Appendix K

Draft Bird and Bat Conservation Strategy

Community Wind South Repower Project
Nobles County, Minnesota

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Community Wind South Wind Repower Project

Bird and Bat Conservation Strategy

Nobles County, Minnesota

July 30, 2021

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Prepared For:

Greenbacker
RENEWABLE ENERGY COMPANY

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ACRONYMS AND ABBREVIATIONS

AGL	Above ground level
AMSL	Above mean sea level
APLIC	Avian Power Line Interaction Committee
APM	Applicant Proposed Measures
AWWI	American Wind Wildlife Institute
BBCS	Bird and Bat Conservation Strategy
BBS	North American Breeding Bird Survey
BCC	Birds of Conservation Concern
BCI	Bat Conservation International
BCR	Bird Conservation Regions
BGEPA	Bald and Golden Eagle Protection Act
BMPs	Best Management Practices
CBC	Christmas Bird Count
ECPG	Eagle Conservation Plan Guidance
ESA	Endangered Species Act
FAA	Federal Aviation Administration
ft	Feet
GIS	Geographic Information Systems
GPS	Global Positioning System
kV	Kilovolt
IBAs	Important Bird Areas
IPaC	Information for Planning and Consultation
m	Meters
MBTA	Migratory Bird Treaty Act
MET	Meteorological Evaluation Tower
MW	Megawatt
NLCD	National Land Cover Database
NPDES	National Pollutant Discharge Elimination System
NREL	National Renewable Energy Laboratory
NWCC	National Wind Coordinating Collaborative
NWI	National Wetlands Inventory
O&M	Operations and maintenance
PADUS	Protected Areas Database of the United States
PCMM	Post Construction Mortality Monitoring
Project	Community Wind South Repower Project

RSA	Rotor Swept Area
SGCN	Species of Greatest Conservation Need
SPCCP	Spill Prevention, Control and Countermeasure Plan
SWPPP	Storm Water Pollution Prevention Plan
USEPA	U.S. Environmental Protection Agency
USC	United States Code
USFWS	United States Fish and Wildlife Service
USGS	U.S. Geological Survey
WEGs	USFWS Final Land-based Wind Energy Guidelines
WEST	Western Ecosystems Technology Inc.
Westwood	Westwood Professional Services
WRRS	Wildlife Response and Reporting System
WTG	Wind Turbine Generator

1.0 INTRODUCTION

Greenbacker Renewable Energy Company, LLC (Greenbacker) is dedicated to producing clean, reliable, renewable power while demonstrating respect and stewardship for the natural environment. As the operator of the 30.75-megawatt (MW) Community Wind South Project (Project or CWS) located in Nobles County, Minnesota and sponsor of the Project's proposed repower (repower Project), CWS has prepared the following Bird and Bat Conservation Strategy (BBCS) to document its approach to environmentally responsible wind energy development, and to guide post-construction operations with respect to wildlife conservation. CWS believes that the repowered Project will continue to provide a net-benefit to the health and prosperity of the people in the nearby communities of Nobles County.

1.1 Corporate Policy on Bird and Bat Conservation

CWS recognizes that wind power generation has the potential to impact bird and bat populations and is committed to minimizing these impacts in order to maintain the integrity of these wildlife communities and the environments on which they depend. CWS also understands that renewable power generation, as an alternative to fossil fuel energy sources, benefits the environment and its inhabitants. By instituting a comprehensive BBCS, CWS believes that the benefits of the proposed Project repowering will outweigh its impacts and will provide positive contributions to human and natural environments.

CWS is committed to working cooperatively with the U.S. Fish and Wildlife Service (USFWS), Minnesota Department of Natural Resources (MNDNR), Minnesota Department of Commerce Energy Environmental Review and Analysis (DOC-EERA), Minnesota MPUC, and non-governmental organizations to promote the reasonable protection of bird and bat species during all phases of the Project's repowering and continued operation. CWS is dedicated to incorporating the latest, state-of-the-art knowledge and best management practices (BMPs) in the field of bird and bat protection at wind farms, and this is reflected in its design and long-term adaptive management strategies. Over the course of the repowered Project's remaining operational life, CWS pledges to continue to operate the repowered Project in a manner which will provide decades of clean, renewable energy to the public while minimizing adverse impacts to birds and bats, to provide a sustainable means of meeting society's growing need for electricity.

1.2 Purpose of the BBCS

As part of CWS's commitment to environmental stewardship, CWS has developed this Project-specific BBCS to reduce potential impacts to birds and bats as result of the activities associated with the proposed repower and the continued operation of the Project. In preparing the BBCS, CWS has incorporated recommendations and guidance from the following sources: the *USFWS Final Land-Based Wind Energy Guidelines* (WEG) (USFWS 2012b); USFWS's *Eagle Conservation Plan Guidance – Module 1 – Land-based Wind Energy, Version 2* (ECPG) (USFWS 2013); USFWS's *Bird Protection Plan Guidelines* (APLIC and USFWS 2005); *State Guidance from the Minnesota Department of Natural Resources* (MNDNR 2011); *Avian and Bat Survey Protocols for Large Wind*

Energy Conservation Systems in Minnesota (Mixon *et al.* 2014); and the Edison Electric Institute's *Reducing Avian Collisions with Power Lines: The State of the Art in 2012* (APLIC 2012). This BBCS also incorporates results of pre-construction bird and bat studies conducted near the Project Area; results from relevant post-construction surveys conducted to date at similar facilities; the latest management practices for effectively avoiding and minimizing potential impacts to birds and bats; and comments and recommendations that have been received to date from the USFWS and MNDNR during the Project development process.

