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

Plum Creek Wind Farm, LLC

Cottonwood, Murray, and Redwood Counties, Minnesota

Docket No. IP6997 / WS-18-700

February 2025

8400 Normandale Lake Boulevard
Suite 1200
Bloomington, MN 55437

Applicant: Plum Creek Wind Farm, LLC

Address: 8400 Normandale Lake Boulevard, Suite 1200
Bloomington, MN 55437

Authorized Representatives: Marta Lasch

Signature:

Marta Lasch

Phone: 952-988-9000

Fax: 952-988-9001

Email: Marta@nationalgridrenewables.com

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ACRONYM LIST

Acronym	Definition
2021 Route Permit	Route Permit issued by the Minnesota Public Utilities Commission for the 345-kilovolt transmission line associated with the Plum Creek Wind Project on September 23, 2021, under Docket Number IP6997/TL-18-701.
2021 Site Permit	Site Permit issued by the Minnesota Public Utilities Commission for the Plum Creek Wind Project on September 23, 2021, under Docket Number IP-6997/WS-18-700.
2022 LWECS Application Guidance	Application Guidance for Site Permitting of Large Wind Energy Conversion Systems in Minnesota (Revised 2022)
2023 Site Permit	Site Permit issued by the Minnesota Public Utilities Commission for the Plum Creek Wind Project on July 5, 2023, under Docket Number IP-6997/WS-18-700.
ACS	American Community Survey
Applicant	Plum Creek Wind Farm, LLC
August 2020 Application	Supplemental and Amended Site Permit Application submitted by National Grid Renewables on August 8, 2020, under docket No. 20208-166257-02.
BESS	battery energy storage system
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
Commission	Minnesota Public Utilities Commission
Commission's General Permit Standards	Commission's Order Establishing General Wind Permit Standards, Docket No. E,G999/M-07-1102 (January 11, 2008)
CSAH	County State-Aid Highway
dBA	A-weighted decibels
DOD	U.S. Department of Defense
EERA	Energy Environmental Review and Analysis
EPA	U.S. Environmental Protection Agency
FAA	Federal Aviation Administration
FEIS	Final Environmental Impact Statement
HVTL Project	Plum Creek Wind Farm, LLC's proposed 345 kV transmission line as filed under Minnesota Public Utilities Commission Docket No. IP6997/TL-18-701.
IPaC	Information for Planning and Consultation
kV	kilovolt
L_{10}	noise level exceeded for ten percent of an hour
L_{50}	noise level exceeded for fifty percent of an hour
LWECS	Large Wind Energy Conversion System
m	meters
m/s	meters per second

Acronym	Definition
MDNR	Minnesota Department of Natural Resources
Minn. R. Ch.	Minnesota Administrative Rules chapter
Minn. Stat. §	Minnesota Statute section
MISO	Midcontinent Independent System Operator
MNDOT	Minnesota Department of Transportation
MPCA	Minnesota Pollution Control Agency
MPUC	Minnesota Public Utilities Commission
MW	megawatt
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NG Renewables	National Grid Renewables Development, LLC
NLCD	National Land Cover Database
NO_2	nitrogen dioxide
NO_X	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
O&M	operations and maintenance
O_3	ozone
Pb	lead
Plum Creek	Plum Creek Wind Farm, LLC
Plum Creek Project	The up to 414-megawatt Plum Creek Wind Farm and 345 kV high voltage transmission line proposed by Plum Creek Wind Farm, LLC.
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
PM_{10}	particulate matter less than 10 microns in diameter
RD	rotor diameter
RSG	Resource Systems Group, Inc
SCADA	Supervisory Control and Data Acquisition
SHPO	State Historic Preservation Office
SO_2	sulfur dioxide
SPAR	Site Permit Amendment Request
SWPPP	Stormwater Pollution Prevention Plan
tpy	tons per year
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WAB	wind access buffer
Wind Project	Plum Creek Wind Farm Project
WMA	Wildlife Management Area
WPA	Waterfowl Production Area

1.0 AMENDMENT REQUESTED

On September 23, 2021, the Minnesota Public Utilities Commission (Commission or MPUC) issued a site permit for an up to 414-megawatt (MW) wind project to Plum Creek Wind Farm, LLC (Plum Creek or Applicant),

Plum Creek, a wholly owned subsidiary of National Grid Renewables Development, LLC (NG Renewables), respectfully submits this Site Permit Amendment Request (SPAR) to the Commission for the Site Permit[1] previously issued for the up to 414 MW Plum Creek Wind Project (Wind Project) pursuant to the Minnesota Wind Siting Act (Minnesota Statutes Section [Minn. Stat. §] 216F) and Minnesota Administrative Rules Chapter [Minn. R. Ch.] 7854. With this SPAR, in accordance with Minn. R. Ch. 7854.1300, subp. 2, Plum Creek is requesting a Site Permit amendment to:

- replace the Vestas V162 5.6 MW and Siemens Gamesa SG170 6.2 MW turbines identified in the permit to allow use of one of four possible new turbine models: GE 3.8-154; GE 6.1-158; Vestas V150-4.5; and Vestas V163-4.5, corresponding to between 68 and 77 wind turbine locations upon construction of the Wind Project;
- shift Collector Substation 1 to a new location in Township 108N, Range 38W, Section 5 (herein referred to as Revised Collector Substation 1);
- reduce the size and number of temporary laydown yards from up to three totaling approximately18 acres to one temporary laydown yard that is about 15 acres in size; and
- extend the date by which construction of the Wind Project and the associated 345 kilovolt (kV) high voltage transmission line (HVTL Project), herein collectively referred to as the Plum Creek Project, to September 25, 2027 or two years from the issuance of the site permit amendment, whichever is later, and extend the in-service date to December 31, 2028, to allow adequate time for construction activities to be completed.

Plum Creek received a Certificate of Need, a Site Permit (2021 Site Permit), and a Route Permit (2021 Route Permit) for the Plum Creek Project from the Commission on September 23, 2021, under Docket Nos. IP6997/CN-18-699, IP-6997/WS-18-700, and IP6997/TL-18-701, respectively. At the time the 2021 Site Permit was issued, the Wind Project proposed to use either 74 Vestas V162 5.6 MW turbines or 67 Siemens Gamesa SG170 6.2 MW turbines; the Wind Project also included up to six alternate turbine locations for the Vestas model (i.e., 80 turbine locations total) and 11 alternate turbine locations for the Siemens Gamesa model (i.e., 78 turbine locations total) that could be used should any of the primary turbine locations be determined inadequate for construction or operation. Plum Creek described the potential effects of the Wind Project in its November 19, 2019 site permit application and its August 28, 2020, updated site

[1] Order granting Certificate of Need and Issuing Site Permit and Route Permit (September 23, 2021). E-docket ID No. 20219-178198-03. Available online at: https://www.edockets.state.mn.us/edockets/searchDocuments.do?method=showPoup&documentId={50C4137C-0000-CE52-9B01-F1ABB1641592}&documentTitle=20219-178198-03.

permit application (August 2020 Application)[2]. The Department of Commerce Energy Environmental Review and Analysis (EERA) compared the potential effects of the Wind Project to project alternatives in the Final Environmental Impact Statement (FEIS), issued on April 12, 2021[3].

On May 5, 2023, Plum Creek submitted a request to allow construction to commence within four years of the 2021 Site Permit issue date and extend the in-service date of the Wind Project and associated HVTL Project to December 31, 2026[4]. The Commission approved Plum Creek's request on July 5, 2023, allowing construction to commence on or before September 23, 2025 (2023 Site Permit) and extending the in-service date for the Plum Creek Project as requested.

Since the issuance of the 2023 Site Permit, Plum Creek has been actively marketing the Plum Creek Project to potential new owner(s)/purchaser(s)[5] of the energy to be generated by the Wind Project and through this process has determined that, due to the timing of the regulatory approvals required for the consummation of the sale of the Plum Creek Project or its energy, along with delays to the current Midcontinent Independent System Operator (MISO) cycle, construction of the Wind Project is unlikely to commence until the summer of 2026 at the earliest or summer 2027 at the latest[6]. Moreover, the wind turbine models approved in the 2021 Site Permit and the 2023 Site Permit will not be commercially available in the U.S. market that would allow construction of Plum Creek Project.

Plum Creek is not requesting a change to the previously considered 73,000-acre Wind Project boundary in Redwood, Cottonwood, and Murray Counties, Minnesota that was described in the August 2020 Application and approved in the 2021 Site Permit and 2023 Site Permit. The Applicant further intends to use a turbine layout for the Wind Project that matches, as closely as possible, the turbine layout that was described in the August 2020 Application and approved in the 2021 and 2023 Site Permit. While shifting the location of one collector substation to the Revised Collector Substation 1 location described herein is proposed, the size and impacts of the substation would be similar to what was previously evaluated (refer to Table 5.0-1 in Section 5.0).

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2 Other – Supplemental and Amended Site Permit Application (August 8, 2020), E-docket No. 20208-166257-02. Available online at: https://www.edockets.state.mn.us/edockets/searchDocuments.do?method=showPoup&documentId={107C3674-0000-CF3C-8D85-8D88C3D06A07}&documentTitle=20208-166257-02.

3 Other – Final EIS (April 21, 2021), E-docket ID No. 20214-172800-03. Available online at: https://www.edockets.state.mn.us/edockets/searchDocuments.do?method=showPoup&documentId={302DC878-0000-C44F-A408-EC0C3DCF8C9D}&documentTitle=20214-172800-03.

4 Extension/Variance Request – Notice of Delayed In-service Date and Request for Extension (May 5, 2023), E-docket No. 20235-195613-02. Available online at: https://www.edockets.state.mn.us/edockets/searchDocuments.do?method=showPoup&documentId={A0B9ED87-0000-CD35-B543-B95E697115FE}&documentTitle=20235-195613-02.

5 See For Example, eDocket Docket No. E-002/CN-23-212, which is considering Plum Creek as one of the projects to be acquired by Northern States Power Company, d/b/a Xcel Energy.

6 In Docket No. E-002/CN-23-212 (the Commission is currently considering a settlement agreement between Xcel Energy, Plum Creek and other bidders to the RFP that would require negotiated Power Purchase Agreements to be filed to the Commission within four months of the Commission's approval of the settlement agreement. This schedule would suggest a Power Purchase Agreement between Xcel Energy and Plum Creek for the Project may not be approved until the summer of 2025, which would not allow construction to commence in 2025.

Accordingly, environmental impacts from the Wind Project are anticipated to be equal to or less than what was evaluated in the August 2020 Application that informed the 2021 Site Permit and the 2023 Site Permit. Detailed descriptions of the requested Wind Project changes, including a supplemental environmental review of those changes, are provided throughout this SPAR.

2.0 APPLICABLE LAW AND ANALYSIS

2.1 Certificate of Need

A Certificate of Need is required for all "large energy facilities," as defined in Minnesota Statutes Section 216B.2421, subd. 2(1), unless the facility falls within a statutory exemption from the Certificate of Need requirements. Because the Wind Project is a generating plant larger than 50 MW, it meets the definition of a large energy facility and would require a Certificate of Need prior to issuance of a Site Permit and construction. Plum Creek received a Certificate of Need for the Wind Project in September 2021 at the same time as the 2021 Site and Route Permits were issued. However, the Wind Project is now exempt from Certificate of Need requirements because it is a large wind energy conversion system (LWECS), as defined in section 216F.01, subdivision 2, and the Wind Project is being developed and permitted by an independent power producer, Plum Creek, under chapter 216E.[7] Accordingly, an extension of the in-service date for the Wind Farm in the Certificate of Need is no longer necessary. However, because the Wind Project received its Certificate of Need prior to the independent power producer exemption becoming law and to avoid potential concerns raised by a non-independent power producer owner or offtaker of the Wind Project, Plum Creek also requests an extension of the in-service date under the Certificate of Need to December 31, 2028. To support the requested in-service date extension, Plum Creek sets forth below how the need for the Wind Project has only increased since the Commission issued a Site Permit and Certificate of Need to the Wind Project.

First, Plum Creek is being actively marketed to potential purchaser(s)[8] of the Wind Project and/or its power. Second, the demand for renewable energy is likely to increase beyond the demand considered in the Wind Project's Certificate of Need proceeding. In February 2023, the Minnesota Legislature passed "100 Percent by 2040" legislation,[9] a carbon-free energy standard, which is likely to increase Minnesota's renewable energy needs by compelling utilities to obtain additional electricity from renewable sources beyond that currently required by the Renewable Energy Standards set forth in Minn. Stat. § 216B.1691 and further reduce carbon from energy sources. The "100 Percent by 2040" standard requires utilities to generate or procure sufficient electricity generated from a carbon-free technology, such as solar, equivalent to at least the percentages of the electric utility's total retail sales to retail customers in Minnesota by the end of the year indicated in Table 2.1-1. Accordingly, a delay in the timing of the Wind Project will not impact the overall need for the Wind Project.

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7 On May 24, 2023, Governor Walz signed H.F. 2310 into law. H.F. 2310 amends Minn. Stat. Section 216B.243, subd. 8 to exempt projects permitted by independent power producers, such as Plum Creek, from certificate of need requirements. See H.F. 2310 lines 353.25- 355.14, inclusive.

8 See For Example, eDocket Docket No. E-002/CN-23-212, which is considering Plum Creek as one of the projects to be acquired by Northern States Power Company, d/b/a Xcel Energy.

9 Governor Walz signed the "100 Percent by 2040" legislation into law on February 7, 2023.

Table 2.1-1 Carbon Free-Standard Milestones	
Year	**Percent of Retail Electric Sales as Carbon-Free Energy**
2030	80% for public utilities; 60 % for other electric utilities
2035	90% for all electric utilities
2040	100% for all electric utilities

2.2 Site Permit

Minn. R. 7854.1300 sets forth the process under which the Commission may amend the conditions to a Site Permit (refer to Section 13 of the Site Permit). The person requesting a permit amendment must submit the request to the Commission describing the amendment and the reasons for the request. The Commission may amend the conditions after affording Plum Creek and interested persons such process to review and comment as is required.

As stated in this SPAR, Plum Creek would like to amend the 2023 Site Permit to:

- allow construction to commence on or before the later of two years after approval of the amendments requested herein or September 25, 2027. Construction may begin as early as summer 2026, however if delays occur, winter conditions and spring road restrictions could result in an inability to commence construction until summer 2027;
- change the turbine models for the Wind Project to one of four new turbine models corresponding to between 68 and 77 primary wind turbine locations to replace the previously contemplated turbine models which are no longer commercially available in the North American market;
- construct Revised Collector Substation 1 in a new, more optimal location in Township 108N, Range 38W, Section 5; and
- reduce the size and number of temporary laydown yards from up to three totaling 18.4 acres to one temporary laydown yard that is about 15 acres in size.

The four new turbine models would predominantly be sited in locations that were evaluated in the August 2020 Application, although each turbine model would have a different mix of primary and alternate turbine locations. Eighteen turbine locations have shifted (refer to Table 3.1-1) from the previous Wind Project turbine layout which is explained in more detail in Section 3.1.

Revised Collector Substation 1 would be moved to a different location in Ann Township, Cottonwood County, but the size of the collector substation would be reduced by 0.5 acre and would be sited in cultivated crop land, similar to the previous location of this substation that was evaluated in the August 2020 Application.

Plum Creek is providing a supplemental environmental review of anticipated impacts and proposed mitigation measures for the changes proposed in this SPAR (where applicable) to allow the Commission to consider the potential impacts and evaluate conditions for the Site Permit amendment. As is demonstrated in this request, the impacts due to the modifications are less than or equal to those impacts previously considered by the Commission.

2.2.1 Site Permit Conditions

Plum Creek respectfully requests that the Commission amend the 2023 Site Permit to reflect the proposed Wind Project changes described herein. A draft of the amendments to the Site Permit requested by Plum Creek with requested changes shown in redline is provided in Appendix A.

Based on early coordination with EERA staff, Plum Creek is aware of additional conditions that are likely to be added to the amended Site Permit to update the Site Permit with conditions that are typically included in most current site permits, including:

- protocols for unanticipated discoveries during construction;
- condition to commit to prevailing wage standard;
- requirement for third-party monitoring during construction ;
- require the permittee to keep records of compliance with the condition and provide them upon request to Commerce or Commission staff in Site Permit Conditions 5.3.18, 5.3.19, 5.3.20, 5.3.21;
- revise Site Permit Condition 8.2 to align with standard permit language that requires the permittee to obtain a Power Purchase Agreement within 2 years of the date of permit issuance.
- revise Site Permit Condition 8.3 to require commencement of construction by the later of two years of the issuance of the amended Site Permit as requested in this amendment request or September 25, 2027;.and
- require updates to the Tier 3 filed study for the Avian and Bat Protection Plan as part of the pre-construction filings.

The Applicant has no issue with these changes and has included these conditions in the draft of the amended Site Permit in Appendix A.

3.0 WIND PROJECT DESCRIPTION

The Wind Project continues to be proposed as a wind energy conversion facility with an up to 414 MW nameplate capacity and the Wind Project boundary has not changed from the 73,000 acres north of Westbrook Minnesota, described in the August 2020 Application and approved in the 2021 Site Permit and 2023 Site Permit issued by the Commission. Map 1 provides an overview of the Wind Project boundary. Table 3.0-1 lists the counties, townships, and public land survey system locations within the Wind Project boundary.

Table 3.0-1
Wind Project Boundary

County Name	Township Name	Township	Range	Sections
Cottonwood	Germantown	108	36	7, 18
	Highwater	108	37	1-14, 16-18, 20-21, 24-25
	Ann	108	38	1-36
	Westbrook	107	38	2-9
Murray	Holly	108	39	1-2, 11-15, 21-28, 30-36
	Dovray	107	39	1-16, 19-24, 28-33
	Murray	107	40	1, 12, 23-26, 36
	Des Moines River	106	39	4-5
Redwood	North Hero	109	38	27-36
	Lamberton	109	37	31-36

With this SPAR, Plum Creek is proposing to replace the 74 Vestas V162 5.6 MW turbines or 67 Siemens Gamesa SG170 6.2 MW turbines identified in the 2023 Site Permit with one of four potential wind turbine models. The proposed new turbine models have rated nameplate capacity ranging from 3.8 MW to 6.1 MW. Plum Creek has evaluated turbine layouts with 78 turbine locations for all models. Depending upon the turbine model selected, Plum Creek would install between 68 and 77 primary turbine locations and between one and 10 alternate turbine locations. Additional Wind Project facilities will include:

- New gravel access roads and improvements to existing roads
- Underground electrical collection and communication lines
- Operations and maintenance (O&M) facility[10]
- Two collector substations (i.e., Collector Substation 2 and Revised Collector Substation 1)
- Up to four permanent meteorological towers
- Sonic Detection and Ranging or Light Detection and Ranging unit
- One temporary laydown area (adjacent to Collector Substation 2)
- Up to two Aircraft Detection Lighting Systems radars

[10] Plum Creek will seek a local land use permit for the O&M facility.

- Up to two temporary batch plant areas for construction of the Wind Project

The location of the O&M facility, Collector Substation 2, and Sonic Detection and Ranging or Light Detection and Ranging unit have not changed from what was proposed by Plum Creek in its site permit applications. The size and number of the temporary laydown yards has been reduced from what Plum Creek proposed in its August 2020 Application. Previously, the Wind Project design included up to three temporary laydown yards that would impact approximately 18 acres; the updated Wind Project design described herein includes one laydown yard that is approximately 15 acres in size. Maps 2a through 2d depict the Wind Project boundary and facilities.

The location of access roads, collection and communication lines, meteorological towers, and crane paths have been updated to correspond to the current Wind Project design; this layout would be the same regardless of which turbine model is selected and only the total number of primary or alternate turbines would vary between the four proposed turbine models.

The turbines Plum Creek are considering for the Wind Project span the energy production range of 3.8 MW to 6.1 MW. Nameplate capacity of the Wind Project is up to 414 MW[11]. Due to the available participating land, siting constraints, and existing agreement with the U.S. Department of Defense (DOD), the Wind Project is limited to 78 total turbine positions. Plum Creek proposes a range of viable turbine models which would allow optimization with respect to production, installed cost, and interconnection/network upgrades costs. Generally, turbines with a lower nameplate capacity like the GE 3.8-154 have a higher capacity factor relative to higher nameplate turbines, so if a smaller project size is deemed optimal, it would make such a turbine more attractive economically. In selecting primary and alternate locations, Plum Creek considered the relative production of individual turbine positions, a qualitative assessment of the incremental construction costs of those locations (e.g. additional road and collection system length vs. the next best position), and sound/shadow flicker impacts which vary by turbine model. Proposed turbine hub heights range from 98 to 120 meters (322 to 394 feet) and the rotor diameter ranges from 150 to 163 meters (492 to 535 feet). Table 3.0-2 shows the range of characteristics for the GE 3.8--154, GE 6.1-158, Vestas V150-4.5, and Vestas V163-4.5 turbine models, as well as the number of primary and alternate turbine positions proposed for each model. The previously permitted wind turbines hub heights ranged from 115 to 119 meters (377 to 390 feet) and had rotor diameters ranging from 162 to 170 meters (532 to 558 feet).

[11] Plum Creek's proposal to sell the power from the Project to Xcel Energy includes an up to 230 MW nameplate capacity Wind Project and a 150 MW/600 MWh battery energy storage project. See For Example, eDocket Docket No. E-002/CN-23-212. If the Project is selected by Xcel Energy Plum Creek would construct 230 MWs of the overall 414 MW Wind Project and reserves the right to request the Commission approve a bifurcation of the Site Permit to allow construction of the remaining portion of the permitted Wind Project. Plum Creek will submit a separate Site Permit Application for the battery energy storage project.

Table 3.0-2
Wind Turbine Characteristics

Characteristic	Turbine			
	GE 3.8-154	GE 6.1-158	Vestas V150-4.5	Vestas V163-4.5
Rated output (kilowatts)	3,800	6,100	4,500	4,500
Hub height in meters (m)[1]	98	117	98, 105, 120	98, 113
Rotor Diameter (m)	154	158	150	163
Total height[2] (m)	176	196	173 – 195 Tower dependent	179.5 - 194.5 Tower dependent
Number of Blades	3	3	3	3
Tip Speed at Rated Power (m/s)	85.7	83.6	94.24	93.88
Rated capacity wind speed[4] (m/s)	12.0	14.5	12.0	11.5
Cut-out wind speed[5] (m/s)	25	25	24.5	24
Maximum sustained wind speed[6] (m/s)	37.5	42.5	37.5	37.5
Swept Area (m^2)	18,723	19,607	17,671	20,867
Rotor speed (rotations per minute)	10.6	10.1	12.0	11.0
Primary Turbine Positions	77	68	75	76
Alternate Turbine Positions	1	10	3	2
Pitch Regulation	Active and independent blade pitch control	Active blade pitch control	Individual hydraulic pitch system with distributor block inside nacelle	Individual hydraulic pitch system with distributor block inside nacelle
Gearbox	Multi-stage planetary/helical gear design	Multi-stage planetary/helical gear design	Two planetary stages plus one helical stage	Two planetary stages plus one helical stage
Yaw Control	Wind Turbine Generator uses active yaw control and yaw drive system contains automatic yaw brake	Yaw drives work with the bearing between machine head and tower to facilitate yaw motion; yaw drive system has automatic yaw brake	Plain bearing system	Plain bearing system
Aerodynamic Brakes	Full feathering through individual blade pitch systems	Full feathering through individual blade pitch systems	Full feathering with 3 pitch cylinders	Full feathering with 3 pitch cylinders
Main Bearing	Single main shaft bearing is mounted in a bearing cap arrangement	Spherical roller	Double-row spherical roller bearing	Double-row spherical roller bearing

Table 3.0-2
Wind Turbine Characteristics

Characteristic	Turbine			
	GE 3.8-154	GE 6.1-158	Vestas V150-4.5	Vestas V163-4.5
Generator	Doubly fed induction type	Doubly fed induction type	Three-phase asynchronous induction with cage rotor	Three-phase asynchronous induction with cage rotor
Low-Noise-Trailing-Edges Option?	Yes	Yes	Yes	Yes
Noise-reduced Operations Mode	Yes	Yes	Yes	Yes

[1] Hub height = the turbine height from the ground to the top of the nacelle.
[2] Total height = the total turbine height from the ground to the tip of the blade in an upright position.
[3] Cut-in wind speed = wind speed at which turbine begins operation
[4] Rated capacity wind speed = wind speed at which turbine reaches its rated capacity
[5] Cut-out wind speed = wind speed above which turbine shuts down operation
[6] Maximum sustained wind speed = wind speed up to which turbine is designed to withstand
Note: m = meter; m/s = meters per second

All proposed turbine models have Supervisory Control and Data Acquisition (SCADA) communication technology to control and monitor the Wind Project. The SCADA communications system permits automatic, independent operation and remote supervision, allowing the simultaneous control of the wind turbines.

Operations, maintenance, and service arrangements between the turbine manufacturer and the Applicant will be structured to provide timely and efficient O&M support. The computerized data network will provide detailed operating and performance information for each wind turbine. Plum Creek will maintain a computer program and database for tracking each wind turbine's operational history.

All turbine models being considered incorporate technology that has been brought to market since the 2021 Site Permit was issued, including:

- Force-flow bedplates (nacelle components joined on a common structure to improve durability)
- New gearbox bearing designs (improving reliability by reducing bending and thrust)
- Noise-reduced operation modes
- Low-noise trailing edges
- SCADA-controlled generation modulation

Each turbine will be equipped with a lightning protection system. The turbine will be grounded and shielded to protect against lightning. The grounding system will be installed during foundation work and will be accommodated to local soil conditions. The resistance to neutral earth will be in accordance with local utility or code requirements. Lightning conductors are placed in each rotor blade and in the tower. The electrical components are also protected.

The wind turbines' steel freestanding tubular towers will be connected by anchor bolts to a concrete foundation. Turbine foundations will use a pad-and-pier tower mounting system consisting of top and bottom templates. These templates consist of anchor bolts and reinforcing steel bar (rebar); they are placed within the excavated portion of the turbine footing and filled with concrete. The anchor bolts protrude from the concrete pad surface and the turbine base is fastened to these bolts. The excavated portion of the concrete turbine pad ranges from approximately 300 to 750 cubic yards depending on soil requirements and turbine size. The turbine pad has an approximately 20-foot above-ground diameter with a typical depth between four to six feet. Approximately two to three feet of the turbine pad remains above grade. Geotechnical surveys, turbine tower load specifications, and cost considerations will dictate final design parameters of the foundations.

3.1 Turbine Layout

Most turbines would be sited in locations that were proposed in the August 2020 Application. However, a few turbine locations have been shifted based on: (i) feedback from the Federal Aviation Administration (FAA) and DOD; (ii) to avoid the 3 rotor diameter x 5 rotor diameter wind access buffer overlap on non-participating parcels, or (iii) to reduce anticipated annual shadow flicker at receptors.

The Wind Project is located approximately 40 miles east of an air surveillance radar (the Tyler radar) operated jointly by the FAA and the DOD. Numerous existing wind projects in the area diminish the ability of the Tyler radar to effectively track low-flying aircraft, and during the FAA's review of the Wind Project and coordination with the DOD, the Wind Project was identified as potential contributor to further performance degradation.

Beginning in late 2020, Plum Creek engaged with a Mitigation Response Team, which is a group of individuals from the various branches of the military with interest in the continued effective operation of the Tyler radar. The process lasted for about two years, and in 2023 the parties executed a mitigation agreement between Plum Creek and the DOD that requires Plum Creek to fund software upgrades to the Tyler radar that would reduce spurious returns that could be produced by the operation of the Wind Project. The software upgrades require a very specific definition of the Wind Project impact area, defined as a 'least-convex polygon' (i.e., the bounding box) outlining the perimeter of the turbine layout considered (i.e., the layout filed with the FAA in summer 2020), and limited modifications to the turbine layout such that they remained within this bounding box. The microwave beam paths and bounding box are shown in Map 3.

While the Mitigation Response Team review was in process, Plum Creek continued to develop the Wind Project as normal, including obtaining a Site Permit for the Wind Project from the Commission. After the mitigation agreement was finalized in April 2023 (and was fully executed in August 2024) and the bounding box was established, Plum Creek reviewed the turbine layout and noted that some turbine locations needed adjustment to comply with the terms of the mitigation agreement. These adjustments, including all turbine shifts proposed in this amendment request, are reflected in the amended mitigation agreement, executed in January 2025.

Table 3.1-1 provides a list of turbine locations that have changed from what was proposed in the August 2020 Application and shown on the Site Permit maps and notes why the change was

necessary. The locations of primary and alternate turbines for all four turbine models are depicted in Maps 2a through 2d. Map 4 provides a comparison of each previous and current turbine location that has changed. The Wind Project turbine layout continues to optimize the wind resource and minimize impacts to potentially sensitive infrastructure, ecological resources, and cultural features.

Table 3.1-1
Turbine Location Shifts

Turbine Number	Vestas V162 Distance Moved (feet)[1]	SG170 Distance Moved (feet)[1]	Reason for Move
T1	244 (Alt-1)	197 (T1)	Avoid WAB overlap on non-participating property
T5	299 (Alt-4)	47 (T5)	Avoid WAB overlap on non-participating property
T6	171 (Alt-5)	55 (T6)	Avoid WAB overlap on non-participating property
T9	73 (T7)	90 (T9)	Avoid WAB overlap on non-participating property
T13	867 (T10)	246 (T13)	Reduce shadow flicker at residence on Parcel ID 06-001-0030 (Participating)
T14	243 (T13)	237 (T14)	Avoid microwave beam path
T23	221 (T18)	220 (T23)	Reduce shadow flicker at non-participating residence
T26	2224 (T25)	2151 (Alt-26)	Avoid WAB overlap on non-participating property and reduce shadow flicker at non-participating residence
T38	370 (T39)	118 (T38)	Reduce shadow flicker at non-participating residence
T39	268 (T40)	258 (T39)	Reduce shadow flicker at residence on Parcel ID 09-028-0010 (Participating)
T42	988 (T43)	625 (Alt-42)	Moved west to accommodate shift of T43
T43	791 (T44)	813 (Alt-43)	Moved to comply with FAA bounding box
T51	617 (T53)	401 (T51)	Reduce shadow flicker at participating residence and to comply with FAA bounding box
T53	7 (T56)	12 (T53)	Moved to comply with FAA bounding box
T64	245 (T66)	257 (T64)	Reduce shadow flicker at residence on Parcel ID 03-003-0100 (Participating)
T73	116 (T75)	53 (T73)	Moved to comply with FAA bounding box
T75	NA	18 (T75)	Moved to comply with FAA bounding box
T78	255 (T79)	14 (Alt-78)	Moved to comply with FAA bounding box

[1] The turbine numbers (both primary and alternates) associated with the layouts for the V162 and SG170 models that were considered in the August 2020 Application are provided in parentheses.

Note: WAB = wind access buffer; FAA = Federal Aviation Administration

The turbine layout proposed in this SPAR continues to meet or exceed the wind energy conversion facility siting criteria outlined in the Commission's Order Establishing General Wind Permit Standards, Docket No. E,G999/M-07-1102 (January 11, 2008; Commission's General Permit Standards), applicable local government ordinances, and NG Renewable's best practices. Table 3.1-2 provides the differing setback distances for each of the four turbine models under consideration for the Wind Project.

Table 3.1-2
Representative Minimum Turbine Setback Distances by Turbine Model

Turbine Description	5 RD[1] (m/ft)	3 RD[1] (m/ft)	1.1x Total Height (including blades, m/feet)
GE 3.8-154	770 m / 2,526 ft	462 m / 1,516 ft	193.6 m / 635.2 ft
GE 6.1-158	790 m / 2,592 ft	474 m / 1,555 ft	215.6 m / 707.3 ft
Vestas V150-4.5	750 m / 2,461 ft	450 m / 1,476 ft	190.3 m / 612.3 ft – 214.5 m / 703.7 ft (tower dependent)
Vestas V163-4.5	815 m / 2,674 ft	489 m / 1,604 ft	197.45 m / 647.80 ft - 213.95 m / 701.94 ft (tower dependent)

[1] The listed RDs provide the range of rotor sizes; depending on the final turbine selection, the RD may vary from the listed values.
Note: ft = feet; m = meters; RD = rotor diameter

Setback distances for all four of the proposed turbine models are lower than the highest setback distance for the tallest turbine model that was considered in the Commission's 2021 permit decision (i.e., the SG170). Setback distances for the SG170 were 850 meters (2,789 feet) for 5 rotor diameters, 510 meters (1,673 feet) for 3 rotor diameters, and 220 meters (722 feet) for 1.1x total turbine height. Maps 5a through 5d display the Turbine Layout and Constraints for each of the four turbine models. Table 3.3-1 provides applicable turbine setbacks for the Wind Project that were described in the August 2020 Application and notes whether the layout described in this SPAR complies with the same setback distances.

3.2 Collector Substations

With this SPAR, Plum Creek is proposing to revise the location of one of the two collector substations for the Wind Project from what was presented in the August 2020 Application. The original location of Collector Substation 1 is in Township 108N, Range 38W, Section 10 in Ann Township in Cottonwood County. Plum Creek is proposing to shift the location of this collector substation about 2.3 miles northwest to Township 108N, Range 38W, Section 5 in Ann Township. The Revised Collector Substation 1 location is adjacent to fewer water resources. Its revised location would allow the HVTL Project to contemplate a shorter, more cost-effective 4.1-mile route segment with fewer turns than a corresponding segment of the route that was approved in the 2021 Route Permit. No changes to the location of Collector Substation 2 are proposed in this SPAR.

Plum Creek has updated the Wind Project design of electrical collection and fiber optic communication lines to connect the turbine array to Revised Collector Substation 1 and Collector Substation 2. The collection and fiber optic lines will allow communication between the wind turbines, substations, O&M facility, and the electrical grid.

No changes to the installation methods for collection and fiber optic lines are proposed from what was presented in the August 2020 Application. The collection and fiber-optic lines will be underground, unless unanticipated site-specific conditions require aboveground wiring in certain areas. Where underground, the wires will be placed in the same trench wherever possible and will include a marking system and occasional aboveground junction boxes. The collection circuits will connect to one of Plum Creek's two collector substations, which will have a fiber-optic connection to the O&M facility and a communication system connection to the grid operator. The power delivered to the Wind Project substations will be converted to 345 kV. The power will travel along a 345 kV transmission line segment connecting Collector Substation 2 to Revised Collector Substation 1 and an additional segment connecting Revised Collector Substation 1 to the switching station and the point of interconnection for the Plum Creek Project. This transmission line and switching station are discussed further in Section 3.3.

3.3 Route Permit

Plum Creek is requesting an amendment to the 2021 Route Permit to change the southern approximately 7.5 miles of the HVTL Project to a shorter, approximately 4.1-mile-long route that will connect Collector Substation 2 to Revised Collector Substation 1. A full description of the proposed HVTL Project changes, as well as a request to extend the construction start and commercial operation date for the HVTL Project, is presented in Plum Creek's Route Permit Amendment Request which is being filed under Docket No. IP-6997/TL-18-701 concurrently with this SPAR. The Applicant is not requesting any changes to the HVTL Project between County State-Aid Highway (CSAH) 45 in Redwood County and the Switching Station or the point of interconnection for the Plum Creek Project.

3.4 Potential Future Facilities

Plum Creek is considering the addition of a battery storage project to operate behind the meter of the Plum Creek Wind Farm. Due to recent permitting reform and anticipated rulemaking, Plum Creek would permit an ancillary battery energy storage system (BESS) project in a separate request/docket to the Site and Route Permit. More will be known about a potential BESS project in the second quarter of 2025.

Table 3.3-1
Wind Turbine Setback Requirements for the Wind Project

Turbine Setback Requirement	Distance for Setback	Authority	Setback in August 2020 Application	Setbacks met by Current Layout?
Wind Access Buffer – Prevailing Wind Directions	5 x rotor diameter (RD)	Commission's General Permit Standards	5 x RD	Yes
Wind Access Buffer – Non-Prevailing Wind Directions	3 x RD	Commission's General Permit Standards	3 x RD	Yes
Residences	500 feet, or the minimum distance required to meet the state noise standard of 50 decibels (dB) using the A-weighted scale (dBA), whichever is greater	Commission's General Permit Standards	1,000 feet from residences	Yes
	1,000 feet and/or sufficient distance to meet state noise standards, whichever is greater[1]	Murray County Renewable Energy Ordinance		
Noise Requirements	Distance must meet the state noise standard of 50 dB(A)[2]	Minnesota Pollution Control Agency (MPCA)	Turbines were sited for turbine-only noise to be < 45 dB(A) at non-participating residences and < 47 dBA at participating residences	Turbines are sited for turbine-only noise to be at <47 dB(A) at all participating and non-participating residences.
Property Lines	3 x RD on east-west axis and 5 x RD on north-south axis	Murray County Renewable Energy Ordinance	3 x RD in non-prevailing wind direction and 5 x RD in prevailing wind direction	Yes, for property lines of non-participating land
Public Roads and Trails	Minimum 250 feet	Commission's General Permit Standards	1.1 x total turbine height – Turbines in the previous layouts for the V162 and SG 170 were all sited to comply with the Murray County Zoning Ordinance, regardless of whether they were in Murray County.	With the exception of Turbine T-43, all turbines conform to the 1.1x total turbine height setback in the Murry County Zoning Ordinance, regardless of whether they are located in Murray County. Turbine T-43, which is in Cottonwood County and is not subject to the Murray County ordinance, was shifted to comply with FAA requirements and is
	1.1 times total height	Murray County Zoning Ordinance		

Table 3.3-1
Wind Turbine Setback Requirements for the Wind Project

Turbine Setback Requirement	Distance for Setback	Authority	Setback in August 2020 Application	Setbacks met by Current Layout?
				now setback 650 feet from County Road 11 (refer to Maps 2a through 2d). This does not comply with the Murray County Zoning Ordinance; however, Turbine T-43 is not in Murray County and shifting the turbine location was necessary to comply with FAA requirements. The location of Turbine T-43 meets the Commission's General Permit Standards, that require a 250-foot setback from public roads and trails.
Other Rights-of-Way (powerline, pipeline)	1.1 x the total height	Murray County Renewable Energy Ordinance	1.1 x total turbine height	Yes. One natural gas pipeline crosses the Wind Project Area; this pipeline was present in the August 2020 Application layout, as well.
Public Conservation Land Managed as Grasslands	3 x RD on east-west axis and 5 x RD on north-south axis[3]	Murray County Renewable Energy Ordinance	3 x RD in non-prevailing wind direction and 5 x RD in prevailing wind direction	Yes
U.S. Fish and Wildlife Service Wetlands Types III, IV, and V which are 10 acres or greater	3 x RD on east-west axis and 5 x RD on north-south axis	Murray County Renewable Energy Ordinance	3 x RD in non-prevailing wind direction and 5 x RD in prevailing wind direction (in Murray County only)	Yes
Other Structures (barns, grain bins, etc.)	1.1 x the total height	Murray County Renewable Energy Ordinance	1.1 x total turbine height (in Murray County only)	Yes
Other Existing WECS and Internal Spacing	3 x RD on east-west axis and 5 x RD on north-south axis	Murray County Renewable Energy Ordinance	N/A	Yes

Table 3.3-1
Wind Turbine Setback Requirements for the Wind Project

Turbine Setback Requirement	Distance for Setback	Authority	Setback in August 2020 Application	Setbacks met by Current Layout?

[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 dBA, whichever is greater. Plum Creek follows the practice of siting turbines at least 1,000 feet from residences or the minimum distance required to meet the state noise standard of 50 dBA, whichever is greater.

[2] Noise standards are regulated by the 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. Additionally, based on the 2022 LWECS Application Guidance, EERA staff recommend turbine-only noise to be < 45 dBA at non-participating residences and < 47 dBA at participating residences. The layouts included in this SPAR meet this recommendation.

[3] Plum Creek implemented this setback based on the prevailing and non-prevailing wind directions. The Wind Project's "wind rose" displaying the prevailing and non-prevailing wind directions is provided in Section 9.1.10 of the August 2020 Application.

Note: RD = rotor diameter

In addition to the setbacks applied to the Wind Project and shown in Table 3.3-1, Plum Creek has designed the turbine layout to minimize shadow flicker to 30 hours or less of shadow flicker per year at non-participating residences with one exception. A detailed discussion of the shadow flicker modeling results and proposed mitigation measures for the updated Wind Project design, including a commitment to prepare a Shadow Flicker Mitigation Plan, is presented in Section 5.5.2.

Additionally, all layouts incorporate Minnesota Department of Natural Resources (MDNR) feedback on siting turbines more than 1,000 feet from riparian areas associated with Highwater and Dutch Charley Creeks. The MDNR requested these setbacks because these corridors likely provide good bat habitat and the setbacks would avoid permanent impacts (turbines, access roads, collector substations) and minimize temporary impacts (crane paths, collection lines, and workspace associated with access roads and turbines) to MDNR-mapped native prairie, native plant communities, and sites of biodiversity significance.

3.5 Wind Project Schedule

Plum Creek is requesting an extension to the schedule outlined in the 2023 2023 Site Permit. The anticipated schedule for the Wind Project, as described in this SPAR, is outlined below in Table 3.5-1.

Table 3.5-1
Anticipated Wind Project Schedule

Activity	2023 Site Permit Anticipated Timeline	2024 Anticipated Timeline[1]
Land Acquisition	Ongoing	Ongoing
Site Permit Amendment	July 2023	August 2025
Other Permits	By Q3 2025	By Q3 2026
Equipment Procurement, Manufacture, and Delivery	Q4 2024 through Q2 2026	Q2 2025 through Q3 2027
Interconnection Generation Interconnection Agreement	Q1 2025	Q1 2026
Construction Start (as early as)	Q3 2025	Q3 2026
Construction Financing	Q3 2025	Q3 2026
Permanent Financing	Q1-Q2 2025	Q1-Q2 2026
Commercial Testing	By Q4 2026	By Q4 2028
Commercial Operation	By Q4 2026	By Q4 2028

[1] Timeline is dependent on the outcome of the confidential negotiations with potential purchaser(s) of the Wind Project and/or its power.

3.5.1 Land Acquisition

Plum Creek has easements and wind rights to construct the Wind Project as currently designed; however, land acquisition will continue until construction to add landowners that wish to participate in the Wind Project in the form of shadow flicker waivers and/or setback easements. Plum Creek will continue to be responsible for all land acquisition and has obtained necessary easements, leases, or purchase agreements from landowners. Plum Creek has obtained purchase options for Collector Substation 2 and is negotiating purchase options for Revised Collector

Substation 1, O&M facilities, and temporary laydown and staging area; final purchase agreements will be executed prior to the start of construction.

3.5.2 Equipment Procurement, Manufacture, and Delivery

Plum Creek will select turbines for the Wind Project after meteorological and economic studies are completed to achieve the best match of turbines for the Wind Project. Turbines could arrive on site as early as the third quarter of 2026.

3.5.3 Construction

Plum Creek personnel will oversee the primary contractors performing onsite Wind Project construction, including, but not limited to, road construction, wind turbine assembly, and electrical and communications installation. Construction will take approximately 15 months to complete; however, depending upon seasonal or weather-related constraints (i.e., minimal work would occur during winter months) it may take more or less time.

3.5.4 Financing

The Applicant will be responsible for financing all predevelopment, development, and construction activities. The Applicant anticipates financing the cost of all predevelopment activities through internal funds. Construction will be financed with internal funds or a combination of internal funds and third-party sources of debt and equity capital. Permanent project financing will be provided with the Applicant's internal funds or a combination of internal funds and third-party sources of debt and equity capital.

3.5.5 Expected Commercial Operation Date

The Applicant anticipates that the Wind Project would begin commercial operation by the fourth quarter of 2028. The commercial operation date is dependent on the completion of the interconnection process, permitting, securing regulatory approvals for the sale of the Wind Project/power generated by the Wind Project, and other development activities. The Wind Project is currently being evaluated as part of the MISO interconnection process and, per the current schedule, the Wind Project is expected to receive its Generation Interconnection Agreement late in the first quarter of 2026. However, due to expected delays, we anticipate that the Generation Interconnection Agreement may be delayed between 3-6 months based on the current estimates.

3.6 Other Permits

The permits or approvals that may be required for the construction and operation of the Wind Project are provided in Table 3.6-1. The list in Table 3.6-1 is the same as what was described in the August 2020 Application. Plum Creek will obtain all permits and licenses that are required for the Wind Project, following approval of the SPAR.

Table 3.6-1
Potential Permits and Approvals

Administering Agency	Permit, Approval, or Consultation	Status and Applicability to the Wind Project
Federal		
U.S. Army Corps of Engineers (USACE)	Wetland Delineation Approvals	Wetland delineations will be completed prior to construction; Plum Creek anticipates impacts will be within the Nationwide Permit 51 threshold.
	Jurisdictional Determination	
	Federal Clean Water Act Section 404	
U.S. Fish and Wildlife Service (USFWS)	Review for Threatened and Endangered Species	Based on coordination with USFWS, a Take Permit is not anticipated for the Wind Project.
Environmental Protection Agency (Region 5) in coordination with the Minnesota Pollution Control Agency (MPCA)	Spill Prevention Control and Countermeasure Plan	Plum Creek will develop a Spill Prevention Control and Countermeasure Plan for use during construction and operation of the Wind Project to minimize risk of site contamination.
Federal Aviation Administration (FAA)	Form 7460-1 Notice of Proposed Construction or Alteration (Determination of No Hazard)	Plum Creek has re-submitted Form 7460-1 for the turbine locations in Q3 2024 to initiate FAA review of the layout under the agreed upon terms of the Mitigation Response Team.
	Notice of Actual Construction or Alteration (Form 7460-2)	After construction is complete, Plum Creek will submit Form 7460-2 for the turbine locations.
State of Minnesota		
Minnesota Public Utilities Commission (MPUC)	Certificate of Need	Issued September 2021
	Site Permit Amendment for Large Wind Energy Conversion System	Site Permit issued September 2021. Amendments issued January 2022 and July 2023. SPAR submitted February 3, 2025.
	Route Permit for electric transmission line	Issued September 2021 Route Permit amendment requests submitted February 3, 2025
Board of Water and Soil Resources	Wetland Conservation Act approvals	Plum Creek has coordinated with the USACE and conducted a desktop review of wetlands and potential impacts with the MDNR update to National Wetlands Inventory data. Based on this desktop data, the Wind Project will fall under the Nationwide Permit 51 threshold for impacts. Prior to construction, Plum Creek will conduct wetland delineations to confirm wetland boundaries and impacts based on final design.

Table 3.6-1
Potential Permits and Approvals

Administering Agency	Permit, Approval, or Consultation	Status and Applicability to the Wind Project
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	Plum Creek has coordinated with SHPO, conducted a literature review of the Wind Project Area, and Wind Project facilities avoided previously identified archaeological sites. Plum Creek will conduct surveys for previously unidentified cultural resources in high-potential areas after the Site Permit Amendment is Ordered and the Wind Project design is finalized. Plum Creek will coordinate with SHPO on the protocol and any potential mitigation.
Minnesota Pollution Control Agency (MPCA)	Section 401 Water Quality Certification	Concurrent with Section 404, Clean Water Act – Plum Creek will meet the Minnesota conditions
	National Pollutant Discharge Elimination System Permit (NPDES) – MPCA General Stormwater Permit for Construction Activity	After the Site Permit Amendment is Ordered by the Commission, Plum Creek will submit NPDES Permit. The permit is required to be submitted within 30 days of the start of construction. The NPDES permit will cover the transmission line and wind farm.
	Very Small Quantity Generator License – Hazardous Waste Collection Program	To be obtained prior to construction.
	Aboveground Storage Tank Notification Form	To be obtained prior to construction.
Minnesota Department of Natural Resources (MDNR)	License to Cross Public Waters	Plum Creek will submit its License to Cross Public Waters based on a final Wind Project design.
	Native Prairie Protection Plan	After the Site Permit Amendment is Ordered by the Commission, Plum Creek will submit its Native Prairie Protection Plan.
	General Permit for Water Appropriations (Dewatering)	To be obtained prior to construction.
	Public Waters Work Permit	To be obtained prior to construction.
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.
	Tall Structure Permit	To be obtained prior to construction.

Table 3.6-1
Potential Permits and Approvals

Administering Agency	Permit, Approval, or Consultation	Status and Applicability to the Wind Project
Local Approvals		
Cottonwood, Murray, and Redwood Counties	Right-of-way permits, crossing permits, driveway permits for access roads, oversize/overweight permits for County Roads	Plum Creek will enter into a Development, Road Use, and Drainage Agreement prior to construction.
Cottonwood County	Well and Septic Permits	To be obtained prior to construction.
Townships	Right-of-way permits, crossing permits, driveway permits for access roads, oversize/overweight permits for township roads	Plum Creek will enter into a Development, Road Use, and Drainage Agreement prior to construction.

3.7 Cost Analysis

The total Wind Project-installed capital costs are estimated to be approximately $750 million to $950 million for the four turbine models. Since 2020, when the initial August 2020 Application was prepared, the price of goods, services and equipment have increased due to multiple factors, including inflationary pressures, outside of the control of entities such as Plum Creek. Wind Project –installed capital costs include wind turbines, associated electrical and communication systems, collector substations, and access roads. Interconnection costs have been assumed but have not been finalized and may deviate from the variable used in the estimate provided based on final MISO study results. Ongoing O&M costs and administrative costs are estimated to be approximately $20-25 million per year, including payments to landowners for wind lease and easement rights.

3.7.1 Site Design Dependent Costs

The overall cost of developing the Wind Project will depend primarily on site selection and construction timing. Site-dependent costs will include: the relative ease of access to the individual wind turbine locations, site-specific subsurface conditions that determine foundation design, access road design and layout, ease of underground work, and the layout of the turbine arrays which affects road and electrical cable cost.

3.8 Decommissioning

The Wind Project decommissioning and restoration plan must be developed in accordance with the requirements of Minn. R. 7854.0500, subp. 13. Plum Creek filed its Draft Decommissioning Plan for the Wind Project with the August 2020 Application. An updated Draft Decommissioning Plan that reflects the Wind Project changes requested herein is provided in Appendix B.

The Decommissioning Plan will be updated, as needed, prior to the Wind Project's pre-construction meeting. At the end of commercial operation, Plum Creek or the Wind Project owners will be responsible for removing wind facilities and removing the turbine foundations to a depth of four feet below grade. Plum Creek reserves the right to extend operations instead of decommissioning at the end of the Site Permit term and would apply for an extension of the

LWECS Site Permit to continue operation of the Wind Project. In this case, a decision may be made on whether to continue operation with existing equipment or to retrofit the turbines and power system with upgrades based on newer technologies.

The anticipated Wind Project life is approximately 30 years beyond the date of first commercial operation. A detailed description of decommissioning and removal activities and site restoration objectives is included in Appendix B. Decommissioning and restoration activities will be completed within 12 months after the date the Wind Project ceases to operate.

Plum Creek will be responsible for all costs to decommission the Wind Project and associated facilities. The cost to decommission will depend upon the prevailing rates for salvage value of the equipment and labor costs. Estimated decommissioning costs for each turbine model are provided in Table 3.8-1. Because of the uncertainties surrounding future decommissioning costs and salvage values, Plum Creek will review and update the cost estimate of decommissioning and restoration for the Wind Project every five years after Wind Project commissioning. This revised cost estimate of decommissioning and salvage value will be submitted to the Commission for review and comment.

Table 3.8-1
Estimated Gross and Net Decommissioning Costs

Turbine Description	Gross Costs in 2024 $	Net Costs in 2024 $
GE 3.8-154	$20M	$11M
GE 6.1-158	$22M	$10M
Vestas V150-4.5	$22M	$9M
Vestas V163-4.5	$21M	$9M

[1] Costs include salvage value, including associated facilities.

A detailed description of the methods used to develop the cost estimate, and the schedule for revising the cost estimate (i.e., every five years starting in year 10 of operation) is provided in the Draft Decommissioning Plan in Appendix B.

Financial assurance will begin in year 10 and will provide for full decommissioning costs prior to the expiration of any Power Purchase Agreement and the operational life of the Wind Project. The financial assurance could include a surety bond agreement, an escrow account, a reserve fund, or another form of security that will ultimately fund decommissioning and site restoration costs after Wind Project operations cease, to the extent that the salvage value does not cover decommissioning costs. Plum Creek may designate Cottonwood, Redwood, Murray counties or the MPUC as beneficiary of the financial assurance. Plum Creek will decommission the Wind Project in accordance with the conditions outlined in the Site Permit. Plum Creek will notify the appropriate landowners and local governing bodies of the decommissioning schedule and has included an obligation to decommission the Wind Project components in applicable lease and easement agreements.

4.0 WIND RIGHTS

No changes are proposed to the Wind Project boundary from what was described in the August 2020 Application and considered in the Commission's 2021 site permit decision and most land ownership remains the same; however, in some cases, private land ownership has changed since the Wind Project received its Site Permit.

Land rights secured from each landowner vary, and may include, but are not limited to, the rights to construct wind turbines and Wind Project facilities including access roads and collection lines, and rights to wind and buffer easements. Plum Creek currently has lease agreements with participating landowners for all parcels that would host Wind Project facilities (and allow compliance with setbacks), which equates to site control of 52,869 acres or 72.5 percent of the Wind Project Area boundary[12]. Plum Creek remains in negotiation with multiple landowners within the Wind Project boundary and anticipates minimal acreage being added to the Wind Project's leased lands before construction. Maps 6a through 6d show the turbine locations and the property lines within the Wind Project boundary, as well as the Wind Project facilities and underlying parcels required for siting that comply with applicable setbacks.

[12] This acreage has been updated to remove duplicate parcels for which multiple easements are signed (i.e., wind easement and transmission easement).

5.0 SUPPLEMENTAL ENVIRONMENTAL REVIEW

Plum Creek is providing a supplemental environmental review of anticipated impacts and proposed mitigation measures for the changes proposed in this SPAR (where applicable) to allow the Commission to consider the potential impacts and evaluate conditions for the Site Permit amendment. All data sources reviewed to prepare the August 2020 Application and in the further record development, were revisited to check for updates. For data sources that have changed since the August 2020 Application was prepared, Plum Creek presents the updated data throughout Section 5.0, as well as data from the August 2020 Application for the purposes of comparison. Information that has not changed since the August 2020 Application was prepared, is not restated herein. In addition, Plum Creek is providing an analysis of topics that were not addressed in the August 2020 Application but have typically been considered in more recent siting proceedings before the Commission, including environmental justice, air quality, greenhouse gas emissions, and climate change.

Table 5.0-1 summarizes the temporary workspaces and permanent impacts of all Wind Project facilities proposed in this SPAR, including Revised Collector Substation 1, and provides the information presented in the August 2020 Application for comparison. Turbine workspaces and permanent impacts presented in Table 5.0-1 for the current Wind Project design reflect what the total impact would be if all primary and alternate turbines were constructed (i.e., 78 turbine locations). Because none of the layouts will utilize all 78 locations, temporary workspaces and permanent impacts presented in Table 5.0-1 are overstated. The number of turbines that would be needed to achieve an up to 414 MW nameplate capacity for the Wind Project would vary from 68 to 77, depending on which turbine is selected (refer to Table 3.0-2). Plum Creek is providing impacts for all 78 potential turbine locations to consider all potential Wind Project impacts and to allow for flexibility in final Wind Project design, if needed.

Except for temporary crane paths, the total area considered for temporary workspaces and permanent impacts from each Wind Project facility is the same or less than what was evaluated in the August 2020 Application. Plum Creek has co-located access roads, collection lines, and crane paths to the extent practicable to minimize the Wind Project's impacts.

Table 5.0-1
Summary of Temporary and Permanent Impacts (acres)

Wind Project Facility[1]	Description of Footprint	August 2020 Application[2]		Current Request	
		Perm.	Temp.	Perm.	Temp.
Turbines	50-foot radius for turbine pad	14.4	--	14.1	--
	300-foot radius for construction workspace	--	494.5	--	480.8
Access Roads	20-foot-wide road	51.6	--	49.5	--
	150-foot-wide construction workspace	--	263.6	--	258.4
Crane Paths	120-foot-wide corridor	--	538.9	--	674.1
Collection Lines	75-foot-wide corridor	--	670.9	--	563.6
Permanent Met Towers	75-foot by 75-foot workspace	--	0.6	--	0.5
Laydown/Staging Areas	Footprint of laydown/staging areas dispersed throughout the Wind Project	--	18.4	--	15.1
Previous Collector Substation 1	Footprint of facility	10.7	--	--	--
Revised Collector Substation 1	Footprint of facility	--	--	10.2	--
Collector Substation 2/ O&M facility	Footprint of facility	10.2	--	10.2	--
	Total	**86.9**	**1,986.9**	**83.9**	**1,992.4**

[1] Plum Creek will construct up to two Aircraft Detection Lighting Systems radars. The number and location of radar unit(s) will be determined based on coordination with the FAA. Temporary workspace associated with Aircraft Detection Lighting Systems is expected to be similar to the permanent met towers (75-foot by 75-foot workspace), resulting in 0.1 to 0.2 acres of temporary impacts. Because the location of the Aircraft Detection Lighting Systems radar(s) is unknown, they are not accounted for in this table.

[2] Impacts provided represent the highest impacts from the August 2020 Application Wind Project design. As such, the impacts may be from the V162 or the SG170 model, whichever is greater.

Note: A double dash indicates that no impacts are anticipated for this feature.

Plum Creek analyzed potential impacts on human and environmental resources for the Wind Project changes presented herein using the same impact assessment areas used in the August 2020 Application. The impact assessment areas for each resource is the geographic area within which the Wind Project may exert some influence. These impact assessment areas vary with the resource being analyzed and the potential impact and are summarized in Table 5.0-2.

The following impact assessment areas will be used:

- **Wind Project boundary**. The approximately 73,000-acre area identified in Map 1 and Table 3.0-1 of this SPAR. This is used as the impact assessment area for conservation easements, hazardous materials, topography, soils, geologic and groundwater resources, surface water and floodplain resources, wetlands, and vegetation.
- **One mile**. A distance of one mile from the Wind Project boundary is used as the impact assessment area for analyzing potential impacts to noise, visual resources, shadow flicker, cultural and archaeological resources, wildlife, and federal- and state-listed species.
- **Five Miles**. A distance of five miles from the Wind Project boundary is used as the impact assessment area for population density in accordance with the Application Guidance for Site Permitting of Large Wind Energy Conversion Systems in Minnesota (2022 LWECS Application Guidance) (Minnesota Department of Commerce, 2022).
- **Ten Miles.** A distance of ten miles from the Wind Project boundary is used as the impact assessment area for analyzing potential impacts on recreation and MDNR high-value areas in accordance with the 2022 LWECS Application Guidance (Minnesota Department of Commerce, 2022).
- **Wind Project Study Area**. Defined generally as the townships and counties where the Wind Project is located, the Wind Project Study Area is used as the impact assessment area for analyzing potential impacts to demographics, environmental justice, land use and zoning compatibility, public services and infrastructure, public health and safety, land-based economies, tourism, local economies and community benefits, air quality, climate change and greenhouse gas emissions. These are resources for which impacts may extend throughout communities surrounding the Wind Project.

Table 5.0-2 Impact Assessment Areas

Impact Assessment Area	August 2020 Application Specific Resource/Potential Impact to Resource	Current Request Specific Resource/Potential Impact to Resource
Wind Project boundary	Conservation Easements, Public Services and Infrastructure, Recreation, Electromagnetic Fields and Stray Voltage, Hazardous Materials, Land-Based Economies, Topography, Soils, Geologic and Groundwater Resources, Surface Waters and Floodplains, Wetlands, Vegetation, Wildlife	Conservation Easements, Hazardous Materials, Topography, Soils, Geologic and Groundwater Resources, Surface Water and Floodplain Resources, Wetlands, Vegetation
One Mile	Noise, Shadow Flicker, Cultural and Archaeological Resources, Rare and Unique Natural Resources	Noise, Visual Resources, Shadow Flicker, Cultural and Archaeological Resources, Wildlife, Federal- and State-listed Species
Five Miles	Population Density	Population Density
Ten Miles	Air Traffic and Visual Impacts	Recreation, MDNR High-Value Areas

Table 5.0-2 Impact Assessment Areas		
	August 2020 Application	Current Request
Impact Assessment Area	Specific Resource/Potential Impact to Resource	Specific Resource/Potential Impact to Resource
Wind Project Study Area	Demographics, Land Use, Tourism, Local Economies and Community Benefits	Demographics, Environmental Justice, Land Use and Zoning Compatibility, Public Services and Infrastructure, Public Health and Safety, Land-based Economies, Tourism, Local Economies and Community Benefits, Air Quality, Climate Change and Greenhouse Gas Emissions

5.1 Demographics

Demographic information provided in Plum Creek's August 2020 Application[13] was from the 2010 U.S. Census and the 2018 American Community Survey (ACS) 5-year Estimates Data Profiles. For this SPAR, Information from the 2020 U.S. Census and the 2022 ACS 5-year Estimates was reviewed to look for changes in the demographic information provided in the August 2020 Application (U.S. Census Bureau, 2023a and 2023b). Updated demographic information from the U.S. Census Bureau is provided in Tables 5.1-1, 5.1-2, and 5.1-3 and information from the August 2020 Application is included for the purpose of comparison.

Demographics in Redwood, Cottonwood, and Murray Counties have not changed significantly from what was provided in Plum Creek's August 2020 Application. Population levels in each county declined slightly between the 2020 census and the 2023 estimate (refer to Table 5.1-1), which was true when the 2010 census and 2019 estimates were compared.

Housing characteristics in the three counties are slightly lower than what was described in the August 2020 Application. Vacant housing units in the three counties range from 544 in Cottonwood County to 1,035 in Redwood County (refer to Table 5.1-1).

Between 82 and 91 percent of the population in the Redwood, Cottonwood, and Murray Counties identify as White Alone, Not Hispanic or Latino, which is between four and 13 percent higher than the state average (refer to Table 5.1-2). As such, the percentage of total minority population in Redwood, Cottonwood, and Murray Counties is significantly lower than the state average of 22 percent. The racial and ethnic makeup of Redwood, Cottonwood, and Murray Counties remains similar to what was described in the August 2020 Application.

[13] Other – Supplemental and Amended Site Permit Application (August 8, 2020), E-docket No. 20208-166257-02. Available online at: https://www.edockets.state.mn.us/edockets/searchDocuments.do?method=showPoup&documentId={107C3674-0000-CF3C-8D85-8D88C3D06A07}&documentTitle=20208-166257-02.

Table 5.1-1
Demographics in Redwood, Cottonwood, and Murray Counties

Location	August 2020 Application					Current Request				
	Population, Census, April 1, 2010	ACS Population Estimates July 1, 2019	Percent Change 2010 - 2019	2018 Estimated Total Housing Units	2018 Estimated Total Vacant Housing Units	Population, Census, April 1, 2020[1]	ACS Population Estimates July 1, 2023[1]	Percent Change 2020 – 2023[1]	2022 Estimated Total Housing Units[2]	2022 Estimated Total Vacant Housing Units[2]
Minnesota	**5,303,925**	**5,639,632**	**6.3**	**2,420,473**	**252,672**	**5,706,494**	**5,737,915**	**0.5%**	**2,493,956**	**237,830**
Redwood County	16,059	15,170	-5.5	7,314	1,074	15,425	15,288	-0.9%	7,110	1,035
Cottonwood County	11,687	11,196	-4.2	5,435	585	11,517	11,319	-1.7%	5,157	544
Murray County	8,725	8,194	-6.1	4,621	919	8,179	8,049	-1.5%	4,418	886

[1] U.S. Census Bureau, 2023a
[2] U.S. Census Bureau, 2022a

Table 5.1-2
Race and Ethnicity of the Population in Redwood, Cottonwood, and Murray Counties

Race/Ethnicity	August 2020 Application				Current Request			
	Minnesota	Redwood County	Cottonwood County	Murray County	Minnesota	Redwood County	Cottonwood County	Murray County
White Alone, Not Hispanic or Latino (%)	79.1	86.4	84.7	92.2	77.6	85.6	81.8	91.0
Black or African American Alone (%)	7.0	1.1	1.3	0.5	7.6	1.1	1.7	0.6
American Indian or Alaska Native Alone (%)	1.4	5.0	0.9	0.5	1.4	5.3	1.0	0.6
Asian Alone (%)	5.2	2.6	4.1	1.6	5.5	2.7	4.5	1.8
Native Hawaiian/Pacific Islander Alone (%)	0.1	0.1	0.4	0.2	0.1	0.1	0.9	0.2

Table 5.1-2
Race and Ethnicity of the Population in Redwood, Cottonwood, and Murray Counties

Race/Ethnicity	August 2020 Application				Current Request			
	Minnesota	Redwood County	Cottonwood County	Murray County	Minnesota	Redwood County	Cottonwood County	Murray County
Two or More Races (%)	2.6	2.3	2.0	1.3	2.8	2.4	2.2	1.6
Hispanic or Latino (%)	5.6	3.8	8.4	4.4	6.0	4.3	10.2	5.0
Total Minority (%)	20.9	13.6	15.3	7.8	22.4	14.4	18.2	8.0

[1] Total minority percentage equals the total population minus the population of White Alone, Not Hispanic or Latino.
Source: U.S. Census Bureau, 2023a

Table 5.1-3
Population Density within Five Miles of the Wind Project

Location	August 2020 Application		Current Request[1]	
	Total Land Area (square mile)	Population Density per square mile	Total Land Area (square mile)	Population Density per square mile
Minnesota	**79,626.74**	**66.6**	**79,626.68**	**71.7**
Redwood County	878.57	18.3	878.57	17.6
Cottonwood County	638.61	18.3	639.97	18.0
Murray County	704.70	12.4	704.67	11.6
Brown County	*611.09*	*42.4*	*611.11*	*42.4*
Lyon County	*714.56*	*36.2*	*714.41*	*35.4*

[1] Counties shown in italics are located outside of the Wind Project Area boundary.
Source: U.S. Census Bureau, 2023b

Table 5.1-3 provides U.S. Census Bureau data about population densities of counties within 5.0 miles of the Wind Project boundary. Population densities in counties within 5.0 miles of the Wind Project remains similar to what was described in the August 2020 Application, while population density in the state has increased from 66.6 in the 2018 ACS 5-year Estimates to 71.7 in the 2022 ACS 5-year Estimates.

5.1.1 Environmental Justice

Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income in decisions related to the development, implementation, and enforcement of environmental laws, regulations, and policies (Minnesota Pollution Control Agency [MPCA], 2024a). The MPCA developed the Understanding Environmental Justice in Minnesota online screening tool to assist with identifying areas of concern for environmental justice (MPCA, 2024b). The online tool uses demographic and economic data from the U.S. Census Bureau at the census tract level to identify environmental justice communities.

Minn. Statutes § 216B.1691, Subd. 1(e) defines an environmental justice area in Minnesota as:

> "(e) "Environmental justice area" means an area in Minnesota that, based on the most recent data published by the United States Census Bureau, meets one or more of the following criteria:
>
> (1) 40 percent or more of the area's total population is nonwhite;
>
> (2) 35 percent or more of households in the area have an income that is at or below 200 percent of the federal poverty level;
>
> (3) 40 percent or more of residents over the age of five have limited English proficiency; or
>
> (4) the area is located within Indian country, as defined in U.S. Code, title 18, section 1151."

Minn. Statutes § 216B.1691, Subd. 1(e) was enacted in 2021, after the August 2020 Application was prepared; as such, comparative information from the August 2020 Application is not included for comparison. Data used in the MPCA's online tool is from the U.S. Census Bureau's 2018-2022 ACS 5-year estimates (MPCA, 2024b). Table 5.1.1-1 provides the data from the MPCA's online tool for each of the census tracts intersecting the Wind Project boundary. This information is also depicted in Map 7.

Table 5.1.1-1 Environmental Justice Review of the Wind Project Boundary[1]				
	Minn. Statutes § 216B.1691, Subd. 1(e) Criteria			
County/Census Tract	Percent Non-white Population	Percent of Households with Income Equal to or Below 200 Percent of Poverty Level	Percent of Residents with Limited English Proficiency	Within Indian Country?
Redwood County				
Census Tract 7505	20.8%	27.7%	4.8%	No
Census Tract 7506	6.4%	33.2%	1.3%	No
Cottonwood County				
Census Tract 2702	10.2%	32.7%	1.1%	No
Murray County				
Census Tract 9001	3.2%	19.4%	0.2%	No
Census Tract 9003	6.0%	23.4%	1.2%	No

The Wind Project is not located within Indian Country as defined in U.S. Code, title 18, section 1151. Furthermore, review of the MPCA's online tool indicates that there are no areas of environmental justice concern within the Wind Project boundary.

5.1.2 Impacts and Mitigation Measures

The changes to turbine locations and Revised Collector Substation 1, as described herein, are not anticipated to affect demographics or other socioeconomic factors in the Wind Project Study Area. The Applicant is not proposing changes to the Wind Project boundary and the updated U.S. Census Bureau information presented in Tables 5.1-1, 5.1-2, and 5.1-3 does not show a significant change in the demographic characteristics of the Wind Project Study Area from what was considered in the Commission's 2021 Site Permit decision.

Approximately 300 construction personnel will be required for construction and 7 to 9 permanent personnel will be needed for operation and maintenance of the Wind Project. Plum Creek will use local contractors for portions of the construction process, as available. If no local contractors are available, the influx of 300 construction personnel would equate to a total temporary population increase of approximately 2.6 percent in Cottonwood County, 3.6 percent in Murray County, and 1.9 percent in Redwood County over 2020 census numbers. This would represent a minimal, temporary increase in the total population of Redwood, Cottonwood, and Murray Counties.

Adequate temporary housing for construction personnel continues to be available in the form of motels and hotels in municipalities near the Wind Project such as Windom, Marshall, Redwood Falls, and Worthington, all of which are within 25 miles of the Wind Project. While Plum Creek would seek to hire locally for permanent operations positions, for the purposes of analysis and to provide an assessment of the greatest possible impacts, Plum Creek assumes that the estimated 7 to 9 operations personnel required for the Wind Project would relocate to the Project Study Area. As shown in Table 5.1-1, a combined total of 2,465 vacant housing units are available in Redwood, Cottonwood, and Murray Counties (U.S. Census, 2022a). Overall, the demand for temporary

housing for construction personnel and housing for 7 to 9 operations personnel would represent a minimal, temporary impact on the availability of housing in the three counties.

As further described in the Local Economies and Community Benefits section of this SPAR, the Wind Project is expected to have an overall positive impact on local economies in Redwood, Cottonwood, and Murray Counties through increases in county tax revenues via the Wind Energy Production Tax, temporary and permanent employment opportunities, and increased revenues for local business from purchases of materials and services during the period of construction.

Review of the MPCA's online tool indicates that no areas of environmental justice concern are crossed by the Optimized Route; therefore, the changes requested herein would not impact areas of environmental justice concern.

5.2 Land Use and Zoning

Land use within the Wind Project Study Area remains the same as what was described in the August 2020 Application. Land within the Wind Project boundary is predominantly rural with sparsely scattered rural residences, farmsteads, commercial livestock operations, and agricultural support facilities throughout. The Wind Project boundary was developed to avoid municipalities to the extent possible; however, the southwestern corner of the Wind Project boundary partially overlaps the municipal boundary of Dovray in Murray County.

The Wind Project is subject to Minnesota Wind Siting Act (Minnesota Statutes Chapter 216F). As such, and pursuant to Minn. Stat. § 216F.07, a site permit issued by the Commission, "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 governments." Therefore, Plum Creek is not required to apply to county zoning authorities for additional building or land use permits or approvals for the Wind Project. However, the county zoning and comprehensive plans provide helpful information on existing land uses and future development that can be used to understand potential Wind Project impacts.

Plum Creek reviewed county planning and zoning information for the Wind Project Study Area to check for updates since the August 2020 Application. Table 5.2-1 provides an inventory of the zoning ordinances and comprehensive plans that were reviewed and notes whether these plans have been updated since the August 2020 Application was filed.

Table 5.2-1
Comprehensive Plan Inventory for Local Governments in Redwood, Cottonwood, and Murray Counties

Governing Body[1]	Name of Plan	Changed Since 8/2020?	Associated Development Plan(s)	Changed Since 8/2020?
Redwood County	Redwood County Land Use Ordinance (2024)	No	Comprehensive Plan (2007)	No
Cottonwood County	Cottonwood County Zoning Ordinance (2016)	No	Comprehensive Land Use Plan (2005)	No
Murray County	Murray County Zoning Ordinance (2019)	Yes	Comprehensive Plan (2016)	No
	Renewable Energy Ordinance (2019)	Yes		

[1] Townships within the Wind Project Area boundary are included in the comprehensive plans for their respective counties.

The Redwood County Comprehensive Plan (2007) has not changed since the August 2020 Application was filed. The draft version of the Redwood County Zoning Ordinance is no longer available on the county website; however, the county website provides a link to the Land Use Ordinance but no date of adoption for this ordinance is provided. Review of the Redwood County Land Use Ordinance did not identify any changes to zoning districts or permitted uses from what was discussed in the August 2020 Application. As such, no updates are provided in this SPAR.

The Cottonwood County Zoning Ordinance (2016) and Comprehensive Plan (2005) have not changed since the August 2020 Application was filed. Therefore, no updates are provided in this SPAR.

The Murray County Zoning Ordinance has been updated since the August 2020 Application was filed (Murray County, 2019). The revised ordinance was adopted in 2019 and became effective in 2020. At the same time, Murray County updated its Renewable Energy Ordinance (2019); adoption and effective dates of the updated Renewable Energy Ordinance are the same as the overall county ordinance. The updated Zoning and Renewable Energy Ordinances contain the same zoning district definitions, compatibility considerations, and setback requirements for commercial-scale wind projects (i.e., greater than or equal to 100 kilowatts) as what was presented in the August 2020 Application.

The portion of the Wind Project boundary that is in Murray County is within the Agricultural District. In addition, the Wind Project boundary falls within the Floodplain Management District, Shoreland Management District, and the Special Protection District; these districts are overlays intended to protect sensitive natural resources. All districts are defined in the Murray County Zoning Ordinance as follows:

- **Agricultural District**: Siting of LWECS is conditionally permitted within the Agricultural District according to the Murray County Renewable Energy Ordinance (Murray County, 2019).
- **Floodplain Management District**: Siting of commercial-scale wind projects in the Floodplain Management District is conditionally permitted according to the Murray County Renewable Energy Ordinance.
- **Shoreland Management District**: Siting of commercial-scale wind projects in the Shoreland Management District is not permitted according to the Murray County Renewable Energy Ordinance.
- **Special Protection District**: Siting of commercial-scale wind projects in the Special Protection District is not permitted according to the Murray County Renewable Energy Ordinance.

As noted in Table 3.3-1, with the exception of Turbine T-43, all turbines conform to the 1.1 x total turbine height setback identified in the Murry County Renewable Energy Ordinance, regardless of whether they are located in Murray County. The Murray County Renewable Energy Ordinance has the most stringent setback requirements of the three counties where the Wind Project is located, so Plum Creek initially used this standard to site all turbines. As part of the FAA and DOD review process (refer to Section 3.1), Turbine T-43, which is in Cottonwood County, was shifted to comply with FAA requirements and is now setback 650 feet from County Road 11 (refer to Maps 2a through 2d). While Turbine T-43 no longer complies with the Murray County Renewable Energy Ordinance the current setback for this turbine exceeds the Commission's General Permit Standards, which call for a minimum of a 250-foot setback from public roads. Furthermore, Turbine T-43 is not in Murray County and shifting the turbine location was necessary to comply with FAA requirements.

5.2.1 Impacts and Mitigation Measures

The Wind Project changes described herein are generally consistent with the comprehensive planning documents and zoning requirements of Redwood, Cottonwood, and Murray counties. As was true in the Wind Project design presented in the August 2020 Application, no Wind Project facilities would be sited or operated within floodplain, shoreland, and other special protection districts and overlay districts that are not compatible with wind energy development. Accordingly, no mitigative measures are proposed.

5.3 Conservation Easements

Review of publicly available geographic information system data did not identify any additional conservation easements within the Wind Project boundary since the review of the Wind Project was conducted for the August 2020 Application.

The Wind Project boundary has not changed from what was provided in the August 2020 Application. Several parcels of agricultural land in the Wind Project boundary are enrolled in the Conservation Reserve Enhancement Program. The Conservation Reserve Enhancement Program is an offshoot of the Conservation Reserve Program 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 Conservation Reserve Enhancement Program 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 Reserve Program (Minnesota Board of Water and Soil Resources, 2024).

Enrollment in the Conservation Reserve Program and Conservation Reserve Enhancement Program is voluntary. Based on publicly available data, there are approximately 1,689 acres (approximately two percent) of the Wind Project boundary in Cottonwood and Murray Counties currently enrolled in Conservation Reserve Enhancement Program and Reinvest in Minnesota easements; these areas shown on Map 10 (Public Land Ownership and Recreation). There are no Conservation Reserve Enhancement Program or Reinvest in Minnesota easements mapped in the Redwood County portion of the Wind Project boundary.

The U.S. Fish and Wildlife Service (USFWS) holds easements within the Wind Project boundary for three Farm Service Agency parcels and an easement for an access road to a National Wildlife Refuge parcel, all of which total 35 acres (less than 0.1 percent) of the Wind Project boundary in Murray and Cottonwood Counties (refer to Map 10). There are no USFWS wetland or grassland easements in the Wind Project boundary.

The updated Wind Project design described in this SPAR would not impact known conservation easements within the Wind Project boundary and no turbines in the updated layout would be sited in or within the wind access buffer of public conservation easements that are managed as grassland (refer to Table 3.3-1). Revised Collector Substation 1 is not sited within or adjacent to known conservation easements. As such, there are no previously undisclosed impacts to consider, and no additional mitigation measures are proposed.

As part of Wind Project real estate title clearance for participating landowners, Plum Creek is actively completing a title search for all Wind Project participants that will also identify any other conservation easements within the Wind Project boundary. If additional conservation easements are identified, Plum Creek will coordinate with the landowner and the agency that administers the conservation easements to identify their trust resources and address any potential impacts.

5.4 Noise

Because Plum Creek is requesting permission from the Commission to change the turbine models under consideration for the Wind Project, Plum Creek engaged Resource Systems Group, Inc (RSG) to prepare a sound modeling analysis for each of the four turbine models under consideration. In the modeling, RSG included all primary and alternate turbine locations (i.e., up to 78 total turbine locations for each of the four models).

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 noise measurements in A-weighted decibels (dBA). Different standards are specified for daytime (7:00 a.m. to 10:00 p.m.) and nighttime (10:00 p.m. to 7:00 a.m.) 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 1. All land within the Wind Project boundary is considered Land Use Noise Area Classification 1. Table 5.4-1 lists the MPCA state noise standards for each land use classification. The MPCA noise standards have not changed since the 2023 Site Permit.

Table 5.4-1
MPCA State Noise Standards – Hourly A-Weighted Decibels

Land Use	Noise Area Classification	Day (7:00am – 10:00pm) dBA		Night (10:00pm – 7:00am) dBA	
		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
Source: Minn. R. Ch. 7030					

In addition to the noise standards in Minn. R. Ch. 7030, the 2022 LWECS Application Guidance (Minnesota Department of Commerce, 2022) states that wind farms should not cause an exceedance of the state noise standard when background sound levels are below the standard. This guidance further states that when background sound levels are equal to or greater than the state standard, the turbines should not contribute more than 47 dBA to total sound levels at nearby receptors.

As part of the original application filing for this Wind Project, RSG conducted background sound modeling within and within one mile of the Wind Project boundary between August 27 to September 5, 2019, and determined that the average nighttime L_{50} across all onsite monitors was 42 dBA. Further analysis indicated that biogenic sound (primarily insects) significantly influenced the modeling results. RSG refined the modeling results to filter out biogenic sound to better understand ambient sound levels within the Wind Project boundary and a one-mile buffer year-round, as the contribution of insects to overall sound levels would only occur in warmer months and would be absent in winter months. The adjusted nighttime L_{50} was 30 dBA at all monitors. Additional details about the background sound modeling and refinement procedures are provided in the Plum Creek Wind Pre-Construction Noise Assessment in Appendix C.

5.4.1 Impacts and Mitigation Measures

Plum Creek designed the turbine layout to be a minimum of 1,000 feet from residences plus the distance required to comply with the MPCA limit of a 50 dBA nighttime L_{50} noise level, if necessary (MPCA, 2015).

As noted in Section 3.0, the turbine layout is the same for all four turbine models under consideration, although the number of turbines differs depending upon the model selected. The closest turbine to a non-participant residence in the layout is 1,681 feet (T-64). The closest turbine to a participant residence in the layout is 1,061 feet (T-12). In the August 2020 Application, the closest turbine to a non-participant residence in the V162 layout was 2,496 feet and in the SG170 layout was 2,124 feet. The closest turbine to a participating residence in the V162 layout was 1,046 feet and in the SG170 layout was 1,246 feet.

Plum Creek incorporated Wind Project-specific background sound monitoring data with turbine sound modeling using the CadnaA® Version 2023 from Datakustik GmbH software to determine the sound levels at receptors within one mile of the Wind Project boundary. RSG's methodologies and results are detailed in the Plum Creek Wind Pre-Construction Noise Assessment in Appendix C.

The analysis accounted for all noise generating elements associated with the proposed wind turbine models and the turbine layout. All proposed primary and alternate turbines were modeled, and turbine-related noise levels were calculated at 461 residences within the Wind Project boundary and a one-mile buffer. Table 5.4.1-1 presents a summary of the sound modeling results. The baseline noise isopleths of turbine-only sound (a line or curve of equal values) are depicted in Maps 8a through 8d.

Table 5.4.1-1
Summary of Modeled Turbine-Only Sound Levels at Residences

Modeled Sound Pressure Level dBA	Number of Residences							
	GE 3.8-154		GE 6.1-158		Vestas V150-4.5		Vestas V163-4.5	
	P	NP	P	NP	P	NP	P	NP
<40.0	84	323	84	323	84	323	84	323
≥ 40.0 and ≤ 45.0	44	2	44	2	44	2	44	2
> 45.0 and ≤ 46.0	5		5		5		5	
> 46.0 and ≤ 47.0	3		3		3		3	
> 47.0	0	0	0	0	0	0	0	0
Total	**136**	**325**	**136**	**325**	**136**	**325**	**136**	**325**

Note: P = Participating and NP = Non-participating.

Table 5.4.1-2 shows the minimum, maximum, and average modeled turbine-only sound levels at residences for each of the two turbine models evaluated in the August 2020 Application and the four turbine models presented in this request.

Table 5.4.1-2
Minimum, Maximum, and Average Modeled Turbine-Only Sound Levels at Residences (dBA)

Residence Classification	Statistic	August 2020 Application		Current Request			
		V162	SG170	GE 154	GE 158	V150	V163
Participating							
	Average	33.0	35.0	36.4	37.6	37.8	38.8
	Minimum	8.0	17.0	18.0	19.8	20.1	21.3
	Maximum	47.0	49.0	46.7	46.5	47.0	47.0
Non-Participating							
	Average	26.0	27.0	28.8	30.2	30.2	31.3
	Minimum	1.0	11.0	11.2	14.6	14.5	15.9
	Maximum	40.0	41.0	40.9	43.1	42.2	43.1

Maximum calculated turbine-only sound levels at all residential receptors (participating and non-participating) are 47.0 dBA or less for all four of the turbine models presented in this request. Compared to the V162 and SG170 models considered in the August 2020 Application, the four new turbine models under consideration for the Wind Project would generate equal to or less noise. The highest maximum calculated turbine-only sound level at non-participating residences is 43.1 dBA for the Vestas V163-4.5 and GE-158 models. Because all 78 primary and alternate turbine locations were included in the modeling, the actual sound levels may be lower as only 68 to 77 turbine locations would be constructed, depending on the model selected. As depicted in the multi-turbine constraint maps and in Table 5.4.1-1, all turbine models and layouts comply with MPCA noise guidelines at residential receptors.

Plum Creek has sited turbines in the updated Wind Project design to minimize noise impacts to residents. In addition, Plum Creek will use noise reduced operation modes to limit the turbine-only sound levels to 47 dBA at night on models GE154 and GE158, if one of these turbine models is selected. Noise reduced operation modes are operational modes built into a turbine's control system that adjusts the turbine's rotor speed to reduce the noise generated by the turbine during certain wind conditions or at night.

Sound propagation modeling was performed using the CadnaA® Version 2023 acoustical modeling software in accordance with the ISO 9613-2 standard, "Acoustics – Attenuation of sound during propagation outdoors, Part 2: General Method of Calculation." The methodology applied in the modeling study follows the ANSI/ACP American National Standard for wind turbine sound modeling. The modeling study conservatively included wind turbines at all 77 potential locations at the maximum manufacturer-specified sound power level. Where necessary to reduce the turbine-only sound level to 47 dBA, the model specified noise reduced operations at night. The modeling assumptions related to these sound mitigation measures are further discussed in the sound assessment report in Appendix C.

To ensure compliance with the state noise standards, Plum Creek will perform a post-construction noise study in accordance with the Department of Commerce's Noise Study Protocol.

Plum Creek has incorporated the 2022 LWECS Application Guidance (Minnesota Department of Commerce, 2022) and sited turbines so that turbine-only noise is less than 47.0 dBA at all participating and non-participating receptors. The layout has been modeled for all four turbine models to help ensure cumulative impacts from all wind turbines, and maximum calculated noise levels for all turbine models are below the MPCA's nighttime L_{50} noise limit of 50 dBA at residential receptors.

5.5 Visual Resources

The topography, viewsheds, and public recreation opportunities within the one mile impact assessment area for visual resources have not changed since the August 2020 Application. Land within the Wind Project boundary and the one-mile buffer consists of glaciated, gently rolling plains with elevations ranging from 1,086 to 1,614 feet (331 to 492 meters) above sea level. Agricultural fields, farmsteads, and gently rolling topography visually dominate the area within one mile of the Wind Project boundary. Viewsheds in this area are generally broad and uninterrupted, with only small, scattered areas where they are defined 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 transmission lines and wind turbines are visible from considerable distances and are the tallest and often the most dominant visual feature on the landscape.

As was described in the August 2020 Application, the updated layout described in this SPAR would still be located within the viewshed of MDNR-managed Wildlife Management Areas, Lake Shetek State Park, USFWS Waterfowl Production Areas, USFWS National Wildlife Refuge lands, or other natural areas and may be visible to people using those areas.

The location of Revised Collector Substation 1 on the south side of CSAH 45 would be visible to passersby and would be a new feature on the landscape in Ann Township. The previous location of this substation that was evaluated in the FEIS was also directly adjacent to a public roadway (i.e., 340th Avenue) and would have been a new feature on the landscape in Ann Township. Plum Creek's request to update the location of this collector substation would shift temporary and permanent impacts from one location to another, but the aesthetic impacts would be largely similar. The nearest residence to Revised Collector Substation 1 is about 0.2 mile northwest of the substation site; the nearest residence to the previous substation location is also about 0.2 mile north of the site.

5.5.1 Impacts and Mitigation Measures

As was true of the previous design, the Wind Project will add to the cumulative visual impacts of other existing wind farms (e.g., Jeffers Wind Energy Center), substations, and other infrastructure by adding up to 77 new turbines in the area. If the proposed collector substation changes described herein are approved by the Commission, the temporary and permanent visual impacts associated with Revised Collector Substation 1 would be approximately 2.3 miles northwest of the site that was evaluated in the FEIS. On balance, the anticipated cumulative visual impact of the Wind Project changes requested in this SPAR would be substantially similar to the cumulative visual impact of the previous Wind Project design that was included in the August 2020 Application.

5.5.2 Shadow Flicker

Because Plum Creek is requesting permission from the Commission to change the turbine models under consideration for the Wind Project, Plum Creek hired ReGenerate, Inc. to prepare an updated shadow flicker modeling analysis for each of the four turbine models under consideration. ReGenerate, Inc. included all primary and alternate turbine locations (i.e., 78 total turbine locations) for each of the four models in the modeling.

ReGenerate, Inc. modeled shadow flicker for the updated Wind Project layout using the same methods that were used for the August 4, 2020 Shadow Flicker Assessment that was filed with the August 2020 Application. A detailed description of the methods used is provided in ReGenerate, Inc.'s report included as Appendix D.

5.5.2.1 Impacts and Mitigation Measures

Shadow flicker frequency calculations for the Wind Project were modeled for 461 residences (i.e., receptors) with WindPRO based on the primary and alternate turbine locations in each turbine model configuration. Receptors include those inside the Wind Project boundary and within one-mile buffer. Tables 5.5.2-1 presents the shadow flicker modeling results for the V162 and SG170 turbine models that was presented in the August 2020 Application; the August 2020 Application information is provided for the purposes of comparison.

Table 5.5.2-1
August 2020 Application – Summary of Shadow Flicker Assessment

Turbine Model	Shadow Flicker (hr./year)	Participating		Non-Participating		Total	
		No. of Receptors	% of Receptors	No. of Receptors	% of Receptors	No. of Receptors	% of Receptors
V162	0	75	52.4%	269	84.6%	344	74.7%
	0.1 to 20	32	22.4%	45	14.1%	77	16.7%
	20.1 to 30	10	7.0%	4	1.3%	14	3.0%
	30.1 to 40	12	8.4%	0	0.0%	12	2.6%
	40.1 to 50	7	4.9%	0	0.0%	7	1.5%
	50.1 to 60	0	0.0%	0	0.0%	0	0.0%
	60.1 or more	7	4.9%	0	0.0%	7	1.5%
SG170	0	69	48.3%	247	77.7%	316	68.5%
	0.1 to 20	38	26.6%	64	20.1%	102	22.1%
	20.1 to 30	12	8.4%	7	2.2%	19	4.1%
	30.1 to 40	12	8.4%	0	0.0%	12	2.6%
	40.1 to 50	6	4.2%	0	0.0%	6	1.3%
	50.1 to 60	4	2.8%	0	0.0%	4	0.9%
	60.1 or more	2	1.4%	0	0.0%	2	0.4%

Table 5.5.2-2 summarizes the shadow flicker modeling results for the four turbine models presented in this request, and Maps 9a through 9d provide a visual representation of these current modeling results. ReGenerate, Inc.'s shadow flicker modeling report for the four turbine models presented in this request is provided in Appendix D.

Table 5.5.2-2
Current Request - Summary of Shadow Flicker Assessment

Turbine Model	Shadow Flicker (hrs./year)	Participating		Non-Participating		Total	
		No. of Receptors	% of Receptors	No. of Receptors	% of Receptors	No. of Receptors	% of Receptors
GE 3.8-154	0	69	50.74	276	84.92	345	74.84
	0.1 to 20	40	29.41	46	14.15	86	18.66
	20.1 to 30	8	5.88	3	0.92	11	2.39
	30.1 to 40	11	8.09	0	0.00	11	2.39
	40.1 to 50	3	2.21	0	0.00	3	0.65
	50.1 to 60	2	1.47	0	0.00	2	0.43

Table 5.5.2-2
Current Request - Summary of Shadow Flicker Assessment

Turbine Model	Shadow Flicker (hrs./year)	Participating		Non-Participating		Total	
		No. of Receptors	% of Receptors	No. of Receptors	% of Receptors	No. of Receptors	% of Receptors
	60.1 or more	3	2.21	0	0.00	3	0.65
GE 6.1-158	0	66	48.53	276	84.92	342	74.19
	0.1 to 20	35	25.74	43	13.23	78	16.92
	20.1 to 30	16	11.76	6	1.85	22	4.77
	30.1 to 40	4	2.94	0	0.00	4	0.87
	40.1 to 50	8	5.88	0	0.00	8	1.74
	50.1 to 60	3	2.21	0	0.00	3	0.65
	60.1 or more	4	2.92	0	0.00	4	0.87
Vestas V150-4.5	0	67	49.26	279	85.85	346	75.05
	0.1 to 20	38	27.94	41	12.62	79	17.14
	20.1 to 30	13	9.56	4	1.54	18	3.90
	30.1 to 40	7	5.15	0	0.00	7	1.52
	40.1 to 50	5	3.68	0	0.00	5	1.08
	50.1 to 60	2	1.47	0	0.00	2	0.43
	60.1 or more	4	2.94	0	0.00	4	0.87
Vestas V163-4.5	0	65	47.79	272	83.69	337	73.10
	0.1 to 20	34	25.00	46	14.15	80	17.35
	20.1 to 30	17	12.50	7	2.15	24	5.21
	30.1 to 40	4	2.94	0	0.00	4	0.87
	40.1 to 50	9	6.62	0	0.00	9	1.95
	50.1 to 60	2	1.47	0	0.00	2	0.43
	60.1 or more	5	3.68	0	0.00	5	1.08

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 layout is summarized in Table 5.5.2-3; maximum shadow flicker (hours per year) from the August 2020 Application is provided for the purpose of comparison.

Table 5.5.2-3 Maximum Shadow Flicker (hours/year)		
Turbine Model	Maximum Shadow Flicker (hours per year)	
	Participating	Non-Participating
August 2020 Application		
V162	119.9	28.4
SG170	99.6	28.5
Current Request		
GE 3.8-154	94.3	22.0
GE 6.1-158	99.5	25.7
Vestas V150-4.5 [1]	88.9	23.7
Vestas V163-4.5 [1]	105.5	26.7

[1] The maximum hub height was used for modeling the Vestas turbine models. For the V150-4.5 the maximum hub height is 120 feet and for the V163-4.5 the maximum hub height is 113 feet (refer to Table 3.0-2).

The shadow flicker modeling results are similar to what they were in the previous Wind Project layout presented in the August 2020 Application; however, the maximum shadow flicker hours per year at participating and non-participating receptors is lower than what was modeled for the V162 and SG170 turbines. The shadow flicker modeling does not take into consideration several factors including:

- availability of the turbines (i.e., whether they are operating or not based on meteorological conditions, curtailment, 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 is surrounded by trees on the north, west, and east sides that are not accounted for by the model. Similarly, the non-participating residence modeled to receive the maximum amount of shadow flicker is also surrounded by trees on the north and west sides, between the turbine and the residence, that are not accounted for by the model. Trees surrounding a residence provide an obstruction to shadows from nearby proposed turbines.

At a distance of 1,000 feet or greater (the Wind Project minimum setback for residences), 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.

Pursuant to condition 7.2 of the 2023 Site Permit, Plum Creek is required to negotiate a shadow flicker agreement or waiver with the landowner for any receptors, participating or non-participating, with more than 30 hours per year of expected shadow flicker impacts attributable to the Wind Project. If Plum Creek is unable to reach agreement on the shadow flicker

waiver, a Shadow Flicker Mitigation Plan is required that outlines mitigation measures that will be used to reduce annual shadow flicker to 30 hours per year or less.

Plum Creek has coordinated with participating and non-participating landowners of receptors with more than 30 hours per year of expected shadow flicker impacts to offer additional shadow-flicker specific agreements and request a waiver. The number of waivers needed differs between the four turbines under consideration for the Wind Project. For example, 19 receptors are anticipated to experience greater than 30 hours of shadow flicker per year for the GE3.8-154 and GE6.1-158 models, 18 receptors for the V150-4.5 model, and 20 for the V163-4.5 model (refer to Table 5.5.2-2). To date, Plum Creek has obtained shadow flicker waivers for all receptors except one. Plum Creek will create a mitigation plan for the turbine to ensure flicker is below 30 hours per year.

As required by condition 7.2 of the 2023 Site Permit, Plum Creek will develop a Shadow Flicker Mitigation Plan for any receptors where a shadow flicker waiver cannot be negotiated. This Shadow Flicker Mitigation Plan will be filed with the Commission at least 14 days prior to the pre-construction meeting for the Wind Project.

5.6 Public Services and Infrastructure

Emergency services, utility infrastructure, roads and railroads, communication systems, television, cell towers and broadband services within the Wind Project Study Area have not changed since the August 2020 Application for the Wind Project. The proposed turbine model changes described herein are in similar locations and of similar height to the turbine models that were described in the August 2020 Application. Revised Collector Substation 1 would be shifted about 2.3 miles to the northwest but would be located in the same township as the previous substation that was described in the August 2020 Application. As such, no additional previously undisclosed impacts on public services and infrastructure are anticipated.

Plum Creek remains committed to the mitigation measures required by the site permit, including:

- Site Permit Condition 5.3.26: Submitting the location of all underground facilities, as defined in Minn. Stat. § 216D.01, subd. 11, to Gopher State One Call following the completion of construction at the site.
- Plum Creek will also identify existing utilities as part of the American Land Title Association survey and contact Gopher One Call to identify buried utilities within the Wind Project boundary prior to construction.
- Site Permit Condition 5.3.13: Coordinating with Cottonwood, Murray, and Redwood Counties and townships within the Wind Project Study Area on road use agreements. and all other required permits and approvals for use of public roads. Plum Creek anticipates the development of a single, cooperative, Development, Road Use, and Drainage Agreement.
- Site Permit Condition 5.3.17: Submitting an interferences assessment of television and radio signal reception, microwave signal patterns, and telecommunications in the project area prior to construction. The assessment will provide data that can be used in the future to determine whether the turbines and associated facilities are the cause of disruption or interference of television or radio reception, microwave patterns, or telecommunications

in the event of complaints about such disruption or interference after the turbines are placed in operation. Plum Creek will be responsible for addressing identified interference with communication systems, television, cell towers, and broadband during or after construction.

A detailed discussion of Plum Creek's coordination and executed mitigation agreement with the FAA and DOD for impacts to the Tyler air surveillance radar is provided in Section 3.1. In addition, Plum Creek commissioned an updated microwave beam path analysis, which is provided in Appendix E. The analysis concluded that the updated design presented in this request should not create4 a line-of-sight obstruction for any licensed or applied non-federal microwave links.

Plum Creek plans to install a private well and septic field for the O&M facility to support operations; these plans were disclosed in the August 2020 Application. Approximately 500 gallons of water are expected to be used per day. This minor use of water is not expected to have a noticeable impact on the water supply. The septic system is expected to process 500 gallons per day. Plum Creek will obtain all necessary permits for installation of the private well and septic field.

5.7 Cultural and Archaeological Resources

Plum Creek hired Tetra Tech, Inc. to conduct a file search in 2019 to identify previously recorded archaeological and historic structural resources within the Wind Project boundary and within a one-mile buffer; the results of this review were included in the August 2020 Application and the evaluation of Wind Project effects in the FEIS. Because the original file search was conducted more than five years ago, Plum Creek asked Tetra Tech, Inc.to refresh the review and check for any additional recorded resources that could be affected by the proposed changes described herein. Tetra Tech, Inc. conducted the refreshed desktop review of the Minnesota Statewide Historic Inventory Portal and the Minnesota Office of the State Archaeologist Portal in May 2024 to check for any additional historic structures and archaeological sites within the Wind Project boundary plus a one-mile buffer (Holven, 2024). Table 5.7-1 provides a summary of the results and also provides the results of the previous review that were provided in the August 2020 Application.

Table 5.7-1
Previously Recorded Cultural Resources within the Wind Project Area and the 1-mile Buffer

Resource Type	August 2020 Application		Current Request	
	Wind Project Area	One-Mile Buffer	Wind Project Area	One-Mile Buffer
Archaeological Sites	1	15	9	19
Sites listed in NRHP [1]	0	0	0	0
Historic Architectural Resources	6	24	23	48
Resources listed in NRHP [1]	0	2	0	2
Total Previously Recorded Cultural Resources	**7**	**39**	**32**	**39**
Total Listed in NRHP [1]	**0**	**2**	**0**	**2**

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

The current review of the Office of the State Archaeologist Portal identified an additional eight previously documented archaeological sites within the Wind Project boundary and an additional four sites within the one-mile buffer beyond what was identified in the 2019 file search. In total, the 2019 and 2024 file searches identified the following previously documented sites within the Wind Project boundary: three Precontact isolated finds, four Precontact lithic scatters, one Post-contact lithic scatter and historic trade item, and one site lead for a historically documented ghost town. The 2019 and 2024 file searches identified the following types of previously documented sites in the one-mile buffer: three Precontact isolated finds, 10 Precontact lithic scatters, three Precontact artifact scatters, two Post-contact sites, and one Post-contact cemetery (Bang Hill Cemetery). None of the previously documented archaeological sites identified in 2019 or 2024 have been evaluated for National Register of Historic Places (NRHP) listing.

The May 2024 review of the Minnesota Statewide Historic Inventory Portal identified 23 historic architectural resources within the Wind Project boundary and an additional 48 within the one-mile buffer (refer to Table 5.7-1). This is 17 additional historic architectural resources within the Wind Project boundary and 24 additional in the one-mile buffer beyond what was identified as a result of the 2019 file search. In total, the 2019 and 2024 file searches identified the following resources within the Wind Project boundary: nine bridges, eight culverts, two schools, Anderson Dodecagonal Barn, St. Olaf Lutheran Church, Holly Township Hall, and Trunk Highway 30. None of these 23 architectural resources have been evaluated for NRHP listing.

Two of the 48 architectural resources in the one-mile buffer are listed in the NRHP. These properties include the Revere Fire Hall (RW-RVC-004), which is located 0.85 mile to the north of the north-central portion of the Wind Project boundary and about 3.5 miles northeast of Revised Collector Substation 1, and the Walnut Grove Cooperative Creamery, located in the Town of Walnut Grove 0.5 mile northwest of the northwest corner of the Wind Project boundary and about 2.5 miles northwest of Revised Collector Substation 1. Both of these NRHP-listed resources were identified in the August 2020 Application and were part of the FEIS evaluation of the Wind Project. The 2019 and 2024 file searches identified the following types of historic architectural resources in the one-mile buffer: fourteen bridges, nine culverts, Trunk Highway 14, three banks,

two schools, five churches, one commercial building, one store, one creamery, two grain elevators, three houses, one lumber yard, one water tower, Slaughter Slough, and the Dovray City Hall. None of these 46 architectural resources have been evaluated for listing in the NRHP.

5.7.1 Impacts and Mitigation Measures

Plum Creek has designed the Wind Project to avoid impacting all previously documented archaeological and architectural resources. As such, no impacts to previously documented archaeological or architectural resources would occur as a result of the turbine and collector substation changes requested in this SPAR.

Plum Creek understands that additional previously undocumented cultural resources could be present within the Wind Project boundary. Archaeological resources would most likely be located on or near elevated landforms near permanent water sources. Architectural resources would most likely be located near existing municipalities, farmsteads, and infrastructure such as roads and bridges.

In compliance with Condition 6.3 of the 2023 Site Permit and in coordination with the Minnesota State Historic Preservation Office (SHPO), Plum Creek will conduct field surveys to identify unrecorded cultural resources that could be affected by the Wind Project facilities. The surveys 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, Plum Creek will work with SHPO to identify measures to avoid or mitigate any effects to these resources. Mitigation measures may include minor adjustments to the Wind Project design and establishing an avoidance buffer around sites to ensure avoidance 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 Plum Creek and the State Archaeologist.

5.8 Recreation

Recreation opportunities within and within 10 miles of the Wind Project boundary are substantially similar to what was present in the August 2020 Application. Plum Creek reviewed information from the U.S. Geological Survey (USGS), MDNR, and other publicly available resources to check for any new or previously unidentified public recreation opportunities. The public lands and recreation areas identified in the August 2020 Application are still present, and no new public recreation opportunities were identified within or within 10 miles of the Wind Project boundary. Map 10 shows the public lands and recreation areas that are within, adjacent to, or within 10 miles of the Wind Project boundary. Information about MDNR High-value Areas is provided in Section 5.23.3.

As noted in the August 2020 Application, there are six Aquatic Management Areas, 36 Wildlife Management Areas, three Scientific and Natural Areas, 11 Waterfowl Production Areas, one state park with an associated state trail (Lake Shetek State Park), and one state water trail (a segment of the Cottonwood River) within 10 miles of the Wind Farm boundary. No impacts on public recreation areas that are outside of the Wind Project boundary are anticipated; therefore, these resources are not described further in this request.

Recreation opportunities within or adjacent to the Wind Project boundary (i.e., recreation areas that could be affected by the Wind Project changes described in this request) are presented in Table 5.8-1; information about recreation areas within or adjacent to the Wind Project boundary from the August 2020 Application is also provided for the purpose of comparison.

Table 5.8-1
Recreation Opportunities within or Adjacent to the Wind Project Boundary

August 2020 Application			Current Request		
Within or Adjacent to the Wind Project Boundary	Name	Area (Acres)	Within or Adjacent to the Wind Project Boundary	Name	Area (Acres)
Adjacent	Budolfson Wildlife Management Area (WMA)	449.0	Adjacent	Budolfson Wildlife Management Area (WMA)	617.3
Adjacent	Buffalo Lake WMA (multiple parcels)	563.6	Adjacent	Buffalo Lake WMA (multiple parcels)	558.4
Adjacent	Dovray WMA (multiple parcels)	963.5	Adjacent	Dovray WMA (multiple parcels)	962.1
Adjacent	Plum Creek WMA	280.6	Adjacent	Plum Creek WMA	282.7
Adjacent	Typhoon WMA	82.5	Adjacent	Typhoon WMA	82.5
Adjacent	Buffalo Lake WPA	80.5	Adjacent	Buffalo Lake WPA	80.5
Adjacent	Devils Run WPA	155.6	Adjacent	Devils Run WPA	155.5
Adjacent	Dutch Creek WPA	19.0	Adjacent	Dutch Creek WPA	19.0
Adjacent	Lake Julia WPA	64.0	Adjacent	Lake Julia WPA	64.0
Partially Within	Pell Creek National Wildlife Refuge (one of multiple parcels)	60.0	Partially Within	Pell Creek National Wildlife Refuge (one of multiple parcels)	86.3

Table 5.8-1
Recreation Opportunities within or Adjacent to the Wind Project Boundary

August 2020 Application			Current Request		
Within or Adjacent to the Wind Project Boundary	Name	Area (Acres)	Within or Adjacent to the Wind Project Boundary	Name	Area (Acres)
Within	Three Walk-in Access Areas	287.6	Within	Three Walk-in Access Areas	287.6

Note: WMA = Wildlife Management Area; WPA = Waterfowl Production Area

Review of snowmobile trail information from MDNR shows that the segment of the Jackson County Snowmobile Trails that crossed the northeast corner of the Wind Project boundary is no longer part of the snowmobile trail system. With this change, there are no snowmobile trails crossing the site, and no potential impacts to snowmobile trails. As was true in the August 2020 Application, the Rolling Hills Golf Course is immediately adjacent to the southern edge of the Wind Project boundary.

The updated Wind Project design described throughout this SPAR would not site facilities in designated public lands or recreation areas and the Wind Project is not anticipated to impact known public recreation opportunities. As such, no mitigation measures are proposed.

5.9 Public Health and Safety

No changes to the Wind Project's potential for electromagnetic fields and stray voltage or air traffic interference are anticipated from the proposed changes described herein.

The dairy operation that was identified within the Wind Project boundary in the August 2020 Application is still in operation today. Turbines in the updated layout continue to be sited nearly one mile from this operation. Similarly, collection lines, at their closest, are also nearly one mile from this dairy farm. At these distances, the Plum Creek Project will have no stray voltage impacts to this dairy operation. Revised Collector Substation 1 is not sited near dairy operations.

The four turbine models under consideration are of similar height and rotor diameter to the turbine models that were described in the August 2020 Application, though some turbine locations have shifted from what is shown in the site permit maps. Revised Collector Substation 1 is about 2.3 miles northwest of the previous location of this substation that was evaluated in the FEIS, is in the same township, and is the same distance from the nearest residence. No additional or previously undisclosed impacts are anticipated from the Wind Project changes presented in this SPAR, and no additional mitigation measures are proposed.

Plum Creek remains committed to the mitigation measures required in the 2023 Site Permit, including:

- Site Permit Condition 4.11: Siting permanent towers for meteorological equipment at least 250 feet from the edge of the nearest public road right-of-way and from the Wind Project

boundary, or in compliance with the county ordinance regulating meteorological towers in the county where the tower is built, whichever is more restrictive. Meteorological towers will be placed on property under Plum Creek's site control or other development rights. Meteorological towers will be marked as required by the Federal Aviation Administration (FAA). There will be no lights on the towers other than what is required by the FAA.

- Site Permit Condition 4.12: Not placing wind turbines or associated facilities in a location that could create an obstruction to navigable airspace of private and public airports (as defined in Minn. R. 8800.0100, subp. 24(a) and 24(b)) in Minnesota, adjacent states, or provinces. Plum Creek will apply the minimum obstruction clearance for private airports pursuant to Minn. R. 8800.1900, subp. 5. Setbacks or other limitations will be followed in accordance with the Minnesota Department of Transportation (MNDOT) Aeronautics and Aviation and the FAA. Plum Creek will notify owners of all known airports within six miles of the Wind Project of the anticipated construction start date at least 14 days prior to the pre-construction meeting. Plum Creek will obtain the necessary permits for structures that are considered to be an obstruction to safety of flight from MNDOT Aeronautics and Aviation and the FAA, as applicable, at least 14 days prior to the pre-operation meeting.

- Site Permit Condition 5.3.28: Coordinating with the FAA on and implementing an Aircraft Detection Lighting System.

5.10 Hazardous Materials

For this SPAR, Plum Creek completed an updated review of the U.S. Environmental Protection Agency's (EPA) Facility Registry Service 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 Treatment, Storage, and Disposal; Resource Conservation and Recovery Act 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, 2024a). Plum Creek also reviewed the MPCA's What's in my Neighborhood database to identify any potential contaminated sites within the Wind Project boundary (MPCA, 2024c).

The results of the updated review for contaminated sites within the Wind Project boundary did not identify any new sites; the list of results is identical to what was provided in the August 2020 Application. No contaminated sites were identified at the location of Revised Collector Substation 1.

In addition to the research described above, and as part of the Wind Project financing process, an ASTM-conforming Phase I Environmental Site Assessment will be conducted for the Wind Project. The Phase I Environmental Site Assessment will identify known recognized environmental conditions or historical recognized environmental conditions that may require additional action prior to or during construction.

5.10.1 Impacts and Mitigation Measures

Construction of the Wind Project, as described in this SPAR, will not impact known contaminated sites. Plum Creek has designed the Wind Project to avoid known contaminated sites within the Wind Project boundary. Plum Creek also will conduct a Phase I Environmental Site Assessment prior to construction to locate any additional contaminated sites within the Wind Project boundary that require avoidance.

No previously undisclosed impacts are anticipated from the updated Wind Project design presented in this SPAR. Plum Creek 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. Because any potentially hazardous waste sites identified through online research or the Phase I Environmental Site Assessment 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 Wind Project, they will be handled, processed, treated, stored, and disposed of in accordance with Minn. R. Ch. 7045.

5.11 Land-based Economies

5.11.1 Agriculture

Information about agricultural production in the Wind Project Study Area provided in the August 2020 Application, and considered in the FEIS, was from the USDA's 2012 Census of Agriculture. The 2022 Census of Agriculture is now available and Plum Creek is providing updated information with this SPAR (USDA, 2022). Agricultural statistics for Redwood, Cottonwood, and Murray Counties are summarized in Table 5.11.1-1.

Table 5.11.1-1
Agricultural Statistics of Redwood, Cottonwood, and Murray Counties

Agricultural Statistics	August 2020 Application			Current Request		
	Redwood	Cottonwood	Murry	Redwood	Cottonwood	Murry
Number of Farms	1,163	813	895	1,323	742	789
Average Farm Size (acres)	448	459	456	423	529	445
Land in Farms (acres)	521,453 (93 % of county)	372,767 (92 % of county)	407,919 (88 % of county)	560,222 (99 % of county)	392,494 (95 % of county)	351,476 (76 % of county)
Market Value of Agricultural Production – Corps[1]	$365 million (70 %)	$234 million (63 %)	$233 million (63 %)	$463 million (58 %)	$354 million (59 %)	$254 million (56 %)
Top 3 Crops by Acreages	Corn, soybeans, sugar beets	Corn, soybeans, forage	Corn, soybeans, forage	Corn, soybeans, sugar beets	Corn, soybeans, forage	Corn, soybeans, forage

Table 5.11.1-1
Agricultural Statistics of Redwood, Cottonwood, and Murray Counties

Agricultural Statistics	August 2020 Application			Current Request		
	Redwood	Cottonwood	Murry	Redwood	Cottonwood	Murry
Market Value of Agricultural Production – Livestock[1]	$153 million (30 %)	$140 million (37 %)	$133 million (36 %)	$341 million (42 %)	$248 million (41 %)	$199 million (44 %)
Top 3 Livestock Inventories by Farms	Cattle, hogs and pigs, sheep and lambs	Cattle, hogs and pigs, sheep and lambs	Hogs and pigs, cattle, sheep and lambs	Cattle, hogs and pigs, poultry	Cattle, hogs and pigs, poultry	Cattle, hogs and pigs, poultry

[1] Percentages provided for market value of agricultural production of crops and livestock are calculated based on the total market value of all agricultural products combined and represent the share of total market value attributed to crops vs. livestock.

Source: USDA, 2022

Agricultural production in Redwood, Cottonwood, and Murray Counties is similar today to what was presented in the August 2020 Application, which was from the 2012 Census of Agriculture. Agricultural production remains a significant part of the local economy in Redwood, Cottonwood, and Murray counties.

The 2022 Census of Agriculture shows that the total number of farms in Redwood County has increased, while the number of farms in Cottonwood and Murray counties has decreased. The average farm size has increased significantly in Cottonwood County, while the average farm size in Redwood and Murray counties show slight decreases from the 2012 data. A lower percentage of total market value of agricultural products in Redwood, Cottonwood, and Murray counties is attributable to crop production when compared to the 2012 data, while the percentage attributable to livestock production has increased in all three counties. The top three types of agricultural crops produced in the three counties have not changed since the 2012 data, but the top three livestock inventories by farms has shifted from cattle, hogs and pigs, and sheep and lambs in the 2012 data to cattle, hogs and pigs, and poultry in all three counties.

5.11.2 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 Wind Project boundary. Review of the Wind Project Study Area in support of this SPAR did not identify any previously undisclosed impacts on forestry resources from what was presented in the August 2020 Application. Revised Collector Substation 1 is sited in cultivated crop land and would not impact forestry resources.

5.11.3 Mining

Previous reviews to identify mining operations within the Wind Project Study Area, as provided in the August 2020 Application, determined that no mining operations were present within the Wind Project boundary. As part of this SPAR, Plum Creek reviewed updates to MNDOT's Aggregate Source Information System data (MNDOT, 2023) to check for any changes since the

August 2020 Application was filed. Topographic maps and County Pit Maps for Redwood, Cottonwood, and Murray Counties have not been updated from what was reviewed for the August 2020 Application; therefore, no additional review of these resources was conducted.

Review of current Aggregate Source Information System data did not identify mining operations within the Wind Project boundary. Therefore, the changes requested in this SPAR would not change the evaluation of the Wind Project that was presented in the August 2020 Application

5.11.4 Impacts and Mitigation Measures

As was true in the Wind Project described in the August 2020 Application, the Wind Project layout would predominantly affect cultivated crop lands, as shown in Table 5.21.1-1. Most of the impacts from the Wind Project would occur during construction and would resolve when construction is complete.

According to analysis of the National Land Cover Database (NLCD) data (refer to Table 5.21.1-1), temporary construction impacts would affect about 3 percent (1,938.5 acres) of the 66,344 acres of cultivated cropland within the Wind Project boundary and permanent facilities (i.e., turbines, access roads, collector substations, O&M facility) would impact less than one percent (81.1 acres). The changes to the Wind Project design presented in this SPAR are not anticipated to significantly impact use of land for agricultural production in Redwood, Cottonwood, and Murray Counties. As demonstrated by other wind energy projects in the Midwest, agricultural practices continue during construction and operations.

Similar to the previous location, Revised Collector Substation 1 would be located in cultivated crop land but would remove about 0.5 acre less cultivated crop land from production than the previous location (refer to Table 5.0-1). While the location of such impacts would change, impacts associated with Revised Collector Substation 1 are, on balance, similar to and slightly less than those previously considered in the FEIS.

Plum Creek remains committed to complying with the mitigation measures identified in Condition 5 of the 2023 Site Permit, including:

- Site Permit Condition 5.3.5: protecting and segregating topsoil from subsoil;
- Site Permit Condition 5.3.6: minimizing soil compaction and decompaction of soil after construction is complete;
- Site Permit Condition 5.3.7: implementing erosion prevention and sediment control practices in accordance with the Wind Project Stormwater Pollution Prevention Plan (SWPPP) and National Pollutant Discharge Elimination System Permit (NPDES) that will be obtained prior to the start of construction;
- Site Permit Condition 5.3.10: restricting the use of pesticides to those approved by the Minnesota Department of Agriculture;
- Site Permit Conditions 5.3.11 and 5.3.12: using best management practices to avoid the spread of invasive species and noxious weeds;
- Site Permit Condition 5.3.18: taking precautions to protect livestock;

- Site Permit Sections 5.3.19 and 5.3.20: repairing or replacing all fences, gates, and drain tiles that may be damaged during construction of the Wind Project; and
- Site Permit Condition 5.3.22: restoring work areas as near as practicable to pre-construction conditions.

No changes to the general conditions in the 2023 Site Permit are part of this request.

No impacts on forestry or mining resources would occur; the updated Wind Project design continues to avoid these resources. Therefore, no mitigation measures are proposed.

5.12 Tourism

Tourism in the Wind Project Study Area continues to center around various festivals and activities hosted by the cities near the Wind Project Area boundary, such as Walnut Grove, and outdoor recreational opportunities at designated public lands and parks.

All Wind Project facilities in the revised design will be located on private lands, and outside of municipal boundaries, as was true of the Wind Project design presented in the August 2020 Application. No impacts on recreational areas, public lands, or other tourism-related activities are anticipated from the proposed changes described in this SPAR. No additional mitigation measures are proposed.

5.13 Local Economies and Community Benefits

The changes requested herein do not change the location of the Wind Project and the Wind Project boundary from what was described in the August 2020 Application. However, updated socioeconomic information from the U.S. Census Bureau is provided herein to allow the Commission to consider the potential impacts and evaluate conditions for the SPAR.

Economic information provided in Plum Creek's August 2020 Application was from the 2010 U.S. Census and the 2018 ACS 5-year Estimates Data Profiles. For this SPAR, information from the 2020 U.S. Census and the 2022 ACS 5-year Estimates was reviewed to look for changes in the economic information that was presented in the August 2020 Application (U.S. Census Bureau, 2022b). The results of this review are provided in Table 5.13-1 and information from the August 2020 Application is included for the purpose of comparison.

Table 5.13-1
Existing Economic Conditions in Redwood, Cottonwood, and Murray Counties

Location	August 2020 Application				Current Request			
	Per Capita Income Level (U.S. dollars)	Unemployment Rate (%)	Persons Living Below the Poverty Level (%)	Top 3 Industries[1]	Per Capita Income Level (U.S. dollars)	Unemployment Rate (%)	Persons Living Below the Poverty Level (%)	Top 3 Industries[1]
Minnesota	**36,245**	**3.9**	**10.1**	**E (25.2%), M (13.4%), R (11.0%)**	**44,947**	**4.0**	**9.3**	**E (25.4%), M (13.4%), R (10.9%)**
Redwood County	27,209	4.1	12.5	E (23.8%), M (13.8%), A (11.1%)	33,175	1.7	10.1	E (24.0%), M (12.0%), Ag (11.6%)
Cottonwood County	31,768	2.6	7.4	E (23.2%), M (20.0%), R (11.5%)	32,818	3.9	12.9	E (23.2%), M (17.1%), Ag (11.6%)
Murray County	28,011	2.5	11.4	E (22.6%), Ag (13.2%), M (12.7%)	38,783	3.0	7.4	E (24.2%), Ag (12.5%), M (12.1%)

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

Source: U.S. Census Bureau, 2022b

Economic conditions in Redwood, Cottonwood, and Murray Counties are similar to what was in the August 2020 Application, though some metrics have changed. Per capita incomes in the counties have increased slightly from what was presented in the August 2020 Application. Unemployment rates in Redwood County have dropped significantly, while unemployment rates in Cottonwood and Murray counties have increased slightly. Poverty levels in Redwood County have decreased while poverty levels in Cottonwood and Murray counties have increased.

5.13.1 Impacts and Mitigation Measures

The overall impact of the Wind Project on the local economies and communities of Redwood, Cottonwood, and Murray Counties will be positive in both the short term and long term. Community benefits associated with the Wind Project closely correspond with the stated economic development goals of the county comprehensive plans. Development of the Wind Project helps to promote the 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.

The changes proposed in this SPAR would not change the potential for the Wind Project to have a beneficial economic impact on Redwood, Cottonwood, and Murray counties. In the FEIS, a loss of economic benefits was noted as a key drawback to the no-build alternative (refer to FEIS Section 3.2.3.1). for example, landowners would lose out on lease payments during the Wind Project's operational life and a key revenue source for local units of government (the Wind Energy Production Tax) would not be realized. An updated analysis of the anticipated beneficial economic impacts from the Wind Project is presented below to allow the Commission to consider the potential impacts and evaluate conditions for the requested Site Permit amendment.

In the August 2020 Application, approximately 250 construction personnel and 11 to 15 permanent operations personnel were anticipated to be needed to construct and operate the Wind Project. Approximately 300 construction personnel will be required for construction and 7 to 9 permanent operations personnel will be needed for operation and maintenance of the Wind Project. This is 50 more construction personnel and 4 to 6 fewer permanent personnel for operation of the Wind Project than was proposed in the August 2020 Application. This information is reflective of current industry trends in the number of personnel required for construction and operation. Plum Creek remains committed to using local contractors and suppliers for portions of the construction process, as available. Plum Creek will pay no less than the prevailing wage rate to all construction and operations personnel, as defined in Minn. Stat. § 177.42, subd. 6. Total wages and salaries paid to construction personnel and permanent Wind Project employees in Redwood, Cottonwood, and Murray Counties will contribute positively to the total personal income of the region.

Additional personal income for residents in the county and state will be generated 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.

The proposed changes described in this SPAR will continue to generate long-term beneficial impacts to the tax base of each county, from construction and operation of the Wind Project, and have an additional positive impact on the local economy in this area of Minnesota. In addition to

the creation of jobs and personal income, the Wind Project will pay 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 $1,460,000 to $1,800,000 or an average of $1,630,000. This is a reduction from the August 2020 Application due to three of the new proposed turbine models having smaller nameplates and the limitation of 78 turbine locations.

Plum Creek remains committed to forming the "Plum Creek Community Fund," a 501(c)(3) organization for the purpose of engaging in and contributing money to the support of charitable activities within the communities near the Wind Project. The Wind Project will contribute $250 per MW of nameplate capacity. Assuming the Wind Project is constructed at 414 MW as proposed in this SPAR, the Wind Project will contribute $103,500 annually to the Plum Creek Community Fund to support charitable activities within the neighboring communities. The funds will be administered by a volunteer board of directors consisting of, but may not be limited to, participating landowners, township officials and one at-large community member. The Plum Creek Community Fund will help ensure that the entire community surrounding the Wind Project, not just the participating landowners, see benefits from construction and operation of the Wind Project. The annual and 20-year total community economic benefits are summarized in Table 5.13.1-1.

Table 5.13.1-1
Community Economic Benefits

Community Economic Benefits	August 2020 Application		Current Request	
	Annual	20-Year Total	Annual	20-Year Total
Tax Revenue (County and Townships)[1]	$1,740,000	$34,800,000	$1,284,000-$1,814,000	$25,680,000-$36,280,000
Plum Creek Community Fund 2	$82,800	$1,656,000	$73,250-$103,500	$1,465,000-$2,070,000
Total Landowner Group Revenue	$2,900,000	$58,000,000	$2,760,000-$3,180,000	$70,400,000 - $81,100,000
Total	**$4,722,800**	**$94,456,000**	**$4,722,800**	**$94,456,000**

[1] Based on potential range of Wind Project output.

5.14 Air Quality

Recently proceedings before the MPUC have included an analysis of potential air quality impacts in Site Permit applications for wind farm development projects. At the time the August 2020 Application was prepared, this requirement did not exist and, as such, Plum Creek did not provide an analysis of potential air quality impacts from construction and operation of the Wind Project. With this SPAR, Plum Creek is providing information about the existing air quality conditions in the Wind Project Study Area and an analysis of potential air emissions impacts for the Commission's consideration as it evaluates conditions for the requested Site Permit amendment.

Section 109(b) of the Clean Air Act requires that the U.S. Environmental Protection Agency establish National Ambient Air Quality Standards (NAAQS) "requisite to protect" public health and welfare (40 Code of Federal Regulations Part 50). The Clean Air Act identifies two classes of NAAQS: primary standards, which are limits set to protect the public health of the most sensitive populations, such as asthmatics, children and the elderly; and secondary standards which are limits

set to protect public welfare, such as protection against visibility impairment or damage to vegetation, wildlife and structures. The U.S. Environmental Protection Agency has promulgated NAAQS for six criteria pollutants: ozone (O_3), particulate matter ($PM_{10}/PM_{2.5}$), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), and lead (Pb). Cottonwood, Murray and Redwood Counties in Minnesota are in compliance with the primary and secondary NAAQS for all criteria pollutants (EPA, 2024b).

In Minnesota, air quality is tracked using air quality monitoring stations across the state. The MPCA uses data from these monitors to calculate the Air Quality Index, on an hourly basis, for O_3, $PM_{2.5}$, SO_2, NO_2, and CO. The pollutant with the highest Air Quality Index value for a particular hour sets the overall Air Quality Index for that hour. The Air Quality Index is used to categorize the air quality of a region as one of five levels of quality: good, moderate, unhealthy for sensitive groups, unhealthy, or very unhealthy (MPCA, 2024d).

The Wind Project is located nearest to the air quality monitor in Marshall, Minnesota. This station monitors for O_3 and $PM_{2.5}$. The Air Quality Index for Marshall for the past five years is provided in Table 5.14-1 (MPCA, 2024e). Note that data from 2023 is not available at the time this SPAR is filed.

Table 5.14-1
Days in Each Air Quality Index Category (Marshall, Minnesota)

Year	Good	Moderate	Unhealthy for Sensitive Groups	Unhealthy	Very Unhealthy
2022	324	30	0	2	0
2021	289	65	3	2	0
2020	330	30	0	0	0
2019	326	35	0	0	0
2018	333	32	0	0	0

Source: MPCA, 2024e.

MPCA considers air quality "bad" once the Air Quality Index reaches the Unhealthy for Sensitive Groups category. Air quality has been considered good for the majority of the past five reported years in Marshall. Since 2018, the seven "bad air" days have occurred. Each of these days had high levels of PM2.5. The five bad air days in 2021 occurred during one week in the summer when Minnesota experienced increased wildfire smoke. Two bad air days occurred in the winter months of 2022 when heating needs increased energy demand.

5.14.1 Impacts and Mitigation Measures

Air emissions during construction would primarily consist of emissions of fugitive dust from vehicular traffic and soil disturbance and criteria pollutant emissions from diesel- and gasoline-fired construction equipment. During construction, the amount of dust generated would be a function of construction activity, soil type, soil moisture content, wind speed, precipitation, vehicle traffic, vehicle types, and road surface characteristics. Dust emissions would be greater during dry periods and in areas where fine-textured soils are subject to surface activity. If construction

activities generate problematic dust levels, Plum Creek may employ construction-related practices to control fugitive dust such as application of water or other commercially available dust control agents on unpaved areas subject to frequent vehicle traffic, reducing the speed of vehicular traffic on unpaved roads, and covering open-bodied haul trucks. Where practicable, the Wind Project will implement procedures to mitigate exhaust emissions from construction equipment. These procedures may include limiting engine idling and use of ultra-low sulfur fuel.

Emissions from construction activities would be similar to those from agricultural activities that are common in the Wind Project Study Area and would only occur for short periods of time in localized areas. Construction air quality effects will be temporary and localized and are not expected to independently cause or significantly contribute to an emission level that results in a violation of NAAQS.

A summary of the estimated Wind Project construction related criteria pollutant emissions is presented in Table 5.14.1-1. Details of the construction-related air pollutant emission calculations for the Wind Project are provided in Appendix F.

Table 5.14.1-1
Construction Related Criteria Pollutant Emissions

Construction Activity	NO_X (tons)	CO (tons)	VOC (tons)	SO_2 (tons)	PM_{10} (tons)	$PM_{2.5}$ (tons)
Off-Road Engines	126.82	29.38	9.11	0.06	5.02	5.01
Unpaved Roads	--	--	--	--	28.24	2.82
Earthmoving	--	--	--	--	9.11	0.96
Total	**126.82**	**29.38**	**9.11**	**0.06**	**42.37**	**8.79**

Note: NO_X = nitrogen oxides; CO = carbon monoxide; VOC = volatile organic compounds; SO2 = sulfur dioxide; PM_{10} = particulate matter less than 10 microns in diameter; and $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter.

Operating emissions would generally be caused by personnel vehicles moving around the site and conducting maintenance activities. Procedures to mitigate emissions from vehicles may include limiting engine idling and the use of ultra-low sulfur fuel.

5.15 Climate Change and Greenhouse Gas Emissions

The effects of climate change have been tied to an increase in greenhouse gas emissions from human-related activity, including transportation, energy production, and industry (EPA, 2024c). A key element in addressing climate change is the reduction of greenhouse gas emissions produced each year. In 2007, Minnesota passed the Next Generation Energy Act, which set statutory goals to reduce greenhouse gas emissions by 80 percent between 2005 and 2050 (MPCA, 2024f). In December 2019, Governor Tim Walz signed into effect Executive Order 19-37 to establish a Climate Change Subcabinet and Governor's Advisory Council on Climate Change. The Climate Change Subcabinet is responsible for identifying policies and strategies to meet or exceed the statutory goals set in the Next Generation Energy Act and to identify policies and strategies to increase climate resiliency across the state (State of Minnesota, 2019). As of 2020, Minnesota is on track to meet this goal and has experienced a 23 percent reduction in greenhouse gas emissions across all industry sectors (MPCA, 2023).

The Wind Project will contribute to Minnesota's on-going success in reducing greenhouse gas emissions by providing a renewable source of energy as an alternative to more carbon-intensive sources of energy, such as coal and natural gas.

5.15.1 Impact of Wind Project on Climate Change

Some greenhouse gas emissions will be produced during the construction and operational phases of the Wind Project. Activities associated with the construction of the Wind Project will result in greenhouse gas emissions from the combustion of diesel and gasoline in heavy construction equipment, delivery vehicles, and worker passenger vehicles. greenhouse gas emissions from construction vehicles will be minimized by keeping construction equipment in good working order. Upon completion of the construction activities, emissions from heavy construction equipment, delivery vehicles, and construction personnel will cease.

A summary of the estimated Wind Project construction greenhouse gas emissions is presented in Table 5.15.1-1. Details of the construction-related air pollutant emission calculations for the Wind Project are provided in Appendix F.

Table 5.15.1-1
Construction Related Greenhouse Gas Emissions

Construction Emissions Source	CO_2 (tpy)	CH_4 (tpy)	N_2O (tpy)	CO_2e (tpy)
Off-Road Engines	4,719.2	0.19	0.04	4734.7
Commuters and Delivery Vehicles	1,485.7	0.00	0.00	1,485.7
Total	**6,204.9**	**0.19**	**0.04**	**6,220.4**

Note: tpy = tons per year; CO_2 = carbon dioxide; CH_4 = methane; N_2O = nitrous oxide; and CO_2e = carbon dioxide, equivalent. CO_2e is calculated using global warming potentials listed in EPA, 2024d.

During operation, the Wind Project is expected to produce enough renewable electricity to service 229,785 homes and to offset approximately 1,164,000 metric tonnes per year carbon dioxide equivalent (CO_2e). This is equivalent to removing nearly 277,000 passenger vehicles from the road annually (EPA, 2024e)

During Wind Project operation, the facility will require 7 to 9 permanent personnel to operate and maintain the facility and will require the use of one to two maintenance trucks per day. Commuter vehicles and maintenance trucks will generate a minor amount of greenhouse gas emissions. Utilities required to support operation of the wind farm include electricity, water, and sanitation. Approximately 1,350 kilowatt hour per month of electricity may be purchased from the grid if needed to meet operational needs such as lighting, cameras, and comfort heating. greenhouse gas emissions generated during the operating phase of the Wind Project will be variable and less than those estimated for construction emissions. Greenhouse gas emissions are generated throughout the life of a wind project at a rate of about 0.74 grams CO_2e per kilowatt hour (DOE, 2015). The Project is expected to generate 2,684 metric tonnes per year CO_2e averaged over the 30-year project lifetime.

5.15.2 Impact of Climate Change on Wind Project

The MDNR publishes historical climate data from the years 1895 to 2024. This data shows that the average temperature of Cottonwood, Murry, and Redwood Counties has been increasing at a rate of 0.16 degrees Fahrenheit per decade. Over the 30-year lifespan of the Wind Project, the annual average temperature could increase by 0.48 degrees Fahrenheit. The annual precipitation has increased at a rate of 0.31 inches per decade (MDNR, 2024a). Over the lifespan of the Wind Project, annual precipitation could increase an additional 0.9 inches. Additionally, the frequency and intensity of heavy rainfall is increasing across the state. The MDNR climate office has defined mega-rain events as rainfalls of more than 6 inches over 1,000 square miles in 24 hours or less. Sixteen mega-rain events have been recorded in the past 50 years in Minnesota. Of these, 11 events have occurred since the year 2000 (MDNR, 2024a).

5.15.3 Impacts and Mitigation Measures

The amount of greenhouse gas s produced are independent of location. Any facility with the same construction and operational characteristics as the Wind Project would produce an equivalent quantity of greenhouse gas emissions. Climate change occurs on a regional- to- global scale. A localized change in greenhouse gas emissions, by itself, will not significantly impact the weather patterns of the area.

Southwestern Minnesota can experience a range of weather events including high winds, hail, high and low temperatures, and heavy snowfall. The Wind Project facilities have been designed and sited to withstand the weather events typically experienced in southwestern Minnesota, as well as the potential for increased severity of storms due to climate change discussed above. All proposed models of wind turbines are designed to meet the International Electrotechnical Commission standard 61400-01, which sets design standards to ensure that wind turbines can withstand increased windspeeds. Wind turbines will be equipped with a control system to reduce operations in extreme weather events. Plum Creek will incorporate stormwater management into the Wind Project design to prevent heavy rainfalls from puddling around the foundations of the wind turbines.

5.16 Topography

The topography within the Wind Project boundary remains the same as it was described in the August 2020 Application. The changes requested herein do not expand or alter the Wind Project boundary and only minor shifts in turbine locations and relocation of one of two collector substations are contemplated. Impacts to topography will be minimal as land within the Wind Project boundary has gently rolling terrain that is currently used for agricultural activities, including large machinery similar to that of which will be required for construction. Additionally, while the Wind Project boundary has approximately 500 feet of elevation change, this change is dispersed across the nearly 20-mile-wide Wind Project boundary and is not localized to a specific area. Therefore, wind turbines and access roads will not require significant excavation or fill beyond that which will be required for turbine foundations or road bases. Plum Creek has designed the Wind Project to minimize the amount of cut and fill and, as such, no mitigative measures are necessary.

5.17 Soils

Soil resources and prime farmland within the Wind Project boundary remain the same as they were described the August 2020 Application. The changes requested herein do not expand or alter the Wind Project boundary.

As noted in the August 2020 Application, approximately 66,154 acres of prime farmland (all categories) and 3,692 acres of farmland of statewide importance are present within the Wind Project boundary. Because some of the turbine locations have shifted and the location of one of the two collector substations has changed from what was presented in August 2020 Application, an updated analysis of permanent impacts on areas of prime farmland is presented in the discussion of impacts and mitigation measures.

5.17.1 Impacts and Mitigation Measures

No previously undisclosed impacts on soils or prime farmland within the Wind Project boundary are anticipated from the updated design described herein. The impacts for the SPAR were calculated using all 78 turbine locations; however, the updated layout would only require 68 to 77 turbine locations to achieve the proposed 414 MW nameplate capacity of the Wind Project depending on which turbine model is selected. Therefore, the impacts presented in Table 5.17.1-1 are likely an overestimation of actual impacts to soils classified as prime farmland or farmland of statewide importance from turbine locations. All soils found within the 10.2-acre footprint of Revised Collector Substation 1 are classified as prime farmland soil. A similar number of turbine locations and similar footprints (i.e., acreage) for collector substations were proposed in the August 2020 Application. Table 5.17.1-1 provides a comparison of the anticipated permanent impacts on prime farmland areas from the Wind Project design described in the August 2020 Application and the updated Wind Project design presented in this SPAR.

Table 5.17.1-1
Summary of Permanent Impacts to Prime Farmland (acres)

Prime Farmland Classification	August 2020 Application [1] Acres [2]	Current Request [1] Acres [2]
Prime Farmland [3]	78.6	80.8
Farmland of Statewide Importance	3.8	2.2
Not Prime Farmland	0.9	0.9
Total	**83.3**	**83.9**

[1] Impacts provided are from the V162 which had the highest number of turbine locations (74) in the August 2020 Application and Wind Project design. The impacts for the SPAR are calculated using all 78 turbine locations; actual impacts would be somewhat less depending upon the turbine model selected.

[2] Acreage of impacts includes all permanent facilities (turbines, access roads, collector substations, and O&M facility).

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

Source: Soil Survey Staff, Natural Resources Conservation Service, USDA, 2019.

Information about permanent impacts on prime farmland that was presented in the August 2020 Application included only primary turbine locations, the maximum of which was in the V162 layout (74 turbines); impacts from other permanent Wind Project facilities, including collector

substations, were also included. In keeping with the approach to other resource analyses in this SPAR, acreages provided in Table 5.17.1-1 for the updated Wind Project design include all 78 turbine locations. The location of Revised Collector Substation 1 was also included in the impact calculations.

Permanent impacts from the updated Wind Project design would equate to a loss of less than one percent of prime farmland within the Wind Project boundary. Permanent impacts also would equate to a loss of less than one percent of farmland of statewide importance within the Wind Project boundary. Impacts on prime farmland and farmland of statewide importance would be minimal, which is consistent with the August 2020 Application design. Plum Creek remains committed to the mitigation measures that were proposed in the August 2020 Application and the conditions in Condition 5 of the 2023 Site Permit, including:

- Site Permit Condition 5.3.5: protecting and segregating topsoil from subsoil;
- Site Permit Condition 5.3.6: minimizing soil compaction and decompaction of soil after construction is complete;
- Site Permit Condition 5.3.7: implementing erosion prevention and sediment control practices in accordance with the Wind Project SWPPP and NPDES that will be obtained prior to the start of construction;
- Site Permit Condition 5.3.7: restoring work areas and reestablishing the original grade and drainage pattern as near as practicable to pre-construction conditions; and
- suspending construction work when wet soil conditions occur.

No additional mitigation measures are proposed.

5.18 Geologic and Groundwater Resources

Geologic and groundwater resources within the Wind Project boundary generally remain the same as they were in the August 2020 Application.

No changes to the Wind Project boundary are part of this SPAR. Shifting some of the turbine locations (refer to Table 3.1-1) and changing the location of one of two collector substations would not result in previously undisclosed impacts on geologic or groundwater resources within the Wind Project boundary. Plum Creek does not anticipate any impacts to bedrock during construction or operation of the Wind Project as bedrock within the Wind Project boundary is at depths greater than proposed foundation depths of four-to-six feet deep. Similarly, Plum Creek does not expect any impacts to groundwater resources as the aquifers are also at depths deeper than the excavation for the turbine foundations and permanent Wind Project facilities in the revised layout are not located near previously identified wells.

Plum Creek remains committed to obtaining all required regulatory approvals related to water use prior to the start of construction (refer to Condition 5.3.8 of the 2023 Site Permit). All permits are listed in Table 3.6-1 in Section 3.6.

5.19 Surface Water and Floodplain Resources

Updated surface water data was reviewed to check for any changes from what was presented in the August 2020 Application.

The following water resources and floodplains are the same as those described in the August 2020 Application.

- Watersheds
- Trout streams
- Outstanding Resource Value Waters
- Minnesota Public Waters Inventory features
- MDNR Designated Wildlife Lakes
- Migratory Waterfowl Feeding and Resting Areas
- Cottonwood County and Murray County 100-Year Floodplains

The following water resources and floodplains have been updated from the original data:

- Impaired Waters
- Redwood County 100-Year Floodplain

Impaired Waters are updated every two years by the MPCA. The most recently finalized data set of Impaired Waters was released April 25, 2024. Five of the impaired waters within the Wind Project boundary that were previously identified in the August 2020 Application remain impaired: the Des Moines River, Plum Creek (Judicial Ditch 20A), Pell Creek, Dutch Charlie Creek, and Devils Run Creek. Four additional impaired waterbodies were identified in the most recent dataset: Two Unnamed Creeks, Dry Creek, and Highwater Creek.

Previous review of the 100-year floodplain within the Wind Project boundary identified 500.1 acres within Redwood County, which were associated with Pell Creek, Plum Creek, Highway Creek, and Highwater Creek. Updated review identified 353.0 acres of the 100-year floodplain within the Wind Project boundary in Redwood County that are associated with the same waterbodies. No changes were noted to the 100-year floodplain data previously disclosed in the August 2020 Application in Cottonwood (471.7 acres) and Murray (135.0 acres) counties.

5.19.1 Impacts and Mitigation Measures

Although changes in the number of impaired waters within the Wind Project boundary and the amount of 100-year floodplains in Redwood County were identified as a result of supplemental environmental resource analysis, the updated Wind Project design described in this SPAR would not result in any previously undisclosed temporary or permanent impacts on surface water resources.

Turbines will be constructed on relatively high elevation portions of the Wind Project boundary to maximize the wind resource, and as such are likely to avoid direct impacts to surface waters and floodplains, which tend to be in lower topographical positions. Access roads have been designed to minimize impacts on surface waters. Temporary impacts to surface waters from use of crane paths during construction of the Wind Project will also be minimized to the extent practicable. Impacts on surface water features from installation of underground collection and communication lines would be avoided by boring under these features. Plum Creek has co-located these facilities at Public Waters Inventory crossings to minimize the number of crossings.

Review of the MDNR Hydrography Dataset indicates one unnamed stream crosses the Revised Collector Substation 1 footprint; however, the field delineation and desktop review of aerial imagery indicate that this stream is not currently present, and the site is consistently used for agricultural production. The nearest existing surface water is a pond located 0.25 miles northwest of Revised Collector Substation 1. The previous location of this collector substation was within 50 feet of an unnamed stream in the southwest corner of Township 108N, Range 38W, Section 10.

The design changes presented in this SPAR have not resulted in changes to the quantity of impervious surfaces associated with permanent Wind Project facilities.

Plum Creek remains committed to the mitigation measures identified in the August 2020 Application, as described below, as well as those required in Condition 5.3.8 of the 2023 Site Permit, including:

- Obtaining all necessary regulatory approvals for any impacts on surface waters or floodplains.
- Obtaining a MDNR License to Cross Public Waters for all facilities (access roads, crane paths, collection lines) that cross Public Waters Inventory watercourses and basins; Plum Creek has co-located these facilities at Public Waters Inventory crossings to minimize the number of crossings.
- Obtaining a NPDES permit and developing a Wind Project SWPPP that outlines best management practices for the entire Wind Project, including additional best management practices near impaired waters to prevent potential runoff to these waters. The SWPPP will be submitted to MPCA for review and approval.
- Permitting access road, collection line, and crane path crossings of jurisdictional waterbodies (waters of the U.S.) with the U.S. Army Corps of Engineers (USACE) and Local Government Unit under the Wetland Conservation Act. Access roads will be designed to maintain the waterbody's flow; crane path crossings of waterbodies will be matted.

The layout avoids permanent impacts to floodplains; therefore, no mitigation is proposed for these resources.

5.21 Wetlands

An updated review of the National Wetland Inventory for Minnesota did not identify changes to the wetland community classifications and acreages throughout the Wind Project boundary from what was described in the August 2020 Application. National Wetland Inventory wetlands within the Wind Project boundary are shown on Maps 11a through 11d.

Table 5.20-1
National Wetlands Inventory Within the Wind Project Boundary

National Wetland Inventory Wetland Type	Acres [1]
Palustrine Emergent Wetland	1,776.2
Palustrine Forested Wetland	246.5
Riverine	120.7
Freshwater Pond/Lake	91.6
Palustrine Scrub-shrub Wetland	32.1
Total	**2,267.1**

[1] Wetland acreage is calculated using the National Wetland Inventory for Minnesota data.

5.21.1 Impacts and Mitigation Measures

On behalf of Plum Creek, Tetra Tech, Inc. conducted a wetland and waterbody field survey in the fall of 2020 of the anticipated impact areas associated with the previous Wind Project design. The results of the field survey were not available for inclusion in the August 2020 Application, which was filed on August 28, 2020. For this SPAR, the 2020 field survey data, being the most recent and accurate, was used to estimate Wind Project impacts on wetlands where this field data overlaps with the current Wind Project design. In areas where the field data does not overlap with the current Wind Project design, data from the National Wetland Inventory for Minnesota was used.

Anticipated temporary and permanent impacts on wetlands from the updated Wind Project design are summarized in Table 5.20.1-1. Permanent Wind Project facilities including turbines, collector substations, O&M facility, and meteorological towers will be constructed on higher elevation portions of the Wind Project Area boundary to maximize the wind resource. Revised Collector Substation 1 would not impact wetlands. The updated Wind Project design presented in this SPAR further minimizes temporary and permanent impacts to wetlands when compared to the previous design.

Table 5.20.1-1
Summary of Wetland Impacts (acres)

Wetland Type	August 2020 Application [1]		Current Request [2]	
	Perm.	Temp.	Perm.	Temp.
Palustrine Emergent Wetland	0.3	19.2	0.2	15.7
Palustrine Forested Wetland	-	3.5-	-	0.3
Riverine	-	1.3	-	0.3
Freshwater Pond/Lake	-	-	-	-
Palustrine Scrub-shrub Wetland	-	0.9	-	1.1
Total	**0.3**	**24.9**	**0.2**	**17.4**

[1] Acreages were determined using National Wetland Inventory data.
[2] Acreages were determined using field survey data from the 2020 field delineation in conjunction with National Wetland Inventory data where field survey was not conducted.

Plum Creek conducted a field delineation of the updated Wind Project design in fall 2024 to verify the results of the previous field delineation and to capture any areas that were not evaluated in the fall 2020 field survey. The 2024 field delineation survey is in progress and the updated findings have not been finalized for use in this SPAR. As such, final impact calculations may vary from what is provided in Table 5.20.1-1. Additionally, after the field delineation is complete, Wind Project facilities may be shifted to further minimize temporary and permanent impacts to wetland features to the extent practicable.

Temporary impacts associated with crane paths will be minimized to the extent practicable by use of construction matting when these features cannot be avoided. Collection lines will be bored under wetland features to minimize impacts.

Plum Creek remains committed to the mitigation measures that were proposed in the August 2020 Application and the conditions in Condition 5 of the 2023 Site Permit, including:

- Site Permit Condition 5.3.8: Construction in wetlands will take place during frozen conditions to the extent feasible. Matting will be used when winter construction is not feasible. Excavated soil from wetlands and riparian areas will be contained in accordance with applicable permits. The shortest route possible will be used for travel through wetland areas.
- Site Permit Condition 5.3.8: Wetland and water resource areas disturbed by construction activities shall be restored to preconstruction conditions in accordance with the requirements of applicable state and federal permits or laws and landowner agreements. All requirements of the USACE, MDNR, Minnesota Board of Water and Soil Resources, and local units of government shall be met
- Site Permit Condition 5.3.21: Temporary equipment staging areas will not be located in wetlands or native prairies.
- Permitting access road, collection line, and crane path crossings of jurisdictional wetlands (waters of the U.S.) with the USACE and Local Government Unit under the Wetland Conservation Act. Access roads will be designed to maintain the wetland's hydrology;

- Protecting topsoil, minimizing soil erosion, and protecting adjacent wetland resources through containing excavated material, using silt fences, protecting exposed soil, stabilizing restored material, and re-vegetating disturbed areas with non-invasive species.

Plum Creek also remains committed to the requirements in Conditions 7.1 (Biological and Natural Resource Inventories) of the 2023 Site Permit and to obtaining all necessary regulatory approvals for any impacts on wetlands.

5.22 Vegetation

Vegetation within the Wind Project boundary remains similar to what was presented in the August 2020 Application. USGS NLCD was updated in 2021; therefore, Plum Creek reviewed the updated dataset to check for changes in land cover within the Wind Project boundary. Table 5.21-1 provides a breakdown of the NLCD land cover types and Map 12 depicts the land cover types within the Wind Project boundary.

Table 5.21-1
Land Cover Types within the Wind Project Boundary

	August 2020 Application		Current Request	
Land Cover	Acres	Percent of Wind Project Boundary	Acres	Percent of Wind Project Boundary
Cultivated Crops	66,564	91.2%	66,344	90.9%
Developed	2,542	3.5%	2,814	3.9%
Hay/Pasture	1,302	1.8%	1,290	1.8%
Emergent Herbaceous Wetlands	1,223	1.7%	1,235	1.7%
Grassland/Herbaceous	630	0.9%	625	0.9%
Deciduous/Mixed/Evergreen Forest	521	0.7%	496	0.7%
Woody Wetlands	101	0.1%	98	0.1%
Barren Land	53	0.1%	36	<0.1%
Open Water	30	<0.1%	28	<0.1%
Shrub/Scrub	2	<0.1%	2	<0.1%
Total	**72,968**	**100%**	**72,968**	**100%**

Source: Dewitz and USGS, 2021

5.22.1 Impacts and Mitigation Measures

The primary impact on vegetation from construction of the Wind Project would be the cutting, clearing, and removal of existing vegetation within construction workspaces. The degree of impact would depend on the type and amount of vegetation affected, the rate at which the vegetation would regenerate after construction, and whether periodic vegetation maintenance would be conducted during operation. Secondary effects from disturbances to vegetation could include increased soil erosion, increased potential for the introduction and establishment of invasive and noxious weed species, habitat fragmentation and edge effects, and a local reduction in available wildlife habitat.

A summary of anticipated impacts on vegetation from construction and operation of the updated Wind Project design is provided in Table 5.21.1-1.

Table 5.21.1-1
Summary of Land Cover Impacts (acres)

Land Cover Type	August 2020 Application [1]		Current Request [2]	
	Perm.	Temp.	Perm.	Temp.
Cultivated Crops	82.8	1,876.0	81.1	1,938.5
Developed (all categories)	3.7	76.1	2.8	43.4
Emergent Herbaceous Wetlands	0.1	3.0	<0.1	4.2
Hay/Pasture	<0.1	1.9	--	2.7
Grassland/Herbaceous	-	1.0	--	1.6
Deciduous/Mixed Forest	-	1.0	--	1.1
Woody Wetlands	-	1.0	--	0.8
Total	**86.6**	**1,960.0**	**84.9**	**1,992.4**

[1] Impacts are provided for the SG170 which represents the highest acreage of permanent impacts from the previous Wind Project design.
[2] Dewitz and USGS, 2021

Consistent with the impacts discussed in the August 2020 Application, over 97 percent of the anticipated permanent and temporary impacts from the updated Wind Project design would affect cultivated cropland. Temporary vegetation impacts will be associated with crane walkways, the installation of underground collection lines, construction workspace around turbines, wider access roads for construction access, and contractor staging and laydown areas. Permanent impacts on vegetative cover within the Wind Project boundary would occur where wind turbines, access roads, collector substations, O&M facility, and permanent meteorological towers are installed. Similar to the previous location of this substation, Revised Collector Substation 1 is located in cultivated crop land; therefore, impacts on vegetation are anticipated to be similar to what was presented in the August 2020 Application for the previous location of Collector Substation 1. Overall, 4.0 percent of the Wind Project boundary will be permanently converted to developed use for operation of the Wind Project.

The turbines and access roads in the updated Wind Project design continue to avoid forests and groves to the extent practicable to maximize turbine output and avoid or minimize tree removal. Impacts on forested areas would primarily be associated with construction activities such as installation of collection lines and use of crane paths. However, there is a small amount forested riparian area (approximately 0.8 acre) that falls within the temporary construction workspace associated with Turbine T-1 that is not reflected in the NLCD data shown in Table 5.21.1-1. Prior to construction, Plum Creek will adjust the temporary construction workspace in this location to avoid clearing the trees.

Plum Creek remains committed to the mitigation measure identified in the August 2020 Application and the Conditions of the 2023 Site Permit, including:

- Site Permit Conditions 5.3.7 and 5.3.22: Initiating restoration of disturbed soils and vegetation as soon as possible after construction activities are completed.
- Restoring areas of disturbed soil in non-cropped areas using weed-free native grasses, forbs, and shrubs as negotiated with the landowner. 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.
- Prioritizing turbine, access road, and collector substation siting in cultivated cropland.
- Avoiding disturbance of wetlands during construction and operation of the Wind Project. If jurisdictional wetland impacts are proposed, Plum Creek will obtain applicable wetland permits (refer to Sections 3.6 and 5.20).
- Site Permit Condition 5.3.9: Designing the Project to minimize clearing of existing trees and shrubs.
- Site Permit Condition 5.3.7: Preparing a construction SWPPP and obtaining a NPDES Permit.
- Using best management practices during construction and operation of the Wind Project to protect topsoil and adjacent resources and to minimize soil erosion (refer to Sections 5.3.5 and 5.3.7). 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.

5.23 Wildlife

No changes to the Wind Project boundary are part of this SPAR. Most turbines would be sited in locations described in the August 2020 Application. However, as previously noted, a few turbine locations have been shifted from what was described in the August 2020 Application (refer to Table 3.1-1). Revised Collector Substation 1 would be of similar size and would be sited in cultivated crop land, similar to the previous location of this substation.

Wildlife within the Wind Project boundary and the one-mile buffer remains similar to what was described in the August 2020 Application. However, since the issuance of the Site Permit, Plum Creek has completed and is continuing to conduct additional Tier 3 field studies to further identify the extent of wildlife present within the Wind Project boundary and the one-mile buffer. These studies will be incorporated into Plum Creek's updated Avian and Bat Protection Plan for the Wind Project that will be provided in a future supplemental filing prior to the pre-construction filings required by the Site Permit.

5.23.1 Impacts and Mitigation Measures

The August 2020 Application concluded that the Wind Project has the potential for impacts to avian and bat populations, noting that based on results of post-construction monitoring at similar

facilities located on similar landscapes, individual bird and bat fatalities would be expected to be similar at the Plum Creek Wind Farm and no single species or group is expected to experience a disproportionate amount of estimated mortality or impacts of a magnitude to affect the local or migratory population. As noted above, Plum Creek continues to complete Tier 3 studies to further identify and evaluate the extent of wildlife present within the Wind Project boundary and the one-mile buffer, which will be incorporated into an updated Avian and Bat Protection Plan for the Wind Project.

Plum Creek remains committed to the mitigation measures required by the 2023 Site Permit and proposed in the August 2020 Application, including:

- Prioritizing turbine siting in cultivated cropland.
- Avoiding siting turbines in mapped native prairie, native plant communities, and sites of biodiversity significance (all ranks).
- The three by five times the rotor diameter setback from areas where Plum Creek does not hold wind rights as required in Condition 4.1 of the Site Permit. This includes setbacks from adjacent Wildlife Management Areas and Waterfowl Production Areas to reduce risk to waterfowl/waterbirds and grassland-associated birds.
- Avoiding siting turbines within a 1,000-foot habitat connectivity buffer of forested areas associated with Highwater and Dutch Charley Creeks.
- Avoiding or minimizing disturbance of individual wetlands or drainage systems during Wind Project construction. Updated wetland delineations are underway and will be completed prior to construction to identify the limits of wetland boundaries near construction activities.
- Site Permit Condition 7.5.1: Conducting two years of post-construction monitoring for birds and bats to assess operational impacts to birds and bats.
- Protecting existing trees and shrubs by avoiding tree removal for turbines, access roads, and underground collector lines to the extent possible . These will be identified based on aerial photos and during field surveys.
- Maintaining sound water and soil conservation practices during construction and operation of the Wind Project to protect topsoil and adjacent resources and to minimize soil erosion. To minimize erosion during and after construction, best management practices for erosion and sediment control will be used. These practices include silt fencing, temporary seeding, permanent seeding, mulching, filter strips, erosion blankets, grassed waterways, and sod stabilization.
- Constructing wind turbines using tubular monopole towers.
- Site Permit Condition 5.3.28: Lighting turbines according to FAA requirements, which will include Aircraft Detection Lighting Systems radar.
- Revegetating non-cropland and pasture areas disturbed during construction or operation with an appropriate native seeding mix.

- Site Permit Conditions 5.3.11 and 5.3.12: Inspecting and controlling invasive species and noxious weeds in areas disturbed by the construction and operation of the Wind Project and developing an Invasive Species Prevention Plan.
- Site Permit Condition 7.5.2: Preparing an Avian and Bat Protection Plan prior to construction and implementing the Avian and Bat Protection Plan during construction and operation of the Wind Project. An updated Avian and Bat Protection Plan will be provided in a future supplemental filing.
    - This Avian and Bat Protection Plan consists of NG Renewables' corporate standards for minimizing impacts to avian and bat species during construction and operation of wind energy projects.
    - The Avian and Bat Protection Plan has been developed in a manner that is consistent with the guidelines and recommendations of the USFWS Wind Energy Guidelines.
    - It includes Plum Creek's commitments to wind farm siting and transmission route suitability assessments, construction practices and design standards, operational practices, permit compliance, and construction and operation worker training.
    - It also includes additional avoidance and minimization measures that may be implemented in consultation with the USFWS and MDNR if avian and bat mortalities exceed an acceptable level.

Further, Plum Creek remains committed to the survey and reporting requirements and mitigation measures outlined in Condition 7.5 (Avian and Bat Protection) of the 2023 Site Permit.

5.24 Rare and Unique Natural Resources

As part of this SPAR, Plum Creek refreshed its review of rare and unique natural resources. Map 13 depicts the results of the review.

5.24.1 Federally Listed Species

The updated review of the USFWS Information for Planning and Consultation (IPaC) report for the Wind Project boundary and a one-mile buffer identified a number of changes compared to the species that were identified in the August 2020 Application (USFWS, 2024a).

On November 30, 2022, the USFWS published a final rule to the federal register listing the northern long-eared bat (*Myotis septentrionalis*) as endangered; previously the species was listed as threatened with a 4(d) rule. This listing went into effect on March 31, 2023 (USFWS, 2023), nullifying the 4(d) rule. In addition, the northern long-eared bat is no longer identified in the IPaC results for the Wind Project (USFWS, 2024a); however, the USFWS has published the Final Land-based Wind Energy Voluntary Avoidance Guidance documents for the northern long-eared bat and tricolored bat (*Perimyotis subflavus*) that will allow wind energy projects to operate in a manner where take is not reasonably certain to occur for the northern long-eared bat or tricolored bat. Now that the final guidance has been issued, it replaces the Interim Wind Guidance for the Northern Long-eared Bat (USFWS, 2024b) and any draft guidance for these species.

The following additional changes were noted in the updated IPaC review:

- The Dakota skipper is no longer identified in IPaC as potentially present within the Wind Project boundary or the one-mile buffer.

- The monarch butterfly, Suckley's cuckoo bumble bee, and the western regal fritillary are identified in IPaC as potentially present in the Wind Project boundary and the one-mile buffer.

The USFWS Official Species List is provided in Appendix G.

Monarch Butterfly

On December 17, 2020, the USFWS published the result of their 12-month review of the monarch butterfly and determined that listing the species under the Endangered Species Act of 1973 was warranted but precluded. The species meets the criteria for listing as an endangered or threatened species, but the USFWS cannot currently implement the listing due to limited staff and/or funding and because there are other listing actions with a higher priority. The species is now a candidate for listing; however, candidate species are not protected under the Endangered Species Act. The USFWS has added the monarch to the updated national listing workplan and is now planning to submit for publication either a new warranted or not warranted finding to the Federal Register by no later than December 4, 2024 (USFWS, 2024c).

Adult monarch butterflies feed on nectar from a wide variety of flowers. Reproduction is dependent on the presence of milkweed, the sole food source for larvae.

Suckley's Cuckoo Bumble Bee

On December 17, 2024, the USFWS published a proposed rule listing the Suckley's cuckoo bumble bee as federally endangered under the Endangered Species Act. Proposed species are not protected under the Endangered Species Act. Generally, under the rulemaking process, a final rule listing the species under the Endangered Species Act is published 12 months after the proposed rule, and the listing becomes effective 30-60 days following publication; an effective final rule for the Suckley's cuckoo bumble bee is expected in January or February of 2026.

Suckley's cuckoo bumble bee is a parasitic species which usurps the nests of other Bombus species. As an obligate social parasite of social bumble bees, the species requires a host colony to raise young born from eggs laid by Suckley females; the species cannot successfully reproduce without the workers of the host colony.

The species is found in a variety of habitats, including prairies, grasslands, farmsteads, woodlands, boreal forests, active and fallow agricultural fields, and urban areas. Suitable summer foraging areas will include a diversity of nectar and pollen sources. Knowledge regarding overwintering sites is limited.

Western Regal Fritillary

On August 6, 2024, the USFWS published a proposed rule listing the western regal fritillary as federally endangered under the Endangered Species Act. As noted above, proposed species are not protected under the Endangered Species Act; an effective final rule for the western regal fritillary is expected in September or October of 2025.

The western regal fritillary is found in tallgrass prairie habitats and generally appears to need large tracts of contiguous grassland habitats or complexes of smaller patches dominated by native plant species. Adult western regal fritillaries feed on nectar from a wide variety of flowers. Reproduction is dependent on the presence of violet species, the sole food source for larvae. The species is typically understood to be present year-round: the adult flight period is generally late spring to mid-autumn, and larvae are present from egg-laying in late summer and early autumn, overwintering in the leaf litter until emerging in spring.

5.24.2 State-Listed Species

With one exception, the state-listed species of concern that were presented in the August 2020 Application were also identified in the 2024 review of the MDNR's Natural Heritage Information System data for documented occurrences of federally listed species, state-listed species, and state species of concern within and within one mile of the Wind Project boundary (MDNR, 2024b),. The August 2020 Application identified the following species:

- Wilson's Phalarope (*Phalaropus* tricolor) Threatened
- Trumpeter Swan (*Cygnus buccinator*) Special Concern
- Upland Sandpiper (*Bartramia longicauda*) Watchlist
- Henslow's sparrow (*Ammodramus henslowii*) Endangered
- Poweshiek Skipperling (*Oarisma poweshiek*) Endangered
- Great Plains Toad (*Anaxyrus cognatus*) Special Concern

At the time the August 2020 Application was prepared the upland sandpiper was considered a "watchlist" species. Watchlist species have no legal status and the MDNR no longer includes watchlist species in the Natural Heritage Information System data.

Plum Creek submitted an updated Natural Heritage Review Request to the MDNR via the MDNR's Minnesota Conservation Explorer online tool on May 29, 2024. The automated assessment generated as part of the Natural Heritage Review Request indicated that further review is needed for state-protected species and ecologically significant areas within the Wind Project boundary and the one-mile buffer (refer to Appendix G). The MDNR response to the May 29, 2024, formal Natural Heritage Review request was received on July 1, 2024 (refer to Appendix G). This response noted that Wilson's phalarope and Trumpeter swans have been documented within one mile of the Wind Project boundary, and Great Plains toad had been documented within the Wind Project boundary.

5.24.3 MDNR High value Areas

MDNR high value areas (i.e., MDNR-mapped native prairie, native plant communities, and sites of biological significance) within the Wind Project boundary and a 10-mile buffer remain similar to what was presented in the August 2020 Application; including 19 sites of biological significance ranked as moderate, and 15 sites ranked as below; and native plant communities, including native prairie. In the Natural Heritage Review received on July 1, 2024, the MDNR recommended that sites of biological significance rated moderate be considered avoidance areas within the permitted Wind Project boundary, and that impacts to native prairie and prairie remnants be avoided or minimized.

The MDNR identified a calcareous fen (Storden 21, ID 33992) documented near the Wind Project boundary in the MDNR's Natural Heritage Review received on July 1, 2024, and noted that wind turbines and associated infrastructure need to completely avoid calcareous fens and not alter the hydrological conditions in the surrounding area. The calcareous fen was not identified in the August 2020 Application.

5.24.4 Impacts and Mitigation Measures

5.24.4.1 Federally Listed Species

Northern Long-eared Bat and Tricolored Bat

Acoustic summer presence/absence bat surveys were conducted in areas of suitable habitat within the Wind Project boundary and the one-mile buffer between July 2-10, 2019, according to the USFWS summer survey guidance for northern long-eared bat issued that year. Additional analysis conducted at that time for the northern long-eared bat (which was the only listed bat species at the time) determined that the species is likely absent from the Wind Project boundary. The August 2020 Application concluded that the Wind Project has the potential for impacts to avian and bat populations, noting that based on results of post-construction monitoring at similar facilities located on similar landscapes, individual bird and bat fatalities would be expected to be similar at the Plum Creek Wind Farm and no single species or group is expected to experience a disproportionate amount of estimated mortality or impacts of a magnitude to affect the local or migratory population.

Acoustic summer presence/absence bat surveys were also conducted in areas of suitable habitat within the Wind Project boundary between July 29 and August 7, 2024. Surveys were conducted per the 2024 USFWS summer survey guidance for northern long-eared bat and tricolored bat. No northern long-eared bat nor tricolored bat calls were identified within the Wind Project boundary during the 2024 survey effort, indicating that these species are likely absent within the Wind Project boundary during the summer maternity season.

An updated Avian and Bat Protection Plan will be prepared for the Wind Project. Further, Plum Creek will comply with all conditions related to avian and bat protection in the 2023 Site Permit (refer to Section 5.22.1).

Prairie Bush Clover

The Wind Project was designed to avoid native prairie impacts; therefore, impacts to the prairie bush clover will also be avoided.

Monarch Butterfly

The Wind Project was designed to occur primarily in cultivated cropland. The Wind Project will also avoid woodlands, shrublands, grasslands, and water resources to the degree practicable.

Construction activities conducted in suitable adult foraging and larval host habitat could result in take of monarchs and caterpillars if conducted during the active period (generally, May 1 to October 1). Plum Creek will continue coordinating with the USFWS to ensure Wind Project activities do not result in unauthorized take of monarch butterflies.

Suckley's Cuckoo Bumble Bee

The Wind Project will also avoid woodlands, shrublands, grasslands, and water resources to the degree practicable. However, the species may also make use of active agricultural fields.

Construction activities conducted in suitable summer foraging and nesting habitat could result in take of bumble bees if conducted during the colony active period (generally, April to late September). Plum Creek will continue coordinating with the USFWS to ensure Wind Project activities do not result in unauthorized take of Suckley's cuckoo bumble bees.

Western Regal Fritillary

According to the Site Characterization Study conducted consistent with the USFWS *Land-Based Wind Energy Guidelines*, small tracts of native prairie are present in portions of the Wind Project boundary. The Wind Project was designed to avoid native prairie impacts, will be constructed primarily in cultivated croplands, and avoids grassland habitats to the highest degree practicable.

Construction activities conducted in suitable adult foraging habitat could result in take of adult fritillaries if conducted during the flight period. Construction activities in areas identified as containing habitat suitable for all life stages (i.e., adequate violets, nectar sources, grassland structure, and adequate environmental conditions) could result in take at any time of year. Plum Creek will continue coordinating with the USFWS to ensure Wind Project activities do not result in unauthorized take of regal fritillaries.

5.24.4.2 State Listed Species

The MDNR Natural Heritage Review dated July 1, 2024, identified the potential for the state-listed threatened Wilson's phalarope (*Phalaropus tricolor*) in the vicinity of the Wind Project, noting that disturbance to suitable nesting habitat must be avoided between mid-May and July or surveys for active nests must be conducted prior to project disturbance. Plum Creek will implement the avoidance measure for the Wilson's phalarope in areas of suitable nesting habitat or will conduct surveys for active nests prior to any Wind Project disturbance.

The MDNR also identified two species of special concern with potential to occur in the vicinity of the Wind Project, the trumpeter swan (*Cygnus buccinator*) and great plains toad (*Anaxyrus cognatus*). The MDNR recommends avoiding construction activities during the nesting season for the trumpeter swan (i.e., late April through early June) and recommends that the use of erosion control mesh, if any, be limited to wildlife-friendly materials.

In addition, Plum Creek will implement Special Condition 6.2 from the 2023 Site Permit for state-listed species (i.e., Henslow's sparrow), which was a condition resulting from an incidental observation of a Henslow's sparrow during pre-construction avian surveys. Per Special Condition 6.2, to avoid impacts to the Henslow's sparrow, construction will not occur within undisturbed mesic and dry prairie areas between May 15 and July 15 unless presence/absence studies have been performed during the same nesting season as the construction activities and rule out the presence of the Henslow's sparrow.

5.24.4.3 MDNR High Value Areas

Plum Creek has sited all turbines in cultivated cropland; the updated design presented in this SPAR avoids permanent impacts from all Wind Project components (e.g., turbines, access roads, permanent met towers, collector substations (including Revised Collector Substation 1), and the O&M facility to MDNR-mapped native prairie, native plant communities, and Minnesota Biological Survey sites of biological significance.

Based on the current design, a crane path and collection line may temporarily impact 1.2 acres of Minnesota Biological Survey sites of biological significance ranked "below," which is less than the previous Wind Project layout that was evaluated in the August 2020 Application.

The calcareous fen identified by the MDNR is located approximately 4.5 miles southeast of the Wind Project boundary and 5.9 miles from the nearest Wind Project component (Turbine T-26); as such, no impacts on the calcareous fen identified by MDNR are anticipated and the Wind Project will not alter the hydrological conditions in the area surrounding the calcareous fen.

5.24.4.4 Mitigation Measures

Plum Creek remains committed to the mitigation measures required by the 2023 Site Permit as well as additional mitigation measures described in the August 2020 Application, including:

- Avoiding permanent impacts from Wind Project facilities (e.g., turbines, access roads, permanent met towers, collector substations, and the O&M facility) on MDNR-mapped native prairie, native plant communities, and sites of biodiversity significance.
- Minimizing temporary impacts on MDNR-mapped native prairie, native plant communities, and sites of biodiversity significance.
- Avoiding or minimizing disturbance of individual wetlands or drainage systems during Wind Project construction.
- Site Permit Condition 4.7: Because there are-mapped native prairie, as defined by Minn. Stat. § 84.02, subd. 5 within the Wind Project boundary, Plum Creek will prepare a Native Prairie Protection Plan in coordination with the MDNR prior to construction.

- Setback turbines from the Waterfowl Production Areas and Wildlife Management Areas in adjacent properties by at least one-quarter mile to comply with the Wind Project perimeter setback.
- Site Permit Condition7.5.2: Prepare an Avian and Bat Protection Plan prior to construction and implement the Avian and Bat Protection Plan during construction and operation of the Project.
- Site Permit Condition 7.5.5: Feathering turbines, 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 through the life of the Project.
- Site Permit Condition 5.3.9: Minimizing clearing of trees and shrubs.

6.0 CONCLUSION

As noted throughout this SPAR, the updated Wind Project design does not represent a significant change in the human or environmental impacts of the Wind Project and is consistent with the evaluation of Wind Project effects presented in the August 2020 Application. Therefore, Plum Creek believes that the proposed changes qualify for a Site Permit amendment without a need for a new site permit or additional environmental review under Minnesota Statute and Rule. Plum Creek respectfully requests that the Commission approve the proposed SPAR. Plum Creek evaluated the conditions in the 2023 Site Permit and identified conditions that would need to be modified; a draft of the amendments to the Site Permit requested by Plum Creek with requested changes shown in redline is provided in Appendix A. In addition, the Draft Decommissioning Plan for the Wind Project has been updated and is included as Appendix B.

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