Roads, Turbine Pads, 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 Project is operational. The approximate length of permanent access roads to be installed is 26 miles. The final length will be determined by the final layout of the Project.

After construction is complete, a gravel roadway (ring) will be installed around the entire base of each turbine to facilitate driving around turbine bases and to allow for access to maintenance crews. This gravel roadway around each turbine base will be approximately 24 feet (7.3 meters) wide. See **Figure 6** in Section 10.2 for an image depicting access roads and the associated gravel rings.

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 50 feet (15.2 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, the site for office trailer(s), 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 clearance surveys have been conducted.

A source for concrete for Project construction is yet to be determined. DCW will obtain all required permits for establishment of batch plants, as needed.

6.4 Associated Facilities Permitting

DCW expects that the Route Permit and Certificate of Need (CON) for the transmission line will be submitted simultaneously with this Site Permit Application. The CON application for the DCW Wind Project will be reviewed in Docket No. CN-20-865. Following the issuance of the 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 55** in **Section 11** of this Application provides a summary of the permits and approvals that may be required.

7.0 WIND RIGHTS

Dodge County Wind, LLC (DCW or Applicant) has substantially completed securing landowner agreements for wind rights and property easements necessary to support the construction and operation of the Project. As of the date of filing, DCW has site control agreements with landowners for approximately 10,335 acres (91.2 percent) of the 11,366 acres of land required for successful construction and operation of the Project. DCW has executed and recorded landowner agreements for nearly 20,434 acres within the 28,348 acres that comprise the Project Site. DCW remains in negotiation with a number of landowners within the Project Site and anticipates adding acreage to the project's leased lands before construction. Current participating and non-participating parcels and landowners are shown on **Map 4 - Parcel Land Status (Appendix A)**. The secured easement agreements will ensure access for construction and operation of the Project and will 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 7854.0500, subpart 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. Additionally, this section describes the current environmental setting and human use of the Project Site in terms of natural resources, human settlement, economics, and archaeological/historical resources. Potential impacts to these resources from the construction and operation of the Project are described and quantified, and potential mitigations for these impacts are discussed. Temporary impact calculations discussed herein include consideration of the construction easement surrounding turbines, access roads, the operation and maintenance (O&M) facility, the collector substation, collection lines, laydown yards, Aircraft Detection Lighting System (ADLS) towers, and crane paths. Permanent impact calculations discussed herein include the final footprints for turbines, access roads, the O&M facility, the substation, and ADLS tower locations.

Agency Coordination Overview

Analysis of the project vicinity has been underway since 2014. Dodge County Wind, LLC (DCW or Applicant) has used study findings and agency input to inform appropriate siting of project infrastructure. The Applicant has consulted with governmental agencies including the Minnesota Department of Natural Resources (MNDNR), U.S. Fish and Wildlife Service (USFWS), U.S. Army Corps of Engineers (USACE), the Minnesota Board of Water and Soil Resources (BWSR), Minnesota State Historic Preservation Office (SHPO), the Minnesota Historical Society, Dodge County, and Steele County. DCW also conducted outreach to 31 Native American tribes to provide an overview of the Project and to invite tribes to participate in project coordination. A detailed list of agencies and entities contacted and coordinated with is set forth in **Appendix D: Agencies Contacted Regarding Project.** Correspondence received from the agencies is included in **Appendix E: Agency Correspondence and Responses**.

With respect to MNDNR, DCW initially requested MNDNR review of a wind resource area that was larger 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 (WMA), the Oak Glen WMA, Oak Glen Lake, and surrounding Wetland Conservation Act (WCA)-protected wetlands. Avian and bat surveys were conducted on this larger area between 2014 and 2016, following USFWS Wind Energy Guidelines (USFWS 2012) and MNDNR Guidance for Commercial Wind Energy Projects (MNDNR 2018).

In February 2017, MNDNR reviewed the second boundary for the Project and commented that the revised boundary was acceptable. 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 DCW has completed. MNDNR recommended surveys for the Henslow's sparrow and loggerhead shrike, which were completed in 2017.

In May 2017, the project boundary shifted west into Steele County to address landowner preferences and updated wind resource data while still avoiding sensitive environmental resource areas. MNDNR expressed concern regarding forested, unfragmented woodlot areas within the project boundary. In response, DCW sited project infrastructure to avoid these woodlot areas.

In July 2018, DCW conducted a meeting with MNDNR and USFWS to discuss the results of the Year 2 avian use studies as well as to solicit feedback regarding a revised turbine layout from the agency biologists. MNDNR biologists expressed concern regarding the location of a single turbine (Turbine 11) in close proximity to a forest patch. Based on this feedback, DCW dropped the turbine from the proposed array in July of 2020.

DCW met with MNDNR and USFWS in February and September of 2021 to provide a project update and to discuss the results of the 2020 resource survey results, including the bat acoustic monitoring study. DCW continues to coordinate with MNDNR, USFWS, and other entities regarding the proposed DCW Wind Project and associated transmission line.

Climate Change and Climate Resilience

Wind energy has among the fewest and lowest environmental impacts of any form of energy generation and emits no air or water pollution. The DCW Project represents a clean, renewable source of energy. The Project creates no greenhouse gases or other air pollutants, uses no water resources to generate electricity, creates no waste by-products, and creates no hazardous waste cleanup obligation at the end of the Project's productive life.

The Project has been designed for resiliency against environmental extremes arising from climate change. Project equipment has been carefully engineered and selected to withstand the potential for severe weather events, including the installation of a cold weather operation package. Turbines have been sited to minimize potential impacts from flooding. Project equipment can be elevated as needed, to provide additional flood protection. Similarly, the project stormwater management system will be designed using the National Oceanic and Atmospheric Administration Atlas-14, a modeling tool that provides precipitation frequency estimates for many Midwestern states, including Minnesota. The model takes into consideration the historical frequency of heavy rainfall events, which is important to project engineers when designing stormwater infrastructure that will be in place for the life of the project.

8.1 Socioeconomics and Local Economies

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), and the U.S. Census 2019 American Community Survey (ACS) population estimate for Dodge County was 20,669, representing an increase of approximately 2.9 percent (U.S. Census Bureau 2021). The county seat of Dodge County is Mantorville, located approximately 7 miles northeast of the Project Site. The 2010 census population for Steele County was 36,576 (U.S. Census Bureau 2010a), and the U.S. Census 2019 ACS population estimate for Steele County was

36,683, representing an increase of approximately 0.3 percent (U.S. Census Bureau 2021). The county seat of Steele County is Owatonna, located approximately one mile northwest of the Project Site.

Table 4 shows the U.S. Census Bureau 2015–2019 ACS demographic profile data for Minnesota, Dodge and Steele Counties, and townships within the Project Site (Ashland, Claremont, Ripley, Westfield, Aurora, and Havana) (U.S. Census Bureau 2021). The demographic profile summarizes population and economic characteristics of the counties and townships in which the Project is located.

Table 4: Population and Economic Characteristics, 2015–2019

Location	Population	Housing Units (Occupied)	Per Capita Income	Families Below Poverty Line (%)
Minnesota	**5,563,378**	**2,185,603**	**$37,625**	**5.9**
Dodge County	**20,669**	**7,756**	**$34,399**	**4.0**
Ashland Township	341	117	$40,832	0.0
Claremont Township	493	167	$38,906	2.8
Ripley Township	170	61	$38,246	0.0
Westfield Township	452	173	$35,407	5.2
Steele County	**36,683**	**14,692**	**$32,477**	**5.5**
Aurora Township	499	197	$34,061	1.3
Havana Township	581	231	$43,094	2.2

Source: (U.S. Census Bureau 2021).

As shown above, Dodge and Steele Counties have a slightly lower per capita income than the state as a whole. However, with one exception, poverty rates in the townships where the Project would be located are lower on average than for the respective counties and the state. Westfield Township, with approximately 5.2 percent of families living below the poverty line, has the highest poverty rate in the area.

According to the ACS 2015–2019 5-Year Data Profile, 8,241 housing units are in Dodge County and 15,628 housing units are in Steele County. The median value of owner-occupied housing units in Dodge and Steele Counties ($183,900 and $169,300, respectively) are both considerably below the state median value of $223,900 (U.S. Census Bureau 2021).

According to the ACS 2014 to 2018 estimates, educational services, health care, and social assistance accounted for 25.2 percent of jobs statewide in Minnesota, followed by manufacturing at 13.4 percent and retail at 11.0 percent (U.S. Census Bureau 2020). In Dodge County, educational services, health care, and social assistance accounted for 31.5 percent of jobs,

according to the ACS, followed by manufacturing at 13.6 percent and retail at 9.9 percent. In Steele County, manufacturing accounted for 23.7 percent of jobs, followed by educational services, health care, and social assistance at 19.8 percent and retail trade at 11.6 percent (U.S. Census Bureau 2020). As noted earlier, the Project Site is primarily agricultural land, and farming represents an important livelihood within the immediate area. In Dodge County, agriculture, forestry, fishing and hunting, and mining accounted for 6.3 percent of jobs. In Steele County, agriculture, forestry, fishing and hunting, and mining accounted for 3.8 percent of jobs (U.S. Census Bureau 2020).

The Minnesota Pollution Control Agency (MPCA) defines environmental justice as "the fair treatment and meaningful involvement of all people, regardless of race, color, national origin, or income, with respect to environmental law and policies." Environmental justice is intended to ensure that all people benefit from equal levels of environmental protection and have the same opportunities to participate in decisions that may affect their environment or health (MPCA 2021b). Environmental justice concerns are raised when a proposed project would differentially and negatively impact specific communities (*e.g.*, placing a project that releases pollutants in a low-income neighborhood).

8.1.1 Potential Impacts

Approximately 400 temporary construction personnel will be required for Project construction. Due to project commitments to local hiring, the majority of the construction workforce will be sourced locally, if possible. Up to 40 percent of workers will be from outside the region and will only remain in Dodge and Steele Counties for the duration of construction (approximately five to seven months). During the operations phase of the Project, which is expected to be 30 years, approximately five to eight permanent O&M staff will support project operations locally. Due to the temporary nature of the 400 construction personnel, and the limited number of permanent O&M staff, the Project is not anticipated to significantly change the demographics of the Project area. Overall, the Project will have a positive impact on the economy of the region by creating temporary and permanent jobs, increasing the counties' tax bases due to production taxes, and providing lease payments to participating landowners.

8.1.1.1 Land Value Impacts

A common concern of communities surrounding wind energy facilities is the potential impact on residential property values. Wind energy projects drive economic development, job growth, and tax revenue, which benefits landowners and land values in the area (**Appendix F: Land Values**). Landowners who host wind turbines on their property earn regular lease payments, which add to the property's value, and lease payments continue with a sale of the property. Hoen and colleagues (2009) collected data from 7,500 sales of single-family homes situated within 10 miles of 24 existing wind facilities in nine different states. Rural areas in Iowa, Illinois, and Wisconsin that were analyzed in the study are similar in nature to the communities in Minnesota found in the current Project Site.

Analysis of eight hedonic pricing models on repeat sales and sales volume models shows no conclusive evidence of impacts of wind facilities to widespread property value in communities surrounding these facilities. Hoen and colleagues (2009) conclude the following:

> Neither the view of the wind facilities nor the distance of the home to those facilities is found to have any consistent, measurable, and statistically significant effect on home sales prices. Although the analysis cannot dismiss the possibility that individual homes or small numbers of homes have been or could be negatively impacted, it finds that if these impacts do exist, they are either too small and/or too infrequent to result in any widespread, statistically observable impact.

The base model for the study also concluded the following: (1) there is no statistically significant difference in sales price between homes found within one mile and five miles of wind energy facilities, and (2) while home buyers and sellers consider the scenic vista of a home when establishing sales prices, there is no statistically significant home sale price difference apparent in the model for homes having minor, moderate, substantial, or extreme views of wind turbines (Hoen et al. 2009)

Additionally, Hoen and colleagues (2013) examined data from 50,000 home sales in 27 counties in nine states analyzed, including Minnesota, Iowa, and Illinois. The study found no statistically significant difference in home sales prices between 1 and 5 miles of wind turbines within a wind energy facility during the post-construction or post-announcement/pre-construction periods of wind energy facilities. Research suggested that the "property-value effect of wind turbines is likely to be small, on average, if it is present at all" (Hoen et al. 2013).

Marous & Company completed a 2021 survey to address the question of whether the development of the wind farm and transmission line has an effect on the value of residential uses and/or agricultural land in proximity to the turbines (Marous & Company 2021). The analysis was based on a matched pair analysis of 34 residential properties with similar demographics, land use and economic characteristics in other states, specifically Minnesota, Iowa, Illinois, Indiana, Ohio, and Kansas. In a review of 109 county assessors from counties in which wind farms with more than 25 turbines are located, all county assessors determined that there was no evidence to support a negative impact upon residential property values due to the development of and the proximity to a wind farm (Marous & Company 2021) (**Appendix F**). Based on the studies outlined above, the Project is expected to have a negligible effect, if any, on the assessed values of private property and, therefore, on property taxes with the understanding that DCW will add to the property tax base as addressed in **Section 8.1.1.4**.

8.1.1.2 Employment Impacts

The Project is expected to generate approximately 400 construction and five to eight full-time O&M jobs, many of which will be filled by local or regional workers. **Table 5** provides DCW's estimate of average and peak headcount, and an approximate local versus non-local breakdown of

construction jobs that may be generated by the Project, based on comparable projects in Minnesota. Local workers are defined as any workers who live in Minnesota or within 150 miles of the state (DCW 2019).

Table 5: Estimated Wind Farm Construction Jobs by Job Type

Labor Type	Average Headcount	Peak Headcount	Approximate Source Location	
			Non-Local (%)	Local (%)
Laborers	100–130	130	70	30
Equipment Operators	60–75	75	20	80
Crane Operators	15–25	25	20	80
Electricians	80–100	100	25	75
Management	50–60	60	40	60

8.1.1.3 Local Spending Impacts

Local businesses within Dodge and Steele Counties are expected to experience a short-term positive increase in revenues 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 non-local workers, as well as the purchase of materials such as fuel, concrete, gravel, and seed mix from local vendors will generate revenue for local businesses. It is anticipated that the largest increase in economic activity would be located near the Project, between Owatonna and Rochester, Minnesota. All concrete ready-mix, road building subcontractors, and the O&M building will be contracted with local Minnesota businesses (DCW 2019).

Communities in the vicinity of the Project will also benefit from induced impacts as a result of the increased spending power of both local and non-local employees working on the Project, particularly during the peak of the construction effort.

8.1.1.4 Tax Payments Impacts

The Project will provide long-term positive economic benefits to local landowners and the local economy of southeastern Minnesota. Landowners participating in the Project will benefit from annual lease payments, while, in accordance with state and county law, DCW will pay property tax for the substation, O&M facility, and transmission poles 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 $1.20 per megawatt-hour (MWh) of electricity produced. This would result in an annual Wind Energy Production Tax ranging from between

$750,000 and $1,000,000 annually after the first year in Dodge County, and between $120,000 and $180,000 annually after the first year in Steele County.

8.1.1.1 Environmental Justice Impacts

MPCA developed an interactive map based upon U.S. Census tract data that identifies locations with environmental justice concerns in Minnesota. The DCW Project is not located within any area so-identified (MPCA 2021a). Therefore, the Project is not anticipated to have adverse environmental justice impacts.

8.1.2 Mitigation Measures

The Project is not expected to result in adverse economic impacts; therefore, no mitigation is proposed. However, DCW has committed to enhancing positive economic impacts to the extent feasible through local hiring and spending. DCW has committed to using reasonable efforts to employ at least 60 percent local labor during construction and to use union workers for skilled roles such as engineering and electrical construction (DCW 2019). 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 temporary and permanent losses in agricultural production (see **Section 8.12.2**).

DCW conducted tribal outreach by providing detailed Project information to various Native American tribes with ancestral ties to the Project area. Participating tribes included the Standing Rock Sioux Tribe, Upper Sioux Community, Rosebud Sioux Tribe, and Sisseton Wahpeton Oyate. Participating tribes were invited to collaborate in micro-siting and subsequent archaeological surveys to identify sites of cultural and religious significance to the tribes. These sites were avoided during design of the project layout. The Project is not expected to result in adverse impacts to sites of cultural and religious significance to participating tribes; therefore, no mitigation is proposed.

Based on MPCA predictive tools and coordination with participating tribes, the Project is not expected to result in adverse environmental justice impacts; therefore, no mitigation is proposed.

8.2 Land Use

8.2.1 Local Zoning and Comprehensive Plans

8.2.1.1 Adopted Comprehensive Plans

Local governments often develop comprehensive plans as community planning tools to guide the future 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, as well as plans for communities within and adjacent to the Project including Dodge Center, Owatonna, Claremont, Hayfield, and Blooming Prairie. **Table 6** provides an inventory of governing bodies within and adjacent to the Project Site, along with their respective comprehensive plans, if available.

Table 6: Comprehensive Plan Inventory for Local Governments

Governing Body	Name of Plan	Year Adopted/ Updated	Associated Development Plan(s)
Dodge County	County-Wide Comprehensive Plan	2019	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
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 social and economic development (Community and Economic Development Associates [CEDA] 2019). The

overall focus of the Comprehensive Plan is on a continued high quality of life for all residents with long-term goals of encouraging citizen input and participation, maintaining Dodge County's rural value and character, protecting and preserving prime agricultural land, growing and sustaining a diversity of housing options, supporting economic development through increased jobs and opportunity for business growth, improving access to quality broadband in the county's rural areas, increasing recreational opportunities, protecting clean air and water while still allowing for growth, and improving and maintaining transportation infrastructure (CEDA 2019).

The primary goals of the Steele County Comprehensive Land Use Plan include the protection of agricultural areas from encroachment of incompatible uses, protection of the agricultural economy and community, promoting orderly development in a manner that does not degrade the natural environment, providing a decision-making guide for managing growth that will serve the best interest of current and future citizens, and making the most efficient and economical use of public funds and investments (Steele County 2007). 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 Project is consistent with Dodge and Steele Counties' respective comprehensive plan goals to conserve farmland and natural resources and support economic and sustainable development. DCW believes that the Project will be compatible with the rural and agricultural character of both 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 kilowatt (kW) or five megawatts (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 2017a). According to Chapter 216F, a large WECS (LWECS) means any combination of WECS with a combined nameplate capacity of 5,000 kW (5 MW) or more, and one in which a permit under Chapter 216F is the only site approval required for its location. The County may assume responsibility, upon written notice to the Minnesota Public Utilities Commission (MPUC or 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 five 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 7**.

Should the Commission nevertheless determine that it must consider the County's standards under Minnesota Statute Section 216F.081, Dodge County has provided a letter on August 17, 2020, indicating that the County supports a finding that there is good cause not to apply the County's standards to the Project. See **Appendix E** for a copy of the letter from Dodge County that specifically states: "Under Minnesota Statute Section 216F.091, 'The Commission, in considering a permit application for LWECS in a county that has adopted more stringent standards, shall consider and apply those more stringent standards, unless the commission finds good cause not to apply the standards.' Dodge County would like to clarify that it was not the County's intent for Chapter 16 of the Dodge County Zoning Ordinance, and its setbacks, to be applied to a wind project such as DCW, seeking siting approval from the Commission."

Steele County has also developed performance standards for WECS, which can be found in Section 15 of the Steele County Zoning Ordinance (Steele County 2015a). 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 Overlay (SH) 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. The Steele County performance standards and setbacks for commercial WECS vary from the Commission's permit standards and are set forth in **Table 7**.

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. **Table 7** provides a comparison of the Dodge and Steele County setbacks to the Commission's setbacks.

Table 7: Comparison for Local Government and Public Utilities Commission Setbacks

MPUC Wind Facility and Collector Lines Setback Categories	MPUC Setback Conditions as Represented in Recent MPUC 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) rotor diameter (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.	5 RD on the predominant wind axis (typically north–south axis), 3 RD on the secondary wind axis (typically east–west axis).	5 times the RD or total height, whichever is greater, from neighboring property lines.
Sound	Greater of 1,000 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 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 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.	Sufficient distance to meet state Residential noise standard Noise Area Classifications (NAC) 1, L_{50} dBA during overnight hours, or minimum of 750 feet (229 meters) (for participants) and 1,000 feet (305 meters) for non-participants) or compliance with noise standards, whichever is greater.	Minimum of 750 feet (229 meters) from neighboring dwellings.

MPUC Wind Facility and Collector Lines Setback Categories	MPUC Setback Conditions as Represented in Recent MPUC Site Permits	Dodge County (Section 16.51)	Steele County (Section 1527)
Roads and Other Rights-of-Ways (ROW)	Wind turbine and meteorological evaluation towers (MET 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 feet [30 meters]), whichever is greater.
Public Land	Wind turbines and associated facilities including foundations, access roads, underground cable, and transformers, shall not be located in public lands, including Waterfowl Production Areas (WPAs), Wildlife Management Areas (WMAs), and Scientific and Natural Areas (SNAs), or in county parks, and wind turbine towers shall also comply with the setbacks of the wind buffer access requirement.	5 RD on the predominant wind axis (typically north–south axis), 3 RD on the secondary wind axis (typically east–west axis).	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 WCA.	No turbines, towers, or associated facilities shall be located within any type of wetland.	N/A

MPUC Wind Facility and Collector Lines Setback Categories	MPUC Setback Conditions as Represented in Recent MPUC Site Permits	Dodge County (Section 16.51)	Steele County (Section 1527)
Meteorological Evaluation Towers (MET Towers)	Permanent towers for meteorological equipment shall be free standing. Permanent MET 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 MET towers in the county the tower is built, whichever is more restrictive. MET towers shall be placed on property where the Permittee holds the wind or other development rights. MET towers shall be marked as required by the Federal Aviation Administration (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.	The greater of 250 feet (76 meters) or 1.1 times the height of the tower (1.2 times the height for non-participating residences). Guy wires must meet the setback.	Total height of the 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 Minnesota Department of Transportation (MnDOT), Department of Aviation, and FAA. The Permittee shall notify owners of all known	No turbines, towers, or associated facilities shall be located so as to create an obstruction to navigable airspace of public and private licensed airports in Minnesota.	N/A

MPUC Wind Facility and Collector Lines Setback Categories	MPUC Setback Conditions as Represented in Recent MPUC Site Permits	Dodge County (Section 16.51)	Steele County (Section 1527)
	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 wind facility so as to minimize the amount of impacted land. 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 supervisory control and data acquisition 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 be negotiated with the affected landowner(s).	Collector lines should be buried and should be located on the back side of the ROW.	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.

MPUC Wind Facility and Collector Lines Setback Categories	MPUC Setback Conditions as Represented in Recent MPUC Site Permits	Dodge County (Section 16.51)	Steele County (Section 1527)
Electrical Collector and Feeder Lines (continued)	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 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.		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.

MPUC Wind Facility and Collector Lines Setback Categories	MPUC Setback Conditions as Represented in Recent MPUC Site Permits	Dodge County (Section 16.51)	Steele County (Section 1527)
Public Conservation Lands	N/A	5 RD on the predominant wind axis (typically north–south axis), 3 RD on the secondary wind axis (typically east–west axis).	N/A
Planned City Expansion	N/A	The greater of 1,000 feet (305 meters) or 5 RD on the predominant wind axis (typically north–south axis), 3 RD on the secondary wind axis (typically east–west axis).	N/A
Other Existing Turbines and Internal Spacing	N/A	Other existing WECS and internal turbine spacing is minimum of 3 RD apart for crosswind spacing and a minimum of 5 RD apart for downwind spacing.	Wind access buffer requirement.
Urban Expansion and Rural Residential District	N/A	The greater of 1,000 feet (305 meters) or 5 RD on the predominant wind axis (typically north–south axis), 3 RD on the secondary wind axis (typically east–west axis).	N/A

MPUC Wind Facility and Collector Lines Setback Categories	MPUC Setback Conditions as Represented in Recent MPUC Site Permits	Dodge County (Section 16.51)	Steele County (Section 1527)
Minnesota Department of Transportation Microwave Beam Path Corridor	N/A	No turbines shall be located within the MnDOT Microwave Beam Path Corridor.	N/A
Substations and Accessory Facilities	N/A	When not located in public ROW, meet zoning district requirements or a minimum of 100 feet (31 meters), whichever is greater. (Agricultural = 50 feet [15 meters] from roads, 25 feet [8 meters] from property lines).	Use the structural set back from roads and property lines of the non-participating owners.
Native Prairie	Wind turbines and associated facilities shall not be placed in native prairie, as defined in Minnesota Statutes §84.02, subdivision 5, unless addressed in a Prairie Protection and Management Plan, and shall not be located in areas enrolled in the Native Prairie Bank Program.	Turbines and associated facilities shall not be placed in native prairie unless approved in the Native Prairie Protection Plan. A Native Prairie Protection Plan shall be submitted if native prairie is present. The Permittee shall, with guidance from the MNDNR and others selected by the Permittee, prepare a Prairie	N/A

MPUC Wind Facility and Collector Lines Setback Categories	MPUC Setback Conditions as Represented in Recent MPUC Site Permits	Dodge County (Section 16.51)	Steele County (Section 1527)
Native Prairie (continued)		Protection and Management Plan, and submit it to the County and MNDNR Commissioner sixty (60) days prior to the start of construction.	
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 Site is 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 (Appendix A) shows the zoning in Dodge and Steele Counties for the Project Site. The portions of the Project Site within Dodge County primarily occur in the county-zoned Agricultural District. Shoreland buffers are present in the Project Site as shown on the county zoning maps. **Map 19 – Flood Zones (Appendix A)** shows the Federal Emergency Management Agency (FEMA) and Dodge County flood zones associated with the Project Site.

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

The City of Owatonna is within Steele County and is the largest urban area in the vicinity of the Project Site. The City of Owatonna's total population as a portion of the total Steele County population has grown from 63.1 to 70.0 percent between 1990 and 2010 (City of Owatonna 2006; U.S. Census Bureau 2010b). 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 less than 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 2018 ACS population estimate was 664 (U.S. Census Bureau 2020). 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 the length of time parcels are protected, annual lease rate, and type of land use/habitat protected.

Review of the Project Site identified one CREP easement and one RIM-WRP easement within the site (BWSR 2019). Refer to **Table 8** below for additional details on these parcels and **Map 6 -**

Public Land Ownership and Recreation (Appendix A) for their respective locations. In addition, one 124-acre RIM-WRP property is located just outside the northern boundary of the Project Site, and one 7.3-acre CREP easement is located just outside the southern boundary of the Project Site (BWSR 2019).

Table 8: Conservation Easements

Conservation Program	Acres	Location	Expiration Year
CREP	37	Steele County near the northern boundary of the Project Site	Not shown/ may be perpetual
RIM-WRP	21	Steele County near the northern boundary of the Project Site; adjacent to CREP Parcel	Not shown/ may be perpetual

Source: (BWSR 2019).

Comprehensive information on CRP easements located on private property within the Project Site was not available at the time of writing. DCW will continue to work to obtain information on CRP easements within the Project Site.

8.2.3 Potential Impacts

8.2.3.1 Local Zoning and Comprehensive Plans

The Project is consistent with Dodge and Steele Counties' zoning requirements and comprehensive plans. The Project Site occurs primarily within county-zoned agricultural districts but also includes floodplains, shoreland districts, 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 Site within Steele County are zoned conservation, no project infrastructure is proposed within a 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. Approximately 0.7 miles of underground collection and approximately 0.3 miles of access roads are planned within the Dodge County remapped floodplain. The Dodge County floodplain is currently being remapped by the county and MNDNR as FEMA floodplains have not been digitally mapped yet. No infrastructure is proposed within the Dodge County shoreland district.

The Project is not likely to impact future zoning and expansion of incorporated areas nearby. 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 within the Project Site.

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 agricultural use.

8.2.3.2 Conservation Easements

The locations of the CREP and RIM/WRP easements have been incorporated into project planning in order to avoid impacts from project activities. Therefore, no CREP or PWP easements would be impacted by project infrastructure or construction. Refer to **Map 6 - Public Land Ownership and Recreation (Appendix A)**.

8.2.4 Mitigation Measures

Since the proposed Project is consistent with the zoning requirements and comprehensive plans for Dodge and Steele Counties and meets all setback requirements, it is unlikely to impact future zoning or expansion. Therefore, no mitigation is proposed to achieve consistency with local zoning and comprehensive plans. Remapping of Dodge County's floodplain is currently underway, and DCW will continue to coordinate with the county and state regarding aboveground facilities within the floodplain.

As discussed above, the Project will avoid known CREP and RIM/WRP easements. CRP easements will be located in coordination with participating landowners. If CRP easements are determined to be present, these locations will be avoided to the maximum extent practicable. If the Project requires the placement of 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 8.15**, **8.16**, **8.17**, **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 three dB is imperceptible to the human ear.

A sound level meter that is used to measure sound is a standardized instrument per American National Standards Institute (ANSI) S1.4-2014 (R2019). It contains "weighting networks" (*e.g.*, A-, C-, and 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." The C-weighting network has a nearly flat response for frequencies between 63 Hz and 4,000 Hz and is denoted as dBC. Z-weighted sound levels are measured sound levels without any weighting curve and are otherwise referred to as "unweighted."

Because the sounds in our environment vary with time they cannot simply be described with a single number. Two methods are used for describing variable sounds. These are exceedance levels and the equivalent level, both of which are derived from 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 percent of the time. It is close to the maximum level observed during the measurement period. The L_{10} is sometimes called the intrusive sound level because it is caused by occasional louder sounds like those from passing motor vehicles.
- L_{50} is the sound level exceeded 50 percent of the time. It is the median level observed during the measurement period. The L_{50} is affected by occasional louder sounds like those from passing motor vehicles; however, it is often found to be comparable to the equivalent sound level under relatively steady sound level conditions.
- L_{90} is the sound level exceeded 90 percent of the time during the measurement period. The L_{90} is close to the lowest sound level observed. It is essentially the same as the residual sound level, which is the sound level observed when there are no obvious nearby intermittent sound sources.
- L_{eq}, 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 Minnesota Administrative Rules, Chapter 7030 for Noise Pollution Control. These rules are enforced by the MPCA through the use of 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 9**.

Table 9: Minnesota Pollution Control Agency State Noise Standards—Hourly A-Weighted Decibels

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

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 dB, the L_{50} limit is more restrictive for a wind energy facility. Therefore, NAC 1 receptors have been evaluated against the L_{50} sound level limit of 50 dBA in this analysis.

An ambient sound level survey was conducted to characterize the current acoustical environment in the community surrounding and within the Project Site. Existing sound sources include vehicles on Highway 14 (including trucks) and on other local roads, occasional trains to the north of the Project Site, wind, dogs, rustling vegetation, occasional distant aircraft, livestock and farm equipment, and geese and 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 Site. These locations were submitted in a protocol to the Minnesota Department of Commerce on March 14, 2018. See **Map 7 - Sound Level Measurement Locations (Appendix A)** for a review of all measurement locations with respect to the Project. This includes the temporary MET tower where wind data were collected. Result summaries of the long-term and short-term measurements are provided in **Table 10** and **Table 11**, respectively. Further details of the measurement locations, methodology, and sound levels are provided in **Appendix G: Pre-construction Sound Analysis**.

Table 10: 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 11: 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 CadnaA sound level calculation software developed by DataKustik GmbH. This software uses the International Organization for Standardization (ISO) 9613-2 international standard for sound propagation (ISO 1996). The sound level analysis for the Project conservatively includes 79 wind turbines. Eleven (11) of the wind turbines are General Electric (GE) 2.52-116 low-noise trailing edge (LNTE) units with a hub height of 90 meters and an RD of 116.5 meters. Sixty-eight (68) of the wind turbines are GE 3.40-140 LNTE units with an RD of 140 meters; eight (8) of the GE 3.40-140 wind turbines are at a hub height of 81 meters, and sixty (60) are at a hub height of 98 meters; three (3) of these wind turbines will be operated in Noise Reduction Operation (NRO) Mode 106. Sound power levels from GE technical reports were used to assign worst-case sound power levels to each of the modeled wind turbines. In addition to the wind turbines, a collector substation will be associated with the Project located in Dodge County. Two 150 megavolt-ampere transformers are proposed for the substation. The National Electrical Manufacturer's Association sound rating for each of the transformers was assumed to be 74 dBA. Epsilon has estimated octave band sound power levels using the broadband sound pressure level and techniques provided in the Electric Power Plant Environmental Noise Guide (Bolt, Beranek and Newman Inc. 1984).

In all, 554 receptors were input into the CadnaA model. These receptors were modeled as discrete points at a height of 1.5 meters (5 feet) above ground level (AGL) 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 (Appendix A)** and are distinguished as either participating or non-participating.

Several modeling assumptions inherent in the ISO 9613-2 calculation methodology, or selected as conditional inputs by Epsilon, were implemented in the CadnaA model to produce conservative results (*i.e.*, higher sound levels).

8.3.1 Potential Impacts

All modeled sound levels, as output from CadnaA, are A-weighted equivalent sound levels (L_{eq}, dBA). Based on Epsilon's experience 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 47 dBA, and results are shown in **Table 12**. Modeled sound level isolines are presented on **Map 9 - L_{50} Sound Modeling Results (Appendix A)**. The highest predicted worst-case Project-Only L_{50} sound level of 47 dBA is at a participating receptor #209. Under conditions resulting in non-wind-turbine ambient sound levels of 47 dBA or less, total sound levels (Project + non-wind-turbine ambient) will meet the MPCA limit of 50 dBA. Nighttime measurements showed non-wind-turbine ambient L_{50} broadband sound levels range from 21 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 of the six locations during the measurement program. Non-wind-turbine ambient sound levels can fluctuate due to sound sources such as ground-level winds, vehicular traffic, birds, and vegetation rustle, all of which have the potential to cause non-wind-turbine ambient sound levels to be equal to or exceed the MPCA L_{50} nighttime limit of 50 dBA. In these instances, the increase to the non-wind-turbine ambient sound level due to the Project will be 0 to 2 dB since the highest modeled Project-Only sound level is 47 dBA. Under conditions where two sound levels have the same or very similar characteristics a two-dBA change is imperceptible to the average person. **Appendix G: Pre-construction Sound Analysis** provides further details of the sound modeling analysis.

Table 12: Summary of Sound Assessment

Modeling Scenario	Maximum Modeled L_{50} Sound Pressure Level (dBA) at NAC 1 Receptors		
	All Receptors	Participating	Non-Participating
Project Only	47	47	47

An evaluation of low-frequency and infrasound levels from a wind energy center at receptors is not required by the state of Minnesota. However, a discussion of low frequency 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 washing machines 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 (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 eight 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 to 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. (Herrmann et al. 2016)

The Massachusetts Department of Environmental Protection and the Massachusetts Department of Public Health (2012) 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 2014). 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 and colleagues (2016) concluded that there was no advantage to using C-weighting to measure low-frequency sound since A-weighting and C-weighting are so highly correlated. In other words, acceptable A-weighted limits also eliminate low-frequency and infrasound impacts.

Low frequency and infrasound have also been studied extensively in Japan. Tachibana and colleagues (2014) 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.

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."

8.3.2 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-foot (427-meter) 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 1,147 feet (349.5 meters) (3 RD) in non-prevailing wind directions and at least 1,911 feet (582.5 meters) (5 RD) in prevailing wind directions for the GE 2.52 MW turbine model and at least 1,378 feet (420 meters) (3 RD) in non-prevailing wind directions and at least 2297 feet (700 meters) (5 RD) in prevailing wind directions for the GE 3.4 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 1,911 feet (582.5 meters) or 5 RD for the GE 2.52 MW turbine model and at least 2297 feet (700 meters) or 5 RD for the GE 3.4 MW turbine model.

In addition to these measures, three (3) of the proposed wind turbines will be placed in NRO Mode 106, as shown on **Map 9 – L_{50} Sound Modeling Results (Appendix A)**.

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

8.4 Visual Resources

8.4.1 General Visual Resources

Aesthetic quality and appeal of a region generally derive from the terrain, natural features (*e.g.,* lakes, rivers, ponds, etc.), native flora, and human-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 Site are expected to have a higher sensitivity to the potential aesthetic impacts than temporary observers.

The general topography of the Project Site is described as undulating, rolling relief with approximate elevations between 1,228 and 1,324 feet above mean sea level (AMSL). Refer to **Map 10 - Site Topography (Appendix A)**. The Project Site 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 Site. The landscape can generally be classified as rural open space.

Vegetation within the Project Site 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 132 residences located within the Project Site. An additional 302 residences are located within one mile of the Project Site, some in the town of Claremont.

The aesthetic character of the Project Site consists of an agricultural landscape, which is 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. Three cemeteries are found within the Project Site: the Aurora Lutheran Cemetery, the Saint John's Lutheran Cemetery, and the Thompson Cemetery.

Three commercial wind farms (Oak Glen Wind, G. McNeilus, and Pleasant Valley) are located within 10 miles of the Project Site and contain turbines of various heights and RDs. They are visible from locations on the proposed DCW Wind Project, as described below:

- The Oak Glen Wind farm is located approximately 2.5 miles southwest of the Project Site and contains 24 turbines that generate 1.8 MW each.
- The G. McNeilus WECS is located approximately 2 miles east of the Project Site and contains 41 turbines that generate 0.9 MW, 0.95 MW, 1.5 MW, or 1.65 MW, individually.
- The Pleasant Valley WECS is located approximately 7.4 miles southeast of the Project Site and contains 100 turbines that generate 2.0 MW each.

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

No existing transmission lines are present within the Project Site. Approximately 138 miles of existing transmission lines are located within 10 miles of the Project Site, ranging from 4 kilovolts (kV) to 161 kV in size. Refer to **Map 2 - Project Site and Facilities**. These existing transmission lines represent existing visual impacts to the Project Site and its vicinity. As indicated, DCW will propose to construct a 161 kV transmission line to connect the proposed wind facility to the transmission grid. A Route Permit Application for the project's transmission line is being submitted simultaneous with this Site Permit Application.

The Federal Communications Commission (FCC) Antenna Structure Registration database identifies no antenna structures within the Project Site. Four antenna structures are located within 2 miles of the Project Site, resulting in additional existing visual impacts within the vicinity of the Project Site. An additional 30 existing antenna structures are located within 10 miles of the Project Site.

Existing nighttime lighting in the vicinity is primarily associated with roadways, residences, and outbuildings.

8.4.2 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. Shadow intensity, or how "light" or "dark" a shadow appears at a specific receptor, will vary with distance from the turbine. The closer a receptor is to a turbine, the more turbine blades block out the sun's rays, and shadows will be wider and darker. Receptors located farther away from a turbine experience thinner and less distinct shadows since the blades block out less sunlight. A stationary wind turbine generates only a stationary shadow similar to any other structure.

A project-specific shadow flicker analysis was conducted using the software package WindPRO (see **Appendix H – Shadow Flicker Analysis**). The worst-case annual duration of shadow flicker was calculated based on the following modeling inputs:

- Proposed wind turbine locations. The modeling analysis included 79 wind turbines.
- Wind turbine dimensions (*i.e.,* RD and hub height). GE 2.52 and GE 3.40 wind turbines are proposed for this Project. The GE 2.52 wind turbine has an RD of 116.5 meters and a hub height of 90 meters, and the GE 3.40 wind turbine has an RD of 140 meters and a hub height of either 81 or 98 meters.
- 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

statuses are presented in **Map 12 - Shadow Flicker Modeling Locations (Appendix A)**. In total, 554 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-foot) spacing was used for this grid.
- No federal, state, or local regulations regarding the maximum radial distance from a wind turbine for which shadow flicker should be analyzed apply 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 meters) 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 developed by the U.S. Geological Survey (USGS).
- Conservatively, obstacles (*i.e.,* buildings and vegetation) were excluded from the analysis. This is effectively a "bare earth" scenario, generating conservative results. 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 are shown in **Table 13**. 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 (NCEI 2018).

Table 13: Monthly Sunshine Probability Values

Month	Possible Sunshine (%)
January	53
February	59
March	57
April	56
May	62
June	67

Month	Possible Sunshine (%)
July	74
August	69
September	62
October	51
November	37
December	38

- Annual operational hours per wind direction sector were provided by NextEra Energy Resources. 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 93 percent 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	193
NNE	369
NE	339
ENE	406
E	332
ESE	400
SE	458
SSE	563
S	973
SSW	662
SW	456
WSW	381
W	429
WNW	794
NW	869
NNW	510
Annual	8,134

The modeled worst-case annual shadow flicker duration ranged from 0 hours, 0 minutes per year to 187 hours, 38 minutes per year. The maximum worst-case flicker was located at a participating receptor (#16). The maximum modeled worst-case annual flicker at a non-participating receptor (#62) is 129 hours, 17 minutes.

Map 13 - Shadow Flicker Modeling Results (Appendix A) presents expected shadow flicker durations as isolines overlaid on aerial imagery. The predicted expected annual shadow flicker duration ranged from 0 hours, 0 minutes per year to 59 hours, 42 minutes per year. The maximum expected flicker was at a participating receptor (#16). The maximum expected flicker at a non-participating receptor (#217) was 40 hours, 30 minutes. The majority of the receptors (387) were predicted to experience no annual shadow flicker. In all, 93 locations were predicted to experience some shadow flicker but less than 10 hours per year. The modeling results showed that 52 locations would be expected to have 10 to 30 hours of shadow flicker per year, and 22 receptors are expected to have over 30 hours of flicker per year, three of which are non-participating receptors. The modeling results are conservative in that modeling receptors were treated as "greenhouses" and the surrounding area was assumed to be without vegetation or structures (bare earth).

Summaries of the modeling results are presented in **Tables 15** and **16**. **Appendix H: 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 (hours:minutes/year)
Maximum Shadow Flicker – Worst Case	187:38
Maximum Shadow Flicker – Expected Case	59:42

Table 16: Predicted Shadow Flicker Impacts at Non-Participating Residents

Statistic	Duration (hours:minutes/year)
Maximum Shadow Flicker – Worst Case	129:17
Maximum Shadow Flicker – Expected Case	40:30

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 (2013), "Generally, flashing lights most likely to trigger seizures are between the frequency of 5 to 30 flashes per second (Hertz)." Based on the data available for the actual or similar wind turbine models proposed for

this Project, the maximum rotational speed of 15.7 revolutions per minute corresponds to a shadow flicker frequency of 0.8 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.

8.4.3 Potential Impacts

Project infrastructure, including turbines, the collector substation, METs, ADLS towers, and the O&M building will create new human-made features visible throughout the landscape. The primary visual impact associated with wind farms are the turbine structures and associated nighttime lighting required by FAA, as they can typically be seen from a greater distance than other project infrastructure. The turbine models proposed for the Project, the GE 3.4 MW and GE 2.52 MW, comprise three blades, a hub, and a monopole. See **Table 17**, below, for turbine size specifications. In general, the larger the RD, the fewer turbines are required to produce the same energy output. The turbines will also have obstruction lighting or marking as required by the FAA for structures over 200 feet (60 meters) AMSL because they have the potential to obstruct air navigation.

Table 17: Rotor Diameter and Number of Turbines

Turbine Model	Total Height (meters/feet)	Hub Height (meters/feet)	Rotor Diameter (meters/feet)	Ground Clearance (meters/feet)	Number of Turbines
GE 3.4 MW	168.0/551.0	98.0/321.5	140.0/459.3	28.0/91.9	60
GE 3.4 MW	151.0/495.0	81.0/265.7	140.0/459.3	11.0/36	8
GE 2.52 MW	148.3/486.5	90.0/295.3	116.5/382	32.0/105	11

The Project will utilize a full coverage ADLS. The ADLS will be positioned to provide full 360-degree surveillance of the airspace around the wind project in order to provide advance detection of approaching aircraft and automatic activation of the wind project obstruction lighting at a sufficient range for operational safety in compliance with FAA regulations. The system will turn off the obstruction lighting when aircraft have cleared the control zone around the wind project or have moved to altitudes above the wind project regulatory minimums. 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 Site. Further information regarding the public lands and snowmobile trails in relation to the Project Site is found in **Section 8.7**.

Wind turbines will alter the visual surroundings of the landscape within and near the Project Site. Wind turbines are not currently present within the Project Site; however, wind turbines are already present in the Project Site. The new 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 wind turbines, silos, and grain elevators; or
- As adding a positive aesthetic quality to the landscape.

The topography in the vicinity of the Project is generally 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, east and west along U.S. Highway 14, and northwest and southeast along U.S. Highway 218 (refer to **Map 1 – Project Site Location**). 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 2 acres in size. The collector substation will include 161 kV busses, transformers, circuit breakers, reactive equipment, steel structures, a control building, metering units, and air-break disconnect switches and will be surrounded by a fence. The fence will be eight feet tall and constructed with two-inch mesh fabric and nine-gauge galvanized steel, and it will include one foot of barbed wire on top of seven feet of chain-link fence. Within the substation, deadends will be no more than 75 feet tall, and other equipment associated with the substation will be around 30 feet tall. A 161 kV transmission 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 human-made alterations to the environment.

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. The entire O&M facility will be surrounded by a six-foot-tall fence with one-inch barbed wire and gates where necessary. Lighting at the O&M facility will include approximately seven wall pack lights with integrated photocells and motion sensors. 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.

Temporary visual impacts will occur during construction, including the presence of equipment staging and laydown areas, crane(s) and crane paths, and the installation of underground collection

lines. Visual impacts as well as temporary alteration of land use within the construction corridor would be for the duration of construction.

8.4.4 Mitigation Measures

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;
- The Project will utilize an ADLS system in compliance with FAA regulations. To reduce the amount of time turbines are illuminated, the Project ADLS system will maintain FAA lights in the off position unless aircraft are detected within the control zone above, or adjacent to, the wind farm. The system will turn off the lighting when aircraft have cleared the control zone around the wind project or have moved to altitudes above the wind project regulatory minimums. DCW will request FAA approval of a lighting plan compliant with the FAA's requirements. See **Section 8.9.2.1** for more information regarding ADLS;
- Electric collection lines will be buried to minimize aboveground structures within the Project Site;
- Exterior substation lighting will be downward facing and will turn off when not in use;
- Exterior O&M facility security lighting will be illuminated at night. The lighting will be attached to the building and will be downward facing;
- Existing roads will be used for construction and maintenance, as feasible, to minimize the number of new roads constructed;
- Temporarily disturbed areas will be converted back to cropland or otherwise reseeded with native seed mixes appropriate for the region; and
- In the event that complaints regarding shadow flicker are received, DCW will apply site-specific mitigation measures to address shadow flicker impact, 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 Site Location [Appendix A]**). A network of roads and utilities provides access, electricity, water supply, and telephone service to rural residences, farmsteads, small industry, and unincorporated areas. No railroad tracks are within the Project Site. Water wells and septic systems are typically used in the Project Site to provide household needs.

The nearest city to the Project Site, Owatonna, is four miles away and has its own fire and police departments, which service much of the western portion of the Project Site within Steele County. Blooming Prairie, located 3.5 miles south of the Project Site, maintains a police department and a volunteer fire department that will service the southern portion of the Project Site within Steele County. The cities of Claremont and Dodge Center located 0.25 miles north and 2.3 miles northeast of the Project Site in Dodge County, respectively, 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 4.9 miles southeast of the Project Site, 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.

8.5.1 Traffic and Roads

Existing road infrastructure in the Project Site consists of county and township roads that typically follow section lines, as well as farmstead driveways and farming access roads. U.S. Highways 218 and 14 are the main access routes to the Project Site 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 Site is found in **Table 18**.

Table 18: Summary of Roadways within the Project Site

Road Type	Approximate Miles within Project Boundary
Federal Highways	0
State Highways	0
County Highways/Roads	40
Township Roads	52

Source:(MnDOT 2012).

Traffic within the Project Site is summarized in **Table 19** below based upon MnDOT data (MnDOT 2020b). The highest average annual daily traffic (AADT) count is on County State Aid Highway (CSAH) 3 in Dodge County, with 355 vehicles per day, using 2017 data; the lowest count was at County Road (CR) Y in Dodge County with 25 vehicles per day, using 2013 data. The remainder of roads sampled within the Project Site contained traffic counts between 30 and 320 vehicles per day with the higher counts in closer proximity to nearby cities. U.S. Highways 218 and 14 are the main access routes into the Project Site and would likely be used as routes to bring materials and equipment to the Project Site; however, the routes will be determined closer to construction and in coordination with local jurisdictions as appropriate. It is anticipated that workers will travel on U.S. Highway 14 to and from hotels near the Project Site. Construction crew coordination and staging will occur at the O&M facility located at County Road Y.

Table 19: Existing Daily Traffic Levels

Roadway Segment Description		Approx. Miles within Project Site*	Traffic Volume (vehicles per day)	Year Data Collected
Dodge	CSAH 3	4.8	355	2017
Dodge	CSAH 3	<0.1	310	2017
Dodge	CSAH 1	2.5	270	2013
Dodge	CSAH 5	2.9	260	2017
Dodge	CSAH 10	3.0	255	2017
Dodge	CSAH 6	0.2	185	2017
Dodge	CR J	2.5	40	2013
Dodge	CR O	3.1	40	2013
Dodge	CR W	3.0	40	2013
Dodge	CSAH 6	2.6	30	2013
Dodge	CR Y	<0.1	25	2013
Steele	CSAH 16	0.1	320	2019
Steele	CSAH 6	0.5	275	2019
Steele	CSAH 16	2.9	210	2019

Source: (MnDOT 2020b).
Notes: CSAH = County State Aid Highway, CR = County Road.
*Rounding has been applied.

8.5.2 Telecommunications and Other Related Resources

A review of a previous iteration of the Project was conducted by the U.S. Department of Commerce, National Telecommunications and Information Administration (NTIA) on July 21, 2020. The NTIA provided the project information to the Interdepartmental Radio Advisory Committee (IRAC) which includes 20 federal agency members. The Project received confirmation on September 8, 2020, that no IRAC member had issues with the placement of turbines within the boundary provided on July 21, 2020, which encompassed the current Project Site. (See **Appendix E: Agency Correspondence and Responses**).

Due to minor changes in project design, a new request for IRAC review was initiated with the NTIA in June 2021. DCW anticipates that a response will be received from the NTIA by no later than the end of Q3 2021.

8.5.2.1 Telephone

Telephone service in the Project Site is provided to farmsteads, rural residences, and businesses by Alltel Corporation, AT&T Mobility Spectrum LLC, Cellco Partnership, 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 in the Project Site.

Table 20: Summary of Federal Communications Commission–Licensed Signals in and within the Vicinity of the Project Site

Communication System Type	Number of Signals
AM (AM Radio Signals)	3
FM (FM Radio Signals)	13
Microwave (Radio Wave Transmission)	14
Cellular	13

8.5.2.2 Microwave Beam Paths

The Telecommunications Study / Electromagnetic Interference Analysis (NextEra Analytics 2021) examined microwave beam paths in the vicinity of the Project Site and identified 14 microwave beam paths near the Project Site and seven that cross into the Project Site (See **Appendix I - Telecommunications Study / Electromagnetic Interference Analysis**). The beam paths are owned and operated by the state of Minnesota, Cellco Partnership, Radio Link Internet, T-Mobile License LLC, and Minnesota WiFi. Refer to **Table 20** for a summary of FCC-licensed signals within the vicinity of the Project Site. NextEra Analytics calculated worst-case Fresnel zones (WCFZ), which are determined by the second Fresnel zone radius obtained at the midpoint of the microwave link. Utilization of the WCFZ, and an offset to account for the blade length, was used to site turbines such that impacts to microwave beam paths are avoided (**Map 14 - Microwave Beam Path [Appendix A]**).

8.5.2.3 AM/FM Radio

The Electromagnetic Interference Analysis (NextEra Analytics 2021) did not identify AM or FM radio towers within the Project Site. Three AM towers and 13 FM towers are within 15.5 miles of the Project Site. The AM towers include call signs KFOW, KQAQ, and KRFO. The FM towers include call signs KRUE, K228DR, K232FY, K234DB, KCJL-LP, KWWK, K255AN, KOWZ, KRCH, K280EC, KRFO-FM, K289AE, and K292GU.

8.5.2.4 Fixed Land Mobile Stations

Land mobile stations are used in the Project Site for public safety, emergency response, and local government communications and will be used for communications among maintenance crews for

the Project. Typically, land mobile stations are unaffected by wind projects because their radio systems are designed with multiple transmitters to provide redundancies that allow their signal to broadcast through wind turbines.

8.5.3 Other Local Infrastructure and Services

No natural gas pipelines or high voltage transmission lines exist within the Project Site. No substations are located within one mile of the Project Site. Approximately 138 miles of existing transmission lines are located within 10 miles of the Project Site. Additionally, there are electric distribution lines owned by Steele-Waseca Cooperative and Peoples Energy Cooperative throughout the Project Site, providing electricity to residents and businesses. This electric distribution infrastructure consists of both overhead and underground conduits. No railroad tracks are within the Project Site.

8.5.4 Television

The Telecommunications Study /Electromagnetic Interference Analysis (NextEra Analytics 2021) determined that no digital or analog television (TV) towers are located within the Project Site (See **Appendix I**). There are 69 licensed TV towers within approximately 62 miles of the Project, including 31 towers that are within 31 miles of the Project and are likely to be broadcasting to the region (**Table 21**). Most of the TV towers within approximately 62 miles of the Project 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) could experience reception interference if the Project is in line-of-sight. These towers are located between approximately 29 and 36 miles from the Project.

Table 21: Digital Television Signals in the Vicinity of the Project Site

Call Sign	Station	Licensee	Signal Strength (kW)
W22FD-D	22	Edge Spectrum, Inc.	15
K21NU-D	21	Edge Spectrum, Inc.	5
K48KJ-D	48	Edge Spectrum, Inc.	4.92
K14PU-D	14	Landover 2 LLC	1
K19KB-D	19	Landover 2 LLC	1
K34MP-D	34	Landover 2 LLC	1
K47OF-D	47	Landover 2 LLC	1
K43OH-D	43	Landover 2 LLC	1
K45MO-D	45	Landover 2 LLC	1
K27OW-D	27	Digital Networks-Midwest, LLC	5.62

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
K35PC-D	35	HC2 Station Group, Inc.	15
K31LN-D	31	Edge Spectrum, Inc.	4
K52HH	52	MS Communications, LLC	0.004
K30NI-D	30	Landover 2 LLC	1
K32LB-D	32	Landover 2 LLC	1
K38OU-D	38	Landover 2 LLC	1
K44LT-D	44	Landover 2 LLC	1
K41MP-D	41	Spectrum Evolution, Inc.	1
K40JT	40	Digital Networks-Midwest, LLC	10.7
K25NK-D	25	Three Angels Broadcasting Network, Inc.	15
K56HW	56	Trinity Broadcasting Network	75
K58GC	58	Three Angels Broadcasting Network, Inc.	29
KAAL	36	KAAL-TV, LLC	620
KSMQ-TV	20	KSMQ Public Service Media, Inc.	319.2
KXLT-TV	26	Sagamorehill of Minnesota Licenses, LLC	108
KIMT	24	Rochester TV License Company, LLC	472
KYIN	18	Iowa Public Broadcasting Board	533
KTTC	10	KTTC License, LLC	43.1
K22LG-D	22	Landover 2 LLC	1
K26MG-D	26	Landover 2 LLC	1
K28MU-D	28	Landover 2 LLC	1
K50NB-D	50	Landover 2 LLC	1
KILW-LD	28	DTV America Corporation	6

Call Sign	Station	Licensee	Signal Strength (kW)
KMQV-LD	49	DTV America Corporation	6
KWJM-LD	15	DTV America Corporation	6
K19IT-D	19	Spectrum Evolution, Inc.	1
K27KL-D	27	Spectrum Evolution, Inc.	1
K29JH-D	29	Spectrum Evolution, Inc.	1
K31KX-D	31	Spectrum Evolution, Inc.	1
K40NI-D	40	Landover 2 LLC	1
K40JS-D	40	Blue Earth-Nicollet Faribault Cooperative Electric Association	3
K49JG-D	49	Blue Earth-Nicollet Faribault Cooperative Electric Association	3
K51KB-D	51	South Central Electric Association	3
K14KD-D	14	South Central Electric Association	3
K16MA-D	16	Blue Earth-Nicollet Faribault Cooperative Electric Association	3
K17MX-D	17	Cooperative Television Association of Southern Minnesota	3
K19LJ-D	19	Blue Earth-Nicollet Faribault Cooperative Electric Association	3
K21KF-D	21	Cooperative Television Association of Southern Minnesota	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 Electric Association	3.1
K31EF-D	31	South Central Electric Association	3
K34NV-D	34	South Central Electric Association	3
K35IU-D	35	South Central Electric Association	3
K47MI-D	47	Cooperative Television Association of Southern Minnesota	3
K45MN-D	45	Landover 2 LLC	1
K25QC-D	25	Edge Spectrum, Inc.	7.5
K43JE-D	43	Edge Spectrum, Inc.	10.82
W19EN-D	19	State of Wisconsin–Educational Communications Board	6
W47CO-D	47	State of Wisconsin–Educational Communications Board	1.6
K22LJ-D	22	Edge Spectrum, Inc.	5
K27MI-D	27	Edge Spectrum, Inc.	3

Call Sign	Station	Licensee	Signal Strength (kW)
K35PA-D	35	Edge Spectrum, Inc.	15

8.5.5 Potential Impacts

8.5.5.1 Traffic and Roads

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.

Temporary impacts are expected to public roads during the construction of the Project 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 Site and would likely be used as routes 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. As Dodge County CSAH 3 has the highest AADT within the Project Site at 355 vehicles per day, an increase in 500 vehicles per day during the peak of the construction phase would equate to 855 vehicles per day or 4,145 vehicles per day under the capacity of a two-lane paved rural highway. As such, temporary impacts to public roads are anticipated to be minimal, though some minor, short-term traffic delays within and near the Project Site may occur during turbine and equipment delivery and construction activities.

DCW will install temporary road and intersection improvements to various public roads in coordination with applicable roadway jurisdictions to facilitate turbine component delivery during the construction phase of the Project. These temporary improvements will be removed and restored following construction consistent with the terms of road use agreements and applicable permits to be established prior to construction. DCW will also construct temporary and permanent access roads, as well as access road approaches and turning radii, which are required to link the Project to the existing road network.

During construction, a temporary route will be 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 each turbine site for assembly in place. Once a turbine is constructed, the crane must be mobilized to 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 existing public roads. Temporary and/or permanent

culvert crossings within regulated water 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.

During operations, only the five to eight maintenance crew workers will utilize roads within the Project Site for regular inspections and maintenance. Nearby county roads have AADT counts between 25 and 540 vehicles per day under current conditions, and traffic is not expected to noticeably increase during the operations phase of the Project.

8.5.5.2 Telephone

The Telecommunications Study / Electromagnetic Interference Analysis (NextEra Analytics 2021) indicates that interference is not likely to occur to cellular telecommunications due to placement of the turbines. Turbines are set back from cell tower beam paths by the length of the blade plus 10 feet (see **Appendix I**). 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.

8.5.5.3 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.

8.5.5.4 AM/FM Radio

The Telecommunications Study / Electromagnetic Interference Analysis (NextEra Analytics 2021) indicated that interference to AM or FM signals is expected to be minimal. Some AM/FM signal loss may occur in close proximity to individual turbines, but most AM/FM radio receptors are 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 3.5 miles from the Project Site 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. One FM tower (KCJL-LP) is located less than 2.5 miles from the Project Site and is the most vulnerable tower to experience interference. This FM tower is approximately 2.47 miles from the neared wind turbine.

8.5.5.5 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.

8.5.5.6 Television

The Telecommunications Study / Electromagnetic Interference Analysis (NextEra Analytics 2021) examined impacts to TV service. While impacts to TV reception are not well known, interference is expected to be limited to areas near a turbine that are within line-of-sight 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 project is located in the line-of-sight 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.

8.5.5.7 Other Local Infrastructure and Services

No transmission lines, substations, natural gas pipelines, or railroads are within the Project Site. Thus, no impacts to such infrastructure 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

8.5.6.1 Traffic and Roads

Turbines have been sited based on applicable county and Commission standards, and, therefore, 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 so that all relevant permits are obtained, delivery plans are communicated, weight limits are not exceeded, and traffic management plans are implemented where necessary. DCW will formalize road development agreements with applicable roadway authorities and will require that the general contractor be in contact with the relevant road authorities during construction. DCW or its contractor will restore impacted or damaged roadways to their original condition. DCW will remove temporary culverts after construction and ensure that temporarily disturbed areas will be converted back to cropland or otherwise reseeded with native seed mixes appropriate for the region.

8.5.6.2 Telephone

In order to avoid potential physical impacts to underground telecommunication lines, such lines will be located using a utility locator service and marked prior to construction. Collection line locations will be coordinated with local telecommunications providers per Minnesota's Gopher State One Call Marking System to avoid direct impacts to existing telephone lines. If inadvertent impacts are identified during or after construction, DCW will address these impacts on a case-by-case basis.

8.5.6.3 Microwave Beam Paths

A non-federal and federal electromagnetic interference study has been performed for the Project Site (NextEra Analytics 2021). The results were considered 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 RD plus 10 meters is placed around each beam's second Fresnel zone. Turbines are located outside of these buffers to mitigate any impact on the signal. The Telecommunications Study (titled Electromagnetic Interference Analysis) conducted by NextEra Analytics (2021) is attached as **Appendix I.**

8.5.6.4 AM/FM Radio

AM/FM radio stations within 10 miles of the Project Site are generally located in Owatonna and south of Dodge Center and are not expected to be close enough to the turbines for reception to be impacted in the Project Site. DCW will address any reception impacts that 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 be made to communication systems to minimize impacts.

8.5.6.5 Fixed Land Mobile Stations

In the unlikely event that fixed land mobile stations 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 be made to communication systems to minimize impacts.

8.5.6.6 Television

NextEra Analytics conducted a Telecommunications Study/Electromagnetic Interference Analysis (NextEra Analytics 2021) for the Project and concluded that TV interference is expected to be limited to areas near a turbine that are within the line-of-sight between a transmitting tower and a TV receptor. In the unlikely event that TV interference is reported following project construction, 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 do the following:

- Log the report and determine whether the interference is project related;
- Meet with the complainant and the local communications technician to determine the status of the affected TV reception equipment;
- Discuss with the complainant the option of (1) installing a combination of high-gain antenna and/or a low-noise amplifier or (2) entering into an agreement to provide a monetary contribution (equal to the cost of installing the recommended equipment) toward comparable Direct Broadcast Satellite (DBS) service;
- At the complainant's election, 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 complainant chooses DBS service, DCW will consider the matter closed upon installation of the satellite dish;
- If the complainant selects antenna and/or amplifier installation and later reports continued interference issues, 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 complainant for the cost of comparable DBS service and will remove the antenna and/or amplifier equipment, unless it was initially installed to service multiple households; and
- If DCW and the complainant 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.

8.5.6.7 Other Local Infrastructure and Services

In order to avoid potential physical impacts to underground electric distribution lines and other utilities, all lines will be located using a utility locator service prior to breaking ground during construction. 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

The Project is located in portions of the Southeast Riverine and Prairie Lakes archaeological regions (Hudak et al. 2002). The Southeast Riverine archaeological 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. The majority of the Project Site is located in the Southeast Riverine archaeological region. In these regions, archaeological resources are predominantly concentrated along the Mississippi River and its tributaries in this area. Expected resource locations would be near water sources on bluff tops and terraces. Archaeological resources are uncommon in the interior uplands of these regions.

Cultural resources investigations and coordination with the Minnesota SHPO have been ongoing since 2017. Cultural resources literature searches and field pedestrian surveys have been completed. Additional field pedestrian surveys are planned in locations where minor design modifications have been made since the time of survey. The literature searches examined cultural resource records available from the Minnesota SHPO and the Office of the State Archaeologist (OSA) within the Project Site and a 1-mile buffer of the Project Site. The most recent cultural resource records were received from the SHPO in May 2020, and the literature search report is included in **Appendix J: Cultural Resources Literature Search**.

No historic properties listed on the National Register of Historic Places (NRHP), Minnesota State Historic Sites Network, or the Minnesota State Register of Historic Places are within the Project Site or within one mile of the Project Site.

The 12 architectural resources within the Project Site identified by the literature search are summarized in **Table 22.** An additional 66 architectural resources within one mile of the Project Site are listed in **Table 23**. Within the Project Site, the Pichner Farmstead (ST-HAV-034), the Dunker Farmstead (ST-HAV-035), and the Thompson/Ripka Farmstead (ST-HAV-038) have been officially determined Eligible for listing in the NRHP under Criterion C (*i.e.,* embodies the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction) by the SHPO. Bridge 20501 (DO-CLT-053), the Aurora Lutheran Church (ST-HAV-006), a farmstead (ST-HAV-023), the Thompson Cemetery (ST-HAV-036), and the Thompson Farmstead (ST-HAV-037) are also located within the Project Site and have been recommended as Not Eligible for listing in the NRHP. Ripley Town Hall (DO-RIP-001) is also located within the Project Site and remains unevaluated for NRHP eligibility. The remaining three resources (ST-HAV-001, ST-HAV-004, and ST-HAV-008) within the Project Site remain unevaluated for NRHP eligibility and do not appear on current aerial imagery, which suggests that they may have been demolished.

Table 23 summarizes the 66 architectural resources located within the 1-mile buffer of the Project Site. Of these resources, the Winona and St. Peter Railroad Claremont Segment (DO-CLC-030 and DO-CLT-009), the Arents Farmstead (DO-CLT-014), the Lehmann Farmstead (DO-CLT-031), and the Nelson Farmstead (ST-HAV-024) have been determined Eligible for listing in the NRHP under Criterion C by the Minnesota SHPO. An additional 25 houses, 22 farmsteads, four commercial properties, two cemeteries, a water plant, and a school have been recommended as Not Eligible for listing in the NRHP at the time of their recording. The remaining six resources are unevaluated for NRHP eligibility. In all, 35 of the 66 architectural resources within the 1-mile buffer are associated with the City of Claremont.

The literature search identified eight previously inventoried archaeological sites within the Project Site (**Table 24**) and an additional 11 archaeological sites within the one-mile buffer (**Table 25**). Of these 19 total sites, only one site, which is located in the one-mile buffer, is recorded as Eligible for listing in the NRHP. Within the Project Site, three sites have been recorded as Not Eligible for listing in the NRHP, an additional three sites were recommended Not Eligible for listing in the NRHP, and a fourth site may be Not Eligible for listing in the NRHP (however, the entire site has not been evaluated to determine NRHP eligibility). The remaining 11 sites, two within the Project Site and nine in the one-mile buffer, are unevaluated for listing in the NRHP.

Table 22: Previously Reported Architectural Resources within the Project Site

County	Architecture Inventory Number	Property Name	Location	NRHP Eligibility
Dodge	DO-CLT-053	Bridge 20501	T107N R18W Section 034	Recommended Not Eligible
Dodge	DO-RIP-001	Ripley Town Hall	T106N R18W Section 021	Unevaluated
Steele	ST-HAV-001	Stark's Creamery	T107N R19W Section 035	Unevaluated, Possibly Demolished
Steele	ST-HAV-004	District School No. 68	T107N R19W Section 036	Unevaluated, Possibly Demolished
Steele	ST-HAV-006	Aurora Lutheran Church	T107N R19W Section 033	Recommended Not Eligible
Steele	ST-HAV-008	St. John's Evangelical Lutheran Church	T107N R19W Section 036	Unevaluated, Possibly Demolished
Steele	ST-HAV-023	Farmstead	T107N R19W Section 027	Recommended Not Eligible
Steele	ST-HAV-034	Pichner Farmstead	T107N R19W Section 026	Officially Eligible—Criterion C
Steele	ST-HAV-035	Dunker Farmstead	T107N R19W Section 026	Officially Eligible—Criterion C
Steele	ST-HAV-036	Thompson Cemetery	T107N R19W Section 027	Recommended Not Eligible
Steele	ST-HAV-037	Thompson Farmstead	T107N R19W Section 027	Recommended Not Eligible
Steele	ST-HAV-038	Thompson/Ripka Farmstead	T107N R19W Section 027	Officially Eligible—Criterion C

Table 23: Previously Reported Architectural Resources within one mile of the Project Site

County	Architecture Inventory Number	Property Name	Location	NRHP Eligibility
Dodge	DO-CLC-002	Church	T107N R18W Section 028	Unevaluated
Dodge	DO-CLC-003	Claremont School	T107N R18W Section 028	Unevaluated
Dodge	DO-CLC-004	Commercial Complex	T107N R18W Section 028	Unevaluated
Dodge	DO-CLC-008	Farmstead	T107N R18W Section 028	Recommended Not Eligible
Dodge	DO-CLC-009	Rand's Arabians	T107N R18W Section 028	Recommended Not Eligible
Dodge	DO-CLC-010	Greenway Cooperative Service	T107N R18W Section 028	Recommended Not Eligible
Dodge	DO-CLC-011	House	T107N R18W Section 028	Recommended Not Eligible
Dodge	DO-CLC-012	House	T107N R18W Section 028	Recommended Not Eligible
Dodge	DO-CLC-013	House	T107N R18W Section 028	Recommended Not Eligible
Dodge	DO-CLC-014	House	T107N R18W Section 028	Recommended Not Eligible
Dodge	DO-CLC-015	House	T107N R18W Section 028	Recommended Not Eligible
Dodge	DO-CLC-016	House	T107N R18W Section 028	Recommended Not Eligible
Dodge	DO-CLC-017	House	T107N R18W Section 028	Recommended Not Eligible
Dodge	DO-CLC-018	House	T107N R18W Section 028	Recommended Not Eligible
Dodge	DO-CLC-019	House	T107N R18W Section 028	Recommended Not Eligible
Dodge	DO-CLC-020	House	T107N R18W Section 028	Recommended Not Eligible
Dodge	DO-CLC-021	House	T107N R18W Section 028	Recommended Not Eligible
Dodge	DO-CLC-022	House	T107N R18W Section 028	Recommended Not Eligible
Dodge	DO-CLC-023	House	T107N R18W Section 028	Recommended Not Eligible
Dodge	DO-CLC-024	House	T107N R18W Section 028	Recommended Not Eligible

County	Architecture Inventory Number	Property Name	Location	NRHP Eligibility
Dodge	DO-CLC-025	House	T107N R18W Section 028	Recommended Not Eligible
Dodge	DO-CLC-026	House	T107N R18W Section 028	Recommended Not Eligible
Dodge	DO-CLC-027	Claremont Water Plant	T107N R18W Section 028	Recommended Not Eligible
Dodge	DO-CLC-028	Greenway Cooperative Service	T107N R18W Section 028	Recommended Not Eligible
Dodge	DO-CLC-030	Winona & St. Peter Railroad Claremont Segment	T107N R18W Sections 028 and 029	Officially Eligible—Criteria A and C
Dodge	DO-CLC-031	Farmstead	T107N R18W Section 028	Recommended Not Eligible
Dodge	DO-CLC-032	House	T107N R18W Section 028	Recommended Not Eligible
Dodge	DO-CLC-034	House	T107N R18W Section 028	Recommended Not Eligible
Dodge	DO-CLC-035	House	T107N R18W Section 028	Recommended Not Eligible
Dodge	DO-CLC-036	House	T107N R18W Section 028	Recommended Not Eligible
Dodge	DO-CLC-037	House	T107N R18W Section 028	Recommended Not Eligible
Dodge	DO-CLC-038	House	T107N R18W Section 028	Recommended Not Eligible
Dodge	DO-CLC-039	House	T107N R18W Section 028	Recommended Not Eligible
Dodge	DO-CLC-040	House	T107N R18W Section 028	Recommended Not Eligible
Dodge	DO-CLC-041	Commercial Building	T107N R18W Section 028	Recommended Not Eligible
Dodge	DO-CLC-042	Farmstead	T107N R18W Section 028	Recommended Not Eligible
Dodge	DO-CLT-002	Farmstead	T107N R18W Section 029	Unevaluated
Dodge	DO-CLT-007	Kubat Farmstead	T107N R18W Section 019	Recommended Not Eligible
Dodge	DO-CLT-009	Winona & St. Peter Railroad Claremont Segment	T107N R18W Section 030	Officially Eligible—Criteria A and C
Dodge	DO-CLT-010	Farmstead	T107N R18W Section 030	Recommended Not Eligible

County	Architecture Inventory Number	Property Name	Location	NRHP Eligibility
Dodge	DO-CLT-014	Arents Farmstead	T107N R18W Section 025	Officially Eligible—Criterion C
Dodge	DO-CLT-018	Farmstead	T107N R18W Section 026	Recommended Not Eligible
Dodge	DO-CLT-019	Farmstead	T107N R18W Section 027	Recommended Not Eligible
Dodge	DO-CLT-022	Farmstead	T107N R18W Section 027	Recommended Not Eligible
Dodge	DO-CLT-023	Farmstead	T107N R18W Section 027	Recommended Not Eligible
Dodge	DO-CLT-024	Farmstead	T107N R18W Section 027	Recommended Not Eligible
Dodge	DO-CLT-031	Lehmann Farmstead	T107N R18W Section 030	Officially Eligible—Criterion C
Dodge	DO-CLT-034	Farmstead	T107N R18W Section 033	Recommended Not Eligible
Dodge	DO-CLT-046	Farmstead	T107N R18W Section 029	Recommended Not Eligible
Dodge	DO-CLT-048	Claremont Hillside Cemetery	T107N R18W Section 033	Recommended Not Eligible
Dodge	DO-CLT-049	St. Francis de Sales Cemetery	T107N R18W Section 033	Recommended Not Eligible
Dodge	DO-CLT-050	Farmstead	T107N R18W Section 029	Recommended Not Eligible
Dodge	DO-CLT-051	Farmstead	T107N R18W Section 033	Recommended Not Eligible
Dodge	DO-CLT-052	McMartin House	T107N R18W Section 033	Recommended Not Eligible
Dodge	DO-WSF-01	Church	T105N R18W Section 004	Unevaluated
Steele	ST-AUR-006	School	T106N R19W Section 036	Unevaluated
Steele	ST-HAV-005	District School No. 26	T107N R19W Section 032	Recommended Not Eligible
Steele	ST-HAV-020	Farmstead	T107N R19W Section 020	Recommended Not Eligible
Steele	ST-HAV-021	Farmstead	T107N R19W Section 020	Recommended Not Eligible
Steele	ST-HAV-024	Nelson Farmstead	T107N, R19W, Section 21	Officially Eligible—Criterion C
Steele	ST-HAV-025	Tollefson Farmstead	T107N R19W Section 022	Recommended Not Eligible
Steele	ST-HAV-026	Farmstead	T107N R19W Section 023	Recommended Not Eligible

County	Architecture Inventory Number	Property Name	Location	NRHP Eligibility
Steele	ST-HAV-027	Farmstead	T107N R19W Section 023	Recommended Not Eligible
Steele	ST-HAV-029	Natzel Farmstead	T107N R19W Section 024	Recommended Not Eligible
Steele	ST-HAV-030	Farmstead	T107N R19W Section 024	Recommended Not Eligible
Steele	ST-HAV-050	Farmstead	T107N R19W Section 024	Recommended Not Eligible

Table 24: Previously Reported Archaeological Sites within the Project Site

County	State Site Number	Site Name	Site Type	Cultural Affiliation	NRHP Eligibility
Dodge	21DO0017	Unnamed	Artifact Scatter, Farmstead	Post-Contact, Historic Euro-American	Not Eligible
Dodge	21DO0018	Unnamed	Artifact Scatter, Farmstead	Post-Contact, Historic Euro-American	Not Eligible
Dodge	21DO0019	Unnamed	Artifact Scatter, Historic Dump	Post-Contact, Historic Euro-American	Not Eligible
Steele	21ST0024	Unnamed	Lithic Scatter, Habitation	Pre-Contact, Late Woodland	Unevaluated
Steele	21ST0025	Unnamed	Lithic Scatter, Habitation	Pre-Contact, Paleoindian, Late Woodland	Unevaluated
Steele	21ST0026	Unnamed	Lithic Scatter, Habitation	Pre-Contact	Recommended Not Eligible
Steele	21ST0027	Unnamed	Single Artifact Find Spot	Pre-Contact	Recommended Not Eligible
Steele	21ST0028	Unnamed	Single Artifact Find Spot	Pre-Contact	Recommended Not Eligible

Table 25: Previously Reported Archaeological Sites within One Mile of the Project Site

County	State Site Number	Site Name	Site Type	Cultural Affiliation	NRHP Eligibility
Dodge	21DO0012	Claremont Station	Transportation-Related Ruin	Post-Contact, Historic Euro-American	Eligible
Dodge	21DO0013	(No name)	Single Artifact Find Spot	Pre-Contact	Unevaluated (likely Not Eligible)
Dodge	21DO0014	(No name)	Lithic Scatter, Habitation	Pre-Contact, Paleoindian, Archaic, and Initial Woodland Traditions	Portion Not Eligible, Remainder Unevaluated
Dodge	21DO0015	(No name)	Lithic Scatter	Pre-Contact	Unevaluated
Steele	21ST0019	(No name)	Lithic Scatter, Workshop	Pre-Contact	Unevaluated
Steele	21ST0020	(No name)	Lithic Scatter, Workshop	Pre-Contact	Unevaluated
Steele	21ST0021	(No name)	Lithic Scatter, Workshop	Pre-Contact, Paleoindian, Late Woodland	Unevaluated
Steele	21ST0022	(No name)	Lithic Scatter, Workshop	Pre-Contact	Unevaluated
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

In addition to the literature searches, Phase I archaeological surveys have been conducted for portions of the proposed Project. These surveys examined areas where ground-disturbing activities are planned. The survey protocol was designed in cooperation with the SHPO. Prior to initiating archaeological surveys DCW conducted micro-siting to identify suitable locations for facility components.

In 2020, DCW conducted outreach to 31 tribes to provide an overview of the Project and to invite tribes to participate in project coordination. A list of the tribes contacted is provided in **Appendix D: Agencies Contacted Regarding Project**, and a copy of the outreach letter is included in **Appendix E: Agency Correspondence and Responses**. In response to this invitation, the Standing Rock Sioux Tribe, Upper Sioux Community, Rosebud Sioux Tribe, and Sisseton Wahpeton Oyate participated in project micro-siting and subsequent Phase I archaeological field surveys. No concerns were identified to DCW by tribal representatives during these efforts. Coordination with tribes is expected to continue throughout project development.

To date, phase I archaeological surveys have identified three archaeological sites (21DO0017, 21DO0018, and 21DO0019) that were subsequently reviewed by the SHPO and determined Not Eligible for listing in the NRHP.[2]

8.6.1 Potential Impacts

DCW has designed the Project to avoid significant architectural resources and archaeological sites. However, the proposed construction activities for the Project have the potential to impact unrecorded and previously unidentified archaeological resources. In addition, the Project may result in visual impacts on cultural resource contexts.

8.6.2 Mitigation Measures

DCW has avoided direct impacts to all recorded architectural resources within the Project Site and within a 1-mile buffer. DCW has also designed the Project to avoid direct impacts to all eight of the recorded archaeological sites within the Project Site and all recorded archaeological sites within a 1-mile buffer.

The Aurora Lutheran Cemetery, Saint John's Lutheran Cemetery, and the Thompson Cemetery are located within the Project Site. The Thompson Cemetery was also identified in Minnesota SHPO records. As currently proposed, DCW has designed the Project to include a 100-foot avoidance buffer around these cemeteries to avoid direct impacts and avoid potential violations of Minnesota Statute 307.08, which protects private cemeteries and burial grounds.

Additional Phase I archaeological surveys will be conducted in coordination with SHPO prior to construction. If significant archaeological resources are identified during additional Phase I archaeological surveys, the integrity and significance of the resource(s) will be assessed in terms

[2] The site number is a Smithsonian trinomial number assigned to each site. The "21" in that number identifies the state the site is located - MN. The "DO" is the County, and the numbers indicate the sequential order the site was identified within that County.

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(s) 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 OSA.

DCW will prepare an Unanticipated Discoveries Plan (UDP) for the Project. Should project construction and/or operation inadvertently encounter unanticipated archaeological resources, tribal resources, or human remains, the discoveries will be reported to the tribes, SHPO and/or OSA, as applicable. The UDP will also address the unanticipated discovery of human remains per Minnesota's *Damages; Illegal Molestation of Human Remains; Burials; Cemeteries; Penalty; Authentication Statute* (Minnesota Statutes 307.08), which protects known or suspected human burials and burial grounds regardless of land ownership status.

8.7 Recreational 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. As shown on **Map 6 - Public Land Ownership and Recreation (Appendix A)**, one WMA and one SNA are within the Project Site and an additional 17 WMAs, two SNAs, and one state park are within 10 miles of the Project Site. Approximately 12.2 miles of snowmobile trails are located within the Project Site.

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 2020a). As shown in **Table 26**, approximately 0.5 miles of the McMartin WMA are located within the Project Site. An additional 17 WMAs are located within 10 miles of the Project.

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

Location Relative to Project Site	WMA Name	WMA Area (acres)
Overlaps northern site boundary	McMartin WMA	37.5 (total) 0.5 (within Project Site)
0.5 miles east	Marsh Wren WMA	40.2
1.8 miles southwest	Oak Glen WMA	87.6
2.3 miles north	Vorce WMA	39.9
2.5 miles west	Aurora WMA	639.1

Location Relative to Project Site	WMA Name	WMA Area (acres)
2.8 miles north	Naylor WMA: Main Unit	270.4
3.1 miles north	Naylor WMA: Naylor Pond Unit	37.0
3.6 miles northeast	Wasioja WMA	10.8
4.0 miles east	Bud Jensen WMA	102.5
4.4 miles northeast	Teapail WMA	15.3
5.0 miles northeast	Pheasants Forever WMA	296.7
5.3 miles southwest	Pogones Marsh WMA	112.6
6.5 miles west	Somerset WMA	439.8
8.1 miles southeast	Vernon WMA	85.4
8.2 miles southwest	Wo Wacintanka WMA	558.0
8.5 miles northeast	Schletty WMA: Easement Unit	1.1
8.6 miles northeast	Schletty WMA: Main Unit	13.3
9.9 miles northwest	Prairie Rose WMA	118.0

Source: (MNDNR 2020a).
Note: Rounding has been applied to all values.

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 2017b). As shown in **Table 27**, the Hythecker Prairie (approximately 39.3 acres) is located within the Project Site. Additionally, two SNAs are located within 10 miles of the Project Site (MNDNR 2020b).

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

Location Relative to Project Site	SNA Name	SNA Area (acres)
Entirely within Project Site	Hythecker Prairie	39.3
8.8 miles southeast	Iron Horse Prairie	37.2
9.2 miles northwest	Clinton Falls Dwarf Trout Lily	18.7

Source: (MNDNR 2020b).
Note: Rounding has been applied to all values.

State Aquatic Management Areas (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 2020c).

No AMAs were identified within the Project Site. However, one AMA, the Naylor AMA, is located approximately 3.1 miles north of the Project Site. Additionally, other lakes, ponds, and rivers used for recreational purposes are present within the Project Site and in the general 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 USFWS-managed wetlands and surrounding uplands are open to hunting (USFWS 2019). As shown in **Table 28**, no WPAs are within the Project Site, but five WPAs are located within 10 miles of the site boundary, including the Dodge Center Creek WPA located adjacent to the Project Site.

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

Location Relative to the Site Boundary	WPA Name	WPA Area (acres)
Adjacent to the western site boundary	Dodge Center Creek WPA	138.4
5.8 miles southwest	Straight Creek WPA	325.2
6.6 miles southwest	Straight Creek WPA	20.4
8.3 miles southwest	Straight River Marsh WPA	166.7
8.8 miles southwest	Straight River Marsh WPA2	16.1

Source: (USFWS 2020b).
Note: Rounding has been applied to all values.

Parks and public trails are public-managed lands that provide outdoor recreational opportunities to the public. No federal, state, or city parks are located within the Project Site; however, Rice Lake State Park is located approximately 1.6 miles north of the Project Site, and four county parks are located within 10 miles of the Project Site, as shown in **Table 29**.

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

Location Relative to Project	County Park Name	County Park Area (acres)
5.0 miles northeast	Plowville Historic Site	0.2
7.3 miles northeast	Seminary Park	1.0
9.0 miles west	Hope School Park	2.0
9.9 miles northwest	Crane Creek Park	4.7

Source: (Steele County 2015b; Dodge County 2019).
Note: Rounding has been applied to all values.

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 local snowmobile clubs. Approximately 12.2 total miles of

snowmobile trails are present within the Project Site. As shown on **Map 6 - Public Land Ownership and Recreation**, these trails traverse the eastern side and the middle portion of the Project Site, 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 individual property owners, the locations of the trails can differ from season to season and may deviate from available trail maps.

8.7.1 Potential Impacts

Although public and recreational lands are located within and adjacent to the Project Site, the Project has been designed to avoid direct impacts to recreational resources and public lands. No turbines have been sited within public lands or designated recreational resources. 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 public lands, as well as from snowmobile trails within and adjacent to the Project Site, 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 the project's potential visual impacts to public lands is found in **Section 8.4.1.**

Noise from temporary construction activities may also diminish the aesthetic quality and scenery of the snowmobile trails. Depending upon the timing of construction activities, construction of the Project may also require the temporary closing or relocating of part of the snowmobile trails to maintain the safety of construction personnel and recreationalists. These impacts will be temporary as they will only occur during the construction of the Project.

8.7.2 Mitigation Measures

No direct permanent impacts from the Project to recreational resources are anticipated, as all turbines have been sited outside of recreational resource areas. Typical mitigation includes following, at a minimum, the setback guidance for public lands of 3 RD × 5 RD. Also, Dodge County requires WECS to be set back from snowmobile trails (*i.e.*, other ROWs) by either 250 feet (76 meters) or 1.1 times the total height of the structure, whichever is greater (Dodge County 2017a). Steele County does not require a setback from snowmobile trails. The Applicant will design the Project in both Steele and Dodge Counties consistent with the Dodge County setback, as feasible, since the location of the trails can differ from season to season and may deviate from available trail maps. The Applicant will continue to work with the local snowmobile groups to confirm the land locations of trails. Additional mitigation measures related to potential visual impacts to public lands and recreational resources in relation to the Project Site are found in **Section 8.4.4**. The Applicant has initiated coordination with local snowmobile clubs and will continue to coordinate with the clubs regarding construction timing to minimize temporary impacts and maintain the safety of both 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"), EMF is separated into electric fields (EFs), measured in kV per meter, and magnetic fields (MFs), measured in milligauss (mG). EFs are dependent on the voltage, and MFs are dependent on the current. The intensity of an EF is proportional to the voltage of the line, and the intensity of an MF is proportional to the current flow through the conductors. Power lines in the United States operate at a power frequency of 60 Hz (cycles per second).

This section discusses EMFs associated with the proposed DCW Wind Project. EMFs associated with the project transmission line are addressed in the Route Permit Application.

8.8.1.1 Electric Fields

The 34.5 kV underground power cable to be used in the proposed DCW Wind Project collection 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 EF to the interior of the cable. Thus, no detectable EF is produced by the cable or by any other components of the wind project collection system.

8.8.1.2 Magnetic Fields

An 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 form 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 MFs produced by each cable to be largely canceled out by the fields produced by the other cables, resulting in relatively low MFs even at ground level directly above the cables. The estimated MF calculations assume maximum current when all turbines are operating at 100 percent on the most heavily loaded cables. These maximum values represent the collection cables nearest to the substation, specifically between the low side of the Generator Step-Up transformer at the project collector substation and the first junction cabinet from the substation, with the cables laid flat but reasonably close together, so it represents the highest field that can reasonably be expected from the entire 34.5 kV 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. As summarized in **Table 30**, the MF profile data show that MF levels decrease rapidly as the distance from the centerline increases (proportional to the inverse square of the distance from the source). These values represent the maximum possible MF values, at a height of 1 meter (3.3 feet) above the ground, under a maximum generation condition.

Table 30: Estimated Magnetic Fields for the Home Run Cable, Normal System Conditions

Distance to Proposed Centerline	Estimated Magnetic Fields (mG)
-100 ft (-31 m)	0.20
-75 ft (-23 m)	0.35
-50 ft (-15 m)	0.84
-25 ft (-8 m)	3.31
0 ft	50.69
25 ft (8 m)	3.31
50 ft (15 m)	0.84
75 ft (23 m)	0.35
100 ft (31 m)	0.20

Home run cable = 34.5 kV, 668 amp

8.8.1.3 Stray Voltage

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. Stray voltage is further defined by the IEEE as:

> A voltage resulting from the normal delivery and/or use of electricity (usually smaller than 10 volts) that may be present between two conductive surfaces that can be simultaneously contacted by members of the general public and/or their animals. Stray voltage is caused by primary and/or secondary return current, and power system induced currents, as these currents flow through the impedance of the intended return pathway, its parallel conductive pathways, and conductive loops in close proximity to the power system. Stray voltage is not related to power system faults and is generally not considered hazardous.

Stray voltage generally refers to a voltage between the grounded neutral of a distribution system and the earth. Most instances of stray voltage can be traced to unbalanced currents in distribution circuits when the currents in the three phase conductors are not all equal. DCW's collector circuits are inherently balanced, so no appreciable neutral-to-earth voltage is expected. There will be no connection between DCW's collection system and the local distribution system. Furthermore, while some circuits may be parallel, no interaction or stray voltage from the project electrical system is anticipated to impact existing distribution facilities or the proposed DCW transmission line.

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 dissipate quickly and relatively close to the source due to the fact that they are buried underground, heavily insulated, and shielded. Research has shown that EFs surrounding buried lines are negligible, and MFs often dissipate significantly within approximately 3 feet (approximately 0.9 meters) of stronger EMF sources, such as transmission lines and transformers (CDC 2014) .

Electrical systems, including farm systems and utility distribution systems, must be adequately grounded to provide reliability and to minimize stray voltage. 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. 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. Stray voltage is also discussed in **Section 8.12**.

8.8.3 Mitigation Measures

Based upon current research regarding EMFs, and the separation distances being maintained between transformers, turbines, and collection lines and 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 ANSI and National Electrical Safety Code guidelines to maintain safety and reliability. Mitigation of potential stray voltage impacts include meeting safety requirements during the construction and operation of the Project and choosing proper wiring materials for wet and corrosive conditions, which can improve grounding and reduce the potential for stray voltage. Connecting and grounding electrical equipment will prevent potential issues related to stray voltage.

8.9 Aviation

No registered public airports are located within the Project Site. Five active registered airports and three active heliports are located within 20 miles of the Project (MnDOT 2020c). Details about these airports are in **Table 31**. The public airports nearest the Project are Dodge Center Airport (3.8 miles east of the Project Site) and Owatonna-Degner Regional Airport (8.6 miles northwest of the Project Site).

Table 31: Airports within 20 Miles of the Project Site

Airport Name	City	County	Distance (Miles)	Runway Information	Runway Elevation ft (m)
Dodge Center Airport (Public)	Dodge Center	Dodge	3.8	Concrete/Turf	1,303/1,295 ft (397/394 m)
Allina Hospital and Clinic Owatonna Heliport	Owatonna	Steele	7.9	Concrete	1,162 ft (354 m)
Owatonna-Degner Regional Airport (Public)	Owatonna	Steele	8.6	Concrete/ Asphalt	1,145/1,139 ft (349/347 m)
Underland Airstrip (Private)	Medford	Steele	10.4	Turf	1,145 ft (349 m)
Saint Olaf Hospital Heliport	Austin	Mower	17.6	Concrete	1,201 ft (366 m)
District One Hospital Heliport	Faribault	Rice	17.9	Concrete	1,060 ft (323 m)
Petes Airport (Private)	Dexter	Mower	18.3	Turf	1,337 ft (408 m)
Austin Municipal Airport (Public)	Austin	Mower	18.5	Concrete	1,233 ft (376 m)

Source: (MnDOT 2020c).
Note: Rounding has been applied to all values.

The closest registered airport is the Dodge Center Airport located approximately 3.8 miles (6.1 kilometers) away from the northeastern extents of the Project Site boundary. This is a public-use airport with one concrete runway and one turf runway. Runway 16/34 is concrete and is 4,500 feet (1,372 meters) in length. Runway 4/22 is turf and is 2,383 feet (726 meters) in length (MnDOT 2020c). Due to agricultural use within the region, small private runways may be associated with crop dusting activities within or near the Project Site.

The Electromagnetic Interference Analysis (NextEra Analytics 2021) did not identify active aviation towers within the Project Site. Aviation towers provide radio communications related to air traffic. Seven aviation towers are located within 15.5 miles (25 kilometers) of the Project Site. The aviation towers have the call signs WRLA2017, WRLB2051, WGE2, WJZ8, WRLG2026, WQSR490, and WRLL2041.

8.9.1 Potential Impacts

Under 14 Code of Federal Regulations Part 77.9, all structures exceeding 200 feet (61 meters) AGL must be submitted to the FAA for an aeronautical study. 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 Structures Permit and approval may be required by MnDOT prior to developing the Project to maintain the safety of airspace within Minnesota. A permit from MnDOT is required for any of the following (MnDOT 2018):

- Structure is greater than 500 feet (152 meters) AGL;
- Structure is more than 200 feet (61 meters) AGL within 3 nautical miles of an airport and increasing by 100 feet (31 meters) for each additional mile out to 6 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 Site. The summary of that evaluation is provided below.

Obstacle clearance surfaces overlying the Project range from 1,599 to 1,849 feet (487 to 564 meters) AMSL 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 AMSL) would require an increase in the FAA documented minimum flight altitudes within the Project Site. If the FAA determines one or the sum of these impacts constitutes a substantial adverse effect, it could result in a determination of hazard.

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

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.

All proposed wind turbines would be in line-of-sight of the Rochester radar operated by the Department of Defense (DOD) and North American Aerospace Defense Command. Proposed wind turbines that create unwanted clutter resulting in false radar returns and a decrease in radar sensitivity could impact air traffic control operations. The FAA and DOD may conduct additional analysis to identify potential safety hazards and the associated risks to the National Airspace System. The additional analysis will require a mitigation agreement between DCW and the DOD and will add time to the FAA's review of proposed wind turbines.

In addition, a military training route overlies a small portion of the Project. In June 2018, DCW coordinated with the Air National Guard and DCW agreed to avoid impacting the training route. An agreement with the DOD and Air National Guard is underway. This was accomplished by utilizing turbines with a lower tip height in the training route area.

Aerial application of seeds, fertilizers, and crop protection chemicals are likely to occur within or near the Project. The construction of wind turbines has the potential to impact crop dusting by creating a physical obstacle within the flight paths required to perform aerial application activities or by creating unstable air near turbines while in operation. Even if wind turbines are not directly located within the field requiring treatment, turbines adjacent to fields where aerial application occurs can impact the airspace required for pilots to turn for their next pass over the field. These impacts may result in higher costs to the farmers from the increased time and complexity of spraying or may result in the fields requiring ground application (MDOC 2019b).

MET towers may also impact aerial application activities. MET towers typically consist of sections of galvanized steel that may or may not require guy wires. MET towers and associated guy wires easily blend into the surrounding environment and may pose a hazard to low-flying aircraft. Furthermore, MET towers are generally built just under the FAA height requirements for lighting and marking, which may increase the hazard to pilots (MDOC 2019b).

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 established by the agency to minimize harmful impact.

8.9.2 Mitigation Measures

DCW submitted the proposed locations of the turbines and associated project facilities to the DOD in early March 2020. DCW submitted a supplemental filing with additional turbine locations in July 2021. DCW expects to execute a Mitigation Agreement with the DOD in the fourth quarter of 2021 and to receive a Determination of No Hazard for each wind turbine and met tower location by the third quarter of 2022. In order to avoid potential impacts to air traffic, the Applicant will mark and light the turbines and MET towers to comply with FAA requirements. Additionally, permanent MET towers will not utilize guy wires, reducing the risk to low-flying aircraft. Tall

Towers Permits will be obtained from MnDOT, as necessary, to maintain safety within Minnesota airspace.

If DCW is notified prior to aerial application activities in the project vicinity, DCW can adjust the turbine direction to create flyways through the wind project. This can facilitate crop dusting activities in the project vicinity. If requested, DCW may also shut down the turbines to reduce air turbulence to allow for aerial application within or near the Project.

8.9.2.1 Aircraft Detection Lighting System

The FAA has approved commercial operation of ADLS for use at wind farms. An ADLS is designed to mitigate the impact of nighttime lights by deploying a radar-based system around a wind facility, turning lights on only when low-flying aircraft are detected nearby. An ADLS must be continuously monitored in accordance with the current version of AC 70/7460-1, Obstruction Marking and Lighting. A similar technology would be Lighting Intensity Dimming Solutions (LIDS), which tailors light intensity to suit the surrounding visibility. The purpose of LIDS is to dim the lights under clear sky conditions while maintaining safe conditions for pilots and reducing the effect to the surrounding communities. LIDS is a turbine-mounted sensor that can control lights on a turbine or group of turbines and does not require its own tower. DCW is currently proposing to install an ADLS as part of the Project. If LIDS or other suitable lighting systems are approved by the FAA before construction, DCW would like to maintain flexibility in choosing an FAA-approved system.

The Project is planning to install two ADLS units. The sensors will be mounted on stand-alone radar towers that stand between 30 feet (9.1 meters) and 100 feet (30.5 meters) tall depending on the local terrain and whether there are any obstructions in the area. Each unit will have a 625-square-foot (5,625-square-meter) graveled area surrounding the 225-square-foot (21-square-meter) foundation that contains the radar tower and generator skid. Each generator skid will consist of a generator, propane canister, transformer, main disconnect, battery, automatic transfer switch, and a generator controller. Security fencing will be installed around each unit. Underground cabling will be installed at each location from nearby turbines to connect the system electrically. If an approaching airplane is detected, its distance, speed, and heading will be tracked, and the system will determine whether to activate the aviation lights. DCW is coordinating with the FAA for implementation of the ADLS. DCW expects FAA feedback on ADLS viability in the third quarter of 2022.

8.10 Safety and Security

The Project is located in predominately rural areas of Dodge and Steele Counties. Emergency management response services within the Project Site are provided by the Dodge County Sheriff and the Steele County Emergency Manager, respectively (Dodge County 2017b; 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.

8.10.1 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 falling ice, unauthorized access to electrical and mechanical components of turbines, turbine malfunction, and turbine collapse.

8.10.2 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 8.10.1** will be incorporated as ongoing 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 county planning offices to assign 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 Point of Interconnection 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. Contracted security services will be employed through construction to maintain the security of construction equipment and facilities. The site team will work with landowners individually to address any specific security concerns raised during construction or operation of the Project.

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

- Wind turbine locations will be registered with DCEM and SCEM for emergency responses and procedures related to the Project;
- The turbines will be clearly numbered for identification and emergency response;
- 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 Occupational Safety and Health Administration requirements, applicable permits, applicable

equipment manufacture and technical work instructions, and any other prudent safety practices, methods, and/or standards generally engaged in, or observed by, the majority of construction contractors for similar work. Contractors are expected to exercise reasonable judgment 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 workplace; 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.

8.11 Hazardous Materials

The predominant land use in the Project Site is agriculture. Potentially hazardous materials currently present within the Project Site may include petroleum products (diesel fuel, gasoline, propane, heating oil, lubricants, and maintenance chemicals), pesticides, and herbicides used in prior or ongoing agriculture-related activities. Farmsteads within the Project Site may have lead-based paint, asbestos associated with shingles or insulation, or polychlorinated biphenyls in transformers. In addition, trash or junk piles are a common occurrence in rural areas.

The MPCA “What's In My Neighborhood?” database (MPCA 2020) of known and potential sources of soil and groundwater contamination was reviewed for the Project Site. The MPCA database indicated that 50 sites are listed within the Project Site, 34 of which are listed as active. Of these sites, there are 21 feedlots, six construction stormwater sites, three industrial stormwater permit sites, three multiple program sites, and one vacant house (MPCA 2020).

8.11.1 Potential Impacts

Prior to construction, the Applicant will conduct a Phase I Environmental Site Assessment conforming to American Society for Testing and Materials standards to identify and avoid existing recognized environmental conditions (RECs) within the Project Site. Facilities identified by the MPCA database will be a particular focus of this assessment.

Hazardous materials used and stored within the Project Site during construction may include fuel, lubricating oil, hydraulic oil, propylene glycol, and other materials. Additionally, during operation of the wind project, 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. Pad-mounted and grounding transformers required for the operation of the Project contain large quantities of cooling fluids, typically mineral oil.

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 water and groundwater resources and soil contamination.

8.11.2 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 and local rules and regulations. A site-specific Spill Prevention, Control, and Countermeasure Plan (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 associated with the Project. 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 contain leaks in the event that they occur.

8.12 Land-Based Economics

Land use in the Project Site is primarily agricultural; this use accounts for approximately 26,321 acres (93 percent) of the Project Site, as shown in **Map 15 - Land Cover (Appendix A)**. An additional one percent of land is indicated as hay/pasture/herbaceous land cover, much of which is used for livestock grazing (MRLC 2019). According to the 2017 U.S. Department of Agriculture (USDA) Agricultural Census Report, over 80 percent of the land in Dodge County (roughly 248,036 acres) was used for agriculture on approximately 611 farms. Corn, soybeans, and wheat are the primary crops grown in Dodge County. Swine, cattle, and turkey are the predominant livestock raised in the county. The market value of agricultural products sold in the county in 2017 was approximately $238.4 million, with crop markets at approximately $138.3 million and livestock markets at approximately $100 million (USDA 2017a).

In Steele County, an estimated 251,221 acres are used for agricultural purposes (86 percent) on approximately 746 farms. The market value of agricultural products sold in Steele County in 2017 was approximately $251.8 million, with crop markets at approximately $153 million and livestock markets at approximately $99 million (USDA 2017b).

Approximately 39 percent of the total Project Site is classified as prime farmland, while approximately 57 percent is classified as prime farmland, if drained. An estimated 2.1 percent of the Project Site is considered farmland of statewide importance (Natural Resources Conservation Service [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 "Agency Interests" database, there are 620 registered feedlots in Dodge County and 643 registered feedlots

in Steele County. Approximately 21 of the aforementioned registered feedlots are in the Project Site (MPCA 2016).

8.12.1 Potential Impacts

The Project is not expected to significantly impact agricultural land use or the general character of the area. Approximately 0.77 acres of land per turbine (in an 80-foot diameter that would include the concrete foundation and gravel ring around the turbine foundation) is expected to be taken out of agricultural production for the life of the Project. Permanent impacts would also include 16-foot-wide permanent access roads; two acres for the DCW substation; and approximately two acres for the O&M facility. Landowners would be able to continue to plant crops near, and graze livestock up to, the gravel roadway around each turbine pad. The primary permanent impact to active agricultural land will be the reduction of crop production on a total of approximately 60.5 acres in the Project Site. Collection lines would not result in permanent impacts as they would be installed entirely underground below the plow zone.

Table 32 summarizes the potential impacts to prime farmland for turbines, access roads, the O&M facility, and the project substation. Approximately 29.7 acres of prime farmland would be permanently impacted by project infrastructure out of a total 60.5 acres of agricultural land.

Table 32: Summary of Permanent Prime Farmland Impacts (Acres)

Prime Farmland Type	Turbines	Access Roads	O&M Facility	Substation	Total
All Areas Prime Farmland	4.9	22.3	1.7	0.8	29.7
Prime Farmland if Drained	3.9	26.2	<0.1	0	30.0
Farmland of Statewide Importance	<0.1	0.1	0	0	0.2
Not Prime Farmland	0.2	0.3	0	0	0.6
Total	9.1	48.9	1.7	0.8	60.5

Note: Rounding has been applied to all values.

Temporary impacts to farmland during project construction will result from construction of 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 likelihood of additional minor impacts such as soil compaction, crop damage or missed planting windows, and drain tile damage. Potential temporary impacts on farmland as a result of construction were calculated using the following assumptions:

- 300-foot-wide construction easements around each turbine location (for crane pads, equipment storage, soil stockpiling, etc.);
- 200-foot-wide construction easements for access roads (for equipment delivery and staging);

- 50-foot-wide construction easements for collection lines;
- 100-foot-wide construction easements for crane paths;
- five acres for the substation;
- two acres for the O&M building; and
- 15 acres for the laydown yard.

Construction activities are not likely to impact the entire construction easement; therefore, these estimates should be considered conservative. **Table 33** provides a summary of the estimated acreage of prime farmland that would be temporarily impacted by project construction.

In addition to direct impacts on agricultural land, livestock in pastureland may be temporarily disrupted by construction activities and noise. There is the potential for damage to livestock fencing, resulting in escaped animals, and the potential for noise and machinery to disrupt normal grazing activity.

During operation, energy generation facilities have the potential to generate stray voltage. As discussed in **Section 8.8.1.3**, 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. Research has shown that stray voltage can negatively impact livestock, ranging from mild behavioral reactions to intense behavioral responses indicative of pain. These responses can include the following:

- Animals avoiding certain exposure locations, which may reduce water or feed intake;
- Farm personnel experiencing difficulty handling animals in areas of exposure; or
- Animals releasing stress hormones produced by contact with painful stimuli (Reinemann 2008).

As discussed in **Section 8.8.2**, 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 anticipated and is therefore not expected to have an impact on livestock.

Table 33: Summary of Temporary Prime Farmland Impacts (Acres)

Prime Farmland Type	Turbines	Access Roads	O&M Facility	Substation	Collection	Laydown Yard	Crane Paths	Total
All Areas Prime Farmland	241.0	220.9	4.3	2.6	67.3	4.6	76.7	617.4
Prime Farmland if Drained	263.5	284.5	0.7	2.4	107.3	8.1	111.0	777.5
Farmland of Statewide Importance	2.9	1.4	0	0	1.4	0	1.2	6.8
Not Prime Farmland	5.4	2.2	0	0	1.9	0	<0.1	9.6
Total	512.8	509.0	5.0	5.0	178.0	12.7	188.8	1,411.2

Note: Rounding has been applied to all values.

8.12.2 Mitigation Measures

Project construction and operation will result in a mix of temporary and permanent impacts on farmland and livestock. DCW has coordinated with landowners to identify property features, such as drain tiles, that need to be avoided during construction activities. DCW will mark the locations of known tile lines to avoid these features during construction where practicable. Where identified features, such as drain tiles, are not avoided due to routing restrictions or are incidentally damaged, the feature 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 occur as a result of construction activities, appropriate measures (*e.g.*, soil decompaction) will be taken in order to restore the impacted area 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**.

DCW will implement best management practices (BMPs) and work with livestock owners to avoid impacts to fencing and grazing activity. Temporary fencing will be put in place in the event that fencing is impacted, and any damaged fencing will be permanently repaired or replaced after construction. Livestock will be protected during all phases of the Project as any fences or gates damaged during project construction or operations would be promptly repaired.

After construction is complete, all land surrounding the turbines and access roads can continue to be farmed. Landowners will be directly compensated for both temporary construction impacts and permanent loss of farmland. 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. 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. With these measures in place, the loss of agricultural land will not result in the loss of agriculture-related jobs or net loss of income to participating landowners.

8.13 Forestry and Mining

There are no economically important forestry resources within the Project Site. According to 2016 Land Cover Data, approximately 1.7 percent of the Project Site consists of wooded areas (MRLC 2019). Most wooded areas within the Project Site are shelterbelts or small woodlands surrounding active farmsteads or associated with streambanks. The western and northeastern portions of the Project Site generally contain more and larger contiguous woodlots in comparison to the remainder of the Project Site. In coordination with MNDNR, DCW has sited project infrastructure to avoid larger, continuous woodlots.

No impacts to economically important forestry resources are expected to occur; therefore, no mitigation is proposed.

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. There are no active gravel or sand pits within the Project Site.

8.13.1 Potential Impacts

Project infrastructure will not be located within mining resources; therefore, no direct impacts to mining resources are expected as a result of the Project. DCW may purchase aggregate from mining operations for use during construction, resulting in a temporary positive impact on local aggregate mining operation(s). DCW will coordinate with the local mining operations, as appropriate.

8.13.2 Mitigation

DCW has designed the Project to avoid locating infrastructure within or near sand and gravel operations. As such, no negative impacts to mining operations are anticipated as a result of the Project. Therefore, no mitigation is proposed.

8.14 Tourism

The tourism industry in Dodge County is active throughout the year. In 2018, annual leisure and hospitality expenditure in Dodge County was approximately $13.2 million, which equated to about 480 tourism-related jobs in the county (Explore Minnesota 2020). Tourism in Dodge County is centered on 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 2018 was approximately $74.2 million, which equated to about 1,509 tourism-related jobs in the county (Explore Minnesota 2020). Owatonna, in Steele County, offers several tourism draws, including the Reptile and Amphibian Discovery Zoo and the Village of Yesteryear, in addition to outdoor recreational activities.

As shown in **Section 8.7**, one WMA and one SNA are within the Project Site and an additional 17 WMAs, five WPAs, two SNAs, one AMA, four county parks, and one state park are within 10 miles of the Project Site. These public resources provide tourism opportunities including biking, camping, wildlife watching, hunting, fishing, and snowmobiling (refer to **Map 6 - Public Land Ownership & Recreation [Appendix A]**).

Snowmobiling is a popular activity in Dodge and Steele Counties with several trails offering a potential tourism draw. Approximately 474 miles of snowmobile trails are found throughout Dodge County, and another 436 miles of trails are in Steele County. Approximately 12.9 miles of trail run through the Project Site (MNDNR 2020d). 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 [MnUSA] 2018).

8.14.1 Potential Impacts

The project facilities are planned on private, primarily agricultural lands, and therefore are not expected to have direct impacts on tourism activities. As discussed in **Section 8.7**, several snowmobile trails are routed through the Project Site. Access to these trails will not be permanently impacted by the Project, and temporary restrictions are not expected to significantly impact the tourism industry in the area. Impacts to recreational users of snowmobile trails and public lands will be mostly visual in nature, due to the presence of additional wind turbines in the landscape. However, ice throw from turbine blades is a possible impact to recreational users.

8.14.2 Mitigation Measures

Proposed setbacks from recreational facilities, public roads, and non-leased properties will reduce indirect impacts to these resources. Turbines will be set back at least 1.1 times the total turbine height from snowmobile trails to minimize the potential for ice throw. Mitigation measures for potential visual impacts to the viewshed from public and recreational lands, including discussion with recreational groups and consideration of additional setbacks, are detailed in **Section 8.7.2**. With these measures in place, the Project is not anticipated to have a negative impact on area tourism.

8.15 Topography

The general topography of the Project Site is described as undulating, rolling relief with approximate elevations between 1,228 and 1,324 feet (372 and 403 meters) AMSL. The Project Site generally has lower elevations in the central and northwestern sections with higher elevations in the southeast and southwest. Local slopes vary throughout the Project Site, and the area generally slopes from the northeast, southeast, and southwest to the center of the Project Site (see **Map 10 - Site Topography**).

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

8.15.1 Potential Impacts

Some limited, localized impacts to the topography within the Project Site will result from the construction of turbine pad sites, access roads, and associated project facilities. Anticipated impacts will be minor as construction of these features will not require significant excavation or fill for foundations or road bases. DCW will avoid construction activities in areas with steep slopes (>10 percent) to the extent feasible.

8.15.2 Mitigation Measures

DCW will implement construction BMPs in accordance with the MPCA's *Stormwater Best Management Practices Manual* and the approved Project Stormwater Pollution Prevention Plan (SWPPP) to reduce erosion and sedimentation impacts. A grading plan will be developed for the

substation and O&M facility area. Following decommissioning of the Project, the site will be restored to its natural topographical contours to the extent possible. Considering project design and the BMPs described here, no significant impacts are expected on topography as a result of the Project.

8.16 Soils

The Project Site primarily (86 percent) comprises five soil associations with similar characteristics (NRCS 2017). These include Skyberg-Maxfield-Clyde (s3623), Kato-Canisteo (s3621), Lester-Le Sueur-Cordova (s3503), Skyberg-Maxfield-Kasson (s3622), and Estherville-Dakota-Bixby-Biscay (s3620). These soil associations are composed of silty clay loams that are moderately dark in color and occur on 0 to 6 percent slopes (see **Map 16 – Soils [Appendix A]**). These soil associations are generally deep, moderately well drained, and 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.

Four additional soil associations within the Project Site account for approximately 14 percent of soils collectively. These are all generally composed of a moderately permeable silt loam on 0 to 15 percent slopes. Soil associations within the Project Site are listed in **Table 34** below.

Table 34: Soil Associations in the Project Site

Soil Association	Area (Acres)	Percent of Project Site*
Skyberg-Maxfield-Clyde (s3623)	6610.84	23.3
Kato-Canisteo (s3621)	5934.75	20.9
Lester-Le Sueur-Cordova (s3503)	4570.69	16.1
Skyberg-Maxfield-Kasson (s3622)	3913.93	13.8
Estherville-Dakota-Bixby-Biscay (s3620)	3440.93	12.1
Readlyn-Racine-Maxfield-Kasson (s3624)	1843.36	6.5
Waukee-Spillville-Radford-Lawler (s3638)	1408.79	5.0
Moland-Merton-Maxcreek-Canisteo (s3619)	302.04	1.1
Muskego-Lester-Hayden (s3505)	237.75	0.8
Vlasaty-Sargeant (s3713)	85.00	0.3

Source: (NRCS 2017).
Note: Rounding has been applied to all values.

8.16.1 Potential Impacts

Construction and operation of the proposed Project will result in short- and long-term impacts to soils within the Project Site. During construction, short-term impacts will include soil compaction, vegetation clearing, dust generation resulting from excavation, soil stockpiling, and redistribution

of soils. During construction, there is also the potential for localized soil erosion and sedimentation. Construction activities are described further in **Section 10**. Long-term impacts will include soil compaction beneath access roads, turbines, substation, and O&M facilities.

8.16.2 Mitigation Measures

A National Pollutant Discharge Elimination System (NPDES) permit, 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. Dust control measures will be implemented during construction as described 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, described further in **Section 10.5**. 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. As part of the post-construction reclamation efforts, compacted soils in areas where project infrastructure is not located will be ripped with a grader, spread with topsoil stockpiled during construction, and revegetated by seeding. Depending upon the timing of reclamation activity, these areas will be reseeded with temporary cover crops or planted with row crops. At the end of the project's life, project facilities will be decommissioned, and soils will be returned back to agricultural use. A Decommissioning Plan for the Wind Project is included as **Appendix K** of this Application. Note that a separate Decommissioning Plan for the DCW Transmission Project will be provided separately as part of the DCW Transmission Project Route Permit Application.

With these measures in place, no significant impacts are anticipated to soils as a result of project construction and operation.

8.17 Geologic and Groundwater Resources

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 17 - Site Geology [Appendix A]**). 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 Site. The average thickness of the glacial drift is generally around 100 feet (30.5 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 groundwater 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 (MDH's) County Well Index online database (MDH 2018), wells are interspersed throughout the Project Site. Well depths within the Project Site vary widely, ranging between 161 and 390 feet (49 and 119 meters) deep, with most being in excess of 100 feet (31 meters) in depth (MDH 2018).

8.17.1 Potential Impacts

Construction of 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 bedrock.

Construction activities will occur to depths of approximately 12 feet (3.7 meters) for turbine foundations, and 20 feet (6.1 meters) for the collector substation foundations. As well depths in the Project Site range between 161 and 390 feet (49 and 119 meters), it is not anticipated that the project activities would impact groundwater resources. Given the well depths in the Project Site and the depths of planned construction activities, construction dewatering is not anticipated; therefore, impacts to groundwater resources are not anticipated.

Furthermore, project activities are not expected to impact groundwater resources or wells due to adherence to state and county setbacks from water wells and the minimal water-related needs of the Project. Currently, it is estimated that up to 12 million gallons of water will be used for construction purposes, including dust abatement and other construction needs. This water would either come from a local well or be trucked in from a suitable local resource and stored at the laydown yard. The source of water will be determined closer to construction. A well will be installed to fulfill the O&M building water requirements. All applicable permits or authorizations for water use or wells will be obtained in advance of construction. Water usage during operations at the O&M facility is expected to be equivalent to the use of a four- to five-person household (approximately 320 to 500 gallons per day).

8.17.2 Mitigation Measures

Construction and operation of the proposed Project is not expected to significantly impact geology or groundwater resources; therefore, no mitigations are proposed.

8.18 Surface Water and Floodplain Resources

The Project Site traverses three watersheds in the Upper Mississippi River Basin: (1) the Upper Cedar watershed (Hydrologic Unit Code [HUC] 07080201), (2) the Zumbro watershed (HUC8 07040004), and (3) the Cannon River watershed (HUC8 07040002) (USGS 2020). Numerous intermittent and ephemeral watercourses, irrigation ditches, and a few perennial streams cross the Project Site. Standing surface water ponds or lakes are infrequent in this area.

According to the USGS National Hydrography Dataset, the Project Site contains approximately 1.6 acres of waterbodies and approximately 54.5 miles of watercourses (USGS 2020) (see **Map 18 - Surface Water [Appendix A]**). Several of the watercourses are designated Public Waters Inventory (PWI) streams. PWI are designated under MNDNR's Public Waters Permit Program (Revisor of Statutes, State of Minnesota 2019).

PWI are assigned protective buffers, inside of which ground-disturbing activities are limited. Seven of these PWI streams in the Project Site have 50-foot (15.2-meter) protection buffer requirements according to the Minnesota Buffer Law (MNDNR 2017f). These buffered streams include the mainstem of Dodge Center Creek, as well as two tributaries in the north-central and northeast portions of the Project Site. An additional 13 designated watercourses scattered throughout the Project Site have 16.5-foot (5.0-meter) protection buffer requirements. **Table 35** summarizes the PWI within the Project Site, and their respective protective buffers.

Table 35: Public Waters Inventory

PWI Type	PWI Feature Name	Protection Buffer (feet)	PWI ID	Length within Project Site (miles)
PW Altered Natural	Dodge Center Creek	50	DODG_13412	0.19
PW Natural	Unnamed Creek	50	DODG_3855	1.02
PW Natural	Dodge Center Creek	50	DODG_7804	3.16
PW Natural	Unnamed Creek	50	DODG_27918	0.03
PW Altered Natural	Unnamed Creek	50	DODG_13413	3.21
Public Ditch		16.5	DODG_76	1.51
Public Ditch		16.5	DODG_75	0.40
Public Ditch		16.5	DODG_72	0.64

PWI Type	PWI Feature Name	Protection Buffer (feet)	PWI ID	Length within Project Site (miles)
PW Natural	Unnamed Creek	50	DODG_3854	1.22
Public Ditch		16.5	STEE_93	1.15
Public Ditch		16.5	DODG_100	0.49
Public Ditch		16.5	DODG_74	0.62
Public Ditch		16.5	DODG_86	2.64
PW Altered Natural	Unnamed Creek	50	DODG_13414	0.52
Public Ditch		16.5	STEE_96	0.67
Public Ditch		16.5	STEE_11	0.66
Public Ditch		16.5	DODG_102	0.05
PW Altered Natural/Public Ditch	Unnamed Creek	16.5	DODG_54	5.77
PW Altered Natural/Public Ditch		16.5	DODG_78	2.22
PW Altered Natural/Public Ditch		16.5	DODG_69	1.50
Total				27.67

Source: (MNDNR 2017f).
Note: Rounding has been applied to all values.

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 (impairment) every two years. Two recorded waterbodies within the Project Site are listed as impaired by the MPCA. Dodge Center Creek and Turtle Creek fail to meet one or more of the aforementioned water quality standards including turbidity, *E. coli*, and/or failure to meet one or more bioassessment standards for macroinvertebrates.

The MNDNR commissioner may formally designate lakes for wildlife management under the authority of Minnesota Statutes § 97A.101, subdivision 2(a) after notice and a hearing. No MNDNR designated wildlife lakes are found adjacent to or within the Project Site (MNDNR 2016b). No identified outstanding resource value waters or trout streams occur adjacent to or within the Project Site (MNDNR 2020e).

FEMA Flood Insurance Rate Maps are available for most of the Project Site, but the majority of base flood elevations have not been determined. There are 100-year floodplains (Zone A) for

Dodge Center Creek and tributaries within the northeast portion of the Project Site (FEMA 2015). Most of the Project Site that has agricultural watercourses has been determined to be an area with minimal flood hazards (Zone C). No recorded floodplains are present within the portion of the Project Site located in Steele County, see **Map 19 – Flood Zones (Appendix A)**. FEMA Floodplain Panels are included in **Appendix L: FEMA Floodplain Panels**.

Remapping of Dodge County floodplains is currently underway, although these data are not yet finalized or ratified. An evaluation of the draft data shows similarities to the FEMA floodplain maps: 100-year floodplains (Zone A) are present along Dodge Center Creek and associated tributaries within the northeast portion of the Project Site. No other floodplains were identified in the preliminary floodplain data provided by Dodge County. DCW will continue to coordinate with the county and state regarding the locations and types of floodplains.

8.18.1 Potential Impacts

Potential temporary impacts to surface water and floodplain resources could occur during project construction when activities could result in increased turbidity of surface waters from soil erosion, fuel or chemical leaks from equipment near surface water areas, and physical disruption to vegetation and wildlife habitat bordering streams. As the Project is currently designed, the highest potential for these temporary impacts would occur at 25 watercourse crossings by collection lines, five watercourse crossings by new access roads, and three watercourse crossings by crane walk paths. No standing waterbodies such as ponds or lakes would be crossed by project infrastructure. No impacts are expected to designated wildlife lakes and special waters.

Runoff from construction area surface disturbance could enter surface waters during installation/removal of temporary and permanent culverts, respectively. This could result in localized increases in turbidity and sediment load in adjacent streams. Similar impacts could occur when collection lines are installed beneath waterway surfaces via open cut methodology or crossing of stream areas by crane path walks. Direct negative impacts to water quality could result in indirect detrimental impacts to aquatic wildlife and habitat.

Potential temporary impacts to surface water quality could occur from inadvertent spills or release of construction equipment fuel or construction activity chemicals. Direct negative impacts to water quality from fuel or chemical contamination could result in indirect detrimental impacts to aquatic wildlife and habitat.

Temporary and permanent impacts could occur should construction activities require clearing of woody vegetation. Similarly, such impacts to herbaceous vegetation could occur during construction area clearing and equipment operation. Direct negative impacts to vegetation resources could cause indirect negative impacts to wildlife habitat and individual organisms.

There is the potential for similar temporary impacts to floodplain areas during project construction. No wind turbines are planned within FEMA floodplains; however, approximately 0.7 miles of collection lines and 0.3 miles of access roads may be located at the far edges of floodplain areas

as designated by Dodge County floodplain mapping. Therefore, negligible impacts to surface water or floodplains are expected from operation of the proposed Project.

8.18.2 Mitigation Measures

The project design process included strong consideration of avoidance of surface water features and floodplains. As described below, numerous mitigation measures would be integrated during project construction to minimize temporary impacts to surface water and floodplain resources that would not be avoided. The Applicant will continue to coordinate with Dodge County regarding the placement of collection lines and an access road within areas designated by Dodge County as floodplain. The Applicant would obtain all permits, licenses, and approvals for surface water crossings, including those associated with impacts to PWI streams. All conditions of approval and required mitigation for these permits would be integrated during project construction. With these mitigation measures in place, negligible residual impacts to surface water and floodplain resources are expected from project construction and operations.

A SWPPP would be developed to systematically employ BMPs for the protection of surface waters from erosion resulting from construction activities. BMPs consistent with the MPCA Stormwater BMP Manual would be employed to contain excavated material (including specific topsoil protection actions), protect disturbed and exposed soil, and revegetate temporary surface disturbance with appropriate plant species. The type of control measure will vary depending upon slope gradients and the susceptibility of soil to wind and water erosion. BMPs will be employed to protect topsoil and minimize soil erosion as well as protect surface water quality and floodplain resources from direct impacts (see **Table 36** for a summary of applicable BMPs and respective use criteria).

Table 36: Surface Water Best Management Practices Selection Summary

BMP Category	Grade or Trigger	BMP
Erosion Prevention	Throughout	Vegetation preservation
		Vegetation 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

BMP Category	Grade or Trigger	BMP
		Straw bale check dams
Sediment Barrier	At watercourse crossings	Sediment fencing
		Straw wattles
		Low water crossings
		Vegetative buffers
		Straw bale check dams

An NPDES permit would be obtained from the MPCA for the construction of the Project. This permit would include a plan to avoid contaminant spills and releases as a primary mitigation strategy. Any planned sites for equipment maintenance, fueling of vehicles, or storage of chemicals will be located away from surface waters to reduce the possibility of such contaminates entering surface waters. Spills will be controlled and cleaned up immediately to eliminate the potential for the material to enter surface waters. The potential for a limited, temporary increase in the sediment load caused by construction activities is expected to be minor in comparison with the agricultural activities and runoff that already occur in the area.

Unavoidable temporary impacts to vegetation will be minimized by implementing BMPs to protect and reapply topsoil, minimize soil erosion, and revegetate disturbed areas with appropriate non-invasive species. This may include planting of native woody species in some locations. Reclaimed topographic conditions will be similar to pre-disturbance conditions. The reclaimed landscape will blend with the surrounding contours and maintain natural hydrology. **Section 8.16.2** provides additional information regarding regulatory agencies and applicable mitigation methods.

8.19 Wetlands

The Project Site contains both isolated wetlands and wetlands associated with watercourses. Identified wetlands within the Project Site are primarily freshwater emergent wetlands with some mapped shrub/scrub and forested wetlands dotting the landscape (see **Map 20 - National Wetlands Inventory Update for Minnesota [Appendix A]**). Some wetlands within agricultural settings appear to exhibit anthropological disturbance. Based on aerial photograph interpretation, a moderate number of the site's 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 Zumbro River.

According to the USFWS National Wetlands Inventory (NWI) database, the Project Site contains approximately 676 acres of mapped NWI wetlands and open water features (2.4 percent of the Project Site) (USFWS 2020c).Wetland types and their associated acreages are listed in **Table 37**.

Table 37: National Wetlands Inventory Wetland Type and Acreage

NWI Type	Acres	Percent of Project Site
Freshwater Emergent Wetland (PEM)	450	1.6%
Freshwater Forested/Shrub Wetland (PFO/PSS)	189	0.7%
Freshwater Pond (Open Waters)	12	<0.1%
Riverine	24	0.1%
Total:	**676**	**2.4**

Source: (USFWS 2020c).
Rounding has been applied to all values.

No calcareous fens have been identified within or adjacent to the Project Site. Calcareous fens are rare and distinctive wetlands characterized by non-acidic peat with a constant supply of calcium-rich 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 Site. Due to the specialized nature of fens, it is unlikely that associated habitat would be found within the Project Site (MNDNR 2016a).

In the state of Minnesota, some wetlands are designated as PWI Basins (PWI Wetlands). All PWI Wetlands are identified as Types 3, 4, or 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. No PWI Wetlands are located within the Project Site. One Type 3 PWI wetland and one Type 4 PWI wetland are located within one mile of the Project Site, consisting of approximately 69.2 acres and 48.9 acres, respectively, as shown on **Map 20 – National Wetlands Inventory Update for Minnesota**. 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 a 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 PWI Wetlands. Most other wetlands not listed in the PWI are regulated under the Minnesota WCA of 1991. The WCA is administered by the Minnesota BWSR and is implemented by Local Government Units (LGUs). The LGUs administering the WCA within the Project Site are the Soil and 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. Finally, waters of the United States, including wetlands, are also protected under Section 404 of the Clean Water Act, administered by the USACE. A permit and/or pre-construction notification from the USACE is required when discharging dredged or fill material into jurisdictional waters of the United States, including wetlands. 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.

8.19.1 Potential Impacts

Turbines and MET towers will be sited in upland, higher elevation areas to maximize the wind resource and therefore are likely to avoid wetlands and surface waters that are typically found at lower elevations. Access roads and other 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. Wetland delineations are ongoing to support avoidance of known wetland areas. 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 to obtain the required permissions and permits.

8.19.2 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 where 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 so that construction crews avoid these areas. Directional drilling of collector and communication lines may be utilized to avoid or further reduce the area of wetland impacts.

If adverse impacts to wetlands are unavoidable, the appropriate agency coordination and permitting will be conducted, which often requires specific BMPs and other protective measures. 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.

SWPPP and NPDES permits will be obtained prior to construction. BMPs will be employed so that excavated material is contained, exposed soil is protected, restored material is stabilized, and disturbed areas are revegetated with appropriate plant species. With these design considerations and mitigation measures in place, significant adverse impacts to wetlands are not anticipated as a result of the Project. 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.

8.20 Vegetation

The Project Site 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. Tallgrass prairie and maple-basswood forests were also common (MNDNR 2017e). Today, this subsection consists primarily of row crop agricultural land.

The 2016 National Land Cover Database—Land Use-Land Cover dataset (MRLC 2019) indicates that the Project Site contains approximately 26,321 acres of cultivated land, or about 93 percent of the Project Site (**Table 38**). In addition to cultivated lands, agricultural regions typically also include idle lands, pastures, and grasslands. The 2016 National Land Cover Database—Land Use-Land Cover dataset indicates that the Project Site contains approximately 323 acres of pastures (1.1 percent of the Project Site) and approximately 203 acres of grassland/herbaceous habitat (one percent of the Project Site) (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 Site and occur along roadsides or ditches, or as uncultivated or fallow fields. These grassy areas can serve some of the same purpose as native prairie in terms of providing valuable habitat for grassland nesting or foraging birds. The remaining land cover type within the Project Site consists primarily of developed/disturbed space.

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

Land Cover	Area (acres)	Percent of Project Site
Cultivated Crops	26,321.0	92.8
Disturbed/Developed	911.5	3.2
Deciduous Forest	338.4	1.2
Hay/Pasture	322.6	1.1
Herbaceous	202.6	0.7
Woody Wetlands	128.8	0.5
Emergent Herbaceous Wetlands	106.8	0.4
Mixed Forest	10.8	<0
Barren Land	5.3	<0
Open Water	0.2	<0.1
Total	28,348.1	100

Source: (MRLC 2019).
Rounding has been applied to all values.

8.20.1 Sites of Biodiversity Significance

The Minnesota Biological Survey (MBS) identifies six Sites of Biodiversity Significance that are located completely within or partially within the Project Site (see **Map 21 - Unique Features [Appendix A]**). 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 (2020f).

Table 39: Sites of Biodiversity Significance

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

Source: (MNDNR 2020f).

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.

Three of the MBS Sites of Biodiversity Significance within the Project Site have been given a "below" biodiversity significance ranking, one sites is ranked as "moderate," and two sites are ranked as "high"(MNDNR 2020g). **Table 40** below shows MBS Sites of Biodiversity Significance (including acreages) that occur within the Project Site.

Table 40: Sites of Biodiversity Significance within the Project Site

Site of Biodiversity Significance Ranking	Number of Sites Within Project Site	Area (acres)*
Below	3	23.4
Moderate	1	0.1
High	2	350.2
Outstanding	0	0.0
Total	6	373.7

Source: (MNDNR 2020g).
*Rounding has been applied.

8.20.2 Native Plant Communities

Thirteen native plant communities are located within the Project Site (see **Map 21 - Unique Features**) (MNDNR 2020h). Three native plant communities classified as Elm-Basswood-Black Ash-(Hackberry) Forest (MHs49a) (totaling 72.5 acres) and ranked as a state vulnerable to extirpation (S3) community type are located within the northeast portion of the Project Site along Dodge Center Creek; two have a condition of "NR" (Not Ranked), and the other is ranked as "BC" (good to fair ecological integrity). Five native plant communities classified as Sugar Maple-Basswood-(Bitternut Hickory) Forest (MHs39a) (totaling 80.2 acres) and ranked as state imperiled (S2) occur within the northeast portion of the Project Site along Dodge Center Creek; four have a condition of NR, and one is ranked as "B" (good ecological integrity). Three native plant communities classified as Elm-Ash-Basswood Terrace Forest (FFs59c) (totaling 67.9 acres) and ranked as S2 are located within the northeast portion of the Project Site along Dodge Center Creek; two have a condition of NR, and the other is ranked as "C" (fair ecological integrity). The two remaining native plant communities within the Project Site are native prairies and are discussed in the **Native Prairie** section, below.

MNDNR has assigned a biodiversity rank to these communities as well. **Table 41** below provides the area and biodiversity ranking associated with the five native plant community types present in the Project Site. All communities have a biodiversity rank of "High."

Table 41: Native Plant Community Types within the Project Site

Native Plant Community Type	Area of Biodiversity Rank High (acres)
FFs59c - Elm - Ash - Basswood Terrace Forest	67.9
MHs39a - Sugar Maple - Basswood - (Bitternut Hickory) Forest	80.2
MHs49a - Elm - Basswood - Black Ash - (Hackberry) Forest	72.5
WPs54 - Southern Wet Prairie	26.1

Source: (MNDNR 2020h).
Note: Rounding has been applied to all values.

8.20.3 Native Prairie

The MNDNR has mapped two native prairie areas within the Project Site, comprising approximately 26.1 acres. Both areas are classified as the WPs54-Southern Wet Prairie type. The MNDNR describes this prairie type 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).

8.20.4 Potential Impacts

Vegetation will be removed during construction and installation of project infrastructure to allow for construction of turbine pads, access roads, the substation, and O&M facilities. The vast majority of project infrastructure will be located in agricultural fields. Less than 0.22 percent of the total Project Site will be permanently converted for wind turbines or other project infrastructure. **Table 42,** below, details anticipated permanent impacts to vegetation and unique vegetation types within the Project Site. 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 43**, below, for details on potential temporary impacts to vegetation by the Project. Construction of the Project will not likely impact the entire construction easements as detailed; these calculations are therefore conservative estimates. Additionally, limited tree clearing may be required for the construction of permanent infrastructure or temporary construction activities (*e.g.*, collection line ROW).

Table 42: Summary of Estimated Permanent Impacts to Vegetation

Land Cover Type	Turbines (acres)	Access Roads (acres)	O&M Facility (acres)	Substation (acres)	ADLS Towers (acres)	Total (acres)
Cultivated Crops	9.1	47.4	1.7	2	<0.1	60.3
Developed, Open Space	0	0.8	0	0	0	0.8
Developed, Low Intensity	0	<0.1	0	0	0	<0.1
Herbaceous	0	0.1	0	0	0	0.1
Hay/Pasture	0	0.5	0	0	0	0.5
Total	9.1	48.9	1.7	2	<0.1	61.8
Native Plant Community	0	0	0	0	**0**	**0**
Sites of Biodiversity	0	<0.1	0	0	**0**	**<0.1**
Total	**0**	**<0.1**	**0**	**0**	**0**	**<0.1**

Note: Rounding has been applied to all values.

Table 43: Summary of Estimated Temporary Impacts to Vegetation

Land Cover Type	Turbines (acres)	Access Roads (acres)	O&M Facility (acres)	Substation (acres)	Collection (acres)	Laydown Yard (acres)	Crane Paths (acres)	Total (acres)
Cultivated Crops	512.7	478.0	4.7	4.6	168.0	12.7	184.2	1,364.9
Developed, Open Space	0	20.8	0.3	0.4	7.4	0	4.3	33.1
Developed, Low Intensity	0	1.8	0	0	0.5	0	0.3	2.6
Developed, High Intensity	0	0.2	0	0	0	0	0	0.2
Herbaceous	0	1.7	0	0	<0.1	0	0	1.8
Emergent Herbaceous Wetlands	0	0	0	0	0.5	0	0	0.5
Mixed Forest	0	0	0	0	0	0	0.3	0.3
Hay/Pasture	<0.1	6.5	0	0	1.4	0	0	8.0
Woody Wetlands	0	0	0	0	0.1	0	0	0.1
Total	512.8	509.0	5.0	5.0	178.0	12.7	189.0	1,411.4
Native Plant Community	0	0	0	0	0	0	0	0
Sites of Biodiversity	0	0.9	0	0	0	0	0	0.9
Total	0	0.9	0	0	0	0	0	0.9

Rounding has been applied to all values.

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 (as designated by the Minnesota Department of Agriculture (MDA) (MDA 2020a, 2020b)) through the implementation of BMPs.

Project infrastructure will be sited to avoid Sites of Biodiversity Significance that are ranked as high or outstanding and 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 0.88 acres ranked as below will be temporarily impacted, and approximately 0.03 acres will be permanently impacted. 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.

8.20.5 Mitigation Measures

DCW has planned the Project, and will continue to develop the Project, to avoid direct permanent and temporary impacts to natural areas, including wetlands, native plant communities, and MBS Sites of Biodiversity Significance within the Project Site, including native prairies, to the extent feasible. Additionally, DCW will avoid impacts to conservation land such as WMAs. All of the permanent turbine impacts are planned entirely in lands currently under crop cultivation. DCW access roads will avoid grasslands, shrubland, and wooded areas when feasible. Access roads are expected to impact primarily agricultural fields and mown herbaceous areas associated with roadsides and ditches. 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 activities will employ all appropriate BMPs, and temporary vegetation impacts will be reclaimed to pre-disturbance conditions. DCW will coordinate with the local NRCS office to ensure that locally sourced native seed is used in revegetating these areas.

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 Site to control and prevent the introduction of invasive species as designated by the MDA (including county-level noxious weed designations by Steele County) (MDA 2020a, 2020b). 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 Site, control of these weeds will be conducted through properly timing, mowing, and using targeted herbicide consistent with the herbicide BMPs published by the MnDOT and MDA (MnDOT 2020a, 2020d; MDA 2020c, 2020d).

8.21 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. Briefly, the tiers are 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 M: Wildlife Conservation Strategy / Avian and Bat Protection Plan contains the completed wildlife studies conducted for the Project.

8.21.1 Results of Tier 1 and Tier 2 Studies

A modified Tier 1 and Tier 2 site assessment was completed for the Project Site during preparation of the comprehensive Wildlife Conservation Strategy (WCS), which addresses Minnesota's requirement for an Avian and Bat Protection Plan (ABPP). Information for documenting responses to the Tier 1 and Tier 2 questions in the WCS/ABPP was gathered through MNDNR and USFWS database research and other publicly available resources. Tier 1 questions help determine potential environmental risk at the landscape scale, and Tier 2 questions help to determine potential environmental risk at the project scale (USFWS 2012). For additional details, see **Appendix M: Wildlife Conservation Strategy / Avian and Bat Protection Plan**.

8.21.2 Potential and Observed Wildlife Usage

Various studies conducted for the Project provide information on existing wildlife usage of the Project Site. **Table 44** provides a summary of the Tier 3 wildlife studies that have been completed for the Project. Reports of findings for these studies are provided in **Appendix M: Wildlife Conservation Strategy / Avian and Bat Protection Plan.** 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
Ground-based Raptor Nest Survey	HDR	2015
Ground-based Raptor Nest Checks	HDR	2016
Year 1 Avian Use Study	HDR	2015–2016
Bald Eagle Point-Count Survey	HDR	2016–2017
Bald Eagle and Raptor Nest Aerial Survey	Atwell, LLC	2017
Targeted Loggerhead Shrike and Henslow's Sparrow Inventory Survey	Atwell, LLC	2017
Year 2 Avian Use Study	Atwell, LLC	2017–2018
Supplemental Acoustic Bat Use Study	Western EcoSystems Technology, Inc. (WEST)	2020
Sullivant's Milkweed Screening	WEST	2020
Northern Long-Eared Bat Habitat Assessment	WEST	2020
Bald Eagle and Raptor Nest Aerial Survey	WEST	2020
Ground-based Eagle Nest Survey	WEST	2021

Note: DCW has adjusted and reduced project boundaries to minimize the potential impacts to environmental resources. As a result, project survey areas frequently differed by survey type and year. See the survey reports in **Appendix M** for more information on the survey coverage of each study.

8.21.2.1 Birds

Two years of avian use point-count surveys have been conducted to document species presence and overall avian use of the Project Site 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 and Year 2 Avian Use Studies are discussed here.

The Year 1 Avian Use Study recorded 16,112 individual birds from 144 species. Passerines were the most abundant species group of birds recorded, accounting for more than 84 percent of all birds observed. Seven species of raptor were observed. A relatively low overall raptor use of the study area of 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).

The Year 2 Avian Migration and Eagle Use Study (Atwell 2018) recorded 6,408 individual birds from 109 species during standardized spring and fall migration surveys. Passerines were the most abundant species group of birds recorded during migration surveys, accounting for more than 61 percent and 71 percent of all birds in the spring and fall, respectively. Sixteen species of raptor were observed during standardized surveys, and relatively low overall raptor use of the study area at 0.53, 0.36, 0.93, and 0.16 raptors/20 minute segment (excluding turkey vultures [*Cathartes aura*]) was documented in the spring, summer, fall, and winter, respectively. Excluding turkey vultures, red-tailed hawks were the most frequently observed raptor species (182 detections) with occurrence frequencies of 17.1 percent, 10.5 percent, 7.0 percent, and 5.8 percent of survey segments in the spring, summer, fall, and winter, respectively (Atwell 2018).

Birds observed during the Year 1 and Year 2 Avian Use Studies include waterfowl (Canada goose [*Branta canadensis*], mallard [*Anas platyrhynchos*], and 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, and swallows) (HDR 2017; Atwell 2018). These species are very similar to those observed during pre-construction surveys at the nearby existing Lakefield and Pleasant Valley wind facilities (Westwood 2010; WEST 2011). Between the two years of study, 163 species were recorded within the Project Site during standardized surveys. This total comprises approximately 61 percent of the recorded bird species within Dodge and Steele Counties based on Avian Knowledge Network (AKN) data (AKN 2018).

No threatened or endangered species listed under the Endangered Species Act (ESA) were observed during the surveys. One endangered species listed by MNDNR, the Henslow's sparrow, was documented within the Project Site during the Year 1 and Year 2 Avian Use Studies (HDR 2017; Atwell 2018). During Year 1, a single Henslow's sparrow was incidentally noted utilizing an isolated patch of restored grassland habitat in the east-central portion of the Project Site (see **Map 21 - Unique Features**). During the Year 2 study, a Henslow's sparrow was heard singing from the Dodge Center Creek WPA located adjacent to the southwestern portion of the Project Site. This observation occurred during a Wetland Utilization Survey in the summer. A total of 11 individual horned grebes (*Podiceps auritus*), listed as endangered by MNDNR, were observed on three occasions over the course of Year 1 and Year 2 studies. These observations all occurred in the spring at Oak Glen Lake, which is outside of the Project Site boundary. One sighting of a loggerhead shrike (*Lanius ludovicianus*), listed as endangered by MNDNR, occurred approximately 7 miles east of the Project Site during targeted loggerhead shrike surveys. One adult shrike was observed tending to two recently fledged young at a homestead with ornamental spruce trees surrounded by agricultural land.

Eight special status species were documented during the course of the Year 1 and Year 2 Avian Use Studies including Acadian flycatcher (*Empidonax virescens*, MNDNR special concern), Franklin's gull (*Leucophaeus pipixcan*, MNDNR special concern), peregrine falcon (*Falco peregrinus*, MNDNR special concern), purple martin (*Progne subis*,; MNDNR special concern),

short-eared owl (*Asio flammeus*, MNDNR special concern), trumpeter swan (*Cygnus buccinator*, MNDNR special concern), bald eagle (Bald and Golden Eagle Protection Act), and golden eagle (*Aquila chrysaetos*, Bald and Golden Eagle Protection Act) (HDR 2017; Atwell 2018). Additionally, American white pelican (*Pelecanus erythrorhynchos*, MNDNR special concern) and Forster's tern (*Sterna forsteri*, MNDNR special concern) were observed only during Wetland Utilization Surveys, and Bell's vireo (*Vireo bellii*, MNDNR special concern) was only observed during the targeted loggerhead shrike and Henslow's sparrow surveys. With the exception of purple martin and bald eagle, these species were generally noted a relatively small number of times (*i.e.,* detected on less than 10 percent of standardized surveys) during the spring and/or fall migratory periods with no observed evidence of breeding. Purple martin was also observed a small number of times in spring and fall; however, this species was also detected during the summer and is a possible breeder in the Project Site. American white pelican and Franklin's gull would occasionally congregate in large numbers.

During the course of 216 hours of surveys, the Year 1 Avian Use Survey documented 63 bald eagle flight minutes with 18 of these minutes occurring within the rotor swept zone (defined in the study as 20–150 meters [66–492 feet] AGL and within 800 meters [2,625 feet] of the survey point) (HDR 2017). During the course of 461 hours of surveys, the Year 2 Avian Use Survey documented 141 bald eagle flight minutes and six golden eagle flight minutes. Approximately 81 of these minutes for bald eagle occurred within the rotor swept zone, whereas all six golden eagle flight minutes were within the rotor swept zone (Atwell 2018).

Avian Wetland Utilization Surveys were conducted as part of the Year 1 Avian Use 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 22,874 individual birds representing 18 different waterbird species. The most commonly observed species were redhead duck (*Aythya americana*) and ring-necked duck (*Aythya collaris*), 25 percent and 13 percent of all observations, respectively.

No species listed under the ESA were observed during Year 2 Wetland Utilization Surveys. As previously mentioned, one Henslow's sparrow was observed at Dodge Center Creek WPA, and eight horned grebes were detected on a single occasion at Oak Glen Wetland Complex, both of which are outside of the Project Site. Both species are listed as endangered by MNDNR. Species of special concern (MNDNR) detected during Wetland Utilization Surveys include American white pelican (362 individuals), Forster's tern (seven individuals), short-eared owl (one individual), and trumpeter swan (102 individuals at Oak Glen Wetland Complex only). Thirty-two bald eagles were also detected over the course of Year 2 Wetland Utilization Surveys. Although both Henslow's sparrow and trumpeter swan were documented during surveys associated with the Project, they were documented in areas outside of the current Project Site, within which suitable breeding habitat for both species is limited. Both are therefore possible but relatively unlikely breeders within the Project Site. Bald eagles are also a possible but relatively unlikely breeder within the Project Site due to limited preferred nesting habitat; preferred bald eagle nesting habitat

within the Project Site is primarily located along Dodge Center Creek. It is possible that bald eagles may build nests at some point within less suitable habitat in the Project Site, such as small woodlots, if bald eagle density continues increasing and breeding expands into less suitable/less preferred nesting areas.

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 5 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 was conducted during March of 2017 (Atwell 2017a; see **Map 21 - Unique Features**).

As indicated in the Bald Eagle and Raptor Nest Aerial Survey report (Atwell 2017a), 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 2.5 miles north of the Project Site. 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 8.9 miles south of the Project Site. Follow-up effort on March 10, 2018, indicated five eagles utilizing this location; subsequently, only one eagle was noted at 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 2017a). An addendum to the raptor nest survey report was prepared to document the findings for an expanded study area that resulted in the identification of four more raptor nest structures to the west of the Project Site in Steele County.

In 2020, Western EcoSystems Technology, Inc. (WEST) conducted an aerial survey for all nests of raptors (within one mile of the Project) and eagles (within five miles of the Project; Foo 2021). No eagle nests were found within the current Project Site. Five occupied and active bald eagle nests were documented within the 5-mile buffer; one additional occupied and active bald eagle nest was documented outside of the 5-mile buffer. Additional raptor nests documented during the survey included two occupied and active red-tailed hawk nests, one occupied and active great horned owl (*Bubo virginianus*) nest, and two occupied inactive unidentified raptor nests. Additionally, nine inactive unidentified raptor nests were recorded. One great blue heron (*Ardea*

herodias) colony was observed at the northern edge of the Project Site along Dodge Center Creek during these surveys.

In 2021, WEST conducted a ground-based eagle nest survey for the current Project Site plus a 2-mile buffer (Foo and Pickle 2021). Three occupied and active bald eagle nests were identified during the survey, all of which were also occupied and active bald eagle nests in 2020. All three nests are located at least 1.7 miles from the Project Site.

Across multiple years of eagle and raptor surveys, no bald eagle nests have been identified within the Project Site. The 2020 raptor nest survey found similar results to the 2017 survey, with five occupied and active bald eagle nests within five miles of the Project, with potential for up to seven within 10 miles of the Project based on the 2017 survey. The 2021 nest survey confirmed that three bald eagle nests are located within 2 miles of the Project Site boundary; all turbines are greater than 2 miles from documented bald eagle nests.

8.21.2.2 Mammals

Many common mammal species are likely to utilize the Project Site, including white-tailed deer (*Odocoileus virginianus*), raccoon (*Procyon lotor*), coyote (*Canis latrans*), red fox and gray fox (*Vulpes fulva*, *V. 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 Site, while the smaller mammal species are likely to use those areas as well as the cultivated areas within the Project Site.

8.21.2.3 Bats

The Project 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, the preferred habitat of these species is not particularly abundant within and in the vicinity of the Project. The little brown and big brown bats utilize lakes and streams for foraging, and they use caves, streams, and human structures for roosting. Silver-haired, eastern red, and hoary bats are forest-dwelling species, and there is relatively little forested habitat within the Project Site. The Applicant received a letter on May 27, 2014, from MNDNR that documented two areas within a preliminary project boundary that may have higher bat use (a wetland complex near the Oak Glen WMA and a wooded riparian area associated with Dodge Center Creek). A May 26, 2017, letter from MNDNR commenting on an updated project boundary outlined a portion of the Project Site proposed at that time that may have higher bat use (the west-central portion of the Project Site in Steele County south of SE 48th Street, north of SE 103rd St. and east of US 218). MNDNR requested that turbines not be sited in that area. In response, the Applicant adjusted the final Project Site boundary to completely exclude the Oak Glen WMA wetland complex, and re-sited turbines

outside of the other two areas identified by MNDNR as a potential concern. Additionally, the Applicant has sited all turbines outside areas identified during a desktop-based GIS habitat assessment of potential northern long-eared bat summer habitat (Hyzy and Stucker 2021) (analysis updated in the WCS [**Appendix M]**). All turbines are sited at least 1,000 feet from these potentially suitable summer habitat areas (wooded patches 10 acres or greater in size).

According to a project bat study conducted in 2014 (Normandeau Associates, Inc. 2014), overall bat use in the project vicinity was 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 Site, and therefore activity recorded at the northern 2014 survey station was associated with bats using forested landscapes. However, this wooded habitat area is no longer within the current Project Site. The second survey station in the 2014 study was also located outside of (west of) the current Project Site, in an agricultural area with relatively similar land cover to that of the current Project Site. The Normandeau (2014) bat study documented low levels of bat activity during the spring 2014 monitoring period; bat activity gradually increased through the summer and peaked at moderate levels during the fall 2014 monitoring period. These results indicate that bats are likely migrating through the Project Site, which was reinforced by higher levels of bat activity that were noted during the fall migratory period (which starts in July). The migratory species detected during the summer seasons are most likely resident in the area. 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 (averaging 23 percent of detection for the study period, with seasonal percentages at each of the two survey stations ranging from approximately 4 to 45 percent of detections) at the Project Site according to the software identification program used in that study. Further assessment of *Myotis* and northern long-eared bats occurred as part of the 2020 acoustic survey and desktop habitat assessment, described further in **Section 8.21.3**.

In the summer and fall of 2020, a second bat study was conducted by WEST to update the 2014 assessment with information on current species composition and relative abundance during summer and fall migration periods (Hyzy et al. 2021). Acoustic surveys used Wildlife Acoustics SM-3 units. The units were placed at two locations representative of the land cover/habitat where turbines will be sited (both at MET towers, each with paired microphones positioned high and low), and one unit was placed at a bat feature station. The bat feature station included habitat features likely to attract bats and included a woodlot edge with grassed margins and a nearby pond and wetland. Surveys were completed between June 24 and October 5, 2020, and all stations were located within the current Project Site. Bat passes per detector night were greatest at the bat feature site. Migratory tree bats were the primary species detected during the 2020 surveys. Northern long-eared bat calls were not confirmed during the 2020 surveys, as described further in **Section 8.21.3**.

Current post-construction monitoring at active wind energy facilities within the Great Plains and eastern United States indicates that migratory tree bats have the greatest mortality risk from turbine collision during the fall migratory period (Erickson et al. 2002; WEST 2019).

Refer to **Section 8.21.3** for a discussion of special status species, including northern long-eared bat.

8.21.2.4 Reptiles and Amphibians

A variety of reptiles and amphibians may be present within the Project Site, such as the American toad (*Anaxyrus americanus*), Cope's gray treefrog (*Hyla chrysoscelis*), western chorus frog (*Pseudacris triseriata*), painted turtle (*Chrysemys picta*), snapping turtle (*Chelydra serpentine*), wood turtle (*Glyptemys insculpta*), common and plains garter snakes (*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.

8.21.3 Rare and Unique Natural Features

8.21.3.1 Threatened and Endangered Species Listed under the Endangered Species Act

The USFWS provides distribution lists of threatened and endangered species listed under the ESA by county. These county lists indicate that Dodge and Steele Counties are within the range (*i.e.*, have documented records and/or have the potential to harbor critical habitat for the designated species) of the threatened northern long-eared bat *(Myotis septentrionalis*) and prairie bush clover (*Lespedeza leptostachya*), summarized in **Table 45**. In the state of Minnesota, the prairie bush clover is also listed as threatened by MNDNR. These species are discussed below with USFWS Information for Planning and Consultation (IPaC) results (USFWS 2020d). No Designated Critical Habitat is present within the Project Site or its vicinity.

Table 45: Endangered Species Act–listed Threatened Species Known to Occur in Dodge and Steele Counties

Species	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. The decline is largely due to white nose syndrome (WNS), a fungal disease that has affected several bat populations (USFWS 2015a; USFWS 2015b). The northern long-eared bat was listed as threatened under the ESA by the USFWS on May 4, 2015, primarily because of the threat posed by WNS. The decision to list the bat as threatened with a 4(d) rule provides protection to address

conservation needs of this bat species. All of Minnesota falls within the 4(d) rule zone (USFWS 2020a). For areas in the United States where WNS affects northern long-eared bat populations, the 4(d) rule describes prohibitions for incidental "take" (defined under the ESA as harming, harassing, or killing of protected species) resulting from activities that may affect northern long-eared bats during vulnerable life cycle stages, namely hibernation and breeding (USFWS 2016a). The closest known occurrences of WNS to the Project lie within Goodhue County, the county adjacent to Dodge County to the north, and Olmsted County, which is the county adjacent to Dodge County to the east (USFWS 2020a).

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 (Swingen et al. 2016). Northern long-eared bats migrate regionally between hibernacula and summer habitat (MNDNR and USFWS 2020). Studies have reported northern long-eared bat migration movements ranging between 30 and 60 miles (USFWS 2016a). Once northern long-eared bats arrive at summer habitat, forested areas greater than 1,000 feet from contiguous suitable habitat are not commonly utilized (USFWS 2014). 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 2016b).

Tree species within woodlots within the Project Site consist generally of cottonwood, American elm, oak, green ash, and black willow. Although several larger woodlots are present (the largest is approximately 245 acres), the average woodlot size (including shelterbelts) is approximately 5 acres. A review of USFWS records and MNDNR databases indicated that no known northern long-eared bat summer roost trees or hibernaculum are within Dodge or Steele Counties. The nearest documented northern long-eared bat summer roost tree to the Project is located in Goodhue County approximately 32 miles to the northeast, and the nearest documented northern long-eared bat hibernaculum is located in Fillmore County approximately 27 miles to the southeast (MNDNR and USFWS 2020). It is possible that northern long-eared bats may pass through or forage within the Project Site during migration periods, similar to anywhere within their range. Even prior to WNS, very few northern long-eared bats had been found as fatalities at wind energy projects in the Midwest (10 publicly reported in Iowa, Illinois, Indiana, Michigan, and Missouri, with none in Minnesota; WEST 2019) indicating that these species may be at relatively low risk of collision.

According to a desktop habitat assessment (Hyzy and Stucker 2021) (analysis updated in the WCS [**Appendix M**]), the Project Site contains 578.6 wooded acres that could be considered as northern long-eared bat habitat with the relative size and/or connectivity (*e.g.*, less than 1,000 feet separating adjacent woodlots ≥10 acres each) that northern long-eared bats commonly utilize during the summer (USFWS 2014). Due to the relatively small average woodlot size within the Project Site, 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 Site. As noted above in **Section 8.21.2.3**, as

a further measure to reduce risk to northern long-eared bats, the Applicant has sited all turbines at least 1,000 feet from forested patches of 10 acres or greater.

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 ESA, 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 E: Agency Correspondence and Responses**) communicated that no further bat studies were needed at that time. During early 2020, MNDNR requested that due to the age of the 2014 survey, a new July–September survey would be adequate to refresh the prior surveys (see above, **Section 8.21.2.3 Bats**). As part of the 2020 general acoustic survey, 15 calls were filtered as potential northern long-eared bat calls by Kaleidoscope Pro on 10 percent of all calendar nights; these were recorded at the bat feature station. A qualified bat biologist manually reviewed all 15 bat calls classified as potential northern long-eared bat, along with 1,266 high frequency bat calls that were recorded on the same nights at the bat feature station where the possible northern long-eared bat calls were recorded (Hyzy et al. 2021). After qualitative review was completed, none of the 15 potential northern long-eared bat calls were confirmed. No northern long-eared bat calls were recorded at any of the representative stations. This study was designed to estimate general activity levels of all bats at the Project; it was not specifically designed to meet the qualifications of a presence/probable absence study, but it does suggest that northern long-eared bats were not present at the Project at locations surveyed during the time of the study.

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, and many other disturbance activities. Today, it is only known to occur in fewer than 100 locations across Illinois, Iowa, Minnesota, and Wisconsin, with the largest population occurring in southwestern Minnesota and northwestern Iowa (MNDNR 2017a). While the MNDNR county maps and the USFWS IPaC tools indicate that the species is found within Dodge County, Minnesota, the more spatially refined Natural Heritage Information System (NHIS) database review does not indicate any occurrence records within the Project Site or within one mile of the Project (MNDNR 2020i).

8.21.3.2 State Rare and Unique Features

The MNDNR provided formal Natural Heritage Review letters for the Project on June 12, 2017, and November 15, 2018. A third request was submitted on April 29, 2020 (**Appendix E: Agency Correspondence and Responses**). In response, MNDNR confirmed that the Natural Heritage Review letter dated November 15, 2018, is still valid; thus, no additional review was necessary. The NHIS electronic database for rare species was also reviewed. The NHIS 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 Site.

MNDNR records have 24 records of 10 different types of rare plants or animals in the Project Site or within the 1-mile buffer. The mapped occurrences include three records of an invertebrate animal and 21 records of vascular plants (see **Table 46**). Additionally, 30 occurrence records of nine native plant community types were recorded within the Project Site or within the 1-mile buffer (see **Table 47**).

Table 47 includes Henslow's sparrow, which was not included in the NHIS query records for the project. Inclusion of Henslow's sparrow in the table is based on project data and coordination with MNDNR. The project data come from targeted sensitive grassland breeding bird surveys, which were conducted during June 2017. These surveys confirmed the presence of Henslow's sparrows at one location within one mile of the Steele County portion of the Project Site (see **Map 21 - Unique Features [Appendix A]**). In addition, this species was documented within one mile of the Dodge County portion of the Project Site during the summer of 2016.

Table 46: Natural Heritage Information System Species Recorded within the Project Site and Vicinity

Type	State Status	Scientific Name	Common Name	Mapped Occurrences within Project Site	Mapped Occurrences within 1-Mile Buffer of Project Site	Year of Most Current Observation
Invertebrate	Special Concern	*Lasmigona compressa*	Creek Heelsplitter	2	1	1988
Vertebrate	Endangered	*Ammodramus henslowii*±	Henslow's Sparrow*	0±	2±	2017±
Vascular Plant	Endangered	*Juglans cinerea*	Butternut	0	1	2009
Vascular Plant	Threatened	*Valeriana edulis* var. *ciliata*	Edible Valerian	1	3	2016
Vascular Plant	Threatened	*Asclepias sullivantii*	Sullivant's Milkweed†	2	0	2009
Vascular Plant	Threatened	*Platanthera flava* var. *herbiola*	Tubercled Rein Orchid	0	1	1999
Vascular Plant	Threatened	*Arnoglossum plantagineum*	Tuberous Indian-plantain	0	1	1978
Vascular Plant	Special Concern	*Arisaema dracontium*	Green Dragon	0	2	2009
Vascular Plant	Special Concern	*Baptisia bracteata* var. *glabrescens*	Plains Wild Indigo	0	3	2010
Vascular Plant	Special Concern	*Eryngium yuccifolium*	Rattlesnake Master	1	5	2016
Vascular Plant	Special Concern	*Cypripedium candidum*	Small White Lady's-slipper	0	1	1981

* Henslow's sparrow was not a species included in the NHIS records query for the Project; however, Tier 3 studies (Atwell 2017b; HDR 2017) documented this species at two locations within one mile of the Project Site.

† Sullivant's milkweed surveys of previously documented locations, and at locations with appropriate habitats, were negative during the August/September 2020 survey window. Additional surveys will be conducted in the 2021 survey window.

Table 47: Natural Heritage Information System Native Plant Communities Recorded within One Mile of the Project Site Boundary

Native Plant Community Type	Number of NHIS Records within the Project Site	Number of NHIS Records within 1 Mile of the Project Site Boundary	Year of Most Current Observation
Black Ash-(Red Maple) Seepage Swamp	0	1	2009
Elm-Ash-Basswood Terrace Forest	3	2	2010
Elm-Basswood-Black Ash- (Hackberry) Forest	3	1	2010
Mesic Prairie (Southern)	0	8	2010
Seepage Meadow/Carr	0	1	2009
Seepage Meadow/Carr, Tussock Sedge Subtype	0	2	2009
Southern Mesic Oak-Basswood Forest	0	2	2010
Southern Wet Prairie	2	0	2008
Sugar Maple-Basswood (Bitternut Hickory) Forest	5	0	2009

8.21.3.3 Native Plant Communities

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. In total, 13 designated native plant communities intersect the Project Site. An additional 17 designated native plant communities are located outside of, but within one mile of, the Project Site. Of these 30 native plant communities, 10 are designated as native prairies. NHIS records indicate the presence of two Southern Wet Prairies within the Project Site and eight Mesic Prairies (Southern) within one mile of the Project Site (refer to **Table 47** and **Map 21 - Unique Features**).

Identified native plant communities were last observed in the field between 2008 and 2010 and is present in either wetland, woodland, or grassland habitats. For additional details regarding native plant communities, please refer to **Section 8.20.2**.

8.21.4 MNDNR Waterfowl Feeding and Resting Areas

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

8.21.5 Important Bird Areas

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

8.21.6 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 Site 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 (Chodachek et al. 2015; Westwood 2015; Johnson et al. 2000; Poulton 2010).

8.21.6.1 Birds

Data from three previously developed wind farms in southern Minnesota (Lakefield, Prairie Rose, and Buffalo Ridge) and other projects showed the bird mortality rates detailed in **Table 48** (Chodachek et al. 2015; Westwood 2015; Johnson et al. 2000).

Table 48: Avian Fatality Rates at Minnesota Wind Farms

Project	Avian Mortality Rate	Year of Study	Source
Black Oak Getty	3.5–8.69 birds/MW/year	2017	Pickle et al. 2018, 2019
Buffalo Ridge	1.43–5.93 birds/MW/year	1996–1999	Johnson et al. 2000

Project	Avian Mortality Rate	Year of Study	Source
Moraine II	5.59 birds/MW/year	2009	Derby et al. 2010a
Stoneray	5.57 birds/MW/year	2019	Stucker et al. 2020
Odell	4.69 birds/MW/year	2016–2017	Chodachek and Gustafson 2018
Elm Creek II	3.64 birds/MW/year	2011–2012	Derby et al. 2012
Red Pine	2.68 birds/MW/year	2018	Trana et al. 2019
Elm Creek I	1.55 birds/MW/year	2009–2010	Derby et al. 2010b
Lakefield	1.07–2.22 birds/MW/year	2012, 2014	Westwood 2013, 2015
Prairie Rose	0.44 birds/MW/study period	2014	Chodachek et al. 2015

Migratory birds and passerines accounted for the majority of avian mortalities at Lakefield and Buffalo Ridge, which is consistent with Strickland and colleagues (2011) who suggest 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 those at the previously mentioned WECSs (see **Table 48**) due to similarities in 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 conservation concern.

The Year 1 Avian Use Study (HDR 2017) and the Year 2 Avian Use Study (Atwell 2018) documented relatively low raptor use (including bald eagles) within the study area. The nearest bald eagle nests are greater than 2 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 in Steele County, just outside of the Project Site (Atwell 2017b). A third Henslow's sparrow was documented in an isolated patch of restored grassland in the east-central region of the Dodge County portion of the Project Site (HDR 2017). None of these locations will be impacted by any proposed infrastructure; the closest proposed turbine is located approximately one mile from the grassland parcel that the species was utilizing during June 2017.

Eleven state endangered horned grebes were observed on three occasions at Oak Glen Lake, which is outside the Project Site. This species is a rare breeder in Minnesota; only three breeding occurrences have been documented in the past 20 years, each northwest of Bemidji, Minnesota

(MNDNR 2014; Pfannmuller et al. 2017). There are no documented breeding records from the vicinity of the Project Site or southern Minnesota. Furthermore, based on avian use data, horned grebe is likely an uncommon to scarce migrant within suitable stopover habitat in the Project Site. Oak Glen Lake is moderately sized and is the largest waterbody within two miles of the Project. The nearest proposed turbine location to Oak Glen Lake is approximately 2.3 miles to the northeast. Given the general lack of suitable stopover habitat in close proximity to planned turbines, the Project Site is anticipated to have minimal, if any, impacts on migrant horned grebes.

One adult loggerhead shrike was seen tending to two recently fledged loggerhead shrikes approximately seven miles east of the Project Site. The presence of an active loggerhead shrike nesting territory does indicate a modest probability that this species could breed in suitable habitat within the Project Site in the future. In an overarching attempt to minimize impacts to species of concern, such as loggerhead shrike, the majority of the proposed project infrastructure has been moved outside of any grassland or scrub-shrub type habitats, including areas with red cedar.

Additionally, DCW has prepared a WCS (**Appendix M**) that will serve as the ABPP that further addresses minimization measures for horned grebe, loggerhead shrike, and other avian species of concern.

8.21.6.2 Bats

Bat mortality at any given wind farm can be highly variable (Kunz et al. 2007) and has not been shown to correlate with pre-construction surveys (Solick and Howlin 2018). 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 to the 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; Arnett et al. 2008). Mortality estimates from Minnesota WECSs illustrate the variability of bat mortality rates detailed in **Table 49**. Bat mortalities recorded for tree-roosting bats (eastern red, silver-haired, and hoary bats) accounted for the majority of the bat carcasses found during fatality search efforts.

Table 49: Publicly Available Bat Fatality Rates at Minnesota Wind Farms

Project	Bat Fatality Rate (bats/MW/study period)	Year of Study	Source
Black Oak Getty	37.59	2018	Pickle et al. 2019
Black Oak Getty	29.88	2017	Pickle et al. 2018
Lakefield	20.19	2014	Westwood 2015
Red Pine	18.74	2018	Trana et al. 2019
Lakefield	15.85	2012	MPUC 2012
Odell	6.74	2016–2017	Chodachek and Gustafson 2018

Project	Bat Fatality Rate (bats/MW/study period)	Year of Study	Source
Big Blue	6.33	2013	Fagen Engineering 2014
Stoneray	4.66	2019	Stucker et al. 2020
Pleasant Valley	1.80	2016–2017	Tetra Tech, Inc. 2017
Prairie Rose	0.41	2014	Chodachek et al. 2015
Buffalo Ridge	0.76–2.72	1996–1999	Johnson et al. 2000, 2004

According to the 2014 and 2020 pre-construction bat monitoring results, bat activity within the Project Site was consistent with findings of similar studies that show bat activity highest in the late summer and fall migration period. Bat activity north of the Project Site was highest between August 12 and August 26 in the period coinciding with the fall 2014 migration season (Normandeau Associates, Inc. 2014). In the 2020 surveys, the peak activity rate at the representative stations (stations located in cultivated fields in similar areas where proposed turbines will be located) was recorded from July 18 to July 24, with a secondary peak in mid-August (Hyzy et al. 2021). 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 (averaging 23 percent of detection) at the two survey locations (both of which are outside of the current Project Site) according to the software identification program used in that study. In the 2020 study, high frequency bat calls (including *Myotis*) represented only 6.1 percent of bat calls at the representative station in the Project Site. Fifteen potential northern long-eared bat calls were filtered by Kaleidoscope Pro on 10 percent of all calendar nights during the 2020 study. After qualitative review was completed, none of the 15 potential northern long-eared bat calls were confirmed (Hyzy et al. 2021).

While the occurrence of *Myotis* species at the Project Site may increase the likelihood of mortality due to turbine collisions, *Myotis* species mortalities have generally been reported in low numbers and are low as a percentage of fatalities at active wind energy projects in North America (Arnett et al. 2008); publicly posted post-construction monitoring studies for Minnesota wind projects also indicate relatively low fatalities for *Myotis* species in the state. Bat monitoring survey results in 2014 (surveyed in locations outside of the current Project Site) show that hoary and silver-haired bats were also detected throughout the 2014 monitoring period. The 2020 study indicated that big brown bat and silver-haired bats were the primary species recorded in the Project Site; these species were present on 93 percent of calendar nights, with hoary bats documented on 91 percent of calendar nights (Hyzy et al. 2021). Using bat passes per night (annual average) as an indicator of bat activity, Normandeau Associates, Inc. (2014) concluded that overall bat use at the 2014 survey stations outside of the current Project Site was considered “moderate” when compared to other wind energy projects located in similar landscapes. In 2020, the overall bat activity at representative stations within the Project Site was 23.31 bat passes per detector night during the

fall migration period (defined here as July 30–October 14). The number of documented bat passes during this fall migration period is on the higher end of the range of activity rates recorded at other wind projects in Minnesota, but it is in the same range as the activity rates recorded at the nearby (within 8 miles) Pleasant Valley Wind project. At that project, two years of pre-construction bat activity surveys recorded study period activity rates ranging between 21.81 and 63.3 bat passes/detector night (Derby et al. 2011; Chodachek et al. 2012).

Results from the 2014 Normandeau study (Normandeau Associates, Inc. 2014) and 2020 WEST survey (Hyzy et al. 2021) suggest that seasonal bat use patterns and general species composition are similar to other wind energy projects located in similar landscapes. As such, impacts to bats as a consequence 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**. In addition, analyses from hundreds of publicly available studies have not shown a strong correlation between bird or bat fatality rates and turbine size (WEST 2019; Newman et al. 2020). Though a recent study conducted by the USGS found correlation between the overall MW of a project and bird and bat fatality rates (Huso et al. 2021), that study was focused on repowered projects that indicated a correlation between fatality rates and produced energy before and after a repower. The study concluded that the relative amount of energy produced at a repowered project is a better predictor of fatality rates than nameplate capacity or the spacing or size of the repowered turbines.

Specifically, impacts to northern long-eared bats are expected to be low based on the lack of suitable summer habitat and the high degree of fragmentation of the limited wooded habitat that is located within the site (refer to **Section 8.21.2** for more in-depth discussion about these findings as they relate to northern long-eared bat likelihood). For further information about bats in relation to the Project, please refer to the WCS/ABPP attached in **Appendix M: Wildlife Conservation Strategy / Avian and Bat Protection Plan**.

8.21.6.3 Reptiles and Amphibians

Wood turtles (*Glyptemys insculpta*) are listed by MNDNR as threatened. Wood turtles forage within grasslands or fallow agricultural fields adjacent to high-quality streams. The majority of the Project Site does not provide suitable habitat for this species as riparian habitat is generally lacking and the streams are of relatively low quality with silt substrate. No wood turtles have been observed within the Project Site. The northeast corner of the Project Site has a few small portions of potentially suitable habitat along Dodge Center Creek, but a majority of this habitat is present outside of the Project Site. Project infrastructure has not been located within or adjacent to this riparian habitat. As such, impacts to this species from development of the Project are not anticipated.

8.21.6.4 Rare and Unique Natural Features

The majority of identified Rare and Unique Natural Features in the Project Site are vascular plants concentrated in the west-central portion of the Project Site (see **Appendix E: Agency**

Correspondence and Responses). MNDNR-listed plants identified with the potential to occur within the Project Site typically occur in high-quality grasslands or prairie, emergent wetlands, or forested wetland habitats. To the maximum extent practicable, the Project has been designed to avoid these habitats. 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. Avoidance of, and limiting impacts to, grassland and wetland areas through turbine siting and during construction will reduce the potential for impacts to these rare and unique natural features (*e.g.*, prairie bush clover and any other state listed plants). Surveys during 2020 did not document any occurrences of Sullivant's milkweed, a species previously identified within the Project Site in wet and mesic prairie habitats (Markhart 2021).

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, although present in the Project Site, 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.

8.21.6.5 MNDNR Waterfowl Feeding and Resting Areas

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

8.21.6.6 Important Bird Areas

No Important Bird Areas are within or in close proximity to the Project; therefore, no potential impacts to Important Bird Areas are expected as a result of the proposed Project. As a result, no mitigation measures are planned for Important Bird Areas.

8.21.7 Mitigation Measures

The Applicant has carefully sited the Project to avoid sensitive areas identified by MNDNR. This has included, among other efforts, placing all turbines and project infrastructure outside of the west-central portion of the Project Site delineated by MNDNR in a letter dated May 26, 2017 (refer to **Map 21 - Unique Features**). The turbine layout has been designed to set turbines back from forested patches 10 acres and larger as much as feasible. As described in **Section 8.21.2**, all turbines are at least 1,000 feet from these 10-acre and larger forested patches present in the Project Site. Setting turbines away from larger patches would be expected to minimize potential impacts to bats, including the northern long-eared bat, that use forested habitat for roosting and foraging.

Recently issued LWECS permits require the installation of software capable of adjusting cut-in speeds as well as operational curtailment through locking or feathering nighttime turbine operation up to the manufacturer's cut-in speeds to minimize bat fatalities. DCW will feather turbine blades

below the manufacturer's cut-in speed from a half-hour before sunset to a half-hour after sunrise between April 1 and October 31.

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 Site 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 Site;
- 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 or minimizing 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 tree-cutting restrictions within the Project Site between June 1 and July 31, as outlined in the USFWS northern long-eared bat 4(d) rule;
- Avoid siting turbines within 1,000 feet of wooded patches 10 acres or greater in size;
- 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 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 MDA (MDA 2020a, 2020b) through the implementation of BMPs. These BMPs include the following actions:

  - 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 MnDOT and MDA (MnDOT 2020a, 2020d; MDA 2020c, 2020d).
- Minimize project infrastructure within grassland and scrub-shrub habitat that may provide potential breeding habitat for state endangered loggerhead shrikes;
- Avoid siting project infrastructure within or adjacent to riparian habitat identified as possibly providing suitable habitat for state endangered wood turtles;
- Conduct Tier 4 post-construction monitoring to better understand bird and bat impacts that are attributable to project operation and adjust operations as appropriate based on the level of mortality observed; and
- Implement the project WCS/ABPP during construction and operation of the Project. The WCS/ABPP has been developed in accordance with the guidelines and recommendations set forth in the USFWS Land-based Wind Energy Guidelines (USFWS 2012) and the Wind Turbine Guidelines Advisory Committee's recommended guidelines to the USFWS (Wind Turbine Guidelines Advisory Committee 2010). The project WCS/ABPP is attached to this Application as **Appendix M: Wildlife Conservation Strategy / Avian and Bat Protection Plan**.

The Applicant is committed to minimizing avian and wildlife impacts from construction and operation of the Project 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. Should additional avoidance and minimization measures be warranted based on operational impacts or a change in listing status for a species that may occur within the Project Site, DCW will coordinate with MNDNR, MNDOC, and/or USFWS, as described in the Adaptive Management section in the **Appendix M: Wildlife Conservation Strategy / Avian and Bat Protection Plan**.

9.0 SITE CHARACTERIZATION

9.1 Description of Resources

To simulate wind flow patterns for the Project Site in Dodge and Steele Counties, Minnesota, NextEra Analytics, a NextEra Energy Resources, LLC 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 NextEra Analytics Enhanced Measure-Correlate-Predict (E-MCP) methodology.

In addition to a thorough meteorological analysis of the site, NextEra Analytics used archived weather data resources and physics-based numerical simulations (weather models) to calculate wind flow patterns at the site for an arbitrary full calendar year. Further analysis was performed using multiple long-term data points from the Modern-Era Retrospective Analysis for Research and Applications (MERRA2) data set as compiled by the National Aeronautics and Space Administration (NASA), which were processed together using the E-MCP method to estimate long-term characteristics of the wind resource. The results of the E-MCP processing phase provided a 30-year normalized time series representative of the long-term wind distributions at the site, which was then applied to the 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.

Six temporary meteorological evaluation towers (MET towers) within the Project Site and three Triton sonic detection and ranging (SoDAR) locations were used in NextEra Analytics' analysis (4534, 4535, 4857, 4858, 4859, 4860, 579-0, 579-95, and 579-002) and are shown below in **Table 50**. The data were collected in 10-minute intervals at each location for an average of nearly four years.

Table 50: Meteorological Evaluation Tower / Sonic Detection and Ranging Information

Tower/SoDAR	Location	Period of Record	Length	Measured Height (m)
4534	43.99524, −93.08350	11/2013 – 07/2018	56	58, 32
4535	44.05294, −92.97690	11/2013 – 07/2018	56	58, 32
4857	44.01297, −93.00410	02/2017 – 03/2021	50	59, 32
4858	43.95836, −92.94100	02/2017 – 03/2021	50	59, 32
4859	43.98158, −93.02690	02/2017 – 03/2021	50	59, 32
4860	43.94916, −92.89200	02/2017 – 03/2021	50	59, 32
579-0	43.93651, −93.01290	10/2013 – 10/2014	12	100, 80

Tower/SoDAR	Location	Period of Record	Length	Measured Height (m)
579-95	43.99387, −92.95540	10/2014 – 12/2017	38	100, 80
579-002	44.03386, −93.09240	03/2018 – 07/2021	41	100, 80

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 8.6 m/s. The highest wind resource is present during the winter month evenings, and 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 are expected to allow for suitable mechanical loads on the turbines.

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 Dodge County Wind, LLC's (DCW's or Applicant's) MET data and the long-term reference data sets available through NASA's MERRA2 reanalysis program. Based on the analysis of measured and model data in the Project Site, the annual variance of wind speed is expected to be 0.04 m/s.

9.1.2 Seasonal Variation

Seasonal variation is represented by the change in wind resource throughout the year. **Table 51** shows the estimated average seasonal variation of wind speed based on long-term data. The late-fall through early-spring months of October through April are expected to have the highest wind speeds, and the summer months of June through August are expected to have the lowest wind speeds.

Table 51: Average Wind Speed

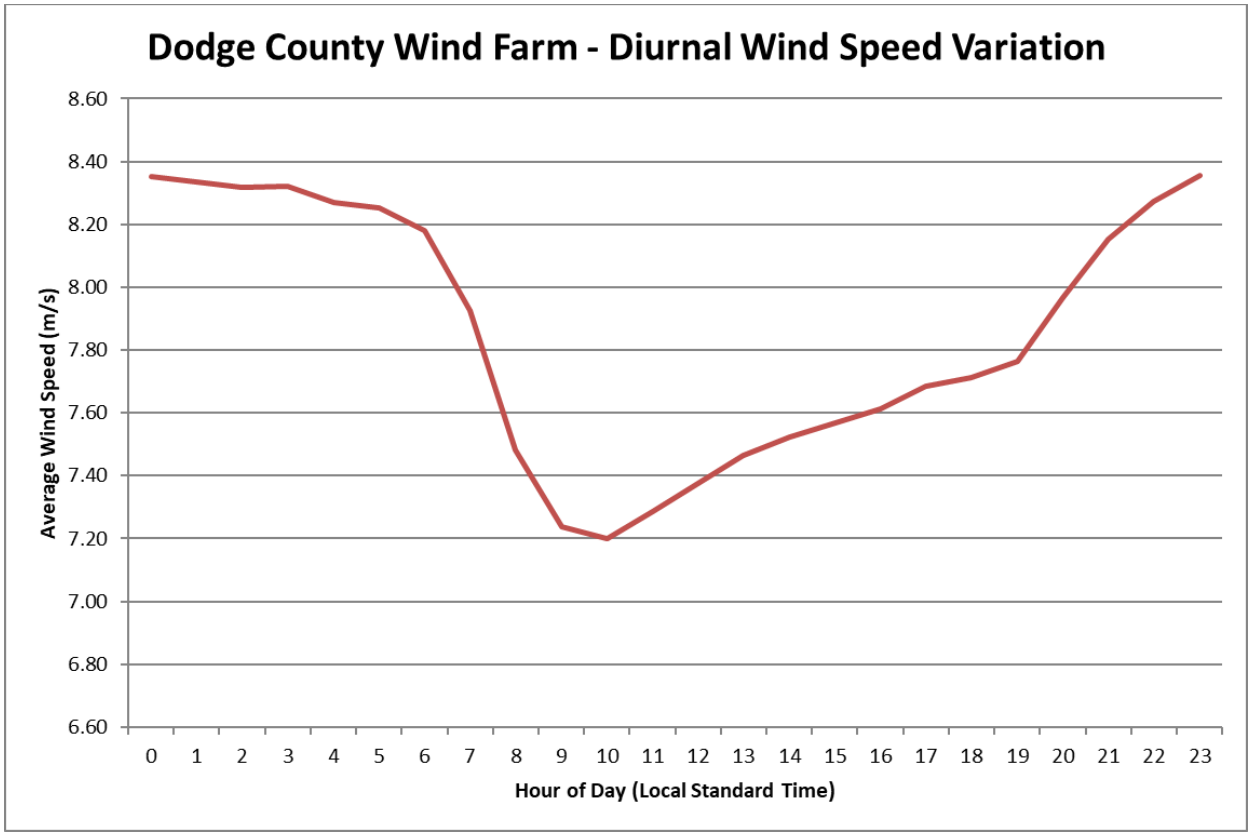
Month	Wind Speed (m/s)
January	8.4
February	8.4
March	8.2
April	8.4
May	7.9
June	7.3
July	6.7
August	6.6
September	7.8

Month	Wind Speed (m/s)
October	8.3
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 Site. While the diurnal variability fluctuates as a function of season, the wind speeds are generally higher during the night and weaker during the day.

Figure 2: Dodge County Wind Diurnal Wind Speed Variation



9.1.4 Atmospheric Stability

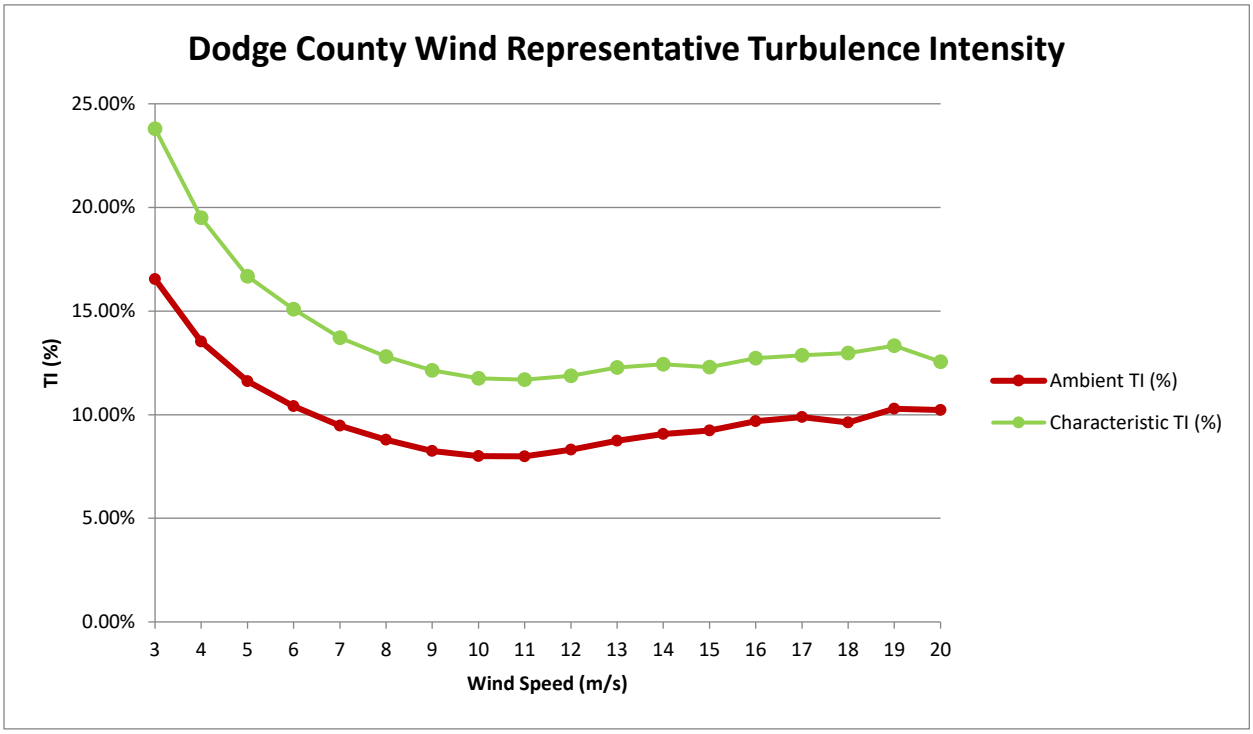
The thermal stability of the atmosphere fluctuates with respect to time of day, season, and instantaneous meteorological conditions. Generally speaking, stability classes characterize the magnitude of the vertical temperature gradient with unstable conditions associated with highly mixed atmospheric layers 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 the Project is expected to be slightly stable based on on-site measurements and global reanalysis data.

9.1.5 Hub Height Turbulence

Turbulence intensity (TI) 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 TI as a function of incremental wind speed bins. For 15 m/s wind speeds within the Project Site, the ambient TI at the site is 9.2 percent and the characteristic TI is 12.3 percent at hub height (98 meters). These measurements are based on wind data measured from the MET towers present at the site. **Figure 3** depicts 10-minute measurements of TI as a function of wind speed bin.

Figure 3: Dodge County Wind Representative Turbulence Intensity



TI values are derived from the MET tower most representative of the turbine locations. Overall, the TI for the site is considered to be reasonable for the region and terrain.

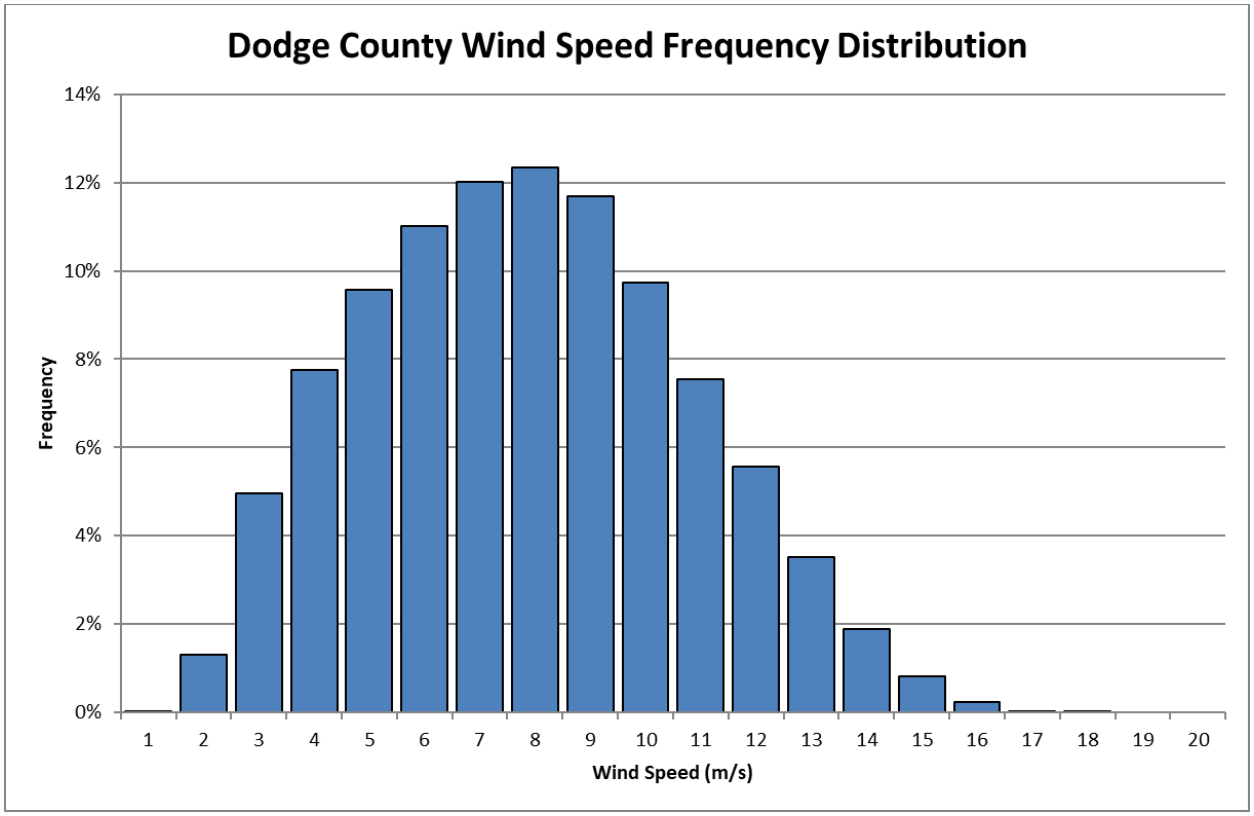
9.1.6 Extreme Wind Conditions

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 these methods, the maximum 50-year 10-minute mean wind speed and 3-second gust for the Project are expected to be 29.9 m/s and 33.5 m/s, respectively. These values are calculated from data collected from six MET towers at the Project Site spanning an average of three 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 Site, which is calculated from six on-site MET towers and three on-site SoDAR units and is normalized to the 25 closest grid points from NASA's MERRA2 dataset. Most of the wind at this site occurs between 4 m/s and 11 m/s.

Figure 4: Dodge County Wind 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 on data collected at the site, the representative wind shear at the site is 0.24.

Table 52: Dodge County Wind Measurement Speeds and Shears

Tower/SoDAR	Short-Term 98-m Wind Speed (m/s)	Long-Term 98-m Wind Speed (m/s)	Overall Shear
4534	7.90	7.83	0.286

Tower/SoDAR	Short-Term 98-m Wind Speed (m/s)	Long-Term 98-m Wind Speed (m/s)	Overall Shear
4535	7.79	7.75	0.219
4857	7.50	7.70	0.254
4858	7.81	8.01	0.223
4859	7.60	7.85	0.243
4860	7.82	8.09	0.209
579-0	8.34	8.06	0.225
579-95	8.40	8.20	0.226
579-002	7.71	7.88	0.251

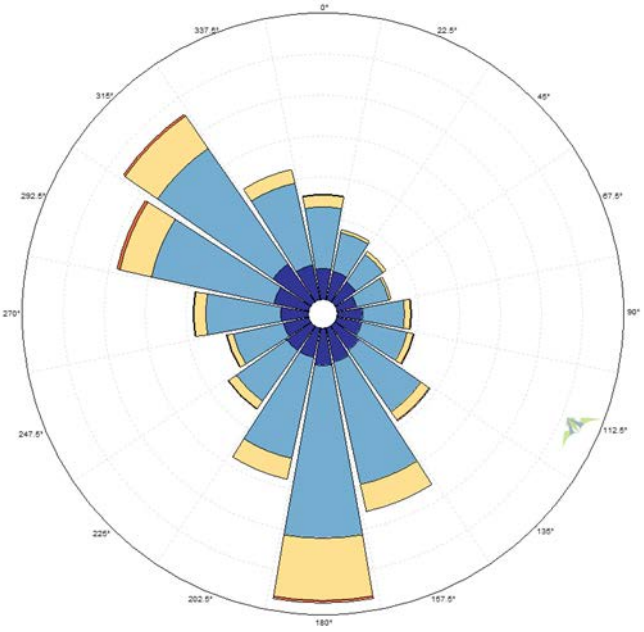
9.1.9 Spatial Wind Variation

As noted previously, the wind resource assessment is based on six MET towers and three SoDAR locations. The mean expected spatial variation in wind speed across the Project Site is between 7.3 and 8.2 m/s based on the turbine locations and their respective hub heights.

9.1.10 Wind Rose

A wind rose is a graphical representation of the prevailing wind directions and wind speeds gathered from measured data. **Figure 5** shows a representative wind rose from the six MET towers and three SoDAR locations located at the Project Site. The wind rose depicts a strong bimodal wind direction distribution at the site with prevailing winds out of the south and northwest consistent with Minnesota's climate and seasonal variation. Energy production at the site can mainly be expected to occur in one of these two sectors.

Figure 5: Wind Rose from Meteorological Tower 4534



9.1.11 Other Meteorological Conditions

Based on Minnesota's northern latitude and location in the Upper Midwest, it is classified as having a continental climate. The Upper Midwest's temperate climate lies within a transition zone between the arctic and tropic characterized by strong seasonal variations in temperature. Pressure systems tend to move across Minnesota north toward the arctic during the spring and south toward the equator during the winter; these movements cause 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; the only exceptions are in areas close to Lake Superior. The highest wind resource is present during the winter months, and the weakest wind resource is present during the summer months.

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 events such as thunderstorms and tornadoes 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 that disturbs air flow, and 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. The analysis takes into consideration terrain complexity, wind speed distributions, TI, and other extreme weather and

temperature conditions. The average temperature at the proposed site is 7.4°C with minimum and maximum temperatures of −43.8°C and 40.4°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 below −30.0°C and at temperatures above 40°C to mitigate the chances of catastrophic failures.

9.2 Other Nearby Wind Turbines

Based on public data available through the Federal Aviation Administration's database, there are three existing commercial-scale wind projects located west, east, and south of the Project Site in Steele, Dodge, and Mower Counties, respectively. 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 Site and consists of 41 wind turbines. Pleasant Valley Wind is located to the southeast of the Project Site and consists of 100 turbines. In total, 92 wind turbines from these operating projects are located within a 10-mile extent around the Project Site. Seventy-three of these 92 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, many necessary pre-construction activities must be performed, such as ordering equipment on a project schedule with appropriate lead times. The following list provides a summary of key construction and pre-construction activities:

- Order all necessary components including towers, nacelles, blades, foundations, 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 Midcontinent Independent System Operator;
- 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 aboveground project infrastructure will be installed, including areas for the turbine pads, culverts, access roads, the project substation, the operations and maintenance (O&M) building, and additional facilities, as necessary. Grading may also be employed at the temporary laydown area. Up to 1,412 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 five to seven 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, Dodge County Wind, LLC (DCW or Applicant) will determine whether the use of chemical applications is warranted for any roadways used for construction on the Project. Water

is routinely and proactively applied in higher traffic areas, for example along haul routes or areas in close proximity to construction areas, and near residences to minimize dust during construction.

During grading and excavation, topsoil is removed, typically to a depth of eight 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 approaching and within the Project Site. Existing state, county, and township roads will be used for the transportation of equipment, construction materials, and personnel to and from and within the Project Site. Temporary roadway improvements will be installed by DCW along specific routes as necessary to facilitate the movement of equipment. Turning radii will be installed by DCW at various intersections to allow for turbine component deliveries. DCW 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 project activities.

10.2 Access Roads

New turbine access roads are necessary to connect the public roadway network to each turbine. In total, approximately 26 miles of permanent access roads will be necessary. Permanent access roads 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 (ring) will be installed around the entire base of each turbine to facilitate driving around turbine bases. This gravel roadway around each turbine base will be approximately 24 feet (7.3 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 depend on terrain, grade, and drainage considerations. Access roads may incorporate geotechnical fabric and cement stabilization measures beneath the aggregate roadway cap. 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 be promptly repaired. DCW will work with landowners to ensure the locations of access roads minimize adjacent land use disruptions to the extent practicable. Access roads will be designed and constructed to include appropriate drainage and culverts as necessary. 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 on final turbine and road layout, landowner requests, avoidance of environmental constraints (such as wetlands, Sites of Biodiversity Significance, prairies, sensitive habitat), and other factors.

Temporary roadways used during construction will be installed to a maximum of 50 feet (15.2 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, and soil decompaction and reseeding will occur as described in **Section 10.5**.

10.3 Associated Facilities

The Project will include construction of an O&M facility, installation of up to two permanent meteorological evaluation towers (MET towers), two Aircraft Detection Lighting System towers, an electrical collection system, and the DCW collector substation. The transmission line that will connect the DCW collector substation to the Point of Interconnection at the Great River Energy Pleasant Valley substation will be addressed in a separate Route Permit Application.

The O&M facility will be adjacent to the substation where 5 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 2 acres.

DCW anticipates installing up to two permanent self-supporting MET towers. The towers will be no less than 250 feet (76 meters) from the edge of road right-of-way 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 will be connected to the project's collector substation through approximately 71.5 miles of underground 34.5 kilovolt (kV) collector lines. Final mileage of underground collection lines will depend on the final site layout. The substation equipment will be installed on concrete foundations and will consist of a graveled footprint area of up to approximately 2 acres. Within this area 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 8-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) a staging area for turbine components, cable, pad-mounted transformers, junction boxes, and other material during construction. Other temporary staging areas may be needed for parking and unloading of large equipment deliveries.

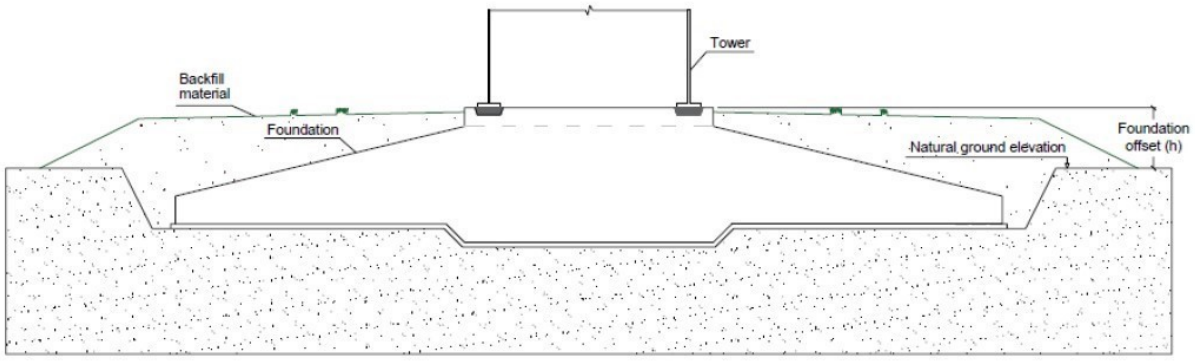
All temporary staging areas will be sited in a location agreed upon by the Applicant and willing landowners. All affected areas will be reclaimed in conjunction with the post-construction cleanup.

10.4 Turbines

DCW anticipates that the freestanding tubular wind turbine towers will be erected on reinforced-concrete spread-footing foundations (**Figure 7**). Turbine components will be delivered to each location, and cranes will walk along designated pathways. Cranes will be used to assemble the turbines and the nacelles. The bearing surfaces of the foundations will be up to approximately 12 feet (approximately four meters) below the current ground surface, with a total width of up to approximately 68 feet (approximately 21 meters). The tubular steel towers will be connected to

the concrete foundations through a base plate and high-strength anchor bolts embedded in the concrete foundations. The design of the foundations may require approximately 36 tons of steel for structural support. The concrete turbine foundations may require up to approximately 1,900 cubic yards of excavation in total, depending on soil requirements and turbine size. The installed foundation concrete is anticipated to require up to approximately 550 cubic yards of material in total. 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 may also be used in the construction of roads and spread across construction areas as discussed in **Section 10.5**.

Figure 7: Turbine Foundation Detail



10.5 Post-Construction Cleanup and Site Restoration

Following the installation of turbines and the mechanical completion of the turbines (when they have been fully erected), gravel driveways will be placed around each 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 as negotiated in road use agreements. This may consist of regrading, repaving, 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 regraded 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. In areas where soil compaction is caused by construction activities, soils will be ripped up with a grader to decompact the soil. These areas will then be topped with topsoil and will also be revegetated.

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 that the landowner wants to return to agricultural use will be restored by the Applicant and then returned to agricultural use by the landowner. For reseeded areas outside of tillable fields, the seed mixture will be determined through coordination with local Natural Resources Conservation Service staff and will consist of native seed mixes appropriate to the region. Reseeded areas (*i.e.,* in areas outside of agricultural fields) will be monitored to confirm that the seeding resulted in revegetation. Additional seed will be applied as necessary. Stormwater best management practices (BMPs), such as silt fence and straw wattle, will not be removed until 70 percent revegetation/regrowth has occurred, unless the area is in a tillable agricultural field. If the area is in tillable agricultural field, a cover crop may be planted to minimize soil loss.

10.6 Operation and Maintenance of Project

DCW, through NextEra Energy Resources, LLC (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 supervisory control and data acquisition on a continual basis, 24 hours per day, seven days per week. Once the Project shifts into operations, the local O&M crew will comprise approximately five to seven primary staff who will largely 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 per day at NEER's Renewable Operations Control Center (ROCC) in Juno Beach, Florida. The ROCC is an advanced technical facility that enables 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. NEER's Florida-based O&M personnel provide root cause and fleet risk analyses, and mitigation planning to assure countermeasures are performed on a scheduled basis.

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 to allow plant production to remain maximized. NEER's central O&M group of 700 dedicated personnel has been created to support scheduled maintenance activities and optimize their 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. Five to eight O&M personnel will be dedicated on-site O&M, such as scheduled maintenance, inspect equipment, and manage inventory, and they are responsible for initial troubleshooting and breakdown event response.

10.7 Costs

The capital expenditure for the Project is estimated to be between approximately $300 and $400 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 will average approximately $3,200,000 per year over the following 29 years. **Table 53** shows a breakdown of estimated project costs.

Table 53: Estimated Project Costs

Project Item	Cost
Labor	$55 – $70 MM
Materials	$225 – $290 MM
Permitting	$5 – $10 MM
Land Acquisition	$15 – $30 MM
TOTAL	$300 – $400 MM

10.8 Schedule

Consistent with the terms of the power purchase agreement, the expected date of the start of commercial operations is December 31, 2023 (**Table 54**). The following schedule sets forth the milestones needed to meet the agreed-upon commercial operations date.

Table 54: Project Schedule

Activity	Estimated Completion
Certificate of Need Order	November 2022
Route Permit Order	November 2022
Site Permit Order	November 2022
Other Permits/Approvals Received	Q4 2022
Environmental Permits Received	Q4 2022
Land Acquisition	Q4 2021
Construction	Q2 2023

Activity	Estimated Completion
In-Service Date	No later than Q4 2023

10.9 Energy Projections

A net capacity factor of approximately 38.9 percent to 46.5 percent is expected annually. The projected average annual output for the Project is approximately 885,900 to 1,059,100 megawatt hours.

11.0 IDENTIFICATION OF OTHER POTENTIAL PERMITS

The Applicant has identified known or potentially required permits, reviews, and approvals for the Project, and these are listed in **Table 55**.

Table 55: 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 • National Telecommunications and Information Administration Communication Study • National Environmental Policy Act Compliance Checklist for Aircraft Detection Lighting System
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) in coordination with the Minnesota Pollution Control Agency	• Spill Prevention Control and Countermeasure Plan
State	
Minnesota Public Utilities Commission	• Site Permit for large wind energy conversion system • Route permit for high voltage transmission line • Certificate of Need
Minnesota Department of Labor and Industry	• Electrical plan review, permits, and inspections

Regulatory Authority	Permit/Approval
Minnesota State Historic Preservation Office (SHPO)	• Informal SHPO consultation for cultural and historical resources review including statewide database and National Register of Historic Places review
Minnesota Pollution Control Agency	• National Pollutant Discharge Elimination System/State Disposal System Permit—General Storm Water Permit for Construction Activity • License for a Very Small Quantity Generator of Hazardous Waste • Spill Prevention, Control, and Countermeasure 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 operation and maintenance (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 a Wildlife Conservation Strategy/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 (MnDOT)	• Oversize/Overweight Permit for State Highways • Access driveway permits for MnDOT roads • Tall Towers Permit • Utility Access Permit

Regulatory Authority	Permit/Approval
Local	
Dodge and Steele Counties	• Roadway Access Permit • Drainage Permit • Working in right-of-way (ROW) Permit • Overweight/Over-Dimension Permit • Utility Permit • Dodge County coordination regarding infrastructure impacts to floodplains
Soil and Water Conservation Districts of Dodge and Steele Counties	• Wetland Conservation Act approvals
Townships	• ROW permits, crossing permits, road access permits, and driveway permits for access roads and electrical collection system, as needed
Other	
Midcontinent Independent System Operator	• Turbine Change Study • Generator Interconnection Agreement

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