BBCSs are structured around an adaptive management framework and includes detailed provisions for avoiding, reducing, and, if warranted, mitigating potential impacts to birds and bats. The BBCS will be a living document for the life of the Project, during which, CWS will work with USFWS and MNDNR to formulate recommendations and definitions and incorporate them into the BBCS on an iterative basis. The monitoring, reporting and adaptive management programs described in this BBCS will allow this plan to respond and adapt to observed results and unforeseen or changing (biological or technological) circumstances over the life of the Project.

1.3 Goals and Objectives

This BBCS has been developed to be consistent with the *Avian and Bat Survey Protocols for Large Wind Energy Conservation Systems in Minnesota* (Mixon et al. 2014) and the most recent USFWS WEG, dated March 23, 2012 (USFWS 2012b). The goal of this BBCS is to minimize the repowered Project's impacts to birds and bats in a scientifically sound, and commercially reasonable manner. CWS intends to achieve this goal by incorporating into the BBCS the following actions:

- Implement a permanent (for the life of the repowered Project) informal wildlife mortality monitoring and reporting program;
- Implement a tiered consultation strategy to guide decision-making and allow for modifications to the BBCS, based on results and unexpected events over the life of the repowered Project; and
- Evaluate the feasibility and effectiveness of avoidance and mitigation measures and adaptive management on minimizing bird and bat mortality.

The USFWS has provided the wind industry with guidance on the siting, design and operation of wind farms through a series of guidance documents that have culminated with the USFWS's voluntary WEG (USFWS 2012b). USFWS guidance documents released prior to the issuance of the USFWS (2012b) WEG included:

- Voluntary Interim Guidelines – July 2003
- Wind Turbine Guidelines Advisory Committee Recommended Guidelines – March 2010
- USFWS Draft Land-Based Wind Energy Guidelines – February 2011

Much of CWS site selection and layout development work occurred while these guidance documents were evolving and before the final USFWS (2012b) WEGs were issued. However, because prior guidance contained many of the elements contained in the final USFWS (2012b) WEG, CWS site screening, characterization, and assessment processes were largely consistent with the tiered assessment approach called for in the USFWS (2012b) WEGs.

1.4 Agency Coordination

Correspondence with state and federal agencies, including the MNDNR, USFWS, and DOC-EERA will be initiated for information specific to the Project regarding sensitive resources and potential impacts. Formal request for comment letters were sent by Westwood on behalf of CWS to the MNDNR on March 19, 2020 and USFWS on June 2, 2020. On June 2, 2020, correspondence was received from the USFWS regarding the proposed repower Project. The Minnesota DNR provided comments via their Natural Heritage Database Search (NHIS) response on June 8, 2020.

1.5 Regulatory Framework

This BBCS was prepared to demonstrate efforts to comply with federal and state regulations including the federal Endangered Species Act (ESA), Bald and Golden Eagle Protection Act (BGEPA), Migratory Bird Treaty Act (MBTA), and State of Minnesota regulations.

1.5.1 Federal Endangered Species Act

The ESA of 1973 (16 U.S.C. §§1531 et seq.), as amended, provides for the listing, conservation, and recovery of listed threatened and endangered species and conservation of designated critical habitat that the USFWS has determined is required for the survival and recovery of these species. Section 9 of the ESA prohibits the "take" of species listed by USFWS as threatened or endangered. Take is defined as "...to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in such conduct." Section 10(a) of the ESA includes provisions for authorizing take that is incidental to, but not the purpose of, otherwise lawful activities. An incidental take permit, set forth in section 10 (a)(I)(B) of the ESA and its accompanying regulations, is available to non-federal activities where the proponent of the activity has determined that the activity is likely to result in take of listed wildlife species. The standard for determining whether activities are likely to result in incidental take is whether take is "reasonably certain" to occur considering direct and indirect impacts of the activities (80 FR 26832).

Section 7(a)(2) of the ESA requires all federal agencies, including the USFWS, to evaluate projects with respect to any species proposed for listing or already listed as endangered or threatened and any proposed or designated critical habitat for the species. Federal agencies must undertake programs for the conservation of endangered and threatened species, and are prohibited from authorizing, funding, or carrying out any action that will jeopardize a listed species or destroy or modify its critical habitat.

The siting, design, and operation of the Project incorporate measures to ensure the potential for impacts to federally-list bird and bat species are reduced or eliminated. These measures are described in this BBCS.

1.5.2 Bald and Golden Eagle Protection Act

The federal BGEPA of 1940 (16 U.S.C. §§ 668–668c), as amended, is administered by the USFWS and was enacted to protect bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*), their nests, eggs, and parts (e.g., feathers or talons). The BGEPA states that no person shall take, possess, sell, purchase, barter, offer for sale, purchase or barter, transport, export, or import any bald or golden eagle alive or dead, or any part, nest or egg without a valid permit to do so. The BGEPA also prohibits the take of bald and golden eagles unless pursuant to regulations. Take is defined by the BGEPA as an action "to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb." Disturb is defined in the BGEPA as "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available: (1) injury to an eagle; (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior." In addition to immediate impacts, this definition also covers impacts that result from human-caused alterations initiated around a previously used nest site during a time when eagles were not present. Although the bald eagle was removed from the Endangered Species List in June 2007, it is still federally protected under the BGEPA and Migratory Bird Treaty Act (MBTA 1918), as described in the following section. In addition, the *National Bald Eagle Management Guidelines* were published in conjunction with delisting by the USFWS in May 2007 to provide provisions to continue to protect bald eagles from harmful actions and impacts (USFWS 2007). In 2009, new permit rules were created for lawful take of eagles. In April 2013, USFWS issued *Final Eagle Conservation Plan Guidance, Module 1: Land-based Wind Energy* to address these new regulatory matters (USFWS 2013).

In 2017, a new incidental take permit rule for eagles became effective. Under 50 C.F.R. § 22.26, the USFWS can issue permits that authorize incidental take of bald and golden eagles when the take is associated with, but not the purpose of an otherwise lawful activity, cannot practicably be avoided, and is compatible with the preservation of the bald and golden eagle (USFWS 2012a). The 2017 rule requires that the permittee comply with all avoidance and minimization or other mitigation measures specified in the terms of the permit to mitigate for the detrimental effects on eagles, including direct and cumulative effects of the permitted take, which the USFWS must also take into account before it issues the permit. Additional considerations for issuing incidental take permits include determinations of whether: the take is associated with the permanent loss of an important eagle use area; the take is necessary to protect a legitimate interest in a particular locality; or the cumulative authorized take may exceed five percent of the local area population (USFWS 2009).

1.5.3 Migratory Bird Treaty Act

The MBTA of 1918 (16 U.S.C. §§ 703-712) makes it unlawful to pursue, capture, kill, or possess any migratory bird or part, nest, or egg of any such bird listed in wildlife protection treaties between the United States, Great Britain, Mexico, Japan, and Russia (and other countries of the former Soviet Union). Most birds (outside of introduced species and non-migratory game birds) within the United States are protected under the MBTA. In total, more than 1,000 bird species are protected by the MBTA, 58 of which can be legally hunted with a permit as game birds.

The MBTA addresses take of individual birds, not population level impacts. Failure to comply with the MBTA can result in criminal penalties. Although the MBTA does not include a provision authorizing incidental take of migratory birds, the USFWS recognizes that some level of mortality of migratory birds at wind projects can occur even if all reasonable measures to avoid mortality are implemented (USFWS 2010). The USFWS has and continues to provide wind power project developers guidance in making a good-faith effort to comply with the MBTA. The USFWS has indicated that the Department of Justice has exercised discretion in enforcing provisions of the MBTA regarding companies who have made good faith efforts to avoid the take of migratory birds. Due to the potential for resident and migratory birds to be affected by the Project, this BBCS has been developed, in part, as a good faith effort on behalf of CWS to comply with the MBTA.

1.5.4 State of Minnesota Regulations

Minnesota Statute 84.0895, Protection of Threatened and Endangered Species, and its associated rules (Minnesota Rules, Parts 6212.1800 to 6212.2300) require the MNDNR to designate species meeting the statutory definition of endangered, threatened, or species of special concern, and henceforth adopt rules to regulate the treatment of species identified as such, under Minnesota Rules, Chapter 6134 (MNDNR 2012). Accordingly, a person may not take, import, transport, or sell any portion of an endangered or threatened species unless by MNDNR permit or designated exemption. In addition, Minnesota Statute 216F.03 requires large wind energy conversion systems (LWECS) to be sited in a "manner compatible with environmental preservation, sustainable development, and the efficient use of resources."

2.0 PROJECT DESCRIPTION

The Project is located in central Nobles County, Minnesota, approximately two miles south of city of Wilmont (**Exhibits 2.0a** and **2.0b**). The proposed repower will involve repairing and upgrading the Project, which will require removing the old nacelles and blades, installing an adapter on top of the existing towers, followed by placement of new nacelles and blades. The repowered turbines (2.2 MW) will replace the existing 2.05 MW turbines. The 2.2 MW configuration upgrades the wind turbines to a new, more efficient configuration with a 33 MW nameplate capacity. The proposed repowering of the 15 existing REpower MM92 turbines includes increasing the blade length from 92.5 m to 110 m, increasing the hub height from 98.5 m to

105.05 m, and increasing the rated capacity from 2,050 kW to 2,200 kW. Construction is proposed to begin in spring 2022.

3.0 PROJECT AREA

The Project Area encompasses approximately 3,111 acres (4.9 square miles) in central Nobles County. The Project is located within the Coteau Moraines subsection of the North Central Glaciated Plains section of the Prairie Parkland Province (MNDNR ECS 1999). The Western Corn Belt Plains Ecoregion was once covered will tallgrass prairie, but is now primarily used for agricultural purposes. Topography is level to gently rolling glaciated till plains and hilly loess plains. Topography within the Project Area is relatively flat, with lower elevations along watercourses (**Exhibit 3.0**). The elevation of the Project Area ranges from approximately 1,648 to 1,748 feet above mean sea level (amsl). The Kanaranzi Creek is located approximately 3.4 miles to the west of the Project Area (**Exhibit 3.0**). Surface ownership within the Project Area is exclusively private.

4.0 PRE-CONSTRUCTION ASSESSMENT AND SITING

The USFWS (2012) WEGs are structured to take a tiered approach toward utility-scale wind energy siting in order to assess and reduce potential impacts to sensitive environmental resources. This structure is intended to lead to the appropriate level of site evaluation that is in direct proportion to the anticipated level of risk the project could pose to species of concern and their habitat. Tier 1 studies and questions are designed to provide early guidance regarding the environmental sensitivity of a site within a landscape context. This typically involves using publicly available information to assist developers in determining the need to communicate with the USFWS, determine the scope of pre-construction assessments, and assess the targeted development region for landscape-level siting restrictions. Using information from the Tier 1 assessment, the general area in which a project may be sited should be refined to an area in which desktop-level data can be used to systematically and comprehensively characterize a potential site for potential risk to species of concern and their habitat (Tier 2). The Tier 3 level of the pre-construction assessment process typically involves scientifically-rigorous studies to assess the potential risk of the site based on information collected in Tiers 1 and 2.

Although the Project is an existing, operational wind facility, the following sections summarize results of Tier 1, 2, and 3 studies completed by Westwood or others and addresses questions posed in the USFWS (2012) WEGs.

4.1 Tier 1 and Tier 2 Studies– Preliminary Site Screening and Site Characterization

4.1.1 Land Cover

Six land cover types were mapped within the Project Area based on National Land Cover Database (NLCD) data (USGS 2014) (**Table 4.1.1** and **Exhibit 4.1.1a**)**.** Land cover within the Project Area is predominately cultivated crops (86 percent), followed by herbaceous (6.2 percent), developed (6.2 percent), emergent herbaceous wetlands (1.2 percent), deciduous forest (0.3 percent), and mixed forest (0.2 percent). National Wetland Inventory (NWI) data (USFWS 2019) mapped approximately 147 acres of wetland (**Exhibit 4.1.1b**). National Hydrography Dataset (NHD) (USGS 2006) has mapped 26 unnamed flowlines and one named (Judicial Ditch Number Eleven-b) flowline within the Project Area.

Table 4.1.1. National Land Cover Database land cover types identified within the Project Area and their respective coverages.

Land Cover Type	Area (Acres)	Percent of Total
Cultivated Crops	2,674	86.0
Herbaceous	192	6.2
Developed	194	6.2
Emergent Herbaceous Wetlands	36	1.2
Deciduous Forest	8	0.3
Mixed Forest	7	0.2
Total	**3,111**	**100.0**

A desktop evaluation was conducted using the Protected Areas Database of the United States (PADUS) database (USGS 2016) to document special biological resource management areas, such as conservation easements and state or federal lands managed for biodiversity, within the Project Area and an associated 5-mile buffer. No special management areas or conservation easements are located within the Project Area. There is a waterfowl production area, four wildlife management areas, and two private federally managed properties within the 5-mile buffer. Three conservation easements managed for biodiversity, totaling approximately 230 acres, are located south of the Project Area (**Exhibit 4.1.1c**).

4.1.2 Wildlife

4.1.2.1 Birds

Migratory Pathways

The Project Area occurs within the Mississippi Flyway, one of the four migratory bird routes used by individuals migrating between breeding and over-wintering grounds. This flyway broadly

follows the Mississippi River and Makenzie River corridors from Louisiana and Mississippi through Minnesota, Wisconsin, and Michigan within the United States and extends through the central Canadian provinces of Ontario, Manitoba, and Nunavut (USFWS 2020a). More than 325 bird species use this flyway during their biannual migrations in the spring and fall (National Audubon Society n.d.).

The Rock River and Des Moines River are approximately 15.5 miles west and 19.6 miles east of the Project Area, respectively. These rivers, along with the numerous streams, ponds, and other waterbodies in the region, provide habitat for a number of migratory waterfowl, shorebirds, and passerines, suggesting that birds from these species groups may use the Project Area during spring or fall migration.

Important Bird Areas

An Important Bird Area (IBA) is an area recognized as possessing habitat important for the conservation of bird populations. In the United States, the program is administered by the National Audubon Society. The National Audubon Society considers IBAs sites as areas that provide essential habitat for one or more species of birds. These include sites for breeding, wintering, or migrating birds and range from only a few acres to thousands of acres in size. The nearest IBA is the Forrest Woods Nature Preserve, located approximately 15 miles northwest of the Project Area (**Exhibit 4.1.2.1**). The Prairie Coteau Complex IBA consists of high quality habitat types such as sedge wetlands and native prairie. The Prairie Coteau Complex IBA is used by as many as 251 bird species, including 71 species of greatest conservation need (SGCN) (National Audubon Society not dated).

North American Breeding Bird Surveys and Christmas Bird Counts

The North American Breeding Bird Survey (BBS) is a cooperative effort between the U.S. Geological Survey's (USGS) Patuxent Wildlife Research Center and Environment Canada's Canadian Wildlife Service to monitor the status and trends of North American bird populations; this includes over 4,800 routes across the United States, Canada, and Northern Mexico (USGS 2017). BBS's are conducted during the peak of the nesting season.

Two active BBS routes are located near the Project Area including Chandler (approximately 6.5 miles to the west) and Worthington (approximately 7 miles to the south) (**Exhibit 4.1.2.1**). From 2013 to 2019, 85 bird species were observed along the Chandler BBS and 85 bird species were observed along the Worthington BBS (**Table 4.1.2.1**). There were no state- or federally-listed species documented along either route.

The National Audubon Society began Christmas Bird Counts (CBC) as a means to monitor bird population trends throughout the United States and Canada. Counts occur from December 14 to January 5 annually, and involve volunteers documenting all bird observations within a 15-mile diameter circle of a designated location.

The nearest CBC is the Jackson County CBC, located approximately 26 miles east of the Project Area (**Exhibit 4.1.2.1**). A total of 58 species were observed from 2013 to 2020. No state- or federally-listed species were observed, although bald eagles, protected under the BGEPA were observed (**Appendix A**). Among the two BBS routes and CBC, there were 123 unique bird species observed.

Table 4.1.2.1. Overall species richness observed from 2013 to 2019 at Breeding Bird Survey (BBS) routes and Christmas Bird Counts (CBC) near the Project Area.

Bird Survey	Overall species richness
BBS route	
Chandler	85
Worthington	85
CBC circle	
Jackson County	58

Anticipated Species within the Project Area

Based on the predominance of agricultural land cover within the Project Area, species most likely to use the Project include those commonly associated with human-disturbed landcovers, including the house sparrow (*Passer domesticus*), red-winged blackbird (*Agelaius phoeniceus*), horned lark (*Eremophila alpestris*), red-tailed hawk (*Buteo jamaicensis*), mourning dove (*Zenaida macroura*), common grackle (*Quiscalus quiscula*), European starling (*Sturnus vulgaris*), and American crow (*Corvus brachyrhynchos*). However, during migration periods, a variety of other passerines, waterfowl, shorebirds, raptors, and other species groups may use the Project Area.

4.1.2.2 Bats

According to the MNDNR (not dated), there are eight species of bats known to Minnesota. Six of these species' ranges encompass the Project Area, including the federally-threatened and state-species of concern northern long-eared bat (*Myotis septentrionalis*), state-species of concern little brown bat (*Myotis lucifugus*), state-species of concern big brown bat (*Eptesicus fuscus*), eastern red bat (*Lasiurus borealis*), hoary bat (*Lasiurus cinereus*), and silver-haired bat (*Lasionycteris noctivagans*).

The six bat species that may occur within or near the Project Area include cave bat species and migratory tree bat species. Cave bat species use caves at for roosting or hibernating purposes, and migratory tree bats typically migrate long distances between breeding and overwinter areas and roost in trees year-round. The northern long-eared, little brown, and big brown bats typically hibernate in caves during the winter and roost in trees, shrubs, caves, or buildings during the summer. There are no known or suspected karst formations mapped within Nobles County. There are no known NLEB hibernacula or roost trees within Nobles County (MNDNR and USFWS 2020).

The silver-haired bat, hoary bat, and eastern red bat are migratory tree bats and typically roost in trees throughout the year.

4.1.2.3 Special Status Species

For the purposes of the BBCS, special status species are defined as species that have a special designation at the state or federal level. This includes birds and bats listed under the federal ESA, Species of Greatest Conservation Need (SGCN), under Minnesota's Endangered Species Statute (Minnesota Statutes, Section 84.0895), Birds of Conservation Concern (BCC) as designated by the USFWS, and under the BGEPA.

Federal or State Listed Species and BGEPA

A total of four species listed under the federal or state endangered species act and BGEPA have the potential to occur within the Project Area (**Table 4.1.2.3a**). The four species were identified by the USFWS (2020) IPaC (**Appendix B**), BBS route results, CBC results, or Bat Conservation International (BCI) species range maps.

Table 4.1.2.3a. Federal- or state-protected species with potential to occur within the Project Area.

Common Name/ *Scientific Name*	Status[1]	Range and General Habitat Requirements	Potential for Occurrence
Bats			
Northern long-eared bat (*Myotis septentrionalis*)	FT/SE	Overwinters in mines and caves. During the summer roosts under tree bark and crevices, may roost in caves or mines (MNDNR 2018c). Their range encompasses the entire state (USFWS 2019a).	Low
Birds			
Bald eagle (*Haliaeetus leucocephalus*)	BGEPA/ --	Nests commonly located in large trees associated with nearby rivers, lakes, streams, or other sources of water (Buehler 2000).	High
Fishes			
Topeka shiner (*Notropis topeka*)	FE/SC	Found in small streams and tributaries of the Missouri River in the southwest corner of Minnesota (MNDNR not dated). Habitat consist of slow-moving streams with sand or gravel substrate, in pools or oxbows (MNDNR not dated).	Moderate
Plants			
Prairie bush clover (*Lespedeza leptostachya*)	FT/ST	Found near the Des Moines River Valley in southwestern Minnesota, in the subsections Coteau Moraines and Minnesota River Prairie (MNDNR 2020). Prairie bush-clover is an obligate of tallgrass prairie habitats (USFWS 2009). Habitat is bedrock outcrops in mesic to dry prairies with loam or sandy soils (MDNR 2020).	Low

FT = Federally threatened; FE = Federally endangered; ST = State threatened; SE = State endangered; SC = Species of Concern

Birds of Conservation Concern (BCC)

The USFWS (2008) BCC list identifies species, subspecies, or populations of migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the federal ESA (USFWS 2008). Species identified as BCC are not afforded legal protections based on this status. The Project Area is located within Bird Conservation Region (BCR) 11, the Prairie Pothole Region. Twenty-seven BCC species are listed in the Prairie Potholes BCR (**Table 4.1.2.3c**).

Table 4.1.2.3c. Birds of Conservation Concern that may occur within the Project Area, and their other statuses.

Common Name	Scientific Name	Federal/State Status	State Wildlife Action Plan Designation
American bittern	*Botaurus lentiginosus*	--/--	SGCN
Baird's sparrow	*Ammodramus bairdii*	--/SE	SGCN
Bald eagle	*Haliaeetus leucocephalus*	BGEPA/--	SGCN
Black-billed cuckoo	*Coccyzus erythropthalmus*	--/--	SGCN
Black tern	*Chlidonias niger*	--/--	SGCN
Buff-breasted sandpiper	*Calidris subruficollis*	--/--	SGCN
Chestnut-collared longspur	*Calcarius ornatus*	--/SE	SGCN
Dickcissel	*Spiza americana*	--/--	SGCN
Grasshopper sparrow	*Ammodramus savannarum*	--/--	SGCN
Horned grebe	*Podiceps auritus*	--/ST	SGCN
Hudsonian godwit	*Limosa haemastica*	--/--	SGCN
Least bittern	*Ixobrychus exilis*	--/--	SGCN
Long-billed curlew	*Numenius americanus*	--/--	--
Marbled godwit	*Limosa fedoa*	--/SC	SGCN
McCown's longspur	*Calcarius mccownii*	--/--	--
Mountain plover	*Charadrius montanus*	--/--	--
Nelson's sharp-tailed sparrow	*Ammodramus nelsoni*	--/SC	SGCN
Peregrine falcon	*Falco peregrinus*	--/ST	SGCN
Red-headed woodpecker	*Melanerpes erythrocephalus*	--/--	SGCN
Short-billed dowitcher	*Limnodromus griseus*	--/--	SGCN
Short-eared owl	*Asio flammeus*	--/SC	SGCN
Smith's longspur	*Calcarius pictus*	--/--	--
Solitary sandpiper	*Tringa solitaria*	--/--	--
Sprague's pipit	*Anthus spragueii*	--/SE	SGCN
Swainson's hawk	*Buteo swainsoni*	--/--	SGCN
Upland sandpiper	*Bartramia longicauda*	--/--	SGCN
Yellow rail	*Coturnicops noveboracensis*	--/SC	SGCN

SE = State endangered; ST = State threatened; SC = Species of Concern; SGCN = Species of Greatest Conservation Need; BGEPA = Bald and Golden Eagle Protection Act

4.2 Tier 3 – Field Studies at Nearby Wind Farms to Document Site Wildlife Conditions and Predict Project Impacts

Although limited formal Project-specific pre-construction wildlife studies were conducted prior to Project construction, area-specific data from nearby wind farms was used to estimate bird and bat use and species composition. The nearby wind farms include Buffalo Ridge in Lincoln and Pipestone Counties, Minnesota and Top of Iowa Wind Farm in Worth County, Iowa. The principal goals of the studies were to (1) understand bird and bat use and activity within the Project Area, (2) evaluate potential impacts that wind power development may have on birds and bats, and (3) provide information that would help to design a wind energy facility such that it minimizes the potential for bird and bat collisions with turbines. Results of these surveys are summarized below.

4.2.1 Comparison of Nearby Studies

To assist in assessing the potential impact CWS would have on avian and bat populations, studies with similar land cover in Minnesota (Buffalo Ridge) and Iowa (Top of Iowa) were reviewed. The Buffalo Ridge area has significant tracts of cropland with areas of Conservation Reserve Program fields containing planted grasslands. This is similar to CWS in that there are significant cropland areas with some planted grassland areas. Due to this similarity in habitat, similar populations of birds and bats could be expected. Other avian-related studies showed that grassland nesting birds avoided nesting in grasslands within 80 meters (262 feet) of turbines. In general, the authors of each study concluded that the Buffalo Ridge wind farms had little effect on avian and bat populations. Due to the similarities in habitat and avian and bat populations, similar mortality rates could be anticipated with CWS.

The Top of Iowa (TOI) area is also similar to the CWS Project Area in that they both contain large tracts of cropland. However, the TOI wind farm is surrounded by three large (1,000 to 2,500 acres) Wildlife Management Areas (WMA's). While there are several WMAs located within five miles of the Project Area, most are small (less than 100 acres) and fragmented from each other in the landscape. The closest is Bluebird WMA (77.5 acres) which is located approximately 1.5 miles southeast of the Project and over two miles from any proposed turbine. The lower unit of Groth WMA (73 acres) and Van Drie WMA (82 acres) are both located approximately three miles from the Project Area. The largest WMA near the Project is Herlein-Boote WMA. Herlein-Boote is located approximately 4.5 miles southeast of the Project and encompasses about 560 acres. Also, the TOI wind farm was surrounded by large complexes of waterbird (e.g., heron) habitat. Very little of this habitat exists in or near the CWS Project Area. Because of the difference in surrounding habitat, it is anticipated that there would be fewer bird and bat populations in the Project Area than in the TOI Project Area.

From this review, it appears that the CWS Project Area has minimal suitable habitat for avian and bat species that would be impacted by wind turbines. There are a limited amounts of small, wooded areas adjacent to farmsteads and some open grassy areas, but in general these grassy areas are small, fragmented, or degraded by agricultural activities. Overall, the areas of potential habitat account for a fractional percentage of the total land cover. Therefore, based on available

habitat, there would be, at the most, similar bird and bat fatalities at the CWS Project Area as compared to the Buffalo Ridge and TOI Areas.

4.2.2 Tier 1, 2, and 3 – USFWS WEG Questions and Reponses

Table 4.2.4. Tier 1, 2, and 3 question summaries and responses.

Tier Question	Tier Question Summary
Are there species of concern present within the proposed Project Area or is habitat present for these species?	The entire Project Area is within designated critical habitat for the Topeka shiner. The USFWS (2021) IPaC identified the federally-threatened NLEB, federally- and state-threatened prairie bush clover, and federally-endangered Topeka shiner as potentially occurring within the Project Area. No state-listed bird species were recorded on nearby BBS or CBC routes. However, 33 bird species identified as BCC, state Species of Concern, or SGCN and the bald eagle (BGEPA) were recorded on nearby BBS and CBC routes. Also, five other special-status bat species, including the big brown, little brown, silver-haired, eastern red, and hoary bats may occur within the Project Area.
Which bird and bat species are likely to use the proposed Project Area?	Six bat species have the potential to occur within the Project Area and surrounding region, including the silver-haired, eastern red, big brown, hoary, little brown, and northern long-eared. Avian species likely to occur within the Project Area include the red-winged blackbird, horned lark, red-tailed hawk, mourning dove, common grackle, European starling, and American crow.
Is there potential for adverse effects to species of concern?	Construction BMPs will minimize impacts to Topeka shiner and their habitat. The special status avian and bat species identified as potentially occurring within the Project Area may be at risk of adverse effects. However, none of the special status species have been reported as fatalities at CWS based on quarterly reporting and curtailing cut-in speeds from April 1 to October 31 will minimize adverse effects to bat species.

5.0 RISK ASSESSMENT

This section provides a qualitative risk assessment for direct impacts to birds and bats related to the repower of the Project. The intent is not to predict the number of turbine-related fatalities or other sources of direct Project-related mortality, as there does not appear to be a correlation between pre-construction risk assessments and observed post-construction bird and bat mortality at wind farms (de Lucas et al. 2008, Ferrer et al. 2011, Sharp et al. 2010). Results from post-construction mortality monitoring (PCMM) studies at nearby wind projects are likely a more reliable and accurate predictor of risk. CWS will continue to modify this BBCS as needed with guidance from the MDNR and USFWS to adapt the results of nearby PCMM studies and unforeseen events over the duration of the repowered Project.

5.1.1 Results from Quarterly Monitoring Reports

CWS was required to submit quarterly avian and bat reports to the MPUC since the Project became commercially operational. Based on the quarterly reports submitted to the MPUC, one mourning dove (*Zenaida macroura*) fatality (3rd quarter of 2015) was recorded since the Project became operational on December 26, 2012. No other bird or bat fatalities were documented.

5.2 Birds

5.2.1 General Impacts

North American bird populations have decreased in abundance since 1970, with declines being primarily attributed to habitat loss (Rosenberg et al. 2019). However, declines are also attributed to other direct and indirect threats of natural or anthropogenic origin. Loss et al. (2015) suggest that cats were the greatest source of mortality for birds, with estimates ranging from 803 million to 2.9 billion birds annually. In comparison, bird fatality estimates from wind energy facilities range from 140,000 and 328,000 birds annually, although fatality estimates are likely to increase as the number of wind energy facilities increases (USFWS 2018).

In a meta-analysis conducted by the American Wind Wildlife Institute (AWWI) that assessed 167 PCMM studies across the continental United States, 75 percent of the studies reported avian fatality rates of less than 3.1 birds/MW/year and a median avian fatality rate of 1.8 birds/MW/year. The median fatality rate for small birds (e.g., passerines) was 1.2 birds/MW/year, while the median fatality rate for large birds (e.g., raptors) was 0.2 birds/MW/year (AWWI 2019). AWWI also categorized studies by avifaunal biome (i.e., Eastern, Northern Forest, Northern Rockies, Pacific, Prairie, Southwest) (Rich et al. 2004), and by USFWS region (i.e., Pacific, Southwest, Great Lakes, Southeast, Northeast, Mountain Prairie). For purposes of comparison, the Project is located within the Prairie avifaunal biome (56 studies evaluated), and the USFWS Midwest Region (27 studies evaluated). The median mortality rate estimate (approximately 1.7 birds/MW/year) for the Prairie avifaunal biome was low compared to other avifaunal biomes. Of the USFWS regions, median mortality rate estimate was greatest (2.6 birds/MW/year) within the Midwest region (AWWI 2019).

The nearest available PCMM study, at the Prairie Rose Road Wind Farm (approximately 40 miles northwest of the Project Area), recorded a total of four bird carcasses (two unidentified sparrows, one Canada goose [*Branta canadensis*], one red-tailed hawk) amongst 204 total turbine searches in 2014, resulting in and estimated mortality rate of 0.4 birds/MW/year (WEST 2015). Comparatively, monitoring at the Odell Wind Farm (approximately 75 miles northeast of the Project Area) estimated greater mortality rates, which ranged from 4.69 - 6.14 birds/MW/year using the Huso and Shoenfeld estimators, respectively (9.38-12.28 birds/tower/year using the Huso and Shoenfeld estimators) based on the 10 bird carcasses recorded during carcass searches (WEST 2018a). This includes estimated mortality rates of 0.19 – 0.26 large birds/MW/year (0.38 – 0.51 large birds/tower/year) and 4.50 – 5.89 small birds/tower/year (9.00 – 11.77 small birds/tower/year). Another study looking at projects along the Buffalo Ridge near Lake Benton,

Minnesota (approximately 75 miles northwest of the Project Area) appeared to generally support the estimated mortality range demonstrated in fatality studies at the Prairie Rose and Odell Wind Farms, recording mortality rates between 0.98 and 4.45 birds/turbine/year (Johnson et al. 2000).

Although some geographic variation exists between the sites, wind-facility avian mortality rates at the Project are anticipated to be within the ranges recorded at the Prairie Rose and Odell sites given their close proximity and similar land use coverages.

5.2.2 General Avian Risk

Although there were small sample sizes of bird carcasses recorded during the 2014 Prairie Rose (WEST 2015) and Odell (WEST 2018a) mortality monitoring studies (n = 4 and n = 10, respectively), according to Strickland and Morrison (2008), passerines are likely at greatest risk of collision, representing an estimated 75 percent of all avian fatalities at wind facilities nationwide. While turbine-related bird mortality risk within the Project Area is likely greatest during the migratory seasons, as has been reported at most wind energy facilities (National Wind Coordinating Collaborative [NWCC] 2010), nocturnal passerine migrants in particular may be at a greater risk than those that migrate during the day, as this group has accounted for over 50 percent of avian fatalities at some sites; however, no individual species have been identified as comprising the majority of fatalities (Erickson et al. 2002). Although, it is estimated that less than 0.01 percent of passerines that migrate in proximity to wind farms are killed by collisions with turbines and no studies have indicated that the reported fatality rates are a cause of concern relative to population-level impacts (Erickson 2007).

Resident passerines may experience lower mortality rates during the breeding season as opposed to migratory passerines, as many species tend to fly below the RSA of the turbines during breeding activities. However, some breeding passerines, such as the horned lark, exhibit behaviors that increase their risk of collision with turbines (Arnett et al. 2007). Behaviors such as courtship activity, individuals taking-off and landing during the crepuscular period, and long-distance nocturnal migrations put birds at greater risk of turbine-collision. Also, birds traveling in low cloud or foggy conditions are also at a greater risk of collision (Kerlinger 1995). Based on the predominance of agricultural land within the Project Area, species such as red-winged blackbirds, house sparrows, European starlings and horned larks are anticipated to be some of the common songbirds within the Project Area, and thus, could be at risk for turbine-related collision.

Waterfowl are another species group that have documented fatalities at wind energy facilities across the United States. According to AWWI (2019), waterfowl comprise approximately 2 percent of all wind energy facility fatalities in the United States, but only comprise 0.9 percent of avian communities (Kushlan et al. 2002). However, Fernley et al. (2006) reported that large and medium-sized species of geese are adept at avoiding wind turbines, and collision rates are very low (0-4/year). According to the Odell Avian and Bat Protection Plan (Applied Ecological Services 2014) high numbers of waterfowl and waterbirds were observed during point count surveys, most common of which was the Canada goose. Other species groups impacted by wind-energy

facilities include doves/pigeons and upland gamebirds, but their risk of collisions is less than that observed in waterfowl (AWWI 2019). Wind-energy related risks to raptor species is discussed in **Section 5.1.3.**

5.2.3 Raptor Risk

Although most avian fatalities documented at wind farms are passerines, raptor fatalities (including eagles) have received the most attention (Arnett et al. 2007). It appears that there are fewer raptor fatalities at newer wind projects than occurred at older-generation wind farms, although the regional variation makes interpretation difficult (Erickson et al. 2002, Jain et al. 2007, Johnson et al. 2002, Kerns and Kerlinger 2004). Raptors constitute approximately six percent of reported bird fatalities, but typically comprise a lesser proportion of birds observed during wind farm pre-construction surveys (Strickland et al. 2011).

High raptor use (greater than 2.0 birds/20 min) has been associated with high raptor fatalities at wind farms. Conversely, raptor fatalities appear to be low when raptor use is low (less than 1.0 birds/20 min) (Strickland et al. 2011), and publicly available records suggest raptor use at Minnesota wind farms is low (WEST 2018b). Use at CWS is not expected to significantly differ, suggesting raptor risk could also be low.

Common raptors in southern Minnesota that are commonly found in agricultural settings include turkey vultures, American kestrels, and red-tailed hawks (Minnesota Ornithologists Union n.d.). These species are also listed among the most frequently observed turbine-related fatalities (AWWI 2019). Project-related impacts to red-tailed hawks or turkey vultures are unlikely to have population-level effects as both species are common and ubiquitous. However, American kestrel populations are declining, and may experience greater population-level impacts than red-tailed hawks or turkey vultures (Sauer et al. 2015).

While collision risks to non-eagle raptors at wind energy facilities are well documented, information concerning collision risks to bald or golden eagles at wind energy facilities are more limited. However, there are a few studies that detail bald and golden eagle fatalities and their collision risks at wind farms. For example, Pagel et al. (2013) reported a minimum of 85 eagle (bald and golden eagles combined) fatalities at wind farms in the contiguous U.S. from 1997 to 2012. Of the 85 reported eagle fatalities, six (7 percent) were bald eagles and 79 (93 percent) were golden eagles. However, preliminary data analyses indicate that 52 bald eagle fatalities or injuries were reported at wind-farms in the contiguous U.S. from 2013 and 2018 (Kritz et al. 2018). Of the 52 bald eagle fatalities or injuries reported by Kritz et al. (2018), only three were reported in Minnesota. Sharp et al. (2010) suggest that bald eagle avoidance of operational wind turbines might reduce the collision risk for this species. Similarly, Whitfield (2009) suggests that golden eagles also exhibit collision avoidance behaviors. As bald eagles occur year-round in the region, there is risk of collision, however wind turbine take of bald eagles is low within Minnesota, and no Project-related bald eagle take has occurred since CWS became operational in 2012.

Golden eagle collision risk within the Project Area is expected to be low, as the species rarely occurs in Minnesota.

5.2.4 Special Status Species

As special status species may use the Project Area for migration stopover, breeding, or overwintering purposes, it is possible that there is collision risk for these species. However, based on quarterly monitoring reports that document only one bird fatality encountered (mourning dove in 2015), which is not a special status species, it suggests that risk to special status species is low.

5.2.5 Conclusion

CWS avian fatality rates (after repowering) are anticipated to be comparable to fatality rates reported from the Prairie Rose and Odell Wind Farms, given the proximity of CWS to these windfarms and that they have similar land cover compositions. Avian fatality rates at the Prairie Rose and Odell wind farms range from 0.40 – 6.14 birds/MW/year (WEST 2015, WEST 2018a). Based on AWWI (2019) data, passerines are anticipated to comprise most of the fatalities observed at windfarms nationwide. As the majority of land use within the Project Area is agricultural, it suggests that passerines such as horned larks, red-winged blackbirds, European starlings, and house sparrows are at the greatest risk. Raptors, especially turkey vultures and red-tailed hawks, could be at risk of turbine collision, although risk is anticipated to be low based on CWS quarterly reports that began in 2012. Impacts to special status species are also anticipated to be low based on CWS quarterly monitoring report results that began in 2012.

5.3 Bats

5.3.1 General Impacts

It is well documented that bats are at risk of collision with operating wind turbines; this includes a recent study by the AWWI (2018a) that performed a meta-analysis of 227 PCMM studies from 146 wind projects throughout the United States. Bat fatalities at wind farms are almost exclusively associated with operating turbines. In studies by Johnson et al. (2000) and Young et al. (2003), bat carcasses collected at wind farms nationwide were recovered only from turbine locