# Public Utilities Commission
# Site Permit Amendment Application for a Large Wind Energy Conversion System

## Grand Meadow Wind Farm Repower Project

## Northern States Power Company

## Mower County, Minnesota

## Docket No. IP-6646/WS-07-839

## May 2021

**414 Nicollet Mall**

**Minneapolis, MN 55401**

| | |
|---|---|
| **Project Name:** | Grand Meadow Wind Farm Repower Project |
| **Project Location:** | Mower County |
| **Applicant:** | Northern States Power Company |
| **Authorized Representative** | Matt Langan, Principal Agent |
| **Signature:** |  |
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# ACRONYM LIST

| Acronym | Definition |
|---|---|
| AADT | Annual Average Daily Traffic |
| ACS | American Community Survey |
| Act | Minnesota Wind Siting Act |
| ADLS | Aircraft Detection Lighting System |
| AMA | Aquatic Management Area |
| Applicant | Xcel Energy |
| Application | Site Permit Amendment Application |
| Application Guidance | Application Guidance for Site Permitting of Large Wind Energy Conversion Systems in Minnesota (Revised July 2019) |
| ASA | Acquisition and Sale Agreement |
| AWWI | American Wind Wildlife Institute |
| BBCS | Bird and Bat Conservation Strategy |
| BLM | Bureau of Land Management |
| BMP | best management practice |
| BWSR | Board of Water and Soil Resources |
| Commission | Minnesota Public Utilities Commission |
| CN | Certificate of Need |
| CREP | Conservation Reserve Enhancement Program |
| CRP | Conservation Reserve Program |
| CSAH | County State Aid Highway |
| CWA | Clean Water Act |
| dB | decibels |
| dBA | decibels using the A-weighted scale |
| DOC-EERA | Minnesota Department of Commerce – Energy Environmental Review and Analysis |
| EMF | electromagnetic field |
| EPA | U.S. Environmental Protection Agency |
| ETP | Eagle Take Permit |
| FAA | Federal Aviation Administration |
| FCC | Federal Communications Commission |
| FEMA | Federal Emergency Management Agency |
| FRS | Facility Registry Service |
| GE | General Electric |
| GIA | Generator Interconnection Agreement |
| Hz | hertz |
| IAV | inter-annual variability |

| Acronym | Definition |
|---|---|
| IBA | Important Bird Area |
| kV | kilovolt |
| $L_{10}$ | ten percent of an hour |
| $L_{50}$ | fifty percent of an hour |
| LGU | Local Government Unit |
| LNTE | low-noise trailing edges |
| LWECS | Large Wind Energy Conversion System |
| m/s | meters per second |
| MBS | Minnesota Biological Survey |
| Mbps | megabytes per second |
| MDA | Minnesota Department of Agriculture |
| MDH | Minnesota Department of Health |
| Merjent | Merjent, Inc. |
| met | meteorological |
| MGS | Minnesota Geological Survey |
| MISO | Midcontinent Independent System Operator |
| MN DEED | Minnesota Department of Employment and Economic Development |
| MNDNR | Minnesota Department of Natural Resources |
| MNDOT | Minnesota Department of Transportation |
| MPCA | Minnesota Pollution Control Agency |
| MPUC | Minnesota Public Utilities Commission |
| MW | megawatt |
| MWFRA | Migratory Waterfowl Feeding and Resting Area |
| NAC | Noise Area Classification |
| NHIS | Natural Heritage Information System |
| NIEHS | National Institute of Environmental Health Sciences |
| NLEB | northern long-eared bat |
| NOAA | National Oceanic and Atmospheric Administration |
| NPC | native plant community |
| NPDES | National Pollutant Discharge Elimination System |
| NRCS | Natural Resource Conservation Service |
| NRHP | National Register of Historic Places |
| NRO | Noise Reduction Operations |
| NSP | Northern States Power Company |
| NTIA | National Telecommunications and Information Administration |
| NWI | National Wetlands Inventory |
| O&M | operations and maintenance |

| Acronym | Definition |
|---|---|
| OSA | Office of the State Archaeologist |
| Phase I ESA | Phase I Environmental Site Assessment |
| POI | Point of Interconnection |
| Project | Grand Meadow Wind Farm Repower Project |
| Project Area | The area within the Project boundary identified in Figure 1 of this Application |
| Project Location | Project boundaries identified in Figure 1 and in Table 4.1-1 |
| PWI | Public Waters Inventory |
| RCRA | Resource Conservation and Recovery Act |
| RD | rotor diameter |
| Repower | Replacing existing 77 meter rotor diameter with either 91 meter or 97 meter rotor diameter rotors and upgrading associated equipment |
| RIM | Reinvest in Minnesota |
| SCADA | Supervisory Control and Data Acquisition |
| SHPO | State Historic Preservation Office |
| SNA | Scientific and Natural Area |
| SOBS | Sites of Biodiversity Significance |
| SWPPP | Stormwater Pollution Prevention Plan |
| TEPC | Turkey Engineering, Procurement and Construction Agreement |
| TI | Turbulence Intensity |
| TV | television |
| USACE | U.S. Army Corps of Engineers |
| USDA | U.S. Department of Agriculture |
| USGS | U.S. Geological Survey |
| USFWS | U.S. Fish and Wildlife Service |
| WCA | Wetland Conservation Act |
| WEST | Western EcoSystems Technology, Inc |
| WIMN | MPCA's *What's in My Neighborhood* Database |
| WMA | Wildlife Management Area |
| WNS | white-nose syndrome |
| WPA | Waterfowl Production Area |
| WRP | Wetland Reserve Program |

| Minnesota Rule Chapter 7854.0500<br>Site Permit Application Contents | | |
|---|---|---|
| **Minnesota Rule** | **Required Information** | **Application Section(s)** |
| **Subpart 1** | **Applicant.** An applicant for a site permit must provide the following background information regarding the applicant: | |
| A. | A letter of transmittal signed by an authorized representative or agent of the applicant; | Included with filing |
| B. | The complete name, address, and telephone number of the applicant and any authorized representative; | See Cover Page |
| C. | The signature of the preparer of the application if prepared by an agent or consultant of the applicant; | See Cover Page |
| D. | The role of the permit applicant in the construction and operation of the LWECS; | 1.1, 1.7 |
| 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; | 1.1 |
| F. | The operator of the LWECS if different from the applicant; and | 1.7 |
| 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 commission, provide the commission with a copy of the document. | 2.0 |
| **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.** The applicant shall include the following information about the site proposed for the LWECS and any associated facilities: | |

| Minnesota Rule Chapter 7854.0500<br>Site Permit Application Contents | | |
|---|---|---|
| **Minnesota Rule** | **Required Information** | **Application Section(s)** |
| 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, 4.2, Figure 1 |
| B. | The following characteristics of the wind at the proposed site:<br>(1) interannual variation;<br>(2) seasonal variation;<br>(3) diurnal conditions;<br>(4) atmospheric stability, to the extent available;<br>(5) turbulence, to the extent available;<br>(6) extreme conditions;<br>(7) speed frequency distribution;<br>(8) variation with height;<br>(9) spatial variations; and<br>(10) wind rose, in eight or more directions; | 9.1 |
| C. | Other meteorological conditions at the proposed site, including the temperature, rainfall, snowfall, and extreme weather conditions; and | 9.1.11 |
| D. | The location of other wind turbines in the general area of the proposed LWECS. | 9.2 |
| **Subpart 5** | **Wind Rights.** The applicant shall include in the application information describing the applicant's wind rights within the boundaries of the proposed site. | 7.0 |
| **Subpart 6** | **Design of Project.** The applicant shall provide the following information regarding the design of the proposed project: | |
| A. | A project layout, including a map showing a proposed array spacing of the turbines; | 5.0, 6.0, Figures 2 and 4 |
| B. | A description of the turbines and towers and other equipment to be used in the project, including the name of the manufacturers of the equipment; | 5.2 |
| C. | A description of the LWECS electrical system, including transformers at both low voltage and medium voltage; and | 5.4 |
| D. | A description and location of associated facilities. | 6.0 |
| **Subpart 7** | **Environmental Impacts.** An applicant for a site permit shall include with the application an analysis of the potential impacts of the project, proposed mitigative measures, and any adverse environmental effects that cannot be avoided, in the following areas: | |
| A. | Demographics, including people, homes, and businesses; | 8.1 |
| B. | Noise; | 8.4 |
| C. | Visual impacts; | 8.5 |
| D. | Public services and infrastructure; | 8.6 |
| E. | Cultural and archaeological impacts; | 8.7 |

| Minnesota Rule Chapter 7854.0500<br>Site Permit Application Contents | | |
|---|---|---|
| **Minnesota Rule** | **Required Information** | **Application Section(s)** |
| F. | Recreational resources; | 8.8 |
| G. | Public health and safety, including air traffic, electromagnetic fields, and security and traffic; | 8.9 |
| H. | Hazardous materials; | 8.10 |
| I. | Land-based economics, including agriculture, forestry, and mining; | 8.11 |
| J. | Tourism and community benefits; | 8.12 |
| K. | Topography; | 8.14 |
| L. | Soils; | 8.15 |
| M. | Geologic and groundwater resources; | 8.16 |
| N. | Surface water and floodplain resources; | 8.17 |
| O. | Wetlands; | 8.18 |
| P. | Vegetation; | 8.19 |
| Q. | Wildlife; and | 8.20 |
| R. | Rare and unique natural resources. | 8.21 |
| **Subpart 8** | **Construction of Project.** The applicant shall describe the manner in which the project, including associated facilities, will be constructed. | 10.1-10.5 |
| **Subpart 9** | **Operation of Project.** The applicant shall describe how the project will be operated and maintained after construction, including a maintenance schedule. | 10.6 |
| **Subpart 10** | **Costs.** The applicant shall describe the estimated costs of design and construction of the project and the expected operating costs. | 10.7 |
| **Subpart 11** | **Schedule.** The applicant shall include an anticipated schedule for completion of the project, including the time periods for land acquisition, obtaining a site permit, obtaining financing, procuring equipment, and completing construction. The applicant shall identify the expected date of commercial operation. | 10.8 |
| **Subpart 12** | **Energy Projections.** The applicant shall identify the energy expected to be generated by the project. | 10.9 |
| **Subpart 13** | **Decommissioning and restoration.** The applicant shall include the following information regarding decommissioning of the project and restoring the site: | |
| A. | The anticipated life of the project; | 11.1 |
| B. | The estimated decommissioning costs in dollars; | 11.2 |
| C. | The method and schedule for updating the costs of decommissioning and restoration; | 11.4 |
| D. | The method of ensuring that funds will be available for decommissioning and restoration; and | 11.3 |
| E. | The anticipated manner in which the project will be decommissioned and the site restored. | 11.5 |

| Minnesota Rule Chapter 7854.0500<br>Site Permit Application Contents | | |
|---|---|---|
| **Minnesota Rule** | **Required Information** | **Application Section(s)** |
| **Subpart 14** | **Identification of Other Permits.** The applicant shall include in the application a list of all known federal, state, and local agencies or authorities, and titles of the permits they issue that are required for the proposed LWECS. | 12.0 |

# 1.0 APPLICANT INFORMATION AND PROJECT BACKGROUND

## 1.1 APPLICANT DESCRIPTION

Northern States Power Company (NSP), a Minnesota corporation, doing business as Xcel Energy (the Applicant), respectfully submits this Site Permit Amendment Application (Application) to the Minnesota Public Utilities Commission (MPUC or Commission) for a site permit amendment for the currently operating 100.5 megawatt (MW) Grand Meadow Wind Farm (Project). The Project is a large wind energy conversion system (LWECS), as defined in the Wind Siting Act, Minnesota Statutes Chapter 216F. The Project is located in Mower County in southeastern Minnesota, directly adjacent to the City of Dexter and about three miles east of Grand Meadow, Minnesota.

Northern States Power Company, doing business as Xcel Energy (Xcel Energy), is a Minnesota corporation headquartered in Minneapolis, Minnesota, that is engaged in the business of generating, transmitting, distributing, and selling electric power and energy and related services in the states of Minnesota, North Dakota, and South Dakota. In Minnesota, Xcel Energy provides electric service to 1.3 million customers. Xcel Energy is a wholly-owned utility operating company subsidiary of Xcel Energy Inc. and operates its transmission and generation system as a single integrated system with its sister company, Northern States Power Company, a Wisconsin corporation, together known as the NSP Companies. The NSP Companies are vertically integrated transmission-owning members of Midcontinent Independent System Operator (MISO). In Minnesota, North Dakota, and South Dakota, Xcel Energy currently has over 3,000 MW of wind generation through commercial owned facilities or power purchase agreements. In addition, Xcel Energy has announced specific plans to add 12 new wind farms totaling 1,970 MW of renewable energy in Minnesota, Wisconsin, Michigan, North Dakota, and South Dakota. Of Xcel Energy's currently owned and operating or wind projects under construction, over 1,300 MW are in Minnesota, including Blazing Star I, Blazing Star II, Lake Benton II, Nobles, Community Wind North, Jeffers, Pleasant Valley, Grand Meadow, Freeborn, and Mower Wind Projects.

## 1.2 PROJECT BACKGROUND, PURPOSE, AND NEED

The Grand Meadow Wind Farm was permitted by enXco Development Cooperation (enXco) as part of the 137 turbine, 205.5 MW Wapsipinicon/Grand Meadow Wind Project. Xcel Energy and enXco entered into an Acquisition and Sale Agreement (ASA) and a Turnkey Engineering, Procurement and Construction Agreement (TEPC) for the 67 turbine, 100.5 MW portion of the Wapsipinicon/Grand Meadow Project. The ASA obligated enXco to complete and transfer to Xcel Energy all project development and land rights associated with the site. The TEPC stipulated that enXco design and build the wind project. After construction was completed, the ownership of the Grand Meadow Wind Farm transferred from enXco to Xcel Energy.

On January 15, 2008, the Commission issued an order approving a site permit to enXco Development corporation to construct the Grand Meadow Wind Farm (the 2008 Site Permit). The Commission order also approved the transfer of the Site Permit from enXco to NSP, effective upon notification to the Commission. On November 10, 2008, NSP and enXco notified the Commission of the transfer of the 2008 Site Permit to NSP pursuant to the January 15, 2008. On December 8, 2008, the Commission issued an order transferring and reissuing the site permit to NSP (the 2008 Site Permit, as amended).

The 2008 Site Permit allowed construction of up to a 100.5 MW LWECS and associated facilities known as the Grand Meadow Wind Farm. The Project is an LWECS, as defined in the Wind Siting Act, Minnesota Statutes Chapter 216F, and is located in Mower County in southeastern Minnesota near the City of Dexter (Figures 1 and 2). In accordance with the issued 2009 Site Permit, enXco installed 67, General Electric (GE) 1.5 sle wind turbines within leased land areas. Xcel Energy has owned and operated the Project for the past 13 years. The Project was commissioned in December 2008 and has a Generator Interconnection Agreement (GIA) with MISO. The Project required a Certificate of Need (CN) which was approved on December 24, 2007 in Docket CN-07-873. The issued 2008 Site Permit expires on December 31, 2038; a copy is provided in Appendix A – Original Site Permit Order for reference.

Xcel Energy is seeking an amendment of the Site Permit to allow Xcel Energy to repower all 67 turbines (Repower), which will increase energy production from the facility, improve overall reliability, and extend the service life of the turbines. The current turbines are otherwise operating as planned. In 2008 when the GE 1.5 sle turbines were installed, the rotor size was 77 meters (252.6 feet) in diameter; Xcel Energy proposes to repower 52 turbines with 97-meter rotors and 15 turbines with 91-meter rotors.

Via this petition (the Application), Xcel Energy is requesting an amendment to the Site Permit to accommodate the Grand Meadow Repower and is providing information to the Commission in support of this request. Xcel Energy submits that the minor changes discussed within this Petition do not substantively change the findings of the 2008 Site Permit as amended. Xcel Energy has reviewed the 2008 Site Permit and provided supplemental information where warranted. With this submission, Xcel Energy respectfully requests Commission approval for an amended Site Permit to support the repowering process with several minor modifications that are discussed in detail within this Petition.

Xcel Energy plans to repower 67 GE 1.5 sle turbines by installing larger rotors, upgraded gear boxes, and associated components. The previously permitted locations of turbines, access roads, collection lines, and other supporting infrastructure will remain the same. A large crane, as described further in Section 6.4, will be used to remove the current rotors and hub requiring a temporary crane path roughly up to 100 feet wide to each turbine. Some minor upgrading of public roadways and intersections will likely be required to allow for delivery of the replacement rotors and nacelle components to each turbine location. Current components will either be recycled or properly disposed of.

Xcel Energy would like to complete the work during the 2023 construction season and is currently targeting the second quarter of 2023 for construction start. The work is anticipated to take 6-7 months, with commercial operation by December 31, 2023.

The purpose of the repowering Project is to improve turbine technology, maximize energy yield, and extend service life of the turbines. New blades provide an increase in the rotor swept area, which, when coupled with the upgraded generators, results in a corresponding increase in the nominal production capacity of the Project from 100.5 MW to roughly 107.2 MW, a 7 percent increase. The Repower does not constitute a material modification and can therefore proceed under the original GIA so long as the energy delivered to the Point of Interconnection (POI) does not exceed 100.5 MW, the amount in the original GIA. In accordance with the GIA, control equipment

will be installed that will limit the injection at the POI to the 100.5 MW service granted in the GIA.

## 1.3 XCEL ENERGY REPOWER CONTEXT

The Grand Meadow Wind Farm Repower Project was among a suite of Repower projects originally proposed in an Xcel Energy Report, responding to the Commission's May 20, 2020, Notice of Reporting Required by Utilities (Docket No. E,G999/CI-20-492.) Following that filing with the Commission, the Company filed a Wind Repower Petition (E002/M-20-620) on September 23, 2020, which was reviewed publicly and approved by the Commission on December 23, 2020. The Company's next step toward project approval is to apply for an amendment to its existing LWECS Site Permit. Statutes and Rules governing the State's public review process for Site Permit Amendments are described in Section 3.0 of this application.

## 1.4 ISSUED SITE PERMIT AND CHANGES REQUESTED

In addition to evaluating the Repower Project against current *Application Guidance for Site Permitting of Large Wind Energy Conversion Systems in Minnesota*, which includes a chapter on Repowering (Application Guidance; DOC-EERA, 2019), the 2008 Site Permit was evaluated for existing permit conditions, and conditions that might need to be modified. Appendix B provides a comprehensive summary of the 2008 Site Permit conditions, and whether they can be satisfied by the repowering Project or require modification. While the majority of the 2008 Site Permit requirements can be satisfied under the Repower Project, Xcel Energy is respectfully requesting that the Commission consider the following modifications within the amended Site Permit:

1. Cover: The Applicant requests that the nameplate capacity of the wind farm be updated to 108 MW and update the expiration date for the permit to 25 years following the date of amended Site Permit issuance.

2. Section I: Update the nameplate capacity of the wind farm to108 MW and update the acreage of the Project boundary to 8,088 acres.

3. Section II: Update the nameplate capacity of the wind farm to 108 MW and individual turbine capacity.

4. Wind Access Buffer C.1: The Applicant requests the Commission waive the wind access buffer setback for 22 turbines, including turbines 101-104, 106, 112, 115-119, 124, 126, 129-131, 133-135, 158-159, and 165.

5. Aircraft Detection Lighting System (ADLS) E.9: The Applicant requests the language be added consistent with other recent projects *"The Permittee shall install and employ an FAA-approved lighting mitigation system. Such a system shall use aircraft detection (aircraft detection lighting system, ADLS), dimming (light intensity dimming solution, LIDS) or other FAA-approved mitigation method. The Permittee shall describe the lighting mitigation system used for the project in its site plan."*

6. Noise Studies F.2: The Applicant requests the language be updated consistent with other recent projects *"The Permittee shall file a proposed methodology for the conduct of a post-construction noise study at least 14 days prior to the pre-construction meeting. The Permittee shall develop the post-construction noise study methodology in consultation with the Department of Commerce. The study must incorporate the Department of Commerce Noise Study Protocol to determine the operating LWECS noise levels at different frequencies and at various distances from the turbines at various wind directions and speeds. The Permittee must conduct the postconstruction noise study and file with the Commission the completed post-construction noise study within 18 months of completion of the repowering project."*

7. Project Energy Projection Reporting H.1: The Applicant requests the language be updated consistent with other recent projects *"The Permittee shall, by February 1st following each complete or partial year of project operation, file a report with the Commission on the monthly energy production of the project including:*

   *a. the installed nameplate capacity of the permitted project;*

   *b. the total monthly energy generated by the project in MW hours;*

   *c. the monthly capacity factor of the project;*

   *d. yearly energy production and capacity factor for the project;*

   *e. the operational status of the project and any major outages, major repairs, or turbine performance improvements occurring in the previous year; and*

   *f. any other information reasonably requested by the Commission.*

   *This information shall be considered public and must be filed electronically."*

8. Wind Resource Use Reporting H.2: The Applicant requests the language be updated consistent with other recent projects *"The Permittee shall, by February 1st following each complete or partial calendar year of operation, file with the Commission the average monthly and average annual wind speed collected at one permanent meteorological tower during the preceding year or partial year of operation. This information shall be considered public and must be filed electronically."*

9. Extraordinary Events Reporting H.4: The Applicant requests the language be updated consistent with other recent projects *"Within 24 hours of discovery of an occurrence, the Permittee shall notify the Commission of any extraordinary event. Extraordinary events include but shall not be limited to fires, tower collapse, thrown blade, acts of sabotage, and injured worker or private person. The Permittee shall, within 30 days of the occurrence, file a report with the Commission describing the cause of the occurrence and the steps taken to avoid future occurrences."*

10. Final Boundaries I.2: The Applicant requests that the Commission approve a smaller project boundary. The proposed boundary more closely aligns with parcels containing

project infrastructure and with Section E.6. of the 2008 permit, Footprint Minimization. The requested boundary is reflected throughout this Application and is specifically defined in Table 4.1-1.

11. Site Permit Section III.L: The Applicant requests that the expiration date for the permit be changed to 25 years following the date of amended Site Permit issuance.

## 1.5 DESCRIPTION OF REPOWERING PROCESS

The general sequence of construction to repower the Project is as follows:

1. The use of existing access roads, Project substation and interconnection facilities, operations and maintenance (O&M) building, and collection line easements will continue.

2. Existing on-site roads, small radius curves, and narrow gravel road sections will be widened to accommodate truck deliveries and crane staging.

3. Wind turbine components will be delivered and off-loaded at the turbine pads and laydown yard.

4. Wind turbine generators will be de-energized to maintain non-operational condition by back-up power or other means during construction. Underground cables will not be removed.

5. Crane crews will remove and place the existing blades, hub, and drive train on the ground. Cranes will stay at the turbine site for demolition and installation tasks then continue moving to the next turbine in the sequence after the tasks are completed. Previously utilized crane paths easements and new crane paths will be used where possible and may be rerouted to accommodate landowner comments.

6. The blades and other components will have zero scrap value. Xcel Energy is coordinating with the equipment supplier on disposal options either at a landfill or recycling facility for the blades. The remaining materials will be reduced to transportable size and removed from the site for disposal. Materials will be disposed in a suitable facility.

7. The gearbox, main shaft, main bearing, and associated subassemblies in the nacelle will be replaced with new upgraded equipment.

8. Once all upgrades are made, the hub, and new blades will be reinstalled on the tower by crane.

9. The turbine will be inspected and tested prior to returning to operation.

10. Areas disturbed by repowering activities will be restored.

11. Unexcavated areas compacted by equipment used during construction may be tilled in a manner adequate to restore the topsoil and subgrade material to a density consistent with the surrounding areas.

It is expected to take approximately 2-3 days per turbine to complete the repowering process, including the foundation repower activities, with some repowering occurring simultaneously.

## 1.6 ROLE OF APPLICANT IN CONSTRUCTION AND OPERATION

Xcel Energy will construct, own, and operate the repowered Project.

## 1.7 OWNERSHIP STATEMENT

Xcel Energy will construct, own, and operate the repowered Project.

## 1.8 COMPLIANCE STATUS OF PROJECT

Prior to submittal of this Petition, Xcel Energy completed an internal audit of its compliance with the 2008 Site Permit. Xcel Energy has complied with all 2008 Site Permit conditions. Xcel Energy is committed to ensuring ongoing compliance with the Site Permit.

## 1.9 COMPLIANCE WITH PROJECT COMPLAINTS AND RESOLUTION

Xcel Energy reviewed the summary of complaint reports as filed with the MPUC, and the log of all complaints between 2008 and 2021. In May 2009, shortly after the Project became operational, there was a complaint on noise. Xcel Energy investigated, coordinated with the landowner, and resolved the complaint. There have been no additional complaints filed between 2009 and 2021.

## 1.10 CONSIDERATION OF EXISTING WIND FARMS

There are three wind farms adjacent to the Grand Meadow Wind Farm: the Prairie Star Wind Farm (100.65 MW) is located adjacent to the southeast, the Wapsipinicon Wind Project (100.5 MW) is located to the north on the north side of Interstate 90, and the Pleasant Valley Wind Farm (200 MW) is located to the west, also on the north/west side of Interstate 90. In consideration of potential cumulative effects related to the Repower Project, Xcel Energy incorporated turbines within two miles of the Project Area from these existing adjacent wind farms in its analyses of wind rights (see Section 7.0), noise (see Section 8.4), and shadow flicker (see Section 8.5.5).

# 2.0 CERTIFICATE OF NEED

The Grand Meadow repowering is exempt from the CN requirement. Minn. Stat. § 216B.243, subd. 8 (8) exempts LWECS repowering projects such as this one from CN requirements.

# 3.0 STATE POLICY

Pursuant to Minnesota Statutes § 216F.03, the Applicant will further state policy by repowering and operating the Grand Meadow Repower in an orderly manner compatible with environmental preservation and sustainable development to more efficiently utilize the site's wind resources. The Applicant plans to repower turbines to maximize wind energy development while minimizing impacts on land resources. By repowering the Project, the Applicant is also extending the life of the Project, which avoids decommissioning and completely rebuilding a new project.

The Wind Siting Act (Minnesota Statutes Chapter 216F) requires an application for a site permit for an LWECS, and subsequent amendments, to meet the substantive criteria set forth in Minnesota Statutes § 216E.03, subd. 7. This Application provides information necessary to comply with these criteria and Minnesota Rules Chapter 7854.

The Wind Siting Rules (Minnesota Rules Chapter 7854) govern the content and treatment of applications for an LWECS site permit under the Wind Siting Act. To the extent available, the Applicant has presented information required by the Wind Siting Rules. In addition, sufficient project design, wind resource, and technical information have been provided for a thorough evaluation of the reasonableness of the proposed project repowering.

This Application has been prepared following the Minnesota Department of Commerce, Energy Environmental Review and Analysis' (DOC-EERA) Application Guidance.

# 4.0 PROJECT DESCRIPTION AND OVERVIEW

## 4.1 PROJECT DESCRIPTION AND LOCATION

Xcel Energy is requesting modification of the project boundary permitted in 2008, which contained approximately 16,704 acres. The Applicant is seeking footprint minimization as described in Section E.6 of the 2008 Site Permit, as amended. The Repower Project infrastructure is physically located on approximately 8,088 acres of privately owned and mostly leased land in Mower County (Table 4.1-1), generally southeast of Interstate 90 and on each side of State Highway 16 (Figure 3 – Project Boundary Modification). All but approximately 80 of these acres are located within the previously evaluated and permitted project boundary; the additional 80 acres are within the town of Dexter to capture the O&M facility and potential laydown areas. Typical landscapes within the reduced Wind Farm area consist largely of agricultural fields and wind energy infrastructure.

**Table 4.1-1**
**Project Location**

| County Name | Township Name | Township | Range | Sections |
|---|---|---|---|---|
| Mower | Clayton | 102N | 15W | 5, 6 |
| | Dexter | 103N | 16W | 24-25, 36 |
| | Grand Meadow | 103N | 15W | 7-9, 17-21, 28-33 |
| | Dexter (city) | 103N | 16W | 24 |

The wind turbines will be mounted on steel tubular towers and have steel reinforced foundations. Associated facilities include electrical collection and communications lines, an electrical substation, permanent meteorological (met) tower and gravel access roads.

Xcel Energy has an executed GIA with MISO. The Repower Project has negotiated an amended GIA to reflect repowered turbines. The overall capacity at the point of interconnection will remain the same. In accordance with the GIA, control equipment will be installed that will limit the injection at the POI to the 100.5 MW service granted in the GIA.

Because the delivered power will be capped at the original 100.5 MW, only minor facilities and systems upgrades will be required by the Repower. As such, Xcel Energy will focus on operational compliance with the GIA. The Grand Meadow Repower will have all of the needed equipment and software to comply with the requirements of the GIA and operate inside the parameters specified by both the original GIA and the amended GIA. This includes all equipment and software needed to comply with low voltage ride through and generation cap requirements.

## 4.2 SIZE OF THE PROJECT AREA IN ACRES

The Repower Project boundary has been reduced to 8,088 acres in this Application. The 2008 Site Permit area was roughly 16,704 acres. Xcel Energy is negotiating with additional landowners for wind rights-only leases to accommodate the 3RD x 5RD Wind Access Buffer setback for the longer blades. Figure 4 (Wind Access Buffer Setbacks) shows the existing wind easements and the parcels Xcel Energy is acquiring wind rights only leases for.

## 4.3 RATED CAPACITY

Rotor replacements provide an increase in the rotor swept area, which results in a corresponding increase in the nominal production capacity of the Project from 100.5 MWs to 107.2 MWs, a 6.7 percent increase. The GIA will remain at 100.5 MW.

## 4.4 NUMBER OF TURBINE SITES

Xcel Energy is actively pursuing repowering approval from the Commission for all 67 of the currently operating turbines.

# 5.0 PROJECT DESIGN

## 5.1 DESCRIPTION OF PROJECT LAYOUT AND SETBACK REQUIREMENTS

The repowered turbines will involve increasing the rotor diameter (RD) from 77 meters (252.6 feet) to either 91 meters (298.6 feet) or 97 meters (318.2 feet). Xcel Energy has reviewed the effects of adding larger rotors upon the permitted and current setback standards for wind projects as shown on Figure 4. The following Table 5.1-1 summarizes the setbacks that: a) were approved in the 2008 Site Permit, as amended, b) are specified under current MPUC standards (MPUC Order Establishing General Wind Permit Standards; Docket No. E,G-999/M-07-1102), and c) that are possible under the proposed repower. Xcel Energy has executed and recorded full lease agreements for approximately 7,238 acres of private land within the Project Area. In addition, Xcel Energy is currently in the process of seeking an additional 1,407 acres of wind rights-only leases (20 parcels) to add to the periphery of the Project for the larger wind access buffers (Figure 4). For turbines that will be repowered to a 91-meter RD, the 3RD setback is 273 meters or 895.7 feet and the 5RD setback is 455 meters or 1,492.8 feet. For turbines that will be repowered to a 97-meter RD, the 3RD setback is 291 meters or 954.7 feet and the 5RD setback is 485 meters or 1,591.2 feet.

Figure 5 (Setbacks) shows the Project layout in relation to setback requirements and other constraints.

**Table 5.1-1**
**Wind Turbine Setback Requirements for the Project**

| Setback | 2008 Site Permit, as amended | Current MPUC Guidance | Possible with Repowering |
|---|---|---|---|
| Wind Access Buffer | 3RD on non-prevailing wind direction and 5RD on prevailing wind direction from non-participating property lines. | 3RD on the non-prevailing wind axis and 5RD on prevailing wind axis from non-participating property lines. | Xcel Energy is currently seeking additional wind rights only leases for new parcels that overlap the larger wind access buffers. |
| Occupied Residential Dwellings | 500 feet and sufficient distance to meet state noise standard. | 500 feet and sufficient distance to meet state noise standard. | Turbines are at least 500 feet from occupied residences. |
| Noise Requirements | Distance must meet the state noise standard of 50 dBA[1] | Distance must meet the state noise standard of 50 dBA[1] | Turbines are repowered for turbine-only noise to be $\leq$ 47 dBA at night at all residences[2,3] |
| Meteorological Towers | 250 feet from the edge of road right-of-way and boundaries of developer's site control. | 250 feet from the edge of road right-of-way and boundaries of developer's site control. | The existing met tower is at least 250 feet from the edge of the road right-of-way. No new meteorological towers are proposed. |
| Other Structures | None specified. | None specified. | None specified. |

**Table 5.1-1**
**Wind Turbine Setback Requirements for the Project**

| Setback | 2008 Site Permit, as amended | Current MPUC Guidance | Possible with Repowering |
|---|---|---|---|
| Public Roads | 250 feet from the edge of the nearest public road right-of-way. | 250 feet from the edge of the nearest public road right-of-way. | Turbines are sited at least 250 feet from public road rights-of-way. |
| Recreational Trails | Not specified. | 250 feet from the edge of public trails, but on a case-by-case basis. | Turbine 157 is within 165 feet of a snowmobile trail. Impacts to the snowmobile trail are not anticipated with Repowering; the trail will be available for public use after the Repower as it is with the current operating project. |
| Public Lands | Wind turbines and associated facilities including foundations, access roads, underground cable, and transformers, shall not be located in Waterfowl Production Areas, State Wildlife Management Areas or Scientific and Natural Areas or in county parks. | 3RD on the non-prevailing wind axis and 5RD on prevailing wind axis from non-participating property lines. | There are no public lands in the Project Area. The larger wind access buffers comply with this setback and no larger wind access buffers overlap public lands. |
| Wetlands, Streams, and Ditches | No turbines, towers, or associated facilities allowed. Electric collector and feeder lines may cross or be placed subject to DNR, USFWS, and/or Corps permit. | No turbines, towers, or associated facilities allowed. Electric collector and feeder lines may cross or be placed subject to DNR, USFWS, and/or Corps permit. | Turbines, towers, and associated facilities are sited avoid impacts to wetlands. The Repower will not involve changes to the electric collector and feeder lines. |
| Internal Turbine Spacing | 3RD on non-prevailing wind direction and 5RD on prevailing wind direction from non-participating property lines. Twenty percent can exceed threshold. | 3RD on the non-prevailing wind axis and 5RD on prevailing wind axis from non-participating property lines. Twenty percent can exceed threshold. | The Repower Project's internal spacing is 13 percent, below the 20 percent threshold. |

**Table 5.1-1**
**Wind Turbine Setback Requirements for the Project**

| Setback | 2008 Site Permit, as amended | Current MPUC Guidance | Possible with Repowering |
|---|---|---|---|
| Public Conservation Lands | None specified. | Avoid infrastructure; non-participating property line setback. | There are no public lands in the Project Area. |
| Native Prairies | Turbines and associated facilities shall not be placed in native prairies, unless addressed in a native prairie protection plan. | Turbines and associated facilities shall not be placed in native prairies, unless addressed in a native prairie protection plan. | Native prairies are avoided by turbines and associated facilities. However, Xcel Energy will prepare a Prairie Protection and Management Plan in consultation with the DNR, as native prairie, as defined in Minn. Stat. § 84.02, subd. 5, occurs within the Project Area. |
| Sand and Gravel Operations | Turbines and associated facilities shall not be placed in active sand and gravel operations, unless negotiated with the owner. | Turbines and associated facilities shall not be placed in active sand and gravel operations, unless negotiated with the owner. | Sand and gravel operations are avoided by turbines and associated facilities. |
| Aviation | None specified. | Turbines and associated facilities shall not be located so as to create an obstruction to navigable airspace of public and private airports. | Turbines and associated facilities have been sited to avoid obstruction to navigable airspace of public and private airports. |

[1] Commission's General Permit Standards identify the minimum setback from residences as 500 feet, or the minimum distance required to meet the state noise standard of 50 decibels dBA, whichever is greater.

[2] Noise standards are regulated by the Minnesota Pollution Control Agency (MPCA) under Minn. R. Ch. 7030. These rules establish the maximum night and daytime noise levels that effectively limit wind turbine noise to 50 dBA. The MPCA standards require A-weighting measurements of noise; background noise must be at least 10 dB lower than the noise source being measured. Xcel Energy has designed the Repower Project such that turbine-only noise at all residences is at or below 47 dBA at night (see Section 8.4).

[3] There is one residence within the adjacent Wapsi North Project that is also within one mile of the Grand Meadow Project Area. This residence is 1.2 miles from the closest Grand Meadow turbine (T-102). The predicted modeled sound at this residence for the existing project is 48 dBA and modeled to be 48 dBA after Repower. Grand Meadow turbines contribute 25.7 dBA to this residence and do not affect the overall sound level at this residence; instead, Wapsi North turbines contribute to the modeled 48 dBA sound level. Therefore, this residence is not discussed further in this Application.

### 5.1.1 Balance of Plant Reliability and Upgrades

The Project has been operating reliably since late 2008. To date, no issues have arisen that call into question the ability of the plant to continue operating through the end the current 2008 Site Permit, as amended, term. The balance of plant equipment and improvements, including the foundations, electrical system, and roads, continue to perform as designed. The proposed repower is driven by the improved project economics that result from the repower rather than by issues with plant reliability.

Additionally, testing and inspection of the balance of plant equipment and facilities have been undertaken to ensure the turbine towers, foundations and electrical system can accommodate the repower hub and rotors. GE is estimating a 25 year post-repower useful life.

## 5.2 DESCRIPTION OF TURBINES AND TOWERS

A horizontal axis wind turbine consists of a hub, nacelle, blades, tower, and foundation. Enclosed within the nacelle is the gear box, low- and high-speed shaft, generator, controller, transformer, and brake. The hub and blades together form the rotor. The tower supports the nacelle, hub, and blades, and is made from tubular steel. Additionally, a control panel inside each turbine houses communication and electronic circuitry.

Xcel Energy is proposing to repower the 67 existing GE 1.5 sle turbines with GE 1.6 sle turbines. All repowered turbines will have a 1.6 MW generating capacity and will maintain the current hub height of 80 meters (262 feet). Xcel Energy will repower 15 turbines with 91-meter rotors and 52 turbines with 97-meter rotors. The repower involves installing rotors with longer blades and replacing components of existing nacelles. The Project nameplate capacity, existing turbine towers, and foundations will remain the same. The repower was developed specifically to upgrade existing turbines to a more efficient configuration, facilitate quick upgrading, and extend turbine service life. Table 5.2-1 provides a comparison of the existing and proposed wind turbine characteristics.

**Table 5.2-1**
**Wind Turbine Characteristics Comparison**

| Design Feature | Existing GE 1.5 sle Wind Turbines | Repowered GE 1.6 sle Wind Turbines | |
|---|---|---|---|
| Nameplate Capacity | 1,500 kW | 1,600 kW | |
| Hub Height | 80 m (262.5 ft) | 80 m (262.5 ft) | |
| Total Height | 118.5 m (389 ft) | 125.5m (411.7 ft) | 128.5 m (421.6 ft) |
| Rotor Diameter | 77 m (252.6 ft) | 91 m (298.6 ft) | 97 m (318.2 ft) |
| Turbine Positions | 67 | 15 (91 m rotor diameter) | 52 (97 m rotor diameter) |
| Design Life | Minimum 20 years | Minimum 20 years | |
| Cut in Wind Speed | 6.7 mph (3 m/s) | 6.7 mph (3 m/s) | |
| Power Regulation | The rotor utilized blade pitch regulation and variable speed operation to achieve optimum | The rotor utilized blade pitch regulation and variable speed operation to achieve optimum power | |

**Table 5.2-1**
**Wind Turbine Characteristics Comparison**

| Design Feature | Existing GE 1.5 sle Wind Turbines | Repowered GE 1.6 sle Wind Turbines |
|---|---|---|
| | power output at all wind speeds. Unit is also equipped with low voltage ride through technology for demanding reliability standards. | output at all wind speeds. Unit is also equipped with low voltage ride through technology for demanding reliability standards. |
| Generation | 1.5 MW per turbine | 1.6 MW per turbine |
| Tower | Multi-coated, conical tubular steel with safety ladder to the nacelle | Multi-coated, conical tubular steel with safety ladder to the nacelle |
| Nacelle Bedplate | 2 part – cast iron front part; girder structure rear part | 2 part – cast iron front part; girder structure rear part |
| Main Bearings | Spherical roller bearings | Spherical 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 |
| Federal Aviation Administration (FAA) Lighting | Standard FAA lighting with the potential for ADLS technology | Standard FAA lighting with the potential for ADLS technology |

The turbine model contains emergency power supplies to allow operation of the control systems, braking systems, yaw systems, and blade pitch systems, and to shut the turbine down safely if grid power is lost. Mechanical and/or ultrasonic anemometers and weather vanes, located on the turbine nacelle, continuously collect real-time wind speed and direction data. Based on the data collected, the turbine yaw system constantly rotates the hub, blades, and nacelle into the wind, while the blade pitch system continuously adjusts the pitch of the blades to optimize the output of the generator. The pitch system also protects the turbine from over-speed events in high winds by pitching the blades perpendicular to the wind and aero-braking the turbine to a stop in normal shutdown conditions. The mechanical braking system, located within the nacelle, is used to stop the turbine's rotation in the event of a storm or turbine fault. The mechanical brake and lock-out system is used to lock the blade rotor to prevent the blades from spinning during maintenance periods or when the turbine is out of service. The gear box adjusts shaft speeds to maintain generator speed in low and high wind speeds. Electrical energy produced by the generator is transmitted through insulated cables in the power rail to a safety switch and then to a transformer located internally in the tower or externally on the base of the tower.

The Project's design includes safety and control mechanisms. These mechanisms are generally monitored using a Supervisory Control and Data Acquisition (SCADA) system. Each turbine is connected to the SCADA system via fiber-optic cable, which allows the turbines to be monitored in real time by the operation and maintenance staff. The SCADA system also allows the Project to be remotely monitored, thus increasing Project oversight as well as the performance and reliability of the turbines. A SCADA upgrade is planned that will help implement feathering up to cut in

speed measure and potential noise reduction operations. Both the local operation and maintenance office and a 24/7 remote operations facility will have control of the individual turbines. These two teams will coordinate to ensure that the wind turbines operate safely and efficiently.

A third mechanism for safety and control is the turbine. Each turbine monitors the wind speed and direction to ensure that its current position is most efficient to produce electricity. This data is also used for feathering the blades, applying the brakes in the event of high wind speeds or ice build-up on the blades, and to tell the turbine when the wind is strong enough to begin turning the generator and produce electricity at the "cut-in" wind speed.

Operations, maintenance, and service arrangements between the turbine manufacturer and Xcel Energy will be structured to continue providing timely and efficient operation and maintenance. The computerized data network will provide detailed operating and performance information for each wind turbine. Xcel Energy will maintain a computer program and database to track each wind turbine's operational history. Certain turbine data is monitored for abnormalities at an Xcel Energy Maintenance and Diagnostic Center in Denver, Colorado.

## 5.3 TURBINE FOUNDATIONS

Structural assessments of the existing foundations are currently being completed by Barr Engineering to determine if the existing foundation design can accommodate the GE 1.6 sle turbine with either 91-meter or 97-meter blades and meet 2021 industry design standards. Based on the preliminary desktop and field assessment work that's been completed, Xcel Energy understands the current foundation design can accommodate the GE 1.6 sle turbine with 91-meter or 97-meter rotors.

## 5.4 DESCRIPTION OF ELECTRICAL SYSTEM

The electrical system is the same as permitted in 2008. Each turbine has its own individual step-up transformer located outside at the base of each unit that increases the voltage at the turbine terminals to the medium voltage level (34.5 kilovolt [kV]) of the buried collector circuits that transmit the power from the turbines to the Project substation. At the Project substation, the power from the collector circuits is then stepped up to 161 kV and delivered to the transmission grid via an approximately five-mile 161 kV transmission line that generally runs north to the Pleasant Valley Substation. The Pleasant Valley Substation is immediately adjacent to and connected to the Prairie Island-Byron-Adams 345 kV transmission line.

# 6.0 DESCRIPTION AND LOCATION OF ASSOCIATED FACILITIES

Associated facilities exist in the locations previously permitted and constructed to support the operation of the wind turbines and facilitate the delivery of the electricity to consumers. The previously permitted locations of permanent associated facilities such as access roads, collection lines, substation, and O&M facilities will remain the same.

## 6.1 TRANSMISSION AND PROJECT SUBSTATION

The Repower Project does not require a new transmission line, and the Wind Farm will continue to connect with the existing Great River Energy Pleasant Valley via the separate project substation and associated 161 kV transmission line.

The existing Project substation is located in the northwest corner of the Project Area, approximately 1.6 miles northeast of Dexter, Minnesota along 690$^{th}$ Avenue on the north side of Interstate 90. Collection lines transmit the power from the turbines to the Project substation. At the Project substation, the power from the collector circuits is then stepped up to 161 kV. From the Project substation, an approximately five-mile 161 kV transmission line connects the Project to the Pleasant Valley Substation where the power is stepped up to 345 kV and onto the transmission grid. No changes will occur to the project substation outside of the existing footprint.

The Project substation is monitored by a SCADA system capable of monitoring and controlling most aspects of the substation facility. The Project substation is monitored for abnormalities at an Xcel Energy Maintenance and Diagnostic Center in Denver, Colorado.

The Project substation has a small building provided within the fenced substation that houses the control and relaying equipment, station batteries, and SCADA system. The entire substation is enclosed by a looped chain link fence.

## 6.2 COLLECTOR LINES AND FEEDER LINES

The following equipment is existing and will continue to be used with the repower. Power from each turbine generator is converted, controlled, and fed inside the tower from the generator down and through the power conditioning equipment and breaker panel. The turbine output voltage is stepped up to the collector system voltage of 34.5 kV by means of an individual step-up transformer located in a separate locked room in the back of the nacelle. Each transformer is connected to the Project substation through underground collector lines.

The collector lines combine the electrical output of the wind turbines through separate 34.5 kV underground collector circuits. The Project substation steps up voltage from these 34.5 kV collector lines to 161 kV and a five-mile transmission line delivers the power to the grid.

## 6.3 ADDITIONAL ASSOCIATED FACILITIES

### 6.3.1 O&M Facility

There will be no upgrades to the existing O&M facility. This building serves as a center for the Project's O&M efforts, provides Project access and storage, and houses the SCADA system. The facility has an existing footprint of approximately 1.8 acres and includes a parking lot and O&M building. The O&M building is approximately 10,000 square feet (980 square meters) and houses Project equipment. The O&M facility is located along Industrial Park Drive within the City of Dexter in the west central portion of the Project Area.

### 6.3.2 Permanent Meteorological Towers

The Wind Farm currently has a single, permanent, free-standing, 80 m (262.5 feet) tall met tower that meets Federal Aviation Administration (FAA) and local requirements for lighting and marking. Xcel Energy is not currently planning to construct any new permanent met towers.

### 6.3.3 Aircraft Detection Lighting System

An ADLS radar system turns FAA-required turbine lights on when low-flying aircraft are detected nearby. Xcel Energy will coordinate with the FAA on potential implementation of an ADLS radar. The location of the radar unit(s) will be determined based on participating landowners, environmental conditions, an analysis of radar coverage from an ADLS technology vendor, and, ultimately, a review and approval by the FAA and Federal Communications Commission (FCC). The ADLS tower(s) will be similar to a meteorological tower; they will be free-standing, and they will require a temporary workspace of approximately 75 feet by 75 feet.

## 6.4 REPOWERING CONSTRUCTION REQUIREMENTS

Previously permitted turbine access roads for the Wind Farm will remain in the same locations and temporarily be widened to up to 150 feet. A large construction crane will be used to remove the old rotors and hub, and to re-install the longer rotors and upgraded nacelle components, generally requiring a temporary 400-foot radius workspace around each turbine and an approximately 100-foot wide crane path between turbines. Xcel Energy has closely worked with landowners on the routing of crane paths to minimize impacts to agricultural fields. In response to landowner concerns about drain tile, Xcel Energy will use construction matting along the crane paths to minimize compaction and potential impacts to drain tile. Tracked vehicles, similar to a bobcat or skid steer, will move with the crane continually placing matting as the crane moves forward. Additionally, Xcel Energy and the construction contractor, with input from landowners, have designed crane paths to maximize routing along existing access roads to turbines, field edges and parcel lines for participating landowners without a turbine, and to be as direct and efficient as possible while avoiding and minimizing crossings of environmentally sensitive features such as Minnesota Department of Natural Resources (MNDNR) native prairie, native plant communities (NPCs), and Sites of Biodiversity Significance (SOBS).

The Repower Project will also require grading of a temporary laydown area to serve both as a parking area for construction personnel and staging area for turbine components during

construction. Xcel Energy is currently coordinating with landowners to host this facility – it will be sited on leased land and to avoid wetlands, waterbodies, cultural resources, and environmentally sensitive features such as native prairie, NPCs, and SOBS. The laydown area will be in place for 6-7 months during construction and then restored. Other temporary staging areas may be needed for parking and unloading of large equipment deliveries. Temporary laydown and staging areas, and restoration of these areas, are described more fully in Section 10.5.

# 7.0 WIND RIGHTS

## 7.1 STATUS OF WIND RIGHTS AND MODIFICATIONS

All current Project facilities are located on leased land and were sited to accommodate the facilities, required setbacks, and turbine placement flexibility needed to avoid natural resources, homes, and other sensitive features. Given the larger rotor diameter of the proposed repower turbines, the Project is working with landowners to secure sufficient land lease and wind easements/setback easement agreements necessary to repower, operate, and maintain the Project. The overall area within the Project boundary consists of approximately 8,088 acres. Within the 8,088-acre Project Area, approximately 7,238 acres (89 percent) of land has been leased, but negotiations continue for an additional 1,407 acres of wind rights only leases with 32 landowners (41 parcels) located both within and outside of the previously permitted project boundary as shown on Figure 4. The 1,407 acres of new wind rights only leases are being pursued for landowners who fall within the larger 3RD x 5RD wind access buffer. Xcel Energy notes that the 1,407 acres of additional wind rights is representative of the entire parcel. However, Xcel Energy is acquiring additional wind rights only for a subset of the area within these parcels, as only the portion of the parcel within the larger 3RD x 5RD will be acquired (e.g., the quarter-quarter section).

In August 2020, the Project's acquisition team met with several existing participating landowners to explain the proposed Project and gather input from the owners on what they thought the Project needed to do in order to gain community support and ultimately a successful repower. The overall feedback was supportive. From that point forward the Project began its acquisition process, which included the following steps:

- Researching current title on all parcels with existing wind easement agreements, as well as those required for the larger 3RD x 5RD wind access buffer.
- Sending a mailer to all landowners in the area with an overview of the proposed project, which included a request for current contact information and a notice that a Project representative would be reaching out to them later in 2020.
- The Project began outreach in early January 2021 to all impacted landowners. This outreach included: direct phone calls, in person site meetings, emails, door hangers, and letters. The outreach and acquisition activities are ongoing.
- In January 2021, the Project held a virtual open house for the public to describe the proposed project and answer questions.
- To date the Project has been in contact with 100 percent of the impacted landowners and have secured approximately 23 of the needed wind rights parcels. The Project team is also continuing to sign wind easement amendments with current participating landowners to extend the term of those easements for the entire life of the repowered project. Additional information is provided in Appendix C. The Project's acquisition team will continue to negotiate and obtain necessary wind rights over the coming months.
- If Xcel Energy's good faith negotiations for wind rights only leases are unsuccessful, Xcel Energy will request landowners sign a declaration acknowledging the landowner does not

wish to enter into an agreement but has no objection to the Commission granting a waiver to the wind access buffer setback.

- For remaining turbines where Xcel Energy is unable to reach agreement or obtain a no-objection declaration, Xcel Energy will seek a waiver from the Commission from the wind access buffer setback, consistent with the Commission's actions in other wind repower dockets.

During acquisition efforts, the Project has also been coordinating closely with the nearby Prairie Star project. Two parcels are impacted by both projects, and Xcel Energy is working with Prairie Star to document a junior wind right granted to the Project that provides the necessary setback wind rights. A mutual consent agreement will be entered into by both parties that confirms the two projects are not in conflict with one another.

As shown in Appendix C, based on the current status of wind rights negotiations, Xcel Energy is requesting the Commission waive the wind access buffer setback for 22 turbines. As the permitting process and wind rights negotiations proceed, Xcel Energy expects the necessary number of setback waivers to decrease significantly. Xcel Energy will periodically update the Commission on the status of its efforts to obtain wind rights agreements with the newly affected landowners within the larger wind access buffer setbacks of the repowered turbines.

# 8.0 ENVIRONMENTAL IMPACTS

In accordance with Minn. R. Ch.7854, Xcel Energy provides the following description of the environmental conditions of the Repower Project Area. Because this is an operating project, Xcel Energy has focused on addressing substantive changes and/or updates rather than a complete revisit of items and resources previously addressed in the 2008 Site Permit Application and with respect to the 2008 Site Permit, as amended.

On January 6, 2021, Xcel Energy sent electronic letters to individuals representing local, state, and federal entities requesting comment. Some of those agencies included the U.S. Fish and Wildlife Service (USFWS), the U.S. Army Corps of Engineers (USACE), the State Historic Preservation Office (SHPO), MNDNR, Minnesota Department of Transportation (MNDOT), Minnesota Department of Health (MDH), Mower County, and the Tribal Historic Preservation Officer of eleven tribes. To date, comments have been received from MNDNR, MNDOT, Minnesota Department of Agriculture, and the Lower Sioux Community. Responses have been incorporated into this Application, where appropriate. Agencies contacted and comments received are provided in Appendix D. Lastly, Xcel Energy met with DOC-EERA staff on March 24, 2021 to discuss Xcel Energy's approach to the Repower Project, the community and landowner outreach, and the anticipated schedule.

As described in Section 6.4, construction of the Repower Project will require the following temporary workspaces:

- Generally, 400-foot radius around turbines,
- Up to 150-foot-wide access roads, and
- Up to 100-foot-wide crane paths.

These temporary workspaces are used for the environmental impact analysis throughout Section 8. As described in Section 6.3.3, Xcel Energy is coordinating with the FAA on implementing ADLS radar unit(s). Because the number and location of these unit(s) is not yet known, impacts associated with ADLS are described generally in applicable sections (i.e., visual resources). Xcel Energy anticipates impacts associated with ADLS will be similar to a met tower, requiring a workspace of approximately 75 feet by 75 feet (less than 0.1 acre) each.

## 8.1 DEMOGRAPHICS

Demographic information for Minnesota and Mower County is based on the U.S. Census Bureau 2010 Census and the 2018: American Community Survey (ACS) 5-year Estimates Data Profiles, available on Explore Census Data and QuickFacts websites. Demographic information is summarized in table 8.1-1.

**Table 8.1-1**
**Demographics in the Project Area**

| Census Category | Minnesota | Mower County |
|---|---|---|
| Population, Census, April 1, 2010[1] | 5,303,925 | 39,163 |
| ACS Population Estimates July 1, 2019[1] | 5,639,632 | 40,062 |
| Percent Change 2010 - 2019[1] | 6.3 | 2.3 |
| Population Density, 2010[1] | 66.6 | 55.1 |
| 2018 Estimated Total Housing Units[2] | 2,420,473 | 17,070 |
| 2018 Estimated Total Vacant Housing Units[2] | 252,672 | 1,568 |

[1] U.S. Census Bureau, 2019a
[2] U.S. Census Bureau, 2018a

The Project is located within a lightly populated rural area in southeastern Minnesota in Grand Meadow, Dexter, and Clayton Townships in Mower County. The nearest municipalities to the Project Area are Dexter (Project Boundary is directly adjacent to the municipal boundary), Elkton (directly adjacent to the southern boundary), Grand Meadow (2.5 miles east), Adams (6.3 miles south/southwest), Taopi (6.7 miles south), Nicolville (7.7 miles west), Rose Creek (7.3 miles southwest), and Brownsdale (8.2 miles northwest). In addition, the City of Austin is about 10.5 miles west of the Project Area. Demographics in the Project Area are largely similar to what was presented in the original Site Permit Application for the wind farm in 2007 (Docket No. IP-6646/WS-07-839).

The 2018: ACS 5-year Estimates Data Profiles, the total number of housing units in Mower County is estimated to be 17,070 (U.S. Census Bureau, 2018a). The U.S. Census data shows that the population density in Mower County is 55.1 persons per square mile, which is lower than the state level but consistent with the more rural nature of the Project Area (U.S. Census Bureau, 2019a). Based on review of 2019 aerial photography, there are 29 residences within the Project Area (Figure 2).

According to the U.S. Census Bureau's Explore Census Data Selection Map, the total minority population in Mower County, that is the total population minus the percent of the population that identifies as White alone, not Hispanic or Latino, is 13.2 percent, which is slightly lower than the state level of 17.9 percent (U.S. Census Bureau, 2019b and 2019c). However, within the Project Area the total minority population is significantly lower than the state or county level and ranges from 0.4 percent in Dexter Township to 6.9 percent in Grand Meadow Township (U.S. Census Bureau, 2019d). The largest minority group in Mower County, at 11.6 percent of the population, is comprised of persons who identify as Hispanic or Latino (U.S. Census Bureau, 2019c).

The Application Guidance suggests an applicant include an environmental justice analysis in the application. Based on review of the Minnesota Pollution Control Agency's (MPCA's) Understanding Environmental Justice website, there are no environmental justice populations within the Project Area (MPCA, n.d.). The U.S. Census Bureau data provided in the paragraph above further supports the argument that environmental justice populations are not present within the Project Area, as the data does not indicate that any minority or low-income population is concentrated in any one area of the Project Area.

### 8.1.1 Impacts

The Project would not have a significant or long-term impact on the existing demographics in Mower County. Construction of the Project will not displace residents and is expected to have a minimal, temporary impact on the demographics of the Project Area. Approximately 150 construction personnel will be required for construction of the Project. Xcel Energy will use union labor for the Repower Project. The influx of approximately 150 construction personnel would equate to a total population increase of approximately 0.3 percent in Mower County over 2010 census numbers. This would represent a minimal, temporary increase in the total population of Mower County.

Temporary housing for construction personnel is available in the form of motels and hotels in municipalities near the Project Area such as Austin, Albert Lea, and Rochester which are within 10 to 30 miles of the Project Area. According to the website Hotels.com, there are five hotels in Austin, 12 hotels in Albert Lea, and more than 30 hotels in Rochester (Hotels.com, 2021). In addition, as shown in Table 8.1-1, 1,568 vacant housing units are available in Mower County (U.S. Census Bureau, 2018a). Overall, the demand for temporary housing for construction personnel would represent a minimal, temporary impact on the availability of temporary housing in Mower County.

Operations and maintenance of the existing Grand Meadow Wind Farm currently requires 6 full-time site staff. After repowering of the turbines is complete, Xcel Energy anticipates that the same number of staff will be required to operate and maintain the facility; no additional permanent full-time staff will be required. Operation of the repowered facility will not affect the demographics of the Project Area.

The Project will not affect environmental justice communities. Minority populations make up a relatively small percentage (generally, 7 percent or less) of the total population in the townships within the Project Area.

### 8.1.2 Mitigative Measures

The Project is not expected to impact the demographics in the Project Area; therefore, no mitigation measures are proposed.

## 8.2 LAND USE AND ZONING

The primary regulatory approval required for the construction and operation of the Repower Project is a Site Permit amendment issued by the Commission. Pursuant to the Minnesota Wind Siting Act (Act), the Commission has been given the responsibility and authority to accept, evaluate and grant permits for wind projects in Minnesota. The Act provides that "No person may construct an LWECS without a site permit issued by the Public Utilities Commission" (Minn. Stat. § 216F.04(a)). The Act defines an LWECS as any combination of wind turbines and associated facilities with a nameplate rating equal to or greater than 5,000 kW. Furthermore, Minn. Stat. § 216F.07 states that, "A permit under this chapter is the only site approval required for the location of an LWECS. The site permit supersedes and preempts all zoning, building, or land use rules, regulations, or ordinances adopted by regional, county, local and special purpose government."

### 8.2.1 Local Zoning and Comprehensive Plans

A comprehensive plan is a land-use and community-planning tool used to guide the direction and intent of growth for a county or municipality. Generally, comprehensive plans discuss existing and future land uses, population and housing trends, economic development goals and opportunities, and environmental characteristics of the county or municipality.

The Mower County Comprehensive Plan (2002) states that, protection of prime agricultural land and support of commercial agriculture will continue to be a priority for the county. Thoughtful expansion of existing urban centers (e.g., Austin) in a manner that supports preservation of the rural, agrarian lifestyle is also a stated goal of the Mower County Comprehensive Plan. The plan does not specifically address wind energy development.

### 8.2.2 Current and Future Zoning

In preparing this Application, Xcel Energy also reviewed the Mower County Zoning Ordinance (2003). The Project Area is primarily located within the Agricultural Preservation District. One smaller pocket of the Project Area is zoned as a Freeway Interchange Management District; this area is located near the City of Dexter and the intersection of Interstate 90 and State Highway 16.

The ordinance does not specifically address repowering of an existing commercial wind energy conversion system, but does contain provisions for regulating wind turbines and wind farms over 5 MW that are regulated by the State of Minnesota (Section 14-18.61). The regulations in this section of the Mower County Zoning Ordinance are intended to protect certain designated microwave beam paths by prohibiting wind turbines within designated microwave beam paths or in an area that falls within a one-mile radius of the center point of designated existing towers. The regulations do not comment on whether wind turbines and wind farms are permitted within the Agricultural or Freeway Interchange Management Districts as a permitted or conditional use. However, Section 14-48 of the ordinance notes that any uses not provided in the list of permitted, conditional, or prohibited uses for a given zoning district shall be considered prohibited and the Planning Commission may conduct a study to determine if the use is acceptable.

Xcel Energy is coordinating with Mower County and Grand Meadow, Dexter, and Clayton Townships to confirm that the Project is in alignment with applicable zoning and to obtain any required permits or approvals. Additionally, Xcel Energy is also coordinating with Mower County and the townships on a road use agreement to protect local roads.

### 8.2.3 Impacts

Repowering of the existing Grand Meadow Wind Farm will not significantly affect existing land uses in Mower County. Agricultural production in the immediate Project vicinity may experience minor short-term impacts from the use of crane paths during construction, but these impacts would resolve when construction is complete. Repowering of the existing turbines will not affect designated microwave beam paths; therefore, the Project will be in compliance with the provisions of Section 14-18.61 of the Mower County Zoning Ordinance (2003). No impacts on county zoning designations are anticipated as a result of the Project.

Operation of the repowered wind farm will not interfere with Mower County's stated goals for preservation of prime agricultural land for continued use in commercial agricultural production. The Grand Meadow Wind Farm has been in operation since 2008 and agricultural production within the Project Area has continued during that time. Additionally, no new turbines or other permanent facilities are proposed.

### 8.2.4 Mitigative Measures

The Project is generally consistent with the comprehensive plan and zoning requirements of Mower County. Accordingly, no mitigative measures are proposed.

## 8.3 CONSERVATION EASEMENTS

The Conservation Reserve Enhancement Program (CREP) is an offshoot of the Conservation Reserve Program (CRP) which is a land conservation program established by the U.S. Department of Agriculture (USDA) and administered by the Farm Service Agency that pays farmers a yearly rental fee for agreeing to take environmentally sensitive land out of agricultural production in an effort to improve environmental health and quality (USDA, n.d.). Minnesota implemented the CREP to target state-identified, high-priority conservation resources by offering payments to farmers and agricultural landowners to retire environmentally sensitive land using the Reinvest in Minnesota (RIM) Program (BWSR, 2019). The RIM Program also includes a Wetland Reserve Program that protects and restores previously drained wetlands and adjacent native grasslands. Enrollment in the conservation easement programs is voluntary. Based on publicly available data, there are no CRP or CREP easements within the Project Area. Figure 6 – Public Land Ownership and Recreation depicts CREP easements in the vicinity of the Project.

### 8.3.1 Impacts

Based on the publicly available information, there are no conservation easements within the Project Area. As such, there will no impacts to these areas.

### 8.3.2 Mitigative Measures

The Project is not anticipated to impact conservation easements. Xcel Energy is actively completing a title search for all Project participants that will also identify any other conservation easements in the Project Area. If additional conservation easements are identified, Xcel Energy will coordinate with the landowners and the agency that administers the conservation easements to identify their trust resources and address any potential impacts. Additionally, Xcel Energy is coordinating with the Natural Resource Conservation Service (NRCS), Board of Water and Soil Resources (BWSR), and MNDNR on the accuracy of the publicly available easement data.

## 8.4 NOISE

Sound level is measured in units of decibels (dB) on a logarithmic scale. It may be made up of a variety of sounds of different magnitudes, across the entire frequency spectrum. The human ear is not equally sensitive to sound at all frequencies and magnitudes. Some frequencies, despite being the same dB level (that is, magnitude), seem louder than others. For example, a 500 hertz (Hz)

tone at 80 dB will sound louder than a 63 Hz tone at the same level. In addition, the relative loudness of these tones will change with magnitude. For example, the perceived difference in loudness between those two tones is less when both are at 110 dB than when they are at 40 dB.

To account for the difference in the perceived loudness of a sound by frequency and magnitude, acousticians apply frequency weightings to sound levels. The most common weighting scale used in environmental noise analysis is the "A-weighting," which represents the sensitivity of the human ear at low to moderate sound pressure levels. The A-weighting is the most appropriate weighting when overall sound pressure levels are relatively low (up to about 70 dBA). The A-weighting de-emphasizes sounds at lower and very high frequencies since the human ear is less sensitive to sound at these frequencies at low magnitude.

The A-weighting is the most appropriate weighting for wind turbine sound for two reasons. The first is that sound pressure levels due to wind turbine sound are typically in the appropriate range for the A-weighting at typical receiver distances (50 dBA or less). The second is that various studies of wind turbine acoustics have shown that the potential effects of wind turbine noise on people are correlated with A-weighted sound level (Pedersen and Waye, 2008) as well as to the perceived loudness of wind turbine sound. Other researchers found that 51 percent of the energy making up a C-weighted measurement of wind turbine sound is not audible. Thus, it is more difficult to relate the level of C-weighted sound to human perception. That is, two sounds may be perceived exactly alike, but there could be significant variations in the C-weighted sound level depending on the content of inaudible sound in each.

Higher sound levels typically exist near roadways and near areas that experience greater human activities such as farming. Agricultural/rural areas with higher wind resources generally experience higher sound levels compared to agricultural/rural areas with lower wind resources. Different communities can experience a wide variety of sound levels within their given ambient acoustic environments, and the variability of sound sources creates their respective spectral content. A comparison of typical noise generators is outlined below in Table 8.4-1.

**Table 8.4-1**
**Decibel Levels of Common Noise Sources**

| Sound Pressure Level (dBA) | Noise Source |
|---|---|
| 140 | Jet Engine (at 25 m) |
| 130 | Jet Aircraft (at 100 m) |
| 120 | Rock and Roll Concert |
| 110 | Pneumatic Chipper |
| 100 | Jointer/Planer |
| 90 | Chainsaw |
| 80 | Heavy Truck Traffic (at 15 m) |
| 70 | Business Office |
| 60 | Conversational Speech |
| 50 | Library |
| 40 | Bedroom |

| Table 8.4-1<br>Decibel Levels of Common Noise Sources | |
|---|---|
| **Sound Pressure Level (dBA)** | **Noise Source** |
| 30 | Secluded Woods |
| 20 | Whisper |
| Source: MPCA, 2008 | |

The MPCA has the authority to adopt noise standards pursuant to Minn. Stat. § 116.07, subd. 2. The adopted standards are set forth in Minn. R. Ch. 7030. The MPCA standards require A-weighted noise measurements. Different standards are specified for daytime (7:00 AM – 10:00 PM) and nighttime (10:00 PM – 7:00 AM) hours. The noise standards specify the maximum allowable noise levels that may not be exceeded for more than 10 percent of an hour ($L_{10}$) and 50 percent of an hour ($L_{50}$), respectively. Household units, including farmhouses, are included in Land Use Noise Area Classification (NAC) 1. Table 8.4-2 shows the MPCA State noise standards. All of the land within the Project Area is considered Land Use NAC 1.

| Table 8.4-2<br>MPCA State Noise Standards – Hourly A-Weighted Decibels | | | | | |
|---|---|---|---|---|---|
| | | **Day (7:00am – 10:00pm) dBA** | | **Night (10:00pm – 7:00am) dBA** | |
| **Land Use** | **Code** | **$L_{10}$** | **$L_{50}$** | **$L_{10}$** | **$L_{50}$** |
| Residential | NAC-1 | 65 | 60 | 55 | 50 |
| Commercial | NAC-2 | 70 | 65 | 70 | 65 |
| Industrial | NAC-3 | 80 | 75 | 80 | 75 |

### 8.4.1 Impacts

The proposed Repower Project consists of increasing the RD from 77 meters to 91 meters at 15 turbine locations and 97 meters at 52 turbine locations, as well as upgrading gear boxes and associated components; the hub height will remain at 80 meters. The number and location of the wind turbines will not be changed by the Repower Project. Xcel Energy has been in continuous commercial operation since late 2008. There have been no noise complaints filed with the Commission since receiving one complaint in 2009, shortly after the Project became operational.

Acoustical modeling was completed by RSG on behalf of Xcel Energy for the Repower Project; a description of the modeling assumptions is included in Appendix E.

Because noise modeling, industry best practices and regulatory guidance has evolved since the Project was initially permitted in 2008, RSG modeled the predicted noise levels of the Project, with the existing GE 1.5 sle turbines with 77 m rotors prior to modeling the Repower Project with the proposed GE 1.6 sle turbines. Modeling the existing Project provided a baseline noise level that assisted Xcel Energy in evaluating modeled noise levels for the Repower Project, especially since no background or post-construction sound level monitoring exists at this site.

Based on RSG's sound propagation modeling, the existing Project produces a maximum turbine-only sound pressure level ($L_{50}$) of 49 dBA. Given that the rated sound power level of the proposed Repower Project's GE 1.6 sle wind turbines with low-noise trailing edges (LNTE) blades is 2 dBA more than that of the existing GE 1.5 sle wind turbines, Xcel Energy conducted a series of analyses looking at feasible noise mitigation strategies for the Repower Project After engaging in these analyses, Xcel Energy designed the Repower Project to include a combination of 97 and 91 meter blades, LNTE blades at all turbine locations, and operation of a number of turbines with Noise Reduction Operations (NRO) modes (see Figure 7 – Sound/Noise). NRO is a technology offered by many turbine manufacturers, specifically a mode the turbines can switch to, either manually or automatically, to reduce sound emissions. When in NRO, the blades are rotated slightly to reduce the rotational speed. This results in lower sound emissions, and a nominal loss in power production.

Based on the proposed design, the maximum predicted Repower Project sound level is 47 dBA during nighttime hours. The following table (Table 8.4-3) compares the predicted turbine-only sound levels at residences before and after the Repower Project.

**Table 8.4-3**
**Modeled Turbine-Only Sound Levels at Residences Before and After the Repower Project**

| Modeled Sound Pressure Level dBA | Number of Residences | | | |
|---|---|---|---|---|
| | Existing Project[1] | | Repowered Project[2] | |
| | Participant | Non-Participant | Participant | Non-Participant |
| <40 | 0 | 65 | 0 | 68 |
| ≤ 45 and ≥ 40 | 6 | 171 | 3 | 168 |
| 46 | 6 | 8 | 8 | 6 |
| 47 | 4 | 2 | 11 | 7 |
| 48 | 3 | 2 | 0 | 0 |
| 49 | 3 | 1 | 0 | 0 |
| 50 | 0 | 0 | 0 | 0 |

[1] 67 GE 1.5 sle turbines with 77 m rotor and 80 m hub height.
[2] 67 GE 1.6 sle turbines with LNTE blades - 52 turbines with 97 m rotors and 15 turbines with 91 m rotors, and 43 turbines with NRO.

Minor, temporary construction noise will be generated by repowering from typical construction equipment such as cranes, component delivery trucks, dump trucks and graders. In general, construction noise will be less than experienced during Project construction as access roads, turbine pads, towers and collection lines will remain in place. Machinery will be properly muffled, as required by law, and hours of operation will be consistent with State standards for similar construction projects. Because of the rural nature of the Project Location, construction-related noise is expected to be typical of farming operations during the height of planting and harvest seasons.

### 8.4.2 Mitigative Measures

As discussed in Section 8.4.1, the Project has been in continuous commercial operation since late 2008 and there have been no noise complaints filed with the Commission during its operational history. For the Repower, Xcel Energy has significantly modified its Project design to incorporate noise mitigation measures. First, all turbines will be equipped with LNTE blades. The LNTE blades lower the predicted sound power level of the turbines by approximately 2 decibels. Second, Xcel Energy has incorporated a combination of GE 1.6 sle turbines with 91-meter or 97-meter blades. Turbines with the 91-meter blades have an estimated sound power level approximately 2 decibels lower than the turbine with the 97-meter blades. While the 91-meter blades have lower expected energy production as compared to the 97-meter blades, the 91-meter blades were strategically sited at 15 turbine locations to minimize expected sound levels at nearby residences. Finally, Xcel Energy will operate a number of both the 91- and 97-meter blade turbines in NRO modes such that all residences have a predicted turbine-only sound level of 47 dBA or less. The modeling assumptions related to these sound mitigation measures are discussed in Appendix E.

## 8.5 VISUAL RESOURCES

The topography of the Project Area is glaciated, gently rolling plains with elevations ranging from 1,332 to 1,439 feet (406 to 439 m) above sea level. Elevations are highest in the central portion of the Project Area and lowest in the northeast corner of the Project Area. Agricultural fields, farmsteads, and gently rolling topography visually dominate the Project Area. The landscape can be classified as rural open space. Figure 8 (Topographic Map) shows the general topography within the Project Area.

Viewsheds in this area are generally broad and uninterrupted, with only small scattered areas where they are interrupted by trees or topography. The settlements in the vicinity are residences and farm buildings (inhabited and uninhabited farmsteads) scattered along rural county roads. The area is also shaped by a built environment. Horizontal elements, such as highways and county roads, are consistent with the long and open viewsheds in the area. Vertical elements such as wind turbines and a 345 kV transmission line are visible from considerable distances and are the tallest and often the most dominant visual feature on the landscape. Additionally, numerous electrical distribution lines parallel some unpaved and paved roads that contribute to the existing visual elements.

There are six wind farms that are visible within ten miles of the Project Area, including:

- Prairie Star Wind Project (61 turbines) in Mower County;
- Wapsipinicon Wind Project (67 turbines) in Mower County;
- Pleasant Valley Wind Project (100 turbines) Mower and Dodge Counties;
- Mower County Wind Energy Center (43 turbines) in Mower County;
- G. McNeilus Wind Farm (9 turbines) in Mower County; and
- McNeilus Wind Farm (6 turbines) in Mower County.

The Prairie Star Wind Project is immediately adjacent to the southeast corner of the Project Area while the Wapsipinicon and Pleasant Valley Wind Projects are immediately adjacent to the northwest and west sides of the Project Area, across Interstate 90 (see Figure 18 – Existing Turbine

Locations). These three wind farms and the three additional existing wind facilities contain turbines of various heights and RDs and contribute to the aesthetics of the area.

### 8.5.1 Impacts

Visual impacts can be defined as the human response to visual contrasts resulting from introduction of elements into a viewshed. Such visual contrasts interact with viewer perceptions of the landscape and may cause a negative, positive, or neutral response to the changes in the viewed landscape. Those likely to be viewing the Project include permanent observers (residents) and temporary observers (motorists, tourists, or recreationalists passing by or using the area intermittently). Residents within and in the vicinity of the Project Area are expected to have a higher sensitivity to the potential aesthetic impacts than temporary observers because they will look at the Project more frequently than those individuals periodically passing through the area. The magnitude of visual impacts associated with wind facilities typically depend on several factors, including:

- distance of the Project facilities from viewers;
- duration of views (highway travelers vs. permanent residents);
- weather and lighting conditions;
- the presence and arrangements of lights on the turbines and other structures; and
- viewer attitudes toward renewable energy and wind power.

Overall, the Project will not be introducing any significant features to the landscape because the wind turbines are already present. The addition of longer blades will be the only visible permanent change. The FAA requires obstruction lighting or marking of structures over 200 feet (61 meters) above mean sea level because they have the potential to obstruct air navigation. Xcel Energy will coordinate with the FAA on a lighting plan that is compliant with FAA requirements. Additionally, Xcel Energy will include ADLS (if approved by the FAA) to mitigate the impact of nighttime lights by deploying a radar-based system for the Project, turning lights on only when low-flying aircraft are detected nearby, pending FAA approval. This assists in maintaining safe conditions for pilots while reducing the effect to the surrounding communities.

Wind turbines are prevalent within and in the vicinity of the Project Area. These structures could produce visual contrast by virtue of the design attributes of form, color, and line; however, the GE 1.6 sle turbines will be similar in appearance to the existing GE 1.5 sle turbines with three blades, a hub, and a monopole.

Temporary impacts related to construction activities are associated with equipment staging and laydown areas, access roads, and crane paths. These activities will be short-term and converted back to cropland or replanted with grasses and vegetation native to the area following the completion of construction. Visual impacts from an increase in traffic and human activity within the Project Area associated with Project construction will also be short-term. Permanent impacts related to repowering the Project may include the addition the ADLS unit(s). The location and number of ADLS radar towers will be determined in coordination with the FAA but are expected to be similar in appearance to a met tower. Overall, the long-term operation of the Project is not anticipated to increase visual impacts associated with new structures, operations lighting, human activity, or traffic within the Project Area.

### 8.5.2 Visual Impacts on Public Resources

While wind turbines will impact the visual surroundings of a wind facility, the degree of visual impact vary based on personal preferences. There are no USFWS national parks or refuges, USFWS Waterfowl Production Areas (WPAs), MNDNR Aquatic Management Areas (AMAs), MNDNR Wildlife Management Areas (WMAs), or other MNDNR-managed lands within the Project Area; there are, however, two snowmobile trails in the Project Area. Additionally, there are several public recreation and wildlife areas within 10 miles of the Project Area (see Figure 6 and Section 8.8). Minnesota State Highway 16 is an 88-mile byway that travels east-west along the Root River valley between the cities of Dexter and LaCrescent, called the Historic Bluff Country National Scenic Byway. While one terminus of the scenic highway is in Dexter, the historic bluffs for which the scenic road is named, occur further east.

Replacing the existing turbines with larger blades within the viewsheds of these public lands and the scenic byway will only minimally change the natural quality and the experience of the persons utilizing those areas. The Project will not be introducing a new feature type to the landscape, and therefore will not significantly affect public resources because existing wind turbines are prevalent within and in the vicinity of the Project Area.

### 8.5.3 Visual Impacts on Private Lands and Homes

Nearby viewers include the rural residences dispersed throughout the Project Area, recreational and public land users, and motorists (primarily those using Interstate 90 and other local roads). The municipalities of Dexter, Grand Meadow, and Elkton are located within 5 miles (8 kilometers) from the nearest existing turbine locations. For nearby viewers, the large size and strong geometric lines of both the individual turbines themselves, and the array of turbines, could dominate views. However, these impacts are assumed to be minor since existing wind turbines have been prevalent within and in the vicinity of the Project Area for more than 12 years. In addition, the operation of the Project will not generate an increase in traffic or noticeable increase in day-to-day human activity; therefore, the Project Area will retain its existing characteristics and the rural sense.

### 8.5.4 Mitigative Measures

Xcel Energy will work to avoid or minimize visual impacts related to the Repowering Project. Xcel Energy proposes the following mitigation measures:

1. Repowered turbine parts will be uniform in color;

2. Turbines will be illuminated only as necessary to meet the minimum FAA requirements for obstruction lighting (e.g., reduce number of lights on turbines and synchronized red flashing lights);

3. Temporarily disturbed areas will be converted back to cropland or otherwise reseeded with native seed mixes appropriate for the region.

### 8.5.5 Shadow Flicker

Shadow flicker caused by wind turbines is defined as alternating changes in light intensity at a given stationary location (or "receptor"), such as the window of a home. In order for shadow flicker to occur, three conditions must be met: (1) the sun must be shining with no clouds to obscure it; (2) the rotor blades must be spinning and must be located between the receptor and the sun; and (3) the receptor must be sufficiently close to the turbine to be able to distinguish a shadow created by it (generally less than 1,500 feet because if the shadow is at this distance, the shadow is sufficiently diffuse that the shadow is not seen as a solid obstruction). Shadow flicker intensity and frequency at a given receptor are determined by a number of interacting factors:

- **Sun angle and sun path**: As the sun moves across the sky on a given day, shadows are longest during periods nearest sunrise and sunset, and shortest near midday. They are longer in winter than in summer. On the longest day of the year (the summer solstice), the sun's path tracks much farther to the north and much higher in the sky than on the shortest day of the day (the winter solstice). As a result, the duration of shadow flicker at a given receptor will change significantly from one season to the next.

- **Turbine and receptor locations**: The frequency of shadow flicker at a given receptor tends to decrease with greater distance between the turbine and receptor. The frequency of occurrence is also affected by the sightline direction between turbine and receptor. A turbine placed due east of a given receptor will cause shadow flicker at the receptor at some point during the year, while a turbine placed due north of the same receptor at the same distance will not, due to the path of the sun at the Project's latitude.

- **Cloud cover and degree of visibility**: As noted above, shadow flicker will not occur when the sun is obscured by clouds. A clear day has more opportunity for shadow flicker than a cloudy day. Likewise, smoke, fog, haze, or other phenomena limiting visibility would reduce the intensity of the shadow flicker.

- **Wind direction**: The size of the area affected by shadow flicker caused by a single wind turbine is based on the direction that the turbine is facing in relation to the sun and location of the receptor. The turbine is designed to rotate to face into the wind, and as a result, turbine direction is determined by wind direction. Shadow flicker will affect a larger area if the wind is blowing from a direction such that the turbine rotor is near perpendicular to the sun-receptor view line. Similarly, shadow flicker will affect a smaller area if the wind is blowing from a direction such that the turbine rotor is near parallel to the sun-receptor view line.

- **Wind speed**: Shadow flicker can only occur if the turbine is in operation. Turbines are designed to operate within a specific range of wind speeds. If the wind speed is too low or too high, the turbine will not operate, eliminating shadow flicker.

- **Obstacles**: Obstacles, such as trees or buildings, can have a screening effect and reduce or eliminate the occurrence of shadow flicker if they lie between the wind turbine and the receptor.

- **Contrast**: Because shadow flicker is defined as a change in light intensity, the effects of shadow flicker can be reduced by increasing the amount of light within a home or room experiencing shadowing flicker.

- **Local topography**: Changes in elevation between the turbine location and the receptor can either reduce or increase frequency of occurrence of shadow flicker, compared to flat terrain.

Shadow flicker modeling for the Repower Project incorporated average long-term sunshine probability from the Minneapolis-St. Paul and Des Moines weather stations between 1981-2010. The Minneapolis-St. Paul weather station is closer to the Repower Project in latitude but Des Moines is more similar to southeast Minnesota in solar resource. Therefore, the average was used (Table 8.5-1). Wind speed and direction is displayed in Chart 9.1-3 Grand Meadow Wind Farm Wind Rose in Section 9.1.10.

**Table 8.5-1**
**Average of Minneapolis-St. Paul and Des Moines Average Sunshine (hours/month)[1]**

| Month | Average |
|---|---|
| January | 149 |
| February | 165 |
| March | 202 |
| April | 227 |
| May | 274 |
| June | 307 |
| July | 340 |
| August | 297 |
| September | 239 |
| October | 202 |
| November | 127 |
| December | 121 |

[1] Data gathered from National Climatic Data Center for Minneapolis, Minnesota, and Des Moines, Iowa (1981-2010).

### 8.5.5.1 Shadow Flicker Impacts

Shadow flicker modeling was completed by ReGenerate for 272 residences (receptors) with WindPRO for the Repower Project. These receptors are those within the Project Area and one-mile buffer that could receive shadow flicker. As expected with slightly taller turbines and longer blades, shadow flicker is anticipated to increase at some receptors. There are seven residences modeled to have more than 30 hours of shadow flicker per year, all of which are participants. Figure 9 - Shadow Flicker provides a visual representation of shadow flicker across the Grand

Meadow Repower Project; Appendix F shows results of the shadow flicker assessment at the Project.

WindPRO calculates the number of hours per year as well as the maximum minutes per day during which a given receptor could realistically expect to be exposed to shadow flicker from nearby wind turbines. The maximum shadow flicker (hours per year) for each non-participants is 29.0 hours per year and 54.7 hours per year for participants.

The shadow flicker modeling is conservative and does not take into consideration several factors including:

- availability of the turbines (i.e., whether they are operating or not based on meteorological conditions and/or maintenance);
- turbines not operating below cut-in and above cut-out wind speeds;
- obstacles (like trees or buildings) obstructing shadow flicker from a receptor; and
- dust or aerosols in the air which reduce the impact of shadow flicker.

For example, the participating residence modeled to receive the maximum amount of shadow flicker has turbines to the east, west, and south, but the residence has dense vegetative screening on each in each of those same directions that is not accounted for by the model. These trees provide an obstruction to shadows from nearby turbines.

The closest turbine to a residence is 1,045 feet; at this distance, receptors will typically experience shadow flicker only when the sun is low in the sky, and when certain meteorological and operational factors are present. If a receptor does experience shadow flicker, it most likely will be only during a few days per year from a given turbine, and for a total of only a fraction (typically less than one percent) of annual daylight hours.

Shadow flicker from the proposed turbines is not harmful to the health of photosensitive individuals, including those with epilepsy. The Epilepsy Foundation has determined that generally, the frequency of flashing lights most likely to trigger seizures is between five and 30 flashes per second (Epilepsy Foundation, 2013).The frequency of shadow flicker due to wind turbines is a function of the rotor speed and number of blades, and it is generally no greater than approximately 1.5 Hz (i.e., 1.5 flashes per second). Because the frequency of wind turbine shadow flicker is so much lower than the frequency range that can trigger seizures, there is no potential for causing seizures.

### 8.5.5.2 Shadow Flicker Mitigative Measures

Grand Meadow Wind Farm has been in continuous commercial operation since 2008. There have been no shadow flicker complaints filed with the Commission during its operational history.

Xcel Energy will evaluate any comments received regarding flicker. In coordination with the affected party, Xcel Energy will evaluate potential flicker minimization options in the unlikely event more flicker is present than was modeled.

Additional mitigation options Xcel Energy may consider providing, where appropriate and reasonable, include exterior screening such as trees, shrubs and awnings, and interior screening such as curtains or blinds for windows.

Xcel Energy can also provide materials about shadow flicker to landowners that can help minimize the effect of shadow flicker such as turning on lights and using a different room for a short period of time.

## 8.6 PUBLIC SERVICES AND INFRASTRUCTURE

Xcel Energy conducted online research to identify emergency services, existing utilities, roads and railroads, and communication systems within the Project Area. The results of this review and a discussion of potential impacts to these services from construction and operation of the Project is presented below.

### 8.6.1 Emergency Services

The Project is located in a rural area in southeastern Minnesota (Figure 1 – Project Location). Within the Project Area, local law enforcement and emergency response agencies are available in Mower County and nearby communities. Mower County has a sheriff department that provides services, and the cities of Austin, Dexter, Grand Meadow, Racine, Spring Valley, Elkton, Sargeant, and Adams have local police departments. Fire services near the Project Area are provided by city and community fire departments in Austin, Grand Meadow, Rose Creek, Adams, Brownsdale, Stewartville, and Spring Valley.

Ambulance response is provided by regional and local ambulance services including Grand Meadow Ambulance which provides emergency response services to the cities of Dexter, Grand Meadow, and Racine, as well as Clayton, Bennington, Frankford, Grand Meadow, Pleasant Valley and Racine townships (Grand Meadow, undated). Adams Area Ambulance Service provides emergency response services to a 120-square mile area in southeastern Minnesota that covers the cities of Adams, Taopi, Johnsburg, and Elkton (Adams Area Ambulance Service, 2018). Local ambulance services are also provided by the communities of Spring Valley, Blooming Prairie, and Hayfield (Minnesota Emergency Medical Services Regulatory Board, 2021).

Hospitals near the Project Area include the Mayo Clinic Health System – Austin: Emergency Room, the Olmsted Medical Center in Spring Valley, and the Mayo Clinic in Rochester. Smaller medical clinics or medical centers in the area include the Mayo Clinic Health System in Adams and the Mayo Clinic Health System in Le Roy.

#### 8.6.1.1 Impacts

Construction and operation of the Project is not expected to impact the availability of emergency services. Repowering of the existing wind farm will be of much lower intensity and extent than building a new wind project of similar size, because new construction of access roads to turbine pads, turbine foundations, towers, underground electrical systems, transmission interconnections, data communication lines, O&M building, etc. will not occur. In addition, the duration of construction will be approximately 6-7 months. After the repowering work is completed, O&M

activity and use of public services and infrastructure would not increase from levels needed prior to the repower.

Xcel Energy will coordinate with emergency services providers to determine appropriate safety precautions and standards and develop measures to address these precautions and standards. If emergency services are required during constriction or operation of the Project, the numerous law enforcement, fire departments, ambulance services, and hospitals near the Project Area would be adequate to address Project-related emergency service needs without negatively impacting the availability of these services for the local populace.

#### 8.6.1.2 Mitigation Measures

Because no impacts to emergency services are anticipated, no mitigation measures are proposed.

### 8.6.2 Existing Utility Infrastructure

The location of existing utilities is an important factor to be considered when siting an LWECS project. Turbines should be sited at least 1.1x the turbine height from existing overhead utilities to avoid potential impacts to existing infrastructure.

Electrical service in the Project Area is provided by Freeborn-Mower Electric Cooperative and Peoples Energy Cooperative (Minnesota Geospatial Commons, 2020). Minnesota Energy Resources provides natural gas service in the Project Area (Minnesota Energy Resources, 2020). Water to rural residences within the Project Area is supplied by private wells.

There is a 345 kV transmission line (Prairie Island-Byron-Adams) in the western portion of the Project Area that runs north-south, beginning near the intersection of Interstate 90 and 260$^{th}$ Street and continues south through the middle of an agricultural field for approximately 3.5 miles. No oil or gas transmission lines are known to exist in the Project Area (National Pipeline Mapping System, 2021). Infrastructure within the Project Area including existing transmission lines is shown on Figure 2.

#### 8.6.2.1 Impacts

Xcel Energy will avoid impacting underground utilities during construction the Project by designing temporary construction workspaces to avoid these features. Xcel Energy has designed the crane paths to minimize crossings of the existing 345 kV transmission line within the western portion of the Project Area. Crane path crossings of the existing 345 kV transmission line will likely require crane breakdown.

After repowering of the existing turbines with longer blades is complete, the turbines will remain sited to the industry best practice of 1.1x turbine tip height from all high-voltage transmission lines.

#### 8.6.2.2 Mitigation Measures

Xcel Energy will conduct a Gopher One Call prior to and during construction to identify the locations of any buried utilities and safety concerns and to prevent possible structural conflicts.

### 8.6.3 Roads and Railroads

Interstate 90 forms the northwestern border of the Project Area. In general, the existing roadway infrastructure in and around the Project Area is characterized by state, county, and township roads that generally follow section lines. Various county and township roads and private gravel access roads provide access to turbines throughout the Project Area. Roadway infrastructure throughout the Project Area also includes two-lane paved and gravel roads. In agricultural areas, many landowners use private, single-lane farm roads and driveways on their property.

The MNDOT conducts traffic counts on roads in Minnesota. The functional capacity of a two-lane paved rural highway is in excess of 5,000 vehicles per day, or Annual Average Daily Traffic (AADT). Interstate 90 crosses the northwestern corner of the Project Area (for about 0.25 mile), then parallels the northwestern edge of the Project Area until the intersection of Interstate 90 and State Highway 16 near the City of Dexter (about 2.5 miles), at which point the interstate deviates to the west and west/northwest of the Project Area. According to MNDOT's Traffic Mapping Application, the AADT of the interstate ranges from 10,400 to 10,800 vehicles per day in the vicinity of the Project Area. Within the Project Area AADTs range from 90 vehicles per day along County State Aid Highway (CSAH) 13 to 1,900 vehicles per day along State Highway 16 (MNDOT, 2021). Traffic counts are generally higher in proximity to nearby cities and towns.

No railroads are located within the Project Area. The nearest railroad to the Project Area is the Canadian Pacific Railroad, which runs through the City of Austin about 12.5 miles west of the Project Area (MNDOT, 2015).

#### 8.6.3.1 Impacts

During the construction phase, temporary impacts are anticipated on some public roads within the Project Area. However, construction traffic for the repowering of the existing turbines would be considerably less than those experienced for construction of a new wind farm facility. Roads will be affected by the transportation of equipment to and from the Project Area and turbine sites. Some roads may also be expanded along specific routes as necessary to facilitate the movement of equipment. Construction traffic will use the existing county, state, and federal roadway system, and existing private turbine access roads to reach the Project Area and deliver construction materials and personnel.

Construction activities will increase the amount of traffic using local roadways, and may temporarily affect traffic numbers in the area, but such use is not anticipated to result in adverse traffic impacts. During the construction phase, several types of light, medium, and heavy-duty construction vehicles will travel to and from the Project Area, as well as private vehicles used by construction personnel. Trucks accessing the Project Area would likely use State Highway 16 to from Interstate 90 to access the Project Area. Specific additional truck routes will be dictated by the location required for delivery.

Xcel Energy estimates that there will be approximately 225 large truck trips per day and up to 125 small-vehicle (pickups and automobiles) trips per day in the area during peak construction periods. The functional capacity of a two-lane paved rural highway is in excess of 5,000 vehicles per day. With the exception of Interstate 90, the heaviest traffic in the Project Area is on State Highway 16

(1,900 AADT) which cuts through the approximate center of the Project Area. Since many of the area roadways have AADTs that are currently well below capacity, the addition of 350 vehicle trips during peak construction would be perceptible, but similar to seasonal variations such as spring planting or autumn harvest.

After construction is complete, traffic impacts during the operations phase of the Repower Project will be minimal and similar to traffic levels for the currently operating wind farm. Operation and maintenance activities will not noticeably increase traffic in the Project Area, as these activities tend to be sporadic and spread out through the Project Area. A small maintenance crew driving through the area in pickup trucks on a regular basis will monitor and maintain the wind turbines as needed. There would be a slight increase in traffic for occasional turbine and substation repair, but traffic function will not be impacted as a result.

#### 8.6.3.2 Mitigative Measures

Xcel Energy is coordinating with Mower County and townships within the Project Area on the development and execution of a single, cooperative Development, Road Use, and Drainage Agreement to minimize and mitigate impacts on existing roadways. Xcel Energy will ensure that the general contractor communicates with the road authorities throughout the construction process, particularly regarding the movement of equipment on roads and the terms of the development agreement.

In addition, Xcel Energy is coordinating with MNDOT to identify any additional operating permits required for the Project. MNDOT responded to Xcel Energy's January Project introduction letter, and stated that it is unclear whether the increased height of the turbines after repowering would present any potential risks to the safety of the traveling public and requested the current setback distances for the two closest turbines on the south side of State Highway 16. MNDOT also identified potential permits for the Project including authorizations for sign removal or relocation, temporary widenings, or other modifications of any MNDOT trunk highways, and oversize/overweight permits.

If roadways are impacted by the use of heavy construction equipment, they will be restored per the Development, Road Use, and Drainage Agreement. Additional operating permits will be obtained for over-sized truck movements after supply routes have been finalized.

No impacts are anticipated from operation of the Project; therefore, no mitigation measures are proposed for this phase of the Project.

### 8.6.4 Communication Systems

Xcel Energy commissioned a communication tower study by Comsearch, which identified two communication towers (one communication tower and one cellular tower) within the Project Area and three additional communication towers within approximately one mile of the Project Area. Additionally, there are five communication antennas in the Project Area and twenty additional antennas within approximately one mile of the Project Area (Appendix G). These two tower structures are registered with the FCC. The antennas may be located on a variety of structure types such as guyed towers, monopoles, silos, rooftops, or portable structures. Additionally, fifteen of

the twenty-five antennas located within one mile of the Project Area are located on four of the communication towers; some towers host multiple antennas. A summary of the types of communication systems in the Project Area are listed in Table 8.6-1. Each of the communication system types are described in more detail below; land mobile towers are described in Section 8.6.6.

**Table 8.6-1**
**Communication Towers and Antennas in the Project Area**

| Communication System Type | | Within the Project Area | Within one mile of the Project Area |
|---|---|---|---|
| Antenna[1] | Microwave | - | 4 |
| | Land Mobile | 3 | 16 |
| | Cellular | 1 | - |
| | FM | - | 1 |
| Tower | Communication | 2 | 3 |

[1] There are 14 unique tower and antenna locations. Some towers hold multiple antennas.
Source: Comsearch (Appendix G)

On January 11, 2021, Comsearch contacted the National Telecommunications and Information Administration (NTIA) in regard to the Repower Project. The NTIA provided plans to the federal agencies represented in the Interdepartment Radio Advisory Committee for the Repower Project. After a 45 plus day period of review, no federal agencies, including the Department of Defense, identified any concerns regarding blockage of their radio frequency transmissions, or construction of turbines on this site. A copy of the letter from the NTIA is provided in Appendix D.

## Microwave Beam Paths

The Repower Project has undertaken an assessment of microwave beam pathways to ensure that the Project does not interfere with microwave paths (Fresnel zones) that have been established for communications systems in the vicinity of the Project. Xcel Energy commissioned a microwave beam path study from Capital Airspace Group. Capital Airspace Group identified 11 microwave beam paths associated with six unique microwave links/signals in the Project Area (some paths contain multiple links/signals; Appendix G and Figure 10). Since the Project became operational in 2008, Dairyland Power Cooperative has "developed" a beam path signal (Fresnel zones) through the Project Area that is close to or intersects the rotor swept area of existing turbines. Therefore, Capital Airspace Group conducted three-dimensional analysis of the new beam paths relative to the existing and proposed RDs.

Dairyland Power Cooperative has two new signals in the Project Area: one between the Dexter tower immediately adjacent to the northwest corner of the Project northeast to the Eyota tower outside the Project Area, and one from the Dexter tower south through the Project Area towards the Adams tower. Three-dimensional analysis indicates that the Fresnel zone between the Dexter and Eyota is currently immediately below the rotor-swept area of existing Turbine 102. Similarly, between the Dexter tower and Adams, the Fresnel zone currently is immediately adjacent to the rotor-swept area of Turbine 137.

**AM/FM Radio**

Comsearch also provided a report on AM and FM Radio broadcast stations in the Project vicinity whose service could potentially be affected by the Project (Appendix G). The closest AM station to the Project is 19.6 km (12.2 mi) west of the Grand Meadow Wind Farm and the closest FM station is located 320 feet south of the Project Area along 220th Street. There are no AM or FM Radio station towers in the Project Area. Xcel Energy has received no complaints of AM or FM radio interference in over 12 years of operation.

### 8.6.4.1 Impacts

**Microwave Beam Paths**

Based on Capital Airspace Group's interference analysis, Dairyland Power Cooperative has "developed" microwave signals since the Project became operational in late 2008. Xcel Energy has not received any complaints of interference from any operators during the over 12 years of project operation. Based on the three-dimensional analysis, it's clear that Dairyland Power Cooperative considered signal reliability in their signals: both are generally on the periphery of the existing rotor-swept area and the signal between Dexter and Eyota is intentionally "stacked" to increase signal reliability. On behalf of Xcel Energy, Capital Airspace Group coordinated with Dairyland Power Cooperative on the Repower Project and the potential signal interruptions from longer rotors and a larger rotor-swept area. Dairyland Power has not responded to multiple attempts by Capital Airspace Group. For Turbine 102, it is anticipated that the longer rotors may cause signal disruption but are not anticipated to cause signal degradation due to the diversity links (stacked signals) as a redundancy and the location of the beam path at the periphery of the rotor swept area. For Turbine 137, the three-dimensional analysis shows the beam path below the rotor swept area; as such, no signal disruption is anticipated.

**AM/FM Radio**

Turbines sited within three kilometers (1.9 miles) of an AM broadcast station can cause impacts to AM broadcast coverage. The closest AM station to the Repower Project is 19.6 kilometers (12.2 miles) from the closest turbine in the Project Area. Therefore, impacts to AM broadcast stations are not anticipated. The coverage of FM stations is generally not susceptible to interference caused by wind turbines. The closest FM station is 0.51 km (0.3 mi) from a turbine. Based on the licensed antenna information and the turbine blade length, this FM station requires a minimum separate distance of 0.254 km, which is easily met with the calculated distance of 0.51 km to the nearest turbine. At this distance, there should be adequate separation to avoid radiation pattern distortion. All other FM stations are located 2.3 km or further from the nearest turbine and would not be impacted by the Repower Project.

In addition, Xcel Energy is not aware of any radio signal interference during the past 12 years of facility operation. A change in coverage of radio stations associated with wind turbine repowering is unlikely due to the nature of the repower changes, which do not increase radio interference.

### 8.6.4.2 Mitigative Measures

Because the Wind Farm has been operating for over 12 years with no complaints, interference with communications systems is not expected. Should the addition of larger rotors trigger interference issues not previously experienced, Xcel Energy will work with those landowners to rectify the issue through the use of high-gain antennas, a low noise amplifier, a monetary contribution toward comparable satellite television services, or another mutually agreeable solution.

**Microwave Beam Paths**

Xcel Energy does not anticipate impacts to microwave beam path signals as a result of the Repower Project. Dairyland Power Cooperative developed the beam paths through the Project Area after the Project became operational in 2008. While the signals between Dexter and Eyota may have minor disruption depending on the orientation of the turbine relative to the beam path, the disruption is not anticipated to cause signal degradation. Furthermore, Dairyland Power has implemented signal redundancy measures to mitigate any potential impacts and ensure microwave signals are not degraded. As discussed above, Xcel Energy will continue to reach out to Dairyland Power to address any unanticipated impacts.

**AM/FM Radio**

Xcel Energy is not aware of any conflicts with AM/FM Radio transmission or reception caused by the Project's operation. Should issues arise as a result of repowering, Xcel Energy will work closely with area stations on potential mitigation options.

### 8.6.5 Television

Comsearch conducted an off-air television report that identified 101 off-air television stations within 150 kilometers (93.2 miles) of the Project Area (Appendix G). Television (TV) stations at a distance of 150 kilometers or less are the most likely to provide off-air coverage to the Project Area and neighboring communities. Of these 101 stations, only 43 are currently licensed and operating; the other 58 stations are either in construction or have applied for a construction permit. Of the 43 licensed and operating stations, 28 are low-power stations or translators. Translator stations are low-power stations that receive signals from distance broadcasters and retransmit the signal to a local audience. These stations serve local audiences and have limited range, which is a function of their transmit power and the height of their transmit antenna. The other 15 licensed and operating stations are digital television broadcast stations.

### 8.6.5.1 Impacts

The rotating blades of a wind turbine have the potential to disrupt over-the-air broadcast TV reception within a few miles of the turbine, especially when the direct path from the viewer's residence is obstructed by terrain. Based on the Comsearch analysis of licensed television stations within 150 kilometers of the Grand Meadow Wind Farm Project Area, eight full-power digital stations and one low-power digital stations currently serve the Project Area; these stations may experience reception disruptions related to the Project. The areas primarily affected by such a disruption would include the Project Area and extend to 10 kilometers beyond the Project Area;

however, the full-power and low-power signals themselves have a broadcast range that extends from 10 to 111 kilometers beyond the Project Area.

The Comsearch TV Coverage Impact Study concluded that since the project is a repower of an existing wind project at the same tower locations with marginal height increases (up to 10 meters), it is expected that the impact due to these changes will be minimal. Television reception at residences relying on cable or satellite television service will not be impacted by the Repower Project. Additionally, Xcel Energy has not had any complaints related to television interference in its over 12 year operational history of the Project.

### 8.6.5.2 Mitigative Measures

If interference to a residence's or business's television service is reported to Xcel Energy, Xcel Energy will work with affected parties to determine the cause of interference and, when necessary, reestablish television reception and service.

Xcel Energy plans to address any post-construction television interference concerns on a case-by-case basis. If television interference is reported to Xcel Energy, Project representatives will:

- Log the contact in Xcel Energy's complaint database to track resolution efforts.
- Review results of the report to assess whether impacts are likely Project related.
- Meet with the landowner and a local communication technician to determine the current status of their television reception infrastructure.
- Discuss with the landowner the option of (1) installing a combination of high gain antenna and/or a low noise amplifier, or (2) entering into an agreement to provide a monetary contribution (equal to the cost of installing the recommended equipment) toward comparable satellite television services at the residence.
- At the landowner's election, Xcel Energy will either install the necessary equipment or enter into an agreement to reimburse the landowner for the cost of comparable satellite television services.
- If the landowner chooses satellite service, Xcel Energy will consider the matter closed upon installation of the satellite dish.
- If the landowner chooses to have the antenna and/or amplifier installed and later complains of continued interference issues, Xcel Energy will send a technician to the site to assess whether the equipment is working properly and fix the equipment as needed and evaluate the reported interference issues.
- If Project-related interference remains an issue, Xcel Energy will propose an agreement that reimburses the landowner for the costs of comparable satellite television services and will remove the antenna and amplifier equipment, unless it was initially installed to serve multiple households.

- If Xcel Energy and the landowner are unable to reach an agreement to resolve interference-related issues, Xcel Energy will report the concern as an unresolved complaint and follow the Commission's dispute resolution process to resolve the matter.

### 8.6.6 Cell Towers and Broadband Interference

As noted in the Land Mobile and Emergency Services report (Appendix G), cellular services in the Project Area are provided by many carriers including AT&T, Sprint, T-Mobile, and Verizon. As described in Section 8.6.4 (Communication Systems), there are three land mobile antennas in the Project Area. Additionally, Comsearch conducted a specific study on land mobile and emergency services for the Project Area (Appendix G). The study identified the same three land mobile antennas in the Project Area as the Communication Tower Study.

Minnesota is prioritizing border-to-border high-speed internet access throughout the state. The Border to Border Broadband Development Grant Program was created in Minn. Stat. § 116J.395 in 2014. The legislative focus of this grant program is to provide state resources that help make the financial case for new and existing providers to invest in building broadband infrastructure to unserved and underserved areas of the state. Based on data from the Minnesota Department of Employment and Economic Development (MN DEED), the majority of the Project Area is identified as an Unserved Area (no wireline broadband of at least 25 megabytes per second (Mbps) download and 3 Mbps upload [25M/3M]). A small portion of the Project Area near Dexter is identified as Underserved Area (wireline broadband of at least 25M/3M but less than 100M/20M) (MN DEED, 2020).

#### 8.6.6.1 Impacts

Xcel Energy does not anticipate any impacts to cellular services as a result of the Repowering Project. Each of the cellular-provider networks in the Project Area is designed to operate reliably in a non-line-of-sight environment. Many land mobile systems are designed with multiple base transmitter stations covering a large geographic area with overlap between adjacent transmitter sites in order to provide handoff between cells. Therefore, any line-of-sight signal blockage caused by placement of the proposed wind turbines would not materially degrade the reception because the end user is likely receiving signals from multiple transmitter locations.

Xcel Energy also does not anticipate any impacts to land mobile communication systems. Per FCC interference emissions from electrical devices in the land mobile frequency bands, turbines within 77.5 m of land mobile fixed-base stations can cause impacts. The closest turbine to a land mobile tower/antenna is over 325 meters, well beyond the recommended FCC interference setback.

Based on data from the MN DEED, the Project Area is considered an Unserved Area for broadband. As such, impacts to broadband service are not likely or anticipated. Additionally, Xcel Energy is unaware of potential interference or disruptions to broadband service that could be caused by operation of wind turbines.

Xcel Energy is not aware of complaints regarding telephone, internet, or cellular phone service during the past 12 years of Project operation.

#### 8.6.6.2 Mitigative Measures

If cell tower signal or broadband interference is identified during or after construction of the Project, Xcel Energy will address the interference on a case-by-case basis. Xcel Energy does not propose mitigative measures at this time.

## 8.7 CULTURAL AND ARCHAEOLOGICAL RESOURCES

On behalf of Xcel Energy, Merjent, Inc. (Merjent) conducted background research on known cultural resources in February 2021 by requesting information from the Minnesota Office of the State Archaeologist (OSA) and the SHPO. Data regarding known cultural resources information resulting from previous professional cultural resources surveys and reported archaeological sites and historic architectural resources was received from the agencies and reviewed. In addition, the Phase Ia background literature review and the Phase I archaeological survey reports prepared for the Grand Meadow, Wapsipinicon, and Prairie Star Wind Farms between 2007 and 2008 were reviewed (MacFarlane and Rothaus, 2007; Kennedy and Jenkins, 2008; Grohnke and Mieras, 2008; Grohnke et al., 2008). In addition to the background research, Merjent also reviewed information from 19th century General Land Office maps and notes on file with the Bureau of Land Management (BLM, 2020) and aerial photographs from 1938 and 1954 on file with the Minnesota OSA.

The background literature review identified archaeological and historic architectural resources within one mile of the Project Area. This information was used to understand the types of archaeological sites that may be encountered and landforms or geographic features that have a higher potential for containing significant cultural resources. A copy of the background literature review, including a cultural and historic overview of the Project Area, is provided in Appendix H.

### 8.7.1 Previous Investigations

The Phase Ia literature review for the Project identified seven previous reports of archaeological inventories or evaluations within the Project Area. Four of the reports provide the results of the Phase Ia background literature review and the Phase I archaeological inventory conducted for the Grand Meadow, Wapsipinicon, and Prairie Star Wind Farms between 2007 and 2008 were reviewed (McFarlane and Rothaus, 2007; Kennedy and Jenkins, 2008; Grohnke and Mieras, 2008; Grohnke et al., 2008). The remaining three reports provide the results of a statewide archaeological survey conducted in 1981 (Minnesota Historical Society, 1981), a National Register Survey of Mower County conducted in 1985 (Historical Research, Inc., 1985), and a Phase I archaeological inventory of the Northern Natural Gas La Crosse Pipeline Loop conducted in 2003 (Lyon et al., 2003).

### 8.7.2 Previously Recorded Archaeological and Historic Architectural Resources

Table 8.7-1 summarizes previously recorded archaeological sites and historic architectural resources that were identified within the Project Area or within one mile of the Project Area. Information regarding National Register of Historic Places (NRHP) eligibility of the previously recorded sites was also reviewed.

**Table 8.7-1**
**Previously Recorded Cultural Resources within the Project Area and within 1-mile Buffer**

| Resource Type | Project Area | 1-mile Buffer |
|---|---|---|
| Archaeological Sites | 3 | 6 |
| Total Listed in or Eligible for Listing in NRHP[1] | 0 | 0 |
| Historic Architectural Resources | 0 | 7 |
| Total Listed in or Eligible for Listing in NRHP[1] | 0 | 0 |
| **Total Previously Recorded Cultural Resources** | **3** | **13** |
| **Total Listed in or Eligible for Listing in NRHP[1]** | **0** | **0** |

[1] The number of NRHP-eligible resources shown is a subset of the total number of archaeological sites or historic architectural resources in each category.

Three previously recorded archaeological sites were identified within the Project Area. Of the three previously recorded sites, two are Precontact artifact scatters and one is a Precontact lithic scatter. None of the previously recorded archaeological sites within the Project Area have been evaluated for listing in the NRHP.

The Phase Ia literature review identified six previously recorded archaeological sites within one mile of the Project Area. Of the six previously recorded archaeological sites within the one-mile buffer of the Project Area, two are Precontact lithic scatters, three are Precontact single artifact finds, and one is an historic site lead (Sutton Ghost Town). Site leads are reported sites that have not been verified or their precise location is unknown. None of the previously recorded archaeological sites within one mile of the Project Area have been evaluated for listing in the NRHP.

The Phase Ia literature review did not identify previously recorded historic architectural resources within the Project Area. A total of seven previously recorded historic architectural resources were identified within one mile of the Project Area. These resources are located within the cities of Dexter and Elkton. In the City of Dexter these resources include the Dexter Elevator, Dexter Public School, First State Bank of Dexter, a residence, a Standard Station, and a commercial block. In the Town of Elkton, the Elkton Post Office was identified as a previously recorded architectural resource. None of these architectural resources have been evaluated for listing in the NRHP.

The Phase Ia literature review also identified three previously recorded historic bridges, one of which (Bridge No. 1942) has been determined not eligible for listing in the NRHP; the other two bridges (Bridge 9680 and Bridge L4977) have not been evaluated for listing in the NRHP. However, location information for these bridges was not included in the records reviewed and their exact location is not known. For this reason, the bridges are is not included in Table 8.7-1.

### 8.7.3 Agency and Tribal Coordination

As part of public outreach for the Project, Xcel Energy sent project introduction letters to the Minnesota SHPO, the Minnesota OSA, and twelve Native American Tribes with known interest in the Project Area. Xcel Energy received a response from the Tribal Historic Preservation Officer for the Lower Sioux Indian Community noting that some of the existing turbines are located within

a documented archaeological site and requesting clarification on whether ground disturbance will be necessary in this area. To date, no additional responses have been received.

### 8.7.4 Impacts

Construction of the Project has the potential to affect archaeological and historic architectural resources within the Project Area. None of the three previously recorded archaeological resources identified within the Project Area have been evaluated for listing in the NRHP. The previously recorded archaeological resources within the Project Area were recorded as part of the original cultural resources investigations for the Grand Meadow Wind Farm; therefore, these resources were considered and avoided to the extent practicable during the original design of the wind farm.

Temporary construction workspaces for the Project (i.e., workspaces at turbine pads, crane paths, staging areas, and widened access roads) are sited away from existing structures and would not affect previously recorded historic architectural resources. Workspaces may affect previously recorded archaeological sites, but as none of the sites are listed in or determined eligible for listing in the NRHP avoidance of these previously recorded archaeological sites is not required. Also, because temporary construction workspaces for the Project are located in areas currently used for agricultural production, any disturbance to previously recorded sites during construction of the Project would be similar to current land uses.

### 8.7.5 Mitigative Measures

During Summer/Fall 2021 and in consideration of previous investigations within the Project Area, literature search results, and future coordination with SHPO, Merjent will conduct field surveys in areas of planned disturbance that have not previously been surveyed. The Phase 1 field survey will meet the standards established in the SHPO Manual for Archaeological Projects in Minnesota. This investigation will be conducted by a professional archaeologist meeting the Secretary of the Interior's Standards for Archaeology as published in Title 36 Code of Federal Regulations Part 6. The survey protocol and report will be coordinated with and approved by SHPO. If archaeological or historic architectural resources are identified as a result of field surveys, Xcel Energy will work with SHPO to identify measures to avoid or mitigate any effects to these resources. Additionally, Xcel Energy will reconfigure the placement of construction workspaces to avoid impacts to newly identified archaeological and historic architectural resources that are eligible for listing in the NRHP. Avoidance of resources may include minor adjustments to the Project design and designation of environmentally sensitive areas to be left undisturbed during construction.

If archaeological resources are discovered during construction, ground disturbing activity would be halted in that location, the SHPO would be notified, and measures will be developed in conjunction with SHPO to assess and protect the resource. Additionally, if unanticipated human remains are discovered during construction, they will be reported to the State Archaeologist per Minn. Stat. § 307.08 and construction will cease in that area until adequate mitigation measures have been developed between Xcel Energy and the State Archaeologist.

## 8.8 RECREATION

Recreational opportunities near the Project Area include hiking, fishing, snowmobiling, hunting, camping, golfing, and nature viewing. Figure 6 – Public Land Ownership and Recreation depicts the locations of WMAs, Scientific and Natural Areas (SNAs), and snowmobile trails within 10 miles of the Project Area.

Minnesota WMAs are managed to provide wildlife habitat, improve wildlife production, and provide public hunting and trapping opportunities. These MNDNR lands were acquired and developed primarily with hunting license fees. WMAs are closed to all-terrain vehicles and horses because of potential detrimental effects on wildlife habitat. There are no WMAs within the Project Area and nine WMAs within 10 miles of the Project Area, as shown in Table 8.8-1.

**Table 8.8-1**
**Wildlife Management Areas within Ten Miles of the Project Area**

| Distance from Project Area Boundary (miles) | WMA Name | General Location Relative to Project Area | WMA Area (acres) |
|---|---|---|---|
| 1.3 | Schwerin Creek WMA | West/southwest | 37.2 |
| 5.3 | Deer Creek WMA | East | 39.7 |
| 5.9 | Cary Creek WMA | Northeast | 50.1 |
| 6.6 | Cartney WMA | Southeast | 480.3 |
| 7.4 | Rustic Retreat WMA | South/southeast | 16.2 |
| 8.7 | Schumann WMA | Northeast | 92.3 |
| 9.4 | Marian Marshall WMA | North | 59.4 |
| 9.4 | Suess WMA | North | 53.8 |
| 9.8 | Mentel WMA | West | 36.7 |

SNAs are areas designated to protect rare and endangered species habitat, unique plant communities, and significant geologic features that possess exceptional scientific or educational values. There are no SNAs within the Project Area and three SNAs located within 10 miles of the Project Area, as shown in Table 8.8-2 and on Figure 6 – Public Land Ownership and Recreation.

**Table 8.8-2**
**Scientific and Natural Areas within Ten Miles of the Project Area**

| Distance from Project Area Boundary (miles) | SNA Name | General Location Relative to the Project Area | SNA Area (acres) |
|---|---|---|---|
| 1.0 | Wild Indigo Prairie SNA | West | 124.7 |
| 7.8 | Racine Prairie SNA | Northeast | 7.9 |
| 8.2 | Shooting Star Prairie SNA | Southeast | 8.3 |

A section of the Heartland Sno-goers Snowmobile Trail bisects the northern portion of the Project Area. Within the Project Area, the trail begins near the intersection of Interstate 90 and State Highway 16, loosely parallels Interstate 90 north-south, the turns to the east-west and cuts across agricultural fields north of State Highway 16 for approximately 2 miles. The trail continues beyond the Project Area toward the Town of Grand Meadow.

Also present within the Project Area is a section of the Mower County Management Snowmobile Trail that begins near the intersection of Interstate 90 and State Highway 16, then parallels the western boundary of the Project Area (traveling north-south) for about 1.7 miles, then bisects a small portion of the Project Area in agricultural fields for about 0.75 mile before continuing on to the Town of Elkton.

There are no WPAs, National Wildlife Refuges, AMAs, Designated Wildlife Lakes, state parks, state trails, state water trails, or golf courses within 10 miles of the Project Boundary.

### 8.8.1 Impacts

Repowering will avoid direct impacts to recreational resources. Xcel Energy has designed the temporary construction workspaces to avoid the Heartland Sno-goers Snowmobile Trail; no crane paths or construction workspace will intersect this trail. However, the Mower County Management Snowmobile Trail would be crossed by crane paths where it bisects a small portion of the Project Area for 0.75 mile. Snowmobile trail crossings by crane paths during construction will result in a minimal, temporary impact to the trail, but no permanent impacts to the trail would occur from these activities. As snowmobile trails are only used during winter months, potential impacts will depend on the timing of construction. If construction in this area is completed during non-winter months, snowmobilers would not notice an impact. Additionally, the Mower County Snowmobile trail occurs within 250 feet of Turbine 157. Xcel Energy does not anticipate any impacts to this snowmobile trail as its been used during operation of the Grand Meadow Wind Farm.

The longer blades will result in an increase in height of up to 10 meters or about 33 feet. Potential visual impacts to recreational resources within and around the Repower Project Area related to adding larger rotors to the turbines will be minimal and are discussed further in Section 8.5.2.

### 8.8.2 Mitigative Measures

No direct impacts to recreational resources are anticipated as a result of repowering the Project, and therefore no mitigation is proposed.

## 8.9 PUBLIC HEALTH AND SAFETY

### 8.9.1 Electromagnetic Fields and Stray Voltage

Electromagnetic fields (EMF(s)) arise from the movement of an electrical charge on a conductor such as transmission lines, power collection (feeder) lines, substation transformers, house wiring, and electrical appliances (NIEHS, 2002). The intensity of the electric portion of EMF is related to the potential, or voltage, of the charge on a conductor, and the intensity of the magnetic portion of the EMF is related to the flow of charge, or current, through a conductor. EMF is commonly

associated with power lines, but they occur only at close range because the magnetic field rapidly dissipates as the distance from the line increases (EPA, 2020a).

#### 8.9.1.1 Impacts

The National Institute of Environmental Health Sciences has conducted extensive research on EMF (NIEHS, 1999). While there is no conclusive research evidence that EMFs from power lines and wind turbines pose a significant health impact, the turbines were originally installed beyond the minimum allowable distances from occupied residences (500-foot minimum setback; the closest turbine to a residence is 1,044 feet), where EMF is expected to be at background levels unrelated to wind project proximity. EMFs from underground electrical collection and feeder lines dissipate very quickly and relatively close to the source because they are installed below ground to a depth of approximately 48 inches and are heavily insulated and shielded. Consequently, the electrical fields that emanate from buried lines and transformers are generally considered negligible, and magnetic fields often decrease significantly within approximately three feet of stronger EMF sources (such as transmission lines and transformers; NIEHS, 2002). No changes to the Xcel Energy electrical system will occur except limited conductor size increases, testing of the system, and repairs to any deficient conductors. Consequently, no significant increase in EMF impact is expected from the repowering or operation of the Project. Xcel Energy is not aware of any complaints or claims of impact from EMFs since the Project became operational.

#### 8.9.1.2 Mitigative Measures

Based upon current research regarding EMFs and the separation distances being maintained between transformers, turbines and collector lines from public access and occupied homes, EMFs associated with the Repower Project are not expected to have an impact on public health and safety. Because no changes to the electrical system with the repowering that could increase EMF are expected, no significant mitigations related to EMF are planned. Xcel Energy is committed to inspecting and maintaining the electrical infrastructure. Xcel Energy is committed to installing facilities in a manner that minimizes the potential for EMFs.

### 8.9.2 Air Traffic

There are no public airports within 10 miles of the Project Area (AirNav, 2021). Air traffic may also be present near the Project Area for crop dusting of agricultural fields. Crop dusting is typically carried out during the day by highly maneuverable airplanes or helicopters.

The Rochester Airport Surveillance Radar (Rochester Radar facility) is located in Olmstead County, Minnesota. The DoD operates the Rochester Radar facility. The proposed Project is within line of sight of this facility.

#### 8.9.2.1 Impacts

There are no public airports within ten miles of the Repower Project; therefore, no impacts are anticipated. The installation of wind turbine towers in active croplands will create a potential for collisions with crop-dusting aircraft. However, the turbines would be visible from a distance. Xcel

Energy will notify local airports about the Project including locations of new ADLS towers in the area to minimize impacts and reduce potential risks to crop dusters.

The DoD has identified wind turbines located within line of sight of the Rochester Radar facility as a potential cause of "over saturation" of the radar system, which has the potential to interfere with the radar's performance.

#### 8.9.2.2 Mitigative Measures

Xcel Energy submitted 7460-1 forms to initiate the FAA review of the Repower Project in February 2021. The FAA will review the repower turbines and issue a "Determination of No Hazard." Further, Xcel Energy will appropriately mark and light the turbines to comply with FAA requirements and, as mentioned in Section 8.5.1, Xcel Energy is coordinating with the FAA on implementing an ADLS. Xcel Energy will notify local airports about the Project to reduce the risk to crop dusters. Additionally, Xcel Energy will coordinate with landowners within and adjacent to the Project regarding crop-dusting activities. The Department of Defense identified a potential impact to the operation of the Rochester Radar facility. Xcel Energy is working with the Department of Defense on a mitigation and voluntary contribution agreement for the Rochester Radar facility.

## 8.10 HAZARDOUS MATERIALS

The land within the Project Area is primarily rural and used for agriculture. Potential hazardous materials within the Project Area are associated with agricultural activities, and include petroleum products (fuel and lubricants), pesticides, and herbicides. Older farmsteads may also have lead-based paint, asbestos shingles, and polychlorinated biphenyls in transformers. Trash and farm equipment dumps are common in rural settings.

Xcel Energy reviewed the U.S. Environmental Protection Agency's (EPA) Facility Registry Service (FRS) to identify sites that are listed on the Comprehensive Environmental Response, Compensation, and Liability Information System (also known as Superfund sites); Resource Conservation and Recovery Act (RCRA) Treatment, Storage, and Disposal; RCRA hazardous waste generators; the Assessment, Cleanup, and Redevelopment Exchange System; Minnesota Permitting, Compliance, and Enforcement Information Management System; and the Leaking Underground Storage Tank—American Recovery and Reinvestment Act database (EPA, 2020b). Xcel Energy also reviewed the MPCA's *What's in my Neighborhood* (WIMN) database to identify any potential contaminated sites in the Project Area (MPCA, 2020a).

Review of the FRS and WIMN databases identified 5 licensed feedlots, one leaking underground storage tank that is in remediation (the CBR Drilling, Inc./Former Windmill Travel Center), one solid waste generator (Miller/Smith Property), one Department of Homeland Security – Chemical Security Assessment Tool Reporter (the McNeilus Truck and Manufacturing Company and Composites Facility), and two hazardous waste, conditionally exempt small quantity generator site (McNeilus Truck and Manufacturing Company and Composites Facility and the existing Grand Meadow Wind Farm) in the Project Area. In addition, the McNeilus Truck and Manufacturing Company and Composites Facility is listed under a number of categories related to air quality (both active and inactive).

In addition to the research described above, an ASTM-conforming Phase I Environmental Site Assessment (Phase I ESA) will be conducted for all parcels the Project Area that require a new lease agreement; parcels already under lease agreements for the Project that are receiving a lease extension will not be included in the Phase I ESA. The Phase I ESA will identify known recognized environmental conditions or historical recognized environmental conditions that may require additional action prior to or during construction.

### 8.10.1 Impacts

Construction of the Project will not impact known contaminated sites. Xcel Energy has designed the Project to avoid known contaminated sites within the Project Area. Xcel Energy also will conduct a Phase I ESA of all newly leased parcels prior to construction to locate any additional contaminated sites in the Project Area that require avoidance.

Spill-related impacts from construction are primarily associated with fuel storage, equipment refueling, and equipment maintenance. To avoid spill-related impacts during construction, Xcel Energy will develop a Spill Prevention, Control, and Countermeasures Plan that will outline measures to be implemented to prevent accidental releases of fuels and other hazardous substances and describe the required response, containment, and cleanup procedures to be used in the event of a spill.

During operation of the Project, three types of petroleum-product fluids will be used for turbine operation:

- gear box oil – synthetic or mineral depending on application (approximately 300 liters);
- hydraulic fluid; and
- gear grease.

Turbine hydraulic oils and lubricants will be contained within the wind turbine nacelle, or in the case of car, truck, and equipment fuel and lubricants, within the vehicle. Transformer oil will be contained within the transformer. Fluids will be monitored during maintenance at each turbine and transformer. A small amount of hydraulic oil, lube oil, grease, and cleaning solvent will be stored in the O&M facility. When fluids are replaced, the waste products will be handled according to regulations and disposed of through an approved waste disposal firm in compliance with the requirements of applicable laws and regulations.

### 8.10.2 Mitigative Measures

Because any potentially hazardous waste sites identified through online research or the Phase I ESA of the Project Area will be avoided, no mitigative measures are necessary. If any wastes, fluids, or pollutants are generated during any phase of construction or operation of the Project, they will be handled, processed, treated, stored, and disposed of in accordance with Minn. R. Ch. 7045.

## 8.11 LAND-BASED ECONOMIES

### 8.11.1 Agriculture/Farming

The majority of land use in the Project Area is cultivated crop land (approximately 7,605 acres or 94 percent), as shown in Figure 12 (Land Cover) and discussed in Section 8.19. As shown in Table 8.15-1 and discussed further in Section 8.15, all of the soils in the Project Area are classified as prime farmland, including those soils identified as prime farmland if the limiting factor is mitigated.

According to the USDA's 2017 Census of Agriculture, the average farm size in Mower County is 419 acres, and is generally larger than the average size of all Minnesota farms, 371 acres. Crop sales account for a larger percentage of total market value of agricultural products compared to livestock in Mower County ($243 million vs. $171 million, annually). Corn, soybeans, and vegetables harvested for sale are the dominant agricultural crops by acreage while hogs and pigs, cattle, and poultry (i.e., layers) are the dominant livestock raised in Mower County.

Specialty crops typically include nurseries, vineyards, orchards, citrus groves, dairies, aquaculture, and tree farms; to date, no farmland engaged in specialty crop production has been identified in the Project Area. Xcel Energy will continue to work with individual landowners through the easement process to identify any specialty crops or livestock operations that may be impacted by the Project. If any specialty crops or livestock operations are identified, Xcel Energy will work with landowners to determine measures to avoid and minimize impacts to these resources.

As discussed in Section 8.3, Conservation Easements, no CRP or CREP easements have been identified within the Project Area (*see* also Figure 6 – Public Land Ownership and Recreation).

#### 8.11.1.1 Impacts

Construction of the Project could cause minimal, temporary impacts to farmland from soil compaction and rutting, accelerated soil erosion, crop damage, temporary disruption to normal farming activities, drain tile damage, and introduction of noxious weeds to the soil surface. Because this is a repowering project, impacts on agricultural land will be limited to workspaces around turbine pads, crane paths, staging areas, and access road widening. However, these impacts would be temporary and would resolve with the completion of the repower work. Furthermore, as discussed in Section 6.4, Xcel Energy will use construction matting along the crane paths to minimize compaction and potential impacts to drain tile. Tracked vehicles, similar to a bobcat or skid steer, will move with the crane continually placing matting as the crane moves forward. Additionally, Xcel Energy and the construction contractor, with input from landowners, have designed crane paths to maximize routing along existing access roads to turbines, field edges and parcel lines.

Operation of the repowered wind farm would not impact agricultural production, as no new turbines or other permanent facilities are proposed. As demonstrated by other wind energy projects in the Midwest, agricultural practices continue during construction. After construction, continued operation of the wind farm would not impact agricultural production in the Project Area.

In a comment letter from Minnesota Department of Agriculture (MDA) on January 7, 2021, the state agency noted they have no specific concerns with the Repower Project. It has been MDA's experience that the displacement of agricultural land is quite low for wind projects and the potential for temporary impact to agricultural soils is well addressed in landowner agreements (Appendix D – Agency Correspondence).

#### 8.11.1.2 Mitigative Measures

Construction of the Repower Project would result in short term, minimal impacts to agricultural production within the Project Area. The use of temporary workspaces around turbine pads, crane paths, laydown area, and access roads is not expected to significantly impact agricultural production. After the repower work is completed, Xcel Energy will restore disturbed areas as close as practicable to their original condition. Post-construction restoration methods may vary depending upon the vegetation (or lack thereof) and the soil types at each location.

Construction equipment used in the erection of wind turbine components is designed with wide tires and tracks to distribute the weight over a larger area, providing stability and reducing soil compaction. In addition, Xcel Energy plans to use timber matting along crane paths to further minimize the potential for soil compaction and impacts on existing drain tile systems. After the repowering work is complete, Xcel Energy will assess disturbed areas to determine whether corrective action (e.g., tilling or other decompaction methods) is needed. The temporary workspaces around turbine pads, areas where access roads are widened, and staging areas typically experience a higher volume of construction vehicle traffic and will likely require de-compacting before being returned to agricultural use.

Xcel Energy will coordinate with property owners to identify features on their property, including drain tile, to avoid impacting these features. While avoidance of drain tile is planned, Xcel Energy recognizes that excavation and heavy equipment operation during construction has the potential to cause damage to known or unknown drain tiles. In the event that there is damage to drain tile as a result of construction activities or operation of the Project, Xcel Energy will work with affected property owners to repair the damaged drain tile in accordance with the lease agreements between Xcel Energy and the landowner.

As discussed in Section 8.3.1, if CRP, CREP, or additional RIM easements are identified during the title search or in consultation with the BWSR, and impacts to such conservation easements are unavoidable, Xcel Energy will work with easement holders to obtain all necessary consents to construct and operate the Project.

### 8.11.2 Forestry

Economically important forestry resources are not found in this region of Minnesota. Forested areas are primarily associated with homes in the form of woodlots, shelterbelts, and along the margin of waterbodies within the Project Area.

#### 8.11.2.1 Impacts

No impacts to forestry resources would occur from construction or operation of the Project.

#### 8.11.2.2 Mitigative Measures

No impacts to forestry resources would occur; therefore, no mitigation will be necessary.

### 8.11.3 Mining

Mining does not comprise a major industry in Mower County. Many of the gravel operations found in Mower County are inactive, abandoned, or their use is limited to the landowner. Because land uses can change over time, and keeping up with these changes can be challenging, Xcel Energy reviewed MNDOT's Aggregate Source Information System data (MNDOT, 2018), the Mower County Pit Map (MNDOT, 2002), and several years of aerial photography to identify mining operations in the Project Area. No active or inactive gravel mines were identified within the Project Area as a result of this review.

#### 8.11.3.1 Impacts

No active or inactive gravel mines are present within the Project Area; therefore, no impacts on mining resources or operations are anticipated as a result of the Project.

#### 8.11.3.2 Mitigative Measures

The Project would not impact mining resources and, as such, no mitigation measure are proposed.

## 8.12 TOURISM

Tourism in the vicinity of the Project centers around various festivals and activities hosted by the cities near the Project Area, such as Austin, and outdoor recreational opportunities described in Section 8.8.

The City of Austin hosts numerous public events during the year including the Austin Winter Extravaganza, which includes one event each month between December and March: a Santa visit at the fairgrounds in December, January Snowflake Days, February Follies, and March Melt (Austin Area Chamber of Commerce, Undated). In the summer months Austin also hosts an annual Independence Day Parade and a Ladies Night Out, both of which are held during July. The Mower County Fair is also held within the City of Austin each year during the month of August at the Mower County Fairgrounds (Mower County Fair, 2021).

Another popular tourist attraction in Austin is the SPAM® Museum and Gift Shop, which are located in the City of Austin. The SPAM® Museum and Gift Shop are operated by Hormel Foods to provide visitors with an introduction to the history of SPAM® products (SPAM, 2021). The museum and gift shop are open 7-days a week and admission to the museum is free. SPAM™bassadors are also available to provide tours of the museum free of charge.

The Historic Bluff Country National Scenic Byway (State Highway 16) is an 88-mile byway that travels east-west along the Root River valley between the cities of Dexter and LaCrescent, with a small loop on U.S. Highway 52 and State Highway 80 (Explore Minnesota, 2021). The byway offers scenic views of Minnesota's bluff country as well as numerous tourist attractions and parks in the small towns along its length (Historic Bluff Country, 2020).

Outside of municipal events, residents and tourists enjoy recreational opportunities at the WMAs, SNAs, and snowmobile trails in Mower County. See Section 8.8 for more details on public recreation opportunities near the Project Area.

### 8.12.1 Impacts

Construction of the Project will have a minimal impact on tourism opportunities in the Project vicinity. Construction impacts would mostly be related to increased traffic due to construction activities that may be perceptible to persons traveling through the Project Area to visit tourist destinations in Austin or nearby recreation lands. These impacts will be minimal, temporary, and isolated to specific areas throughout the Project Area.

### 8.12.2 Mitigative Measures

The Project is not expected to impact tourism opportunities in the Project vicinity; therefore, no mitigation measures are proposed.

## 8.13 LOCAL ECONOMIES AND COMMUNITY BENEFITS

Socioeconomic information is provided at the county level to characterize the socioeconomic conditions in the Project Area and at the state level for the purpose of comparison. Table 8.13-1 summarizes the existing socioeconomic conditions in the Project Area.

**Table 8.13-1**
**Existing Economic Conditions in the Project Area**

| Category | Minnesota | Mower County |
|---|---|---|
| Per Capita Income Level (U.S. dollars) | $36,245 | $29,116 |
| Unemployment Rate (%) | 3.9 | 4.5 |
| Persons Living Below the Poverty Level (%) | 10.1 | 12.8 |
| Top 3 Industries[1] | E (25.2%), M (13.4%), R (11.0%) | E (25.7%), M (23.3%), and R (9.7%) |

Source: U.S. Census Bureau, 2018b

[1] Industries are defined under the 2012 North American Industry Classification System and abbreviated as follows: E = Educational, Health and Social Services; M = Manufacturing; and R = Retail Trade.

The top three industries of employment in the State of Minnesota are “education, health, and social services” at 25.2 percent, “manufacturing” at 13.4 percent, and “retail trade” at 11.0 percent. The top three industries of employment in Mower County are similar to the state level, but “manufacturing” plays a larger role in this area of southwestern Minnesota than at the state level (U.S. Census Bureau, 2018b).

Per capita income in Mower County is about $7,000 less than per capita income at the state level, which is $36,245 (see Table 8.13-1). The unemployment rate in Mower County, 4.5 percent, is slightly higher than the state level and the percentage of persons living below the poverty level in Mower County is two percentage points higher than the state level of 10.1 percent.

### 8.13.1 Impacts

The overall impact of the Project on the local economy and communities of Mower County will be positive in both the short term and long term. Repowering of the existing wind farm supports diversification of economic development in the agricultural sector and promotes efforts to attract additional employment opportunities and tax revenues while retaining and growing the existing business base. Repowering is expected to extend life of the Grand Meadow Wind Farm, thereby extending the economic benefits for an additional ten years beyond the term of the current easement agreements.

Because most of the land within the Project Area is used for agricultural production, Xcel Energy anticipates that some land will be temporarily removed from agricultural production for less than a year while the repowering work is completed. Landowners will be compensated for crop loss under the terms of their landowner agreements. Participating landowners will also benefit economically from continued long-term lease payments for the anticipated life of the repower Project.

Approximately 150 construction personnel will be required for the construction phase of the Project. Xcel Energy and its construction contractor will use union labor for construction of the Repower Project. Total wages and salaries paid to construction personnel in Mower County will contribute positively to the total personal income of the region. Additional personal income will be generated for residents in the county and state by circulation and recirculation of dollars paid out by the Applicant for business expenditures and for state and local taxes. Expenditures made for equipment, fuel, operating supplies, construction personnel lodging, and other products and services benefit businesses in the counties and the state.

Operations and maintenance of the existing Grand Meadow Wind Farm currently requires 6 full-time site staff. After repowering of the turbines is complete, Xcel Energy anticipates that the same number of staff will be required to operate and maintain the facility; no additional permanent full-time staff will be required.

Long-term beneficial impacts to the tax base of Mower County, as a result of the construction and operation of the Project, will have an additional positive impact on the local economy in this area of Minnesota. In addition to the creation of jobs and personal income, Grand Meadow Wind Farm pays a Wind Energy Production Tax to the local units of government of $0.0012 per kilowatt hour of electricity produced, resulting in annual Wind Energy Production tax revenue from approximately $475,000 annually, and approximately $12 million over the anticipated life of the Repower Project.

### 8.13.2 Mitigative Measures

Socioeconomic impacts associated with the Project will be positive with an influx of wages and expenditures made at local businesses during Project construction and continued operation of the wind farm for an additional 25 years from site permit amendment order will contribute to the county tax base. Because the impacts of the Project would be primarily positive, no mitigation measures are proposed.

## 8.14 TOPOGRAPHY

The Project is located in the Oak Savanna subsection of the MNDNR's Ecological Classification System (MNDNR, 2000). Subsection boundaries delineate a significant regional change in geology, topography, and vegetation. The Oak Savanna subsection consists of a rolling plain of loess-mantled ridges over sandstone and carbonate bedrock and till. Topography is gently rolling. Glacial drive is generally less than 100 feet thick with the maximum thickness of about 200 feet.

In the Project Area, elevations range from 1,332 to 1,438 feet (406 to 438 meters) above sea level. This elevation change is gradual; there are not areas of significant elevation change in the Project Area. A topographic map of the Project Area is shown in Figure 8 (Topographic Map).

### 8.14.1 Impacts

All workspaces utilized for the Repower Project will be temporary; therefore, no impacts to topography are anticipated.

### 8.14.2 Mitigative Measures

All workspaces utilized for the Repower Project will be temporary; therefore, no mitigative measures are proposed.

## 8.15 SOILS

Soil series, as established by the NRCS, are soils that are grouped together based on similar soil chemistry and physical properties. Each soil series is delineated as a single map unit and represents the dominant soil patterns or characteristics (Soil Survey Staff, 2020). Mapped soil series within the Project Area were identified from the NRCS soil surveys of Mower County, Minnesota.

In addition to the soil series, the USDA, NRCS identifies areas that are important to agricultural use, such as prime farmland and farmland of statewide importance. Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. Prime farmland can be cultivated land, pastureland, forestland, or other land. Important farmlands consist of prime farmland, unique farmland, and farmland of statewide or local importance (Soil Survey Staff, 2020). As shown in Table 8.15-1, all of the soils in the Project Area are classified as prime farmland, including those soils identified as prime farmland if the limiting factor is mitigated. Soils are mapped on Figure 13 (Soils).

**Table 8.15-1**
**Prime Farmland Within the Project Area (acres)**

| Prime Farmland Classification | Acres | Percent of Project Area |
|---|---|---|
| Prime Farmland[1] | 8,087.6 | 100.0% |
| Farmland of Statewide Importance | 0 | 0.0% |
| Not Prime Farmland | 0 | 0.0% |
| **Total** | **8,087.6** | |

[1] This includes soils classified as prime farmland or prime farmland if the limiting factor is mitigated.

### 8.15.1 Impacts

Repowering the project will likely result in minor short-term impacts to soils within the Repower Project Area during construction. No additional impacts are expected from continued operation of the Repower Project.

### 8.15.2 Mitigative Measures

The potential for construction-related soil erosion will be minimized by siting laydown areas to avoid highly erodible soils on steep slopes. Avoiding steep topography will also reduce the size of cut and fill areas. Within work areas, topsoil will be separated form subsoils, protected from erosion and runoff using mulch, and then re-spread over disturbed areas once work is completed. Erosion control measures will also be implemented during construction to avoid or minimize soil erosion and off-site deposition. Erosion and sedimentation will be reduced by implementation of best management practices (BMPs) such as mulching, hydroseeding, wildlife-friendly erosion control blankets, silt fence installation, jute matting, revegetation, and/or interim reclamation (see Section 10.5). After repowering is completed, soils will be planted with crops or revegetated to stabilize them long term. Based on the implementation of these recommended and required mitigation measures, no adverse impacts to soil resources are expected as a result of repowering the project.

## 8.16 GEOLOGIC AND GROUNDWATER RESOURCES

### 8.16.1 Surficial Geology

Surficial geology in the Project Area contains a loess plain over bedrock or till. Also included are Late Wisconsin end moraines, stagnation moraines, and outwash. The underlying bedrock is typically coved by less than 100 feet of glacial till, which consists of loam and clay-loam textured, unsorted sediment (MNDNR, 2021a; MGS, 2019). Figure 14 – Geology provides an overview of geologic conditions in the Project Area.

### 8.16.2 Bedrock Geology

The bedrock underlying the glacial material in the Project Area is about 230 feet below land surface and consists of Coralville, Little Cedar, Pinicon Ridge and Spillville Formations (MGS, 2011). This Paleozoic rock consists of largely vuggy dolostone with limestone and shale intermittently (MGS, 1998).

### 8.16.3 Aquifers and Wells

Groundwater in the region is supplied by both surficial and buried aquifers. The aquifers consist of thick loam and clay loam glacial sediments, with limited extent surficial and buried sand aquifers, overlying thick and extensive Paleozoic sandstone and carbonate aquifers.

The Upper Carbonate Aquifer is the primary bedrock aquifer. It ranges in thickness and is confined by shale and carbonate rock, known as the Maquoketa confining unit. The water usually meets public use supply recommendations but is also susceptible to contamination from the land surface due to the karst landscape of the area. Purposes of withdrawals from the Upper Carbonate Aquifer include public supply, agricultural purposes, domestic use, and commercial & industrial purposes (Olcott, 1992).

Homes and farms in the Project Area typically use private wells and septic systems for their household needs. According to the Minnesota Department of Health's Minnesota Well Index online database, there are eight located wells within the Project Area and generally associated with residences (MDH, 2019).

### 8.16.4 Impacts

Impacts to geologic and groundwater resources from the Repower Project are not anticipated, as there will be only minimal surface disturbance for construction cranes and workspaces around turbines.

### 8.16.5 Mitigative Measures

Because impacts are not expected to geologic resources during the Project construction and operation, mitigation measures are not anticipated.

## 8.17 SURFACE WATER AND FLOODPLAIN RESOURCES

Surface water and floodplain resources for the Project Area were identified by reviewing U.S. Geological Survey (USGS) topographic maps, Minnesota Public Waters Inventory (PWI) maps, and other resources. The majority of the Project Area occurs within the Root River watershed; a small portion of the southwest corner of the Project Area occurs within the Cedar River watershed (MNDNR, 2021b; Figure 15 – Surface Waters). Named waterbodies within the Project Boundary include Deer Creek and South Fork Bear Creek.

There are no trout streams within the Project Area (MNDNR, 2021c). Similarly, none of the waterbodies within the Project Area are identified as Outstanding Resource Value Waters under Minn. R. 7050.0335, subp. 3. Figure 15 (Surface Waters) shows the locations of surface waters, federal Clean Water Act (CWA) 303(d) impaired waters, and Minnesota PWI waters within the Project vicinity, all of which were downloaded from the Minnesota Geospatial Commons. Deer Creek is the only impaired water in the Project Area.

Public waters are all waters that meet the criteria set forth in Minn. Stat. § 103G.005, subd. 15 that are identified on PWI maps authorized by Minn. Stat., § 103G.201 (MNDNR, 1984) and consist of PWI wetlands, PWI basins, and PWI watercourses. These water features are regulated as public

waters under the MNDNR's Public Waters Permit Program. PWI wetlands include all type III, type IV, and type V wetlands (as defined in USFWS Circular No. 39, 1971 edition) that are 10 acres or more in size in unincorporated areas or 2.5 acres or more in size in incorporated areas. There is one PWI watercourse listed as a MNDNR PWI watercourse within the Project Area; there are no PWI basins or PWI wetlands within the Project Area. The PWI watercourse in the Project Area is Bear Creek (M-009-033-088) which only spans 265 feet of the Project Area.

Section 303(d) of the CWA requires each state to review, establish, and revise water quality standards for all surface waters within the state. Waters that do not meet their designated beneficial uses because of water quality standard violations are considered impaired. There are two 303(d) impaired waters within the Project Area: Deer Creek and Bear Creek (South Fork Bear Creek; see Figure 15). Deer Creek is listed as impaired for E. coli and Bear Creek is listed as impaired for aquatic macroinvertebrate bioassessments (MPCA, 2020b).

### 8.17.1 Wildlife Lakes in and Adjacent to Project Boundary

The MNDNR commissioner may formally designate lakes for wildlife management under the authority of Minn. Stat. § 97A.101, subd. 2. This designation allows the MNDNR to temporarily lower lake levels periodically to improve wildlife habitat and regulate motorized watercraft and recreational vehicles on the lake. There are no MNDNR designated wildlife lakes in Mower County (MNDNR, 2016a). As noted above, there are also no state designated trout streams located within the Project boundary (MNDNR, 2021c).

### 8.17.2 Migratory Waterfowl Feeding and Resting Lakes

Migratory Waterfowl Feeding and Resting Areas (MWFRA) protect waterfowl from disturbance on selected waters of the state by prohibiting motors on these lakes during waterfowl season. These lakes are nominated by a petition process and approved or denied by the MNDNR after public input is received. There are no migratory waterfowl feeding and resting lakes in Mower County (MNDNR, 2016b).

### 8.17.3 Federal Emergency Management Agency Floodplains within Project Area

Federal Emergency Management Agency (FEMA)-designated floodplains are digitally available for the Project Area (FEMA, 2013). There are no 100-year floodplains within the Project Area (Figure 16– FEMA Floodplain).

### 8.17.4 Impacts

Due to the presence of watercourses within the Project Area, permits may be required for temporary crane crossings. Potential temporary impacts will be closely coordinated with the MNDNR, USACE, and the Local Government Units (LGUs) administering the Minnesota Wetland Conservation Act (WCA; Mower County), as appropriate.

The Repower Project will not impact floodplains as there are none present in the Project Area.

### 8.17.5 Mitigative Measures

Temporary impacts to waterbodies associated with crane paths will be minimized. Xcel Energy does not anticipate crane crossings of PWI watercourses and these are limited to approximately 265 feet in the northern portion of the Project Aera. Should the portion of Bear Creek that is designated as a PWI be crossed by the crane, Xcel Energy will obtain a MNDNR License to Cross Public Waters.

Because there are impaired waters within the Project Area, the National Pollutant Discharge Elimination System (NPDES) permit and Stormwater Pollution Prevention Plan (SWPPP) will require additional BMPs for potential runoff to these waters. As part of the NPDES permit process, Xcel Energy will design BMPs for the entire Project, including near impaired waters. The MPCA will review the SWPPP prior to finalizing.

Xcel Energy will permit crane path crossings of waterbodies (waters of the U.S.) with the USACE and LGU under the WCA. Access roads will be designed to maintain the waterbody's flow; crane path crossings of waterbodies will be matted.

There are no floodplains within the Project Area; therefore, no mitigation is proposed.

## 8.18 WETLANDS

Wetlands are areas with hydric (wetland) soils, hydrophilic (water-loving) vegetation, and wetland hydrology (inundated or saturated much of the year). Wetlands are part of the foundation of water resources and are vital to the health of waterways and communities that are downstream. Wetlands detain floodwaters, recharge groundwater supplies, remove pollution, and provide fish and wildlife habitat. Wetlands are also economic drivers because of their key role in fishing, hunting, agriculture, and recreation. Wetland types include marshes, swamps, bogs, and fens. Wetlands vary widely due to differences in soils, topography, climate, hydrology, water chemistry, vegetation, and other factors.

Wetlands within the Project Area were identified using Minnesota's update to the National Wetlands Inventory (NWI). Some of the wetlands are associated with creeks and unnamed intermittent streams within the site and some of the wetlands are isolated basins. The Cowardin Classification System wetland types and their acreage within the Project Area are presented in Table 8.18-1.

**Table 8.18-1**
**National Wetlands Inventory in the Project Area**

| NWI Wetland Type | Wetland Count | Acres[1] |
|---|---|---|
| Freshwater Emergent Wetlands | 17 | 58.4 |
| Freshwater Forested Wetlands | 1 | 0.8 |
| Freshwater Pond | 3 | 0.4 |
| Riverine | 1 | < 0.1 |
| **Wetland Total** | **22** | **59.6** |

[1] Wetland acreage is calculated using Minnesota's Update to NWI data.

There are approximately 59.6 acres of NWI-mapped wetlands in the Project Area, which constitutes less than one percent of the Project Area. Most of the mapped wetlands (97 percent) are freshwater emergent wetlands. There is less than one acres of freshwater forested wetlands, freshwater ponds, and riverine wetlands (Table 8.18-1). See Figure 17 (Wetlands Inventory Map) for locations of wetlands within the Project Area.

### 8.18.1 Impacts

Based on the current crane path layout, only minimal, if any, impacts to wetlands are anticipated. Minor, temporary impacts to wetlands may occur as a result of construction crane movements.

### 8.18.2 Mitigative Measures

Formal wetland delineations of the Project Area will be completed prior to construction, and the crane paths may be refined to further avoid and minimize wetland impacts. Temporary placement of construction materials (e.g. timber mats) into any wetland for purposes of temporary crossings may require coordination with USACE and Mower County, administering Section 404 of the CWA and the Minnesota WCA, respectively. Because all proposed impacts are temporary, project fill placement activities are expected to qualify under a Nationwide or Regional General Permit and be eligible for a "no-loss" determination under the WCA.

The MPCA administers the NPDES permit program in Minnesota and regulates construction activities that disturb more than one acre of land. As part of its NPDES permit application, a SWPPP will identify erosion and sedimentation control measures to prevent adverse water quality impacts to wetlands during and after construction. Mitigation measures included in the SWPPP should be sufficient to ensure that streams and surface waters within the Repower Project Area do not incur adverse construction-related stormwater impacts.

Xcel Energy will mitigate impacts to wetlands during construction and operation by protecting topsoil, minimizing soil erosion, and protecting adjacent wetland resources. Practices may include containing excavated material, use of silt fences, protecting exposed soil, stabilizing restored material, and re-vegetating disturbed areas with non-invasive species.

## 8.19 VEGETATION

The Project Area is in the Oak Savanna subsection of the Minnesota and Northeast Iowa Morainal Section in the Eastern Broadleaf Forest Province, as defined by the Ecological Classification System of Minnesota (MNDNR, 2000). Historically, bur oak savanna was the primary vegetation, but areas of tallgrass prairie and maple-basswood forest were common. Tallgrass prairie was concentrated on level to gently rolling portions of the landscape, in the center of the subsection. Bur oak savanna developed on rolling moraine ridges at the western edge of the subsection and in dissected ravines at the eastern edge. Maple-basswood forest was restricted to the portions of the landscape with the greatest fire protection, either in steep, dissected ravines or where stream orientation reduced fire frequency or severity (MNDNR, 2021a).

Based on review of aerial photographs and land use/land cover database information, the majority of the land area in the Project Area is cultivated crops (refer to Table 8.19-1 and Figure 12 – Land

Cover). Corn, soybeans, and vegetables harvested for sale are the dominant agricultural crops by acreage in Mower County (USDA, 2017). The land cover types in the Project Area are shown in Table 8.19-1 (Yang et al., 2018).

**Table 8.19-1**
**Land Cover Types and their Relative Abundance in the Project Area**

| Land Cover | Acres | Percent of Project Area |
|---|---|---|
| Cultivated Crops | 7,605.3 | 94 |
| Herbaceous | 31.7 | 0.4 |
| Hay/Pasture | 33.9 | 0.4 |
| Developed | 343.5 | 4.2 |
| Emergent Herbaceous Wetlands | 54.7 | 0.7 |
| Deciduous/Mixed/Evergreen Forest | 15.7 | 0.2 |
| Barren Land | 2.7 | <0.1 |
| **Total** | **8,087.6** | **100** |

Source: 2016 National Land Cover Database (Yang et al., 2018)

Forested areas are primarily windbreaks around residences and riparian areas along the unnamed tributaries in the Project Area. Some of the wetlands are associated with creeks and unnamed intermittent streams within the site and some of the wetlands are isolated basins.

### 8.19.1 Impacts

Temporary construction workspaces for the Repower Project were designed to occur primarily in cultivated cropland. Impacts to agriculture are discussed in Section 8.11.1.

The 2008 Site Permit, as amended, required a prairie protection plan to the extent there were prairie impacts (Site Permit Condition C.6). Because there were no impacts to native prairie when the Wind Farm was constructed, a prairie protection plan was not required or prepared. Similarly, impacts to native prairie will be avoided by Xcel Energy during the repowering process. For example, there is a Site of Biodiversity ranked below within 400 feet of Turbines 123 (site Grand Meadow 30) and Turbines 112 and 113 (site Grand Meadow 19). In these cases, Xcel Energy will utilize an irregular shaped workspace to work only in cultivated cropland and avoid areas that potential contain native prairie. Similarly, proposed crane paths have been routed primarily on agricultural lands. The Repower Project will also avoid woodlands, shrublands, grasslands, and water resources to the degree practicable. However, some minor and temporary impacts to wetlands, grasslands and shrubland may occur as a result of crane path construction. It is possible that these areas may contain native vegetation (i.e., plant species living in the area where it is found naturally vs. being introduced). If disturbed, Xcel Energy is committed to restoring and seeding these areas with certified weed-free native mixes appropriate for the region. It is the goal of Xcel Energy to minimize impacts to non-cultivated and sites of biodiversity within the Project Area.

### 8.19.2 Mitigative Measures

Xcel Energy will initiate restoration of disturbed soils and vegetation as soon as possible after construction activities are completed. Xcel Energy will restore areas of disturbed soil in non-cropped areas using weed-free native grasses, forbs, and shrubs. In cropped areas, a temporary cover crop may be planted to stabilize soils depending on the timing of construction completion and the next growing season.

The following measures will be used to avoid and minimize potential impacts to land of the Project Area during siting, construction, and operation to the extent practicable:

- Prioritize siting temporary construction workspaces in cultivated cropland.
- Avoid disturbance of wetlands during construction and operation of the Project. If jurisdictional wetland impacts are proposed, Xcel Energy will obtain applicable wetland permits (see Section 8.18).
- Design the Project to minimize the need to clear existing trees and shrubs.
- Prepare a construction SWPPP and secure a NPDES Permit.
- Use BMPs during construction and operation of the Project to protect topsoil and adjacent resources and to minimize soil erosion. Practices may include containing excavated material, protecting exposed soil and stabilizing restored material, revegetating non-cropland and range areas with wildlife conservation species, and (wherever feasible) planting native tall grass prairie species in cooperation with landowners.

## 8.20 WILDLIFE

### 8.20.1 General Wildlife

Wildlife in the Project Area consists of birds, mammals, fish, reptiles, amphibians, and insects, both resident and migratory, that use the Project Area habitat for forage, breeding, and/or shelter. The resident species are representative of Minnesota game and non-game fauna that are associated with farmlands, upland grasslands, and wetland and forested areas. Given that the land cover present in the Project Area is comprised primarily of agricultural lands, available wildlife habitat is limited. The majority of the migratory wildlife species are birds, including waterfowl, raptors, and songbirds. The wildlife in the Project Area are similar to what was presented in the original Site Permit Application for the wind farm in 2007.

The Grand Meadow Wind Farm became operational in late 2008, prior to the USFWS's issuance of the 2012 Land-Based Wind Energy Guidelines and Eagle Conservation Plan Guidance. In 2016, in response to those guidelines, Xcel Energy developed a Bird and Bat Conservation Strategy (BBCS), which addresses the pre-construction siting and field survey efforts that were completed in order to minimize impacts to wildlife and sensitive habitats; BMPs that were implemented to minimize impacts during construction; and post-construction monitoring/studies/reporting. Xcel Energy has prepared an updated BBCS (Appendix I) for the Repower Project.

In addition, in 2020, Xcel Energy obtained a voluntary Eagle Take Permit (ETP) for incidental take of bald eagles during operation of its Pleasant Valley and Grand Meadow Wind Farms. The permit was effective as of April 7, 2020 and expires on April 6, 2025. This permit was obtained based on the presence of active eagle nests within its Pleasant Valley Wind Farm Project Boundary, which is adjacent to the Grand Meadow Wind Farm on the north side of Interstate 90. Xcel Energy included the Grand Meadow Wind Farm in the take permit due to the proximity of Grand Meadow to the Pleasant Valley Wind Farm. However, there are no known eagle nests within or adjacent to the Grand Meadow Project Boundary. In accordance with the ETP, Xcel Energy will conduct permit compliance monitoring, including two years of systemic monitoring and five years of incidental monitoring, as well as two years of aerial eagle nest surveys.

### 8.20.2 Important Bird Areas

Important Bird Areas (IBAs) are created under voluntary, non-regulatory, international conservation effort that identifies critically essential habitats for birds, designates these habitats as IBAs, monitors the IBAs for changes in avian distribution and abundance, and conserves IBAs to protect birds in the long-term (MNDNR, 2021d). In Minnesota, the IBA program is led by the MNDNR's Nongame Wildlife Program and Audubon Minnesota. There are no IBAs in Mower County.

### 8.20.3 Impacts

Development of the Project, including the construction and operation, is expected to produce a minimal impact to wildlife. Based on studies of existing wind power projects in the United States and Europe, the impact to wildlife would primarily occur to avian and bat populations. It can be expected that, similar to the existing wind farm and at other wind developments, there is a high likelihood that individual bird and bat fatalities will occur at the Project. Repowering the Project with longer rotors will increase in rotor-swept-area, and therefore, may increase collision risk to birds and bats. Similarly, construction activities will introduce risk to primarily birds from construction equipment and vehicles traveling around the Project Area. However, it is unlikely that the Grand Meadow Repower Project will affect species at the population level.

As discussed above, the Grand Meadow Wind Farm became operational prior to implementation of the 2012 USFWS Land Based Wind Energy Guidelines. However, the Department of Commerce, in coordination with the MNDNR and Western EcoSystems Technology, Inc (WEST), developed a multi-year post-construction study to evaluate the fatality risk to bats at wind facilities within Southern Minnesota and evaluate possible correlations between turbine site characteristics and estimated fatality rates. Two years of surveys were conducted, in 2013 and 2014; the Grand Meadow Wind Farm Project was one of three projects that participated in the study. Fatality estimates from those surveys are included in Table 8.20-1 below.

In addition to post-construction data from Grand Meadow, recent post-construction data are available from the following wind facilities in southern Minnesota with comparable landscapes to Grand Meadow from which to draw correlative inferences about potential impacts on birds and bats from Project operations:

- Odell Wind Farm (Odell) in Cottonwood, Jackson, Martin and Watonwan Counties, Minnesota;
- Red Pine Wind Energy Facility (Red Pine) in Lincoln County, Minnesota;
- Lakefield Wind Project (Lakefield) in Jackson County, Minnesota;
- Elm Creek I Wind Project (Elm Creek I) in Jackson County, Minnesota;
- Elm Creek II Wind Project (Elm Creek II), in Jackson and Martin Counties, Minnesota;
- Prairie Rose Wind Energy Facility (Prairie Rose) in Rock County, Minnesota;
- Big Blue Wind Farm (Big Blue) in Faribault County, Minnesota;
- Oak Glen Wind Farm (Oak Glen) in Steele County, Minnesota;
- Pleasant Valley Wind Farm (Pleasant Valley) in Dodge and Mower County, Minnesota.

Data from post-construction avian and bat studies at these facilities suggest the types and levels of impacts that may be occurring at the Project and may be realized at the Repower Project (Table 8.20-1):

**Table 8.20-1**
**Recent Bird and Bat Post-Construction Fatality Estimates at Wind Facilities in Southern Minnesota**

| Facility | Survey Timeframe (month/year) | Bird (#/MW) | Bat (#/MW) | Comments |
|---|---|---|---|---|
| Odell[1] | 12/2016-12/2017 | 4.69 | 6.74 | • Most avian fatalities were in September and October<br>• Bat fatalities were primarily July through September<br>• Seasonality suggests most fatalities were fall migrants<br>• Most common bat species was hoary bat |
| Red Pine[2] | 3/2018-11/2018 (cleared plot) | 4.47 | 11.35 | • Most common bird species were ruby-crowned kinglet, marsh wren, red-eyed vireo, and sedge wren<br>• Bat species were hoary, big brown, eastern red, and silver-haired |
| | 3/2018 – 11/2018 (road & pad) | 2.68 | 18.74 | |
| Lakefield[3] | 4/2012-11/2012 | 2.75 | 19.97 | • Fifteen species of birds documented<br>• Documented bat species were hoary, big brown, eastern red, and little brown<br>• No fatalities were federal- or state-listed |
| | 6/2014-10/2014 | 1.07 | 20.19 | • Most of the bat fatalities (65 percent) were solitary tree roosting bats (eastern red bat, hoary bat)<br>• Bat fatalities were during fall migration (last week of July through mid-September) |

**Table 8.20-1**
**Recent Bird and Bat Post-Construction Fatality Estimates at Wind Facilities in Southern Minnesota**

| Facility | Survey Timeframe (month/year) | Bird (#/MW) | Bat (#/MW) | Comments |
|---|---|---|---|---|
| Elm Creek I | 2009-2010 | 2.32 | 1.49 | • This report is not publicly available |
| Elm Creek II | 2011-2012 | 8.73 | 2.81 | • This report is not publicly available |
| Prairie Rose[4] | 4/2014-6/2014<br>8/2014-10/2014 | 0.44 | 0.41 | • Estimates provided are per study period (i.e., 8 weeks during spring migration and 10 weeks during fall migration)<br>• An operational shut-down from August 18 through August 28, 2014 may have affected fatality rates |
| Big Blue[5] | 7/2013-10/2013 | -- | 6.33 | • Systematic avian surveys were not conducted<br>• Bat fatalities peaked twice: in late July/early August and in late August/early September.<br>• Bat fatalities were primarily tree-roosting bats |
| Oak Glen[5] | 2013 | -- | 3.09 | • Systematic avian surveys were not conducted<br>• Bat fatalities peaked twice: in late July/early August and in late August/early September.<br>• Bat fatalities were primarily tree-roosting bats |
| Pleasant Valley[6] | 2016 - 2017 | 0.68 | 1.80 | • Bat fatalities were detected in late summer and early fall.<br>• Documented bat species were eastern red bat, little brown bat, hoary bat, big brown bat, and silver-haired bat. |
| Grand Meadow[5] | 2013 | 0.53-0.80 | 3.11 | • Bat fatalities peaked twice: in late July/early August and in late August/early September.<br>• Bat fatalities were primarily tree-roosting bats<br>• Surveys focused on bat fatalities, conclusions for birds only apply to period between July and October; avian fatalities were only observed as incidental observations<br>• 2013 bird fatality estimate is for small birds; no large birds were documented<br>• In 2014, no small or large birds were documented in the standardized searches |
| | 2014 | 0.0 | 1.05 | |

**Table 8.20-1**
**Recent Bird and Bat Post-Construction Fatality Estimates at Wind Facilities in Southern Minnesota**

| Facility | Survey Timeframe (month/year) | Bird (#/MW) | Bat (#/MW) | Comments |
|---|---|---|---|---|
| [1] | | | | Chodachek and Gustafson, 2018 |
| [2] | | | | Trana et al., 2019 |
| [3] | | | | Westwood Professional Services, 2015 |
| [4] | | | | Chodachek et. al, 2015 |
| [5] | | | | Chodachek et al., 2014 |
| [6] | | | | Tetra Tech, 2017 |

Overall, adjusted fatality rates for all bird species vary between three to six birds/MW/year for the majority of post-construction fatality studies nationwide. Fatality estimates are relatively constant across the country except for in the Great Plains, where there appears to be lower avian fatality rates, and the Pacific region, where there may be slightly higher fatality rates. Most avian fatalities due to wind turbines are small passerines, about 60 percent of avian fatalities in publicly available reports in the United States. Fatality rates of migratory passerines increase in the spring and fall during migration (AWWI, 2020). The majority of avian species have a low risk of impacts at the population level (Allison et al., 2019). Based on the post-construction fatality studies outlined above, national averages for post-construction fatalities, and AWWI's conclusions about geographic trends, Xcel Energy anticipates that avian fatalities due to collision will be at or below the national average and may result in limited localized impacts to some groups of birds, such as small passerines.

Potential unavoidable impacts from the Project on bats are expected to be similar to the post-construction fatality rates at the above wind facilities, based on the similar land uses within the Project Area, geographic proximity of the projects, and similarities in species composition. Migratory tree-roosting bats (e.g., hoary bat, silver-haired bat, and eastern red bat), which were detected during the Project's pre-construction studies, may have the highest risk of collision based on previous bat fatality studies (AWWI, 2020). Unlike birds, wind facilities may present a risk to populations of migratory tree-roosting bats; in addition, although impacts from wind facilities on cave-roosting bats are typically low, even a small impact can be a risk to populations already impacted by white-nose syndrome (Allison et al., 2019). Overall, risk of mortality to bats in the Project Area is likely to be greatest on nights during fall migration, when the number of bats moving through the area are the highest. During the fall migration, weather conditions that are most conducive to higher mortality rates occur with warm temperatures (greater than 50 degrees Fahrenheit) and low wind speeds (less than 6.5 m/s or 14 miles per hour) (Baerwald and Barclay, 2009; Arnett et al., 2011; Good et al., 2011; Cryan and Brown, 2007). In addition, risk may be higher on the first night following the passage of a low-pressure system when the prevailing wind shifts from a southerly to a northerly direction (Cryan and Brown, 2007; Good et al., 2011). Additional impacts may include a small reduction in the available habitat that some wildlife uses for forage or cover; however, operation of the Project will not significantly change the existing land use.

### 8.20.4 Mitigative Measures

The MNDNR's early coordination response letter dated February 5, 2021 recommended the following in regard to the Project: (1) feathering turbine blades below cut-in speeds to minimize impacts to bat species, (2) preparation of an Avian and Bat Protection Plan, and (3) conduct post-construction fatality monitoring.

Xcel Energy will equip operating turbines with software capable of adjusting cut-in speeds and will require that turbines are locked or feathered up to the manufacturer's standard cut-in speed from one-half hour before sunset to one-half hour after sunrise from April 1 to October 31 of each year of operation, per MNDNR's recommendation.

Xcel Energy prepared an updated BBCS (Appendix I) to document and describe measures to identify, avoid, and manage risks to avian and bat species that may result from wind turbine upgrades, both during construction and operation. Xcel Energy submitted the BBCS to MNDNR staff on April 15, 2021. The BBCS is based on those recommendations provided in the USFWS's Land-Based Wind Energy Guidelines (USFWS, 2012) that apply to a repower project and operational wind farm. The BBCS also describes the protocol that will be used for post-construction avian and bat fatality monitoring, which will be conducted for two years.

In accordance with the Standard Erosion Control and Invasive Species Prevention Best Practices included with the preliminary comments from the MNDNR on the Project (Appendix D), Xcel Energy will utilize wildlife friendly erosion control and invasive species prevention practices to minimize risks to aquatic and terrestrial habitats, as applicable. Examples include utilizing bio-netting or natural netting erosion control blanket types to minimize the risk of entanglement and death of small animals, and cleaning of equipment at a site prior to moving to the next site to prevent invasive species introduction and spread. Lastly, construction staff will be provided with wildlife awareness training on construction and operational BMPs to reduce risks to wildlife and incident reporting.

## 8.21 RARE AND UNIQUE NATURAL RESOURCES

In a letter dated January 6, 2021, Xcel Energy requested comments on the Project from the USFWS and MNDNR. To date, comments have not been received from the USFWS. The MNDNR responded with early coordination comments on the Project in a letter dated February 5, 2021. The MNDNR recommended that a Natural Heritage Information System (NHIS) Review be completed for the Project. Xcel Energy submitted a Natural Heritage Review Request to the MNDNR for the Project on April 7, 2021. A copy of this request is included in Appendix H. To date, a response has not been received.

### 8.21.1 Federal and State Listed Species

The USFWS's Information for Planning and Consultation system (USFWS, 2021) was reviewed for federally listed species, candidate species, and designated or proposed critical habitat that may be present within the Project Area (Table 8.21-1). The MNDNR's Natural Heritage Information System (NHIS) was also reviewed for documented occurrences of federally listed species, state listed species, and state species of concern within one mile of the Project Area (MNDNR, 2020a;

Table 8.21-2). The MNDNR maintains the NHIS database through their Natural Heritage Program and Nongame Game Research Program; the NHIS is the most complete source of data on Minnesota's rare, endangered, or otherwise significant plant and animal species, plant communities, and other rare natural features. Although these reviews do not represent a comprehensive survey, they provide information on the potential presence of rare and unique species and habitats. The NHIS information provided here is based on a query of licensed NHIS data (per MNDNR license agreement; MNDNR, 2020a); as noted above, Xcel Energy has submitted an NHIS review request to MNDNR to confirm species' presence.

**Table 8.21-1**
**Federally Listed Species with the Potential to Occur in the Project Area**

| Species | Federal Status |
|---|---|
| Northern Long-eared Bat (*Myotis septentrionalis*) | Threatened |
| Prairie Bush-Clover (*Lespedeza leptostachya)* | Threatened |

**Table 8.21-2**
**Federal and State Listed[1] Species Documented Within One Mile of the Project Area[2]**

| Type | Federal Status | State Status[3] | Scientific Name | Common Name | NHIS Records within the Project Area (#) | NHIS Records within one Mile of Project Area Boundary (#) | Year of Most Current Observation |
|---|---|---|---|---|---|---|---|
| Plant | -- | THR | *Valeriana edulis var. ciliata* | Edible Valerian | 0 | 1 | 2009 |
| | -- | END | *Parthenium integrifolium* | Wild Quinine[4] | 1 | 1 | 2010 |

1 The MnDNR also maintains a listing of special concern species. Special concern species are not legally protected, but are uncommon in Minnesota or have unique or highly specific habitat requirements and deserve careful monitoring of its status.
2 MNDNR, 2020a
3 THR = Threatened, END = Endangered
4 During permitting of the original Project, an area within the Project boundary that was documented in 1979 as a prairie remnant and noted as having the state-listed wild quinine present was confirmed to be cultivated with no native prairie species remaining (via field survey and coordination with the MnDNR).

The northern long-eared bat (NLEB) is a medium-sized bat species that occurs across the eastern and central U.S. (Caceres and Barclay, 2000). The annual life history of the NLEB includes an inactive period when the species is hibernating and an active period when the species forages, raises its young, and breeds. Hibernation generally occurs in caves and mines between November 1 and March 31 (USFWS, 2015; USFWS, 2016). In April, the species emerges from its hibernacula and moves to summer habitat. NLEB typically forage on flies, moths, beetles, caddisflies, and other insects in the understory of wooded areas (USFWS, 2015). Adult females form breeding or

maternity colonies that are variable in size, ranging from a few individuals to as many as 60 adults (Caceres and Barclay, 2000; Wisconsin Department of Natural Resources, 2017). During the summer, the species roosts in live and dead trees in cavities and crevices and under bark (Timpone et al., 2010). The NLEB forages primarily in forested areas (USFWS, 2015). The NLEB is currently experiencing a population decline due to a disease that affects hibernating bats called white-nose syndrome (WNS). Records of documented hibernacula and roost trees are maintained in the MNDNR's NHIS. Based on a review of NHIS records, there are no documented NLEB maternity roost trees within 150 feet of the Project Area or hibernacula within 0.25 mile of the Project Area. Although there are no records of NLEB, the species may still be present in the Project Area.

The prairie bush clover is an obligate of tallgrass prairie habitats (USFWS, 2019). As discussed in Section 8.21.2 below, there is no MNDNR-mapped native prairie within the Project Area.

As shown in Table 8.21-2 above, and based on review of the NHIS, there are two state-listed (threatened or endangered) plants recorded within 1 mile of the Project Area: the edible valerian and wild quinine. The edible valerian is a long-lived perennial that favors moist, sunny, calcareous habitat, including calcareous fens, wet meadows, and moist prairies (MNDNR, undated). The wild quinine is a long-lived perennial prairie species that is restricted to mesic habitats in remnant prairies and savannas of the type that developed in the southeastern portion of the state (MNDNR, 2020b).

### 8.21.1.1 Impacts

Northern Long-eared Bat

Construction of the Project will not involve tree clearing, and, as such, will not impact NLEB. See Section 8.20.3 for a discussion of the Projects operational impacts on bat species, including NLEB.

Prairie Bush-Clover

There is no MNDNR-mapped native prairie within the Project Area; therefore, suitable habitat for the prairie bush clover will not be impacted by the Repower Project.

Edible Valerian and Wild Quinine

There is no calcareous habitat or prairie habitat located within the Project Area; therefore, suitable habitat for the edible valerian and wild quinine will not be impacted by the Project.

### 8.21.1.2 Mitigative Measures

Northern Long-eared Bat

No mitigative measures are proposed for construction, as the Project will not involve tree clearing and will not impact NLEB. See Section 8.20.4 for a discussion of the mitigative measures that Xcel Energy would employ to protect this and other bat species during operation.

Prairie Bush-Clover

Xcel Energy will not impact suitable habitat for prairie bush clover; as such, no mitigative measures are proposed.

Edible Valerian and Wild Quinine

Xcel Energy will not impact suitable habitat for the edible valerian and wild quinine; as such, no mitigative measures are proposed.

### 8.21.2 Native Prairie

In addition to rare and sensitive species, the MNDNR also maps rare and unique plant communities that may include relatively rare habitats (e.g., prairie) or higher quality or good examples of more common plant communities (e.g., wet meadow). Although most NPCs have no legal protection in Minnesota, these areas may have the potential to contain undocumented populations of rare plant species, which may be protected under Minnesota's state endangered species law (Minn. Stat. § 84.0895). These native prairies and NPCs may also provide essential habitat for rare species of fauna.

Native prairies are typically unplowed plant communities originating on the site and dominated by grass and sedge species, with a rich mix of broad-leaved forbs and a few low shrub species (MNDNR, 2018). Approximately 250,000 acres of native prairies ranked good to excellent remain in Minnesota (MNDNR, 2017a). There is no MNDNR-mapped native prairie within the Project Boundary.

The MNDNR's railroad prairie rights-of-way are native prairie remnants that occur along railroad rights-of-way. The railroad rights-of-way program was instituted in 1997 by the Minnesota legislature in the Prairie Parkland and Eastern Broadleaf Forest ECS Provinces (MNDNR, 2017b). There are no railroad prairie rights-of-way in or adjacent to the Project Area (MNDNR, 2017b).

#### 8.21.2.1 Impacts

There is no MNDNR-mapped native prairie within the Project Boundary; therefore, there will be no impacts to MNDNR-mapped native prairie.

#### 8.21.2.2 Mitigative Measures

As noted above, there is no MNDNR-mapped native prairie within the Project Boundary; therefore, no specific mitigation measures are proposed.

### 8.21.3 Native Plant Communities and Sites of Biodiversity Significance

The Minnesota Biological Survey (MBS) assesses and maps the distribution and status of the Minnesota's fauna, flora, NPCs, and SOBS.

## Native Plant Communities

NPCs are assemblages of native plants that have not been substantially impacted by non-native species or human activities. NPCs are formed and classified by hydrology, soils, landforms, vegetation, and natural disturbance regimes such as floods, wildfires, and droughts. NPCs are named for the characteristic plant species within them or for characteristic environmental features (MNDNR, 2021e). NPCs may include native prairie. The MNDNR has classified NPCs within the state using plant species, soils, and other site-specific data from vegetation plots. The current NPC classification covers most of the wetland and terrestrial vegetation in the state and was completed in 2003. It is a six-level hierarchical classification that accounts for vegetation structure and geology, ecological processes, climate and paleohistory, local environmental conditions, canopy dominants, substrate, and environmental conditions (Aaseng et al., 2011).

There is one NPC within the Project boundary, a seepage meadow/carr community (WMs83a), which is also a Site of Biodiversity Significance ranked moderate (see below) and is associated with South Fork Bear Creek. Approximately 11.4 acres of this mapped NPC is located within the Project Area; however, the temporary workspaces associated with the Repower Project will not impact this NPC.

## Sites of Biodiversity Significance

The MBS is an assessment of Minnesota landscapes for NPCs, rare animals, rare plants, and animal communities through desktop review and follow-up field survey. MBS designates and assigns rankings to SOBS, based on landscape context, NPC, and occurrence of rare species populations. The MBS groups and ranks SOBS for each Minnesota's system subsections for the purpose of designating and cataloguing the state's most notable examples of NPCs and rare species. A site's biodiversity rank is based on the presence of rare species populations, the size and condition of NPCs within the site, and the landscape context of the site (MNDNR, 2009; MNDNR, 2021f). Both native prairie and NPCs may also be designated as SOBS. There are four biodiversity significance ranks: outstanding, high, moderate, and below:

- "Outstanding" sites contain the best occurrences of the rarest species, the most outstanding examples of the rarest NPCs, and/or the largest, most ecologically intact or functional landscapes.

- "High" sites contain very good quality occurrences of the rarest species, high-quality examples of rare NPCs, and/or important functional landscapes.

- "Moderate" sites contain occurrences of rare species, moderately disturbed native plan communities, and/or landscapes that have strong potential for recovery of NPCs and characteristic ecological processes.

- "Below" sites lack occurrences of rare species and natural features or do not meet MBS's 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.

There are no MBS SOBS ranked as high or outstanding within the Project Area. Table 8.21-3 presents the MBS's SOBS with rankings of below or moderate that occur within the Project Area and their Biodiversity Significance Rank (also see Figure 11).

**Table 8.21-3**
**Sites of Biodiversity Significance within the Project Area**

| Site of Biodiversity Significance Rank | Number of Sites Within Project Area | Acres |
|---|---|---|
| Below | 2 | 40.3 |
| Moderate | 1 | 11.4 |
| **Total** | | **51.7** |

### 8.21.3.1 Impacts

There are three SOBS within the Project Boundary: Grand Meadow 30 (ranked below), Grand Meadow 19 (ranked below), and Grand Meadow 17 (ranked Moderate). The temporary workspaces associated with the Repower Project will not impact Grand Meadow 17 (a similarly mapped NPC, discussed above).

Turbines 112 and 113 are sited in cultivated cropland and the 400-foot-radius construction workspace for these turbines intersect Grand Meadow 19. Grand Meadow 19 is a former railroad grade, and the current land use where each workspace intersects Grand Meadow 19 is actively cultivated agricultural field. Agricultural production in the immediate Project vicinity may experience minor short-term impacts from the use of the workspace during construction, but these impacts would resolve when construction is complete.

Turbine 123 is within 400 feet of Grand Meadow 30; however, Xcel Energy will use an irregular shaped workspace in cropland to avoid impacts to this site.

### 8.21.3.2 Mitigative Measures

As noted above, Xcel Energy has designed crane paths and construction workspaces to avoid impacts to NPCs and MBS SOBS sites; therefore, no specific mitigation measures are proposed.

# 9.0 SITE CHARACTERIZATION

## 9.1 SITE WIND CHARACTERISTICS

The wind monitoring program at the Wapsipinicon South Project (now known as Grand Meadow Wind Farm) began in May 2002 with Mast 302. Mast 302 was a 50-m, guyed, tubular NRG tall tower with a 152-mm (6-inch) diameter. Table 9.1-1 shows basic information about the mast. The tower operated until 14 July 2004, when it was rebuilt after sustaining damage from farm equipment. Documents provided by the developer and verified by AWS Truepower (now AWS/UL) indicate the meteorological (met) tower was rebuilt in the same location and equipment configuration as the initial met tower.

**Table 9.1-1**
**Mast Data for the Grand Meadow Wind Farm**

| Mast ID | Site UTM Coordinates (WGS84, Zone 14N) | | Elev. (m) | Period of Record | Monitoring Heights (m) | | |
|---|---|---|---|---|---|---|---|
| | Easting | Northing | | | Wind Speed | Wind Direction | Temp |
| 302 | 528392 | 4834428 | 435 | 13 MAY 2002 – 15 DEC 2006 | 48.9, 29.5, 9.8 | 48.9, 29.5 | 2 |

Wind speed and temperature data from the Mast tower was adjusted to align with data from multiple reference sites in the area (r-squared), which are shown in Table 9.1-2. A higher r-squared value indicates a stronger correlation.

**Table 9.1-2**
**Correlation of MET Data with Reference Sites**

| Reference | r-squared Value |
|---|---|
| Mason City, IA | 0.798 |
| Minneapolis, MN | 0.653 |
| Rochester, MN | 0.894 |
| Waterloo, IA | 0.698 |

### 9.1.1 Interannual Variation

Interannual variation is the variation in wind speed from one year to the next. The inter-annual variability (IAV) of wind speed at the Project is estimated to be 6.0% by UL (formerly AWS Truepower, an independent consultant serving the wind energy industry). The IAV of 6.0%, applied to the Project's estimated average hub height wind speed, is 0.48 m/s.

### 9.1.2 Seasonal Variation

Seasonal variation is represented by the shift in wind speeds from one month to the next. Table 9.1-3 shows the estimated average seasonal variation based on long-term correlations with meteorological data collected in the Project Area. The months of October through May are

expected to generally have the highest wind speeds, while the months of July and August are expected to have the lowest wind speeds.

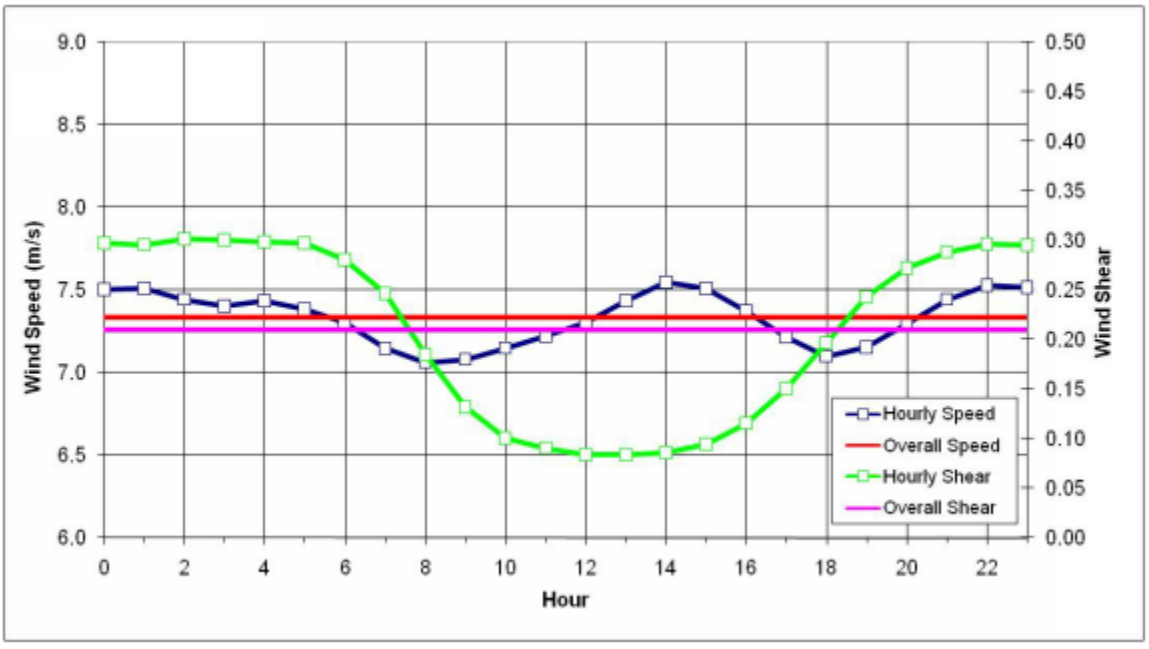
**Table 9.1-3**
**Average Wind Speed at Hub Height of Turbines (80 m)**

| Month | Wind Speed (m/s) |
|---|---|
| January | 8.97 |
| February | 8.44 |
| March | 8.73 |
| April | 9.07 |
| May | 8.53 |
| June | 7.69 |
| July | 6.77 |
| August | 6.28 |
| September | 7.65 |
| October | 7.94 |
| November | 8.38 |
| December | 8.86 |
| **Annual Average** | **8.1** |

### 9.1.3 Diurnal Conditions

As shown in Chart 9.1-1, the annual daily wind speed pattern at hub height at the Project's met tower has an increase in wind speeds during the evening and overnight hours.

**Chart 9.1-1: Diurnal Wind Speeds**



### 9.1.4 Atmospheric Stability

The stability of the atmosphere can be calculated when the temperatures at two levels are available. For the Repower Project, temperature sensors at multiple heights were not available. Based on other regional atmospheric data, Xcel Energy expects the approximate atmospheric stability profile to be: Neutral (15 percent), Stable (70 percent), and Unstable (15 percent). These percentages were confirmed to be appropriate with the National Oceanic and Atmospheric Administration (NOAA)/National Weather Service Station, Chanhassen, Minnesota.

### 9.1.5 Hub Height Turbulence

Turbulence intensity (TI) is an indicator of the variability of wind speed. Hub height TI at the met tower is on average 10 percent at 15 meters per second (m/s). Overall, the TI at the met tower is considered to be in the moderate range.

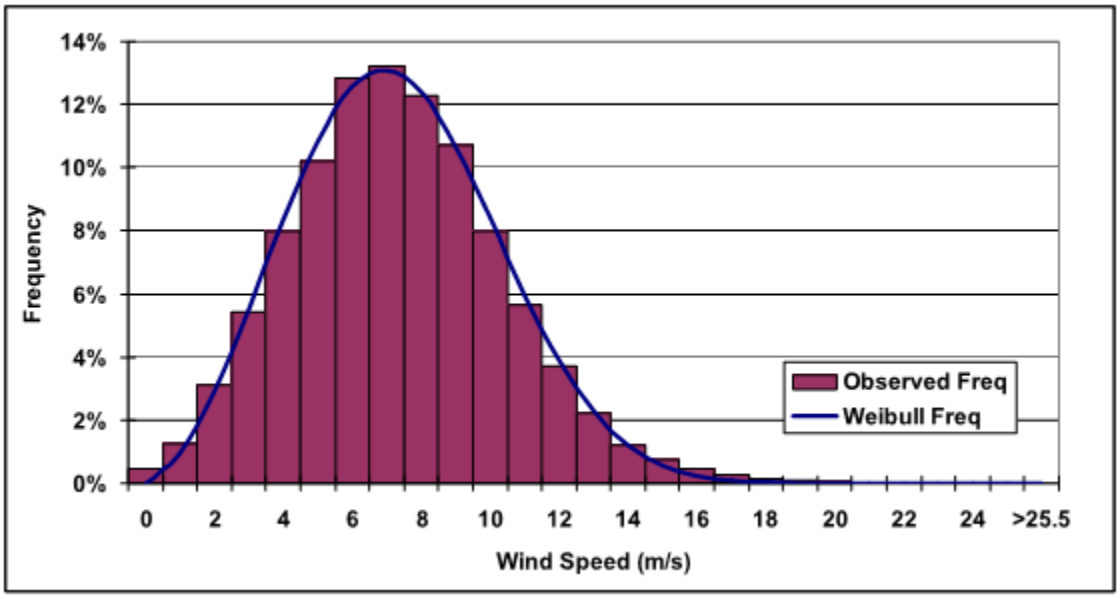
### 9.1.6 Extreme Wind Conditions

The hub height 50-year extreme 10-minute wind speed for the Project Area is 38.8 m/s. The extreme wind speed has been estimated by GE for the mechanical loads analysis of the turbine components.

### 9.1.7 Wind Speed Frequency Distribution

Chart 9.1-2 shows the wind speed frequency distribution at hub height calculated from wind data collected at MET Mast 302. A majority of the winds occur between 3 m/s and 12 m/s. The characteristics of this distribution are consistent with wind regimes observed elsewhere in Minnesota.

**Chart 9.1-2: Wind Speed Frequency Distribution**




### 9.1.8 Wind Variation with Height

Data from Mast 302 can be seen in Table 9.1-4 shows wind speed at instrument height, wind shear exponent and the extrapolated hub height wind speed.

**Table 9.1-4**
**Mast Data for the Grand Meadow Wind Farm**

| Mast ID | Monitoring Height (m) | Climate-adjusted Speed (m/s) | Effective Wind Shear Exponent | Extrapolated 80-m Hub Height speed (m/s) |
|---|---|---|---|---|
| 302 | 48.9 | 7.37 | 0.209 | 8.16 |

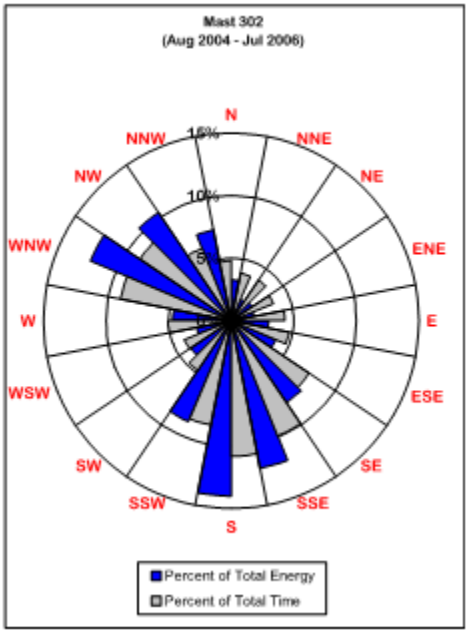
### 9.1.9 Spatial Wind Variation

AWS/UL has estimated the annual average hub height wind speeds among the Project's 67 turbines to range from approximately 7.95 to 8.23 m/s, averaging approximately 8.13 m/s. These estimates result from a combination of mesoscale and microscale wind flow modeling using AWS/UL proprietary software developed using standard industry methodology and formulas.

### 9.1.10 Wind Rose

A wind rose is a graphical representation of wind speeds based on the direction the wind comes from and the frequency it comes from each direction. Chart 9.1-3 shows the wind rose for the Grand Meadow Repower Project

**Chart 9.1-3: Grand Meadow Wind Rose**




### 9.1.11 Other Meteorological Conditions

Minnesota has a continental-type climate characterized by frequent occurrences of continental polar air throughout the year, with occasional Arctic outbreaks during winter and occasional periods of prolonged heat during the summer, especially in southern Minnesota when warm air moves in from the Gulf of Mexico and southwestern United States. Pacific Ocean air masses moving across the western United States allow for mild and dry weather conditions during all seasons. While the climate within the Project Area is fairly uniform due to relatively little topographic relief and lack of large water bodies, extreme weather events, such as tornadoes, thunderstorms, high winds, and blizzard conditions, do occur. Extreme weather events have been recorded by the NOAA in the Repower Project area (NOAA, 2021) in the U.S. Storm Events Database for the period of time from January 1970 through November 2020 (fifty years). Extreme weather events during this period include tornadoes, hail, thunderstorm winds, high wind, winter storms, blizzards, extreme cold, heavy snow, excessive heat, dense fog, floods, and flash floods (among others). NOAA recorded 476 extreme weather events in Mower County during this time period. Typically, such storms are local in extent, short in duration, and result in damage to relatively small geographic areas. There were 110 event days with property damage reported during this period (NOAA, 2021).

## 9.2 LOCATION OF OTHER WIND TURBINES WITHIN 10 MILES OF PROJECT BOUNDARY

Based on the U.S. Wind Turbine database (USGS, 2021), there are 326 existing wind turbines associated with six wind farms within 10 miles of the Project Area. These include:

- Prairie Star (61 turbines) in Mower County;

- Wapsipinicon Wind Project (67 turbines) in Mower County;
- Pleasant Valley Wind Project (73 turbines) Mower and Dodge Counties;
- Mower County Wind Energy Center (43 turbines) in Mower County;
- G. McNeilus Wind Farm (9 turbines) in Mower County; and
- McNeilus Wind Farm (6 turbines) in Mower County.

Note that some of these wind farms have more turbines than are included in the 10-mile buffer from the Project Area. For example, the Pleasant Valley Wind Project includes 100 turbines, 73 of which are within 10 miles of the Grand Meadow Wind Farm. Figure 18 shows the location of existing wind turbines and wind energy projects. As displayed on Figure 18, there are several more existing wind turbines up to 20 miles northwest and southeast of the Repower Project.

# 10.0 PROJECT CONSTRUCTION

Repowering will consist of the following general construction steps: completing improvements to existing gravel roads to accommodate truck deliveries, preparing laydown and staging areas, installing temporary crane crossings over streams, offloading new turbine components near operating turbines, removing and replacing existing blades and hub with a construction crane, performing engineering inspections on new components, returning turbines to operation, and restoring temporarily disturbed areas to pre-construction conditions.

As a repowering project, earthmoving is fairly minimal and generally limited to the laydown yard, temporary turning radius improvements, staging at turbine sites, and ditch or stream crossing areas. Land will be graded only where needed to allow for crane and delivery truck access. Detailed descriptions of construction processes are described within sections below for primary grading and preparation areas. Prior to any earthwork being performed, Gopher State One Call will be contacted to mark utility locations, rights-of-way will be identified as needed, and construction stakes placed. Limited access road widening and temporary storage area construction will be completed as necessary to accommodate the repower.

Professional design engineering firms and experienced pre-qualified trade contractors will be hired and managed by the primary contractor for component dismantling and installation. Xcel Energy will have overall project management responsibilities. The repowering team will be on-site to handle materials, deliveries, staging, repowering, and quality assurance. An on-site construction manager will coordinate all aspects of the work, including ongoing communication with local officials, citizens groups, and landowners.

The construction manager will also oversee the temporary widening of access roads, crane routes, gear box and blade installations, electrical infrastructure, as well as the coordination of materials receiving, inventory, and distribution.

## 10.1 ROADS AND INFRASTRUCTURE

During construction, roadways will be accessed by a variety of small to large construction vehicles requiring temporary roadway improvements along some public roads within the Project Area. Following the completion of the repower process, operations traffic will return to normal including small-to-medium sized vehicles performing routine maintenance on turbines and associated facilities. Xcel Energy estimates that the maximum construction workforce the Project will create is approximately 350 additional trips per day on local roadways during peak repowering when turbine components and equipment are being delivered. Total trips per day will decrease to approximately 3 to 6 vehicle trips per day following repowering.

There will be turning radii installed at various intersections to allow for turbine component deliveries and typically includes widening select intersections to allow for the long delivery trucks to turn, and upgrading road surfaces by grading or the addition of gravel. Due to the short-term nature of the repower work, road improvements will primarily be compaction and placement of gravel. Xcel Energy will coordinate with the state, county, and townships, as applicable, regarding the planned use of haul routes that may require road improvements or traffic control measures

during the construction period and to ensure that any overweight permits, road use permits, road maintenance agreements and other approvals are secured.

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

## 10.2 ACCESS ROADS AND CRANE CROSSINGS

The Project will not require construction of new, permanent access roads. Some access roads will be temporarily widened to allow for crane movement and delivery of equipment to the construction easement located at the base of each turbine. Cranes will be constructed along the access roads to enable removing and replacing turbine components. Xcel Energy will coordinate with landowners throughout the repowering process to minimize disturbances due to active agricultural lands. Upon completion of repowering, temporary access roads will be returned to their normal 16-foot (4.9-meter) widths.

To facilitate crane movement and equipment delivery during construction, crane paths will be utilized during the repower process. Crane paths will be finalized based on landowner requests, avoidance of environmental constraints such as wetlands, Sites of Biological Significance, prairies, sensitive habitat, and other factors. These crane paths will be installed in a 100-foot (30.5-meter) corridor, all of which will be matted. Access roads widened for crane paths and equipment deliveries will be reduced to their permanent width of approximately 16 feet (4.9 meters) upon completion of construction. Where temporary installations are removed, areas will be graded to natural contours, soil decompaction and reseeding will occur as described further in Section 10.5.

Streams and wetlands will be crossed in several locations with cranes. Wetland crossings will generally be installed and restored in accordance with the following steps, and the site SWPPP:

a. Plan crane walks according to unique area conditions where crane walk will occur.

b. Install down grade perimeter controls such as fiber rolls, silt fence, and erosion control blanket to protect conveyances as field conditions dictate.

c. Install geotextile fabric, timber mats.

d. Walk cranes across wetlands during dry conditions.

e. Restore all disturbed areas to pre-construction conditions following crane walk activity by removing timber mats and geotextile fabric, seeding all disturbed areas, installing erosion control blankets on all ditch bottoms and disturbed slopes great than 3:1, and then removing erosion control measures once final stabilization has occurred.

## 10.3 ASSOCIATED FACILITIES

No changes to the existing O&M building are proposed or needed to accomplish repowering. Minor updates to the existing substation and collection circuits will be required as described in Sections 6.1 and 6.2, respectively. No new permanent meteorological towers are required for the Project. Xcel Energy will utilize the existing permanent towers where currently installed.

A secure laydown area will be prepared where wind turbine components are temporarily stored, or processed, as part of the wind turbine repowering operation. Xcel Energy is currently coordinating with landowners to host this facility – it will be sited on leased land and to avoid wetlands, waterbodies, cultural resources, and environmentally sensitive features such as native prairie, NPCs, and SOBS. The area will consist of gravel and will be in place for approximately 6-7 months and then in conjunction with post-construction clean-up.

## 10.4 TURBINE SITE LOCATION

### 10.4.1 Foundation Design

Existing turbine foundations will remain unchanged; no changes to the foundations are anticipated.

### 10.4.2 Tower

The existing turbine towers will be used during repowering activities; no modifications will take place. The repowered rotor (consisting of hub and blades) will be assembled on the ground and picked up as a single unit to be bolted to the nacelle. At this point, crews will work within the tower to ensure all mechanical and electrical connections are completed to facilitate energization.

## 10.5 POST CONSTRUCTION CLEAN-UP AND SITE RESTORATION

Project activities causing temporary impacts are associated with the widening of existing access roads for equipment transport, crane walk paths, laydown areas, and turbine repowering activities within the construction easements. Areas temporarily disturbed by construction activities will be re-graded to original contours and revegetated with native seed mixes, crops, or as otherwise noted in the land use agreement. Excavated soil associated with the electrical system upgrades during the ADLS system will be used as backfill and remaining soil will be spread over temporary construction areas and revegetated. In areas where soil compaction occurred from construction activities, areas will be uncompacted, topped with topsoil, and revegetated.

Impacted areas will be monitored to ensure revegetation. Stormwater BMPs, such as silt fence and straw wattle, will not be removed until at least 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 will be planted to minimize soil loss.

All temporary road radius improvements and temporary culverts will be removed and restored as turbines become mechanically complete. For any section of state, county, or township road used as a haul route, the roadway will be restored to its pre-construction state or better, as negotiated from road use agreements. This may consist or re-grading, re-paving, enhancing the shoulder of the road or enhancing the segment of roadway as agreed upon by Xcel Energy and the responsible road authority.

## 10.6 OPERATION AND MAINTENANCE OF PROJECT

NSP will be responsible for O&M of the Project upon final turnover. O&M will be conducted by NSP consistent with applicable North American Electric Reliability Corporation Reliability Standards. There will be 24 hours per day, 7 days a week operational monitoring of the Project

through SCADA. The O&M crew will consist of 6 full-time staff who largely will be wind technicians (i.e., technicians who carry out the maintenance on the turbines) along with a site supervisor. These workers will work out of the Project O&M building.

Turbines and the substation are monitored remotely by an O&M contractor 24 hours a day at the O&M Contractor's monitoring center. Faults are reset when possible to ensure high turbine availability. Wind technicians are called out on non-resettable faults based on time of day and wind conditions. Certain turbine data is monitored for abnormalities at an Xcel Energy Maintenance and Diagnostic Center in Denver, Colorado.

Engineers also provide performance and reliability optimization using various methods and replicate best practices across the fleet. Fleet O&M is focused on prevention rather than an event response philosophy. Production assurance engineers and wind fleet team major component subject matter experts support fleet level O&M. It is the O&M staff's responsibility to provide root cause and fleet risk analyses, as well as to provide mitigation planning to assure countermeasures are performed on a scheduled basis, which serves to maximize production.

Facility maintenance is a combination of time based and predictive maintenance schedules and is also modified as needed based on engineering decisions. On-site service and maintenance activities include routine inspections, preventive maintenance, component replacements, parts inventory, and unscheduled maintenance and repairs of wind turbines, pad-mount transformers, electrical power network, data communication systems, safety/protection systems, meteorological towers, and radio communications systems. Scheduled time-based turbine maintenance is performed on lower wind days whenever possible to maximize site output on high wind days. Substation and collection system maintenance is scheduled in the summer during low wind periods. Spare parts are kept on site to address long lead times, and frequently used items are kept to ensure that the failed equipment is returned to service as quickly as possible.

## 10.7 COSTS

The Capital Expenditure for the Project is currently estimated to be approximately $126 million and includes all costs of development, design, and construction. Ongoing O&M costs and administrative costs are estimated to be approximately $3 to 4 million per year, including payments to landowners for wind lease and easement rights.

## 10.8 SCHEDULE

The anticipated date of commercial operations is December 2023.

## 10.9 ENERGY PROJECTIONS

A net capacity factor of approximately 43.5 percent is expected annually for the Project. An average annual output of 396,865 MWh is anticipated, a 23.5 percent increase from the existing GE 1.5 sle base case.

### 10.9.1 Wake Loss

Turbine locations will not be changed as part of the Project; therefore, wake loss is expected to remain similar after the repower. Wake loss calculations for the existing GE 1.5 sle base case was 10.86 percent. The Repower Project will have a wake loss of 10.23 percent. Wake loss from the Repower Project is modeled to decrease as a result of operating with NRO modes for noise mitigation (see Section 8.4.1).

# 11.0 DECOMMISSIONING AND RESTORATION

Section L of the original Site Permit Application for the Grand Meadow Wind Project addressed decommissioning and restoration. The original project will not be decommissioned; it will be repowered. As part of the repowering process, the existing blades and other components as described in Section 1.5 of this Application will be removed. The Xcel Energy equipment supplier will coordinate with the appropriate agencies for responsible recycling or disposal of those components. The remaining materials will be reduced to transportable size and removed from the site for disposal. Materials will be disposed in a suitable disposal facility. Section 10.5 of this Application describes Post Construction Cleanup and Restoration.

Project decommissioning and restoration costs will change as a result of repowering. To address these changes, Xcel Energy prepared an updated decommissioning and restoration plan in May 2021 to reflect the repowered Project (Appendix J).

## 11.1 ANTICIPATED LIFE OF THE PROJECT

Xcel Energy estimates the service life of the Repower Project to be approximately 25 additional years.

## 11.2 ESTIMATED DECOMMISSIONING COSTS IN CURRENT DOLLARS

Xcel Energy estimates that net decommissioning cost (estimated cost of dismantling and removal less the salvage value) for the Wind Farm after the Repower Project is complete at $24,310,598.

## 11.3 METHOD FOR ENSURING THAT FUNDS ARE AVAILABLE FOR DECOMMISSIONING

Xcel Energy will be responsible for all costs associated with decommissioning the Grand Meadow Wind Project. To ensure that there is an adequate recovery of future decommissioning and restoration costs, a negative net salvage rate is included in the calculation of the depreciation expense rate for the production assets in this Project. The net salvage rate reflects the net of the estimated decommissioning costs and any offsetting proceeds from the salvaging and/or recycling of certain generation equipment, such as the towers, cables, and other material. The net salvage rate is negative in this case because the forecasted costs of decommissioning the facility are higher than the expected salvage proceeds.

In Docket No. E,G002/D-19-723 (the 2020 Annual Review of Remaining Lives), Xcel Energy has proposed a net salvage percent of -12.5 percent for the Grand Meadow Wind Project. As per Commission order, every five years Xcel Energy is required to perform a comprehensive dismantling study on all electric generation plants. The most recent study was filed in in the 2020 Annual Review of Remaining Lives (Docket No. E,G002/D-19-723) and included all plants in-service as of April 2020. Plants added after that date will be incorporated in the next dismantling study to be performed in 2025.

## 11.4 METHOD FOR UPDATING THAT FUNDS ARE AVAILABLE AND UPDATING DECOMMISSIONING COSTS

As stated above, Xcel Energy is required to perform a comprehensive dismantling study on all electric generation plants. The most recent study was filed in 2020; the next study will be performed in 2025.

## 11.5 ANTICIPATED METHODS OF SITE DECOMMISSIONING AND RESTORATION

Decommissioning of the site will include: (1) removal of all turbines and towers; (2) removal of all pad mounted transformers; (3) removal of all above-ground distribution facilities; (4) removal of foundations to a depth of four feet below grade; and (5) removal of surface road material and restoration of the roads and turbine sites to previous conditions to the extent feasible, consistent with the landowner's desires. Removed components will either be scrapped and properly disposed of or recycled. The determination will be made based on the expected market for the used components.

Removal and restoration obligations shall be completed within eighteen (18) months, and in general accordance with the requirements of Minnesota Rules 7854.0500, subp. 13, and applicable county requirements.

# 12.0 IDENTIFICATION OF OTHER POTENTIAL PERMITS

Xcel Energy will be responsible for undertaking all required environmental review and will obtain all permits and licenses that are required following issuance of the LWECS Site Permit. The potential permits or approvals that have been identified as being required for the construction and operation of the Project are shown in Table 12-1. Copies of agency correspondence to date are provided in Appendix D.

**Table 12-1**
**Potential Permits and Approvals**

| Administering Agency | Permit, Approval, or Consultation | Status and Applicability to the Project |
|---|---|---|
| **Federal** | | |
| U.S. Army Corps of Engineers | Wetland Delineation Approvals | Xcel Energy has conducted a desktop review of wetlands and potential impacts with the MNDNR update to National Wetlands Inventory data. Based on this desktop data, the Project will fall under the impact threshold for either a Nationwide Permit or Minnesota Regional General Permit. Prior to construction, Xcel Energy will conduct wetland delineations to confirm wetland boundaries and impacts based on final design. |
| | Jurisdictional Determination | |
| | Federal Clean Water Act Section 404 | |
| U.S. Fish and Wildlife Service | Review for Threatened and Endangered Species | Based on a review of federally listed species, a Take Permit is not anticipated for the Project. |
| | Eagle Take Permit (ETP) | Xcel Energy will coordinate with USFWS on the need for either an amendment to the existing ETP or a new ETP. |
| Environmental Protection Agency (Region 5) in coordination with the Minnesota Pollution Control Agency (MPCA) | Spill Prevention Control and Countermeasure Plan | The Construction Contractor will develop a Spill Prevention Control and Countermeasure Plan for use during construction and operation of the Project to minimize risk of site contamination. |
| Federal Aviation Administration | Form 7460-1 Notice of Proposed Construction or Alteration (Determination of No Hazard) | Xcel Energy submitted Form 7460-1 for the turbine locations in February 2021 to initiate FAA review of the turbines and ADLS. |
| | Notice of Actual Construction or Alteration (Form 7460-2) | After construction is complete, Xcel Energy will submit Form 7460-2 for the turbine locations. |
| Federal Communications Commission (FCC) | Radio Station Authorization/License | Typically required for operation of communications tower associated with ADLS. If needed, Xcel Energy will obtain prior to operation of ADLS communications tower. |
| **State of Minnesota Approvals** | | |

**Table 12-1**
**Potential Permits and Approvals**

| Administering Agency | Permit, Approval, or Consultation | Status and Applicability to the Project |
|---|---|---|
| Board of Water and Soil Resources (BWSR) | Wetland Conservation Act approvals | Xcel Energy has conducted a desktop review of wetlands and potential impacts with the MNDNR update to NWI data. Based on this desktop data, the Project will fall under the impact threshold for either a Nationwide Permit or Minnesota Regional General Permit. Prior to construction, Xcel Energy will conduct wetland delineations to confirm wetland boundaries and impacts based on final design. |
| Minnesota Public Utilities Commission | Site Permit Amendment for Large Wind Energy Conversion System | Submitted May 27, 2021. |
| Minnesota State Historic Preservation Office (SHPO) | Minnesota Statute 138; Cultural and Historic Resources Review and Review of State and National Register of Historic Sites and Archeological Survey | Xcel Energy has coordinated with SHPO, conducted a literature review of the Project Area. Xcel Energy will conduct surveys for previously unidentified cultural resources in previously unsurveyed areas in summer/fall 2021. Xcel Energy will coordinate with SHPO on the protocol and any potential mitigation. |
| MPCA | Section 401 Water Quality Certification | Concurrent with Section 404, Clean Water Act – Xcel Energy will meet the Minnesota conditions |
| | National Pollutant Discharge Elimination System (NPDES) Permit – MPCA General Stormwater Permit for Construction Activity | After the Site Permit is Ordered by the Commission, Xcel Energy will submit NPDES Permit. The permit is required to be submitted within 30 days of the start of construction. |
| | Very Small Quantity Generator License – Hazardous Waste Collection Program | To be obtained prior to construction, if necessary. |
| | Aboveground Storage Tank Notification Form | To be obtained prior to construction, if necessary. |
| Minnesota Department of Natural Resources (MNDNR) | License to Cross Public Waters | To be obtained prior to construction, if necessary. |
| | Native Prairie Protection Plan | Potential Native Prairie Review |

**Table 12-1**
**Potential Permits and Approvals**

| Administering Agency | Permit, Approval, or Consultation | Status and Applicability to the Project |
|---|---|---|
| | General Permit for Water Appropriations (Dewatering) | To be obtained prior to construction, if necessary. |
| | Public Waters Work Permit | Xcel Energy will submit its application for a crane crossings of PWI Watercourses, if necessary |
| Minnesota Department of Transportation (MNDOT) | Utility Permits on Trunk Highway Right-of-way (Long Form No. 2525) | To be obtained prior to construction. |
| | Oversize/Overweight Permit for State Highways | To be obtained prior to construction. |
| | Access Driveway Permits for MNDOT Roads | To be obtained prior to construction. |
| **Local Approvals** | | |
| Mower County | Right-of-way permits, crossing permits, driveway permits for access roads, oversize/overweight permits for County Roads | Xcel Energy will enter into a Development, Road Use, and Drainage Agreement prior to construction. |
| Townships | Right-of-way permits, crossing permits, driveway permits for access roads, oversize/overweight permits for township roads | Xcel Energy will enter into a Development, Road Use, and Drainage Agreement prior to construction. |

# 13.0 REFERENCES

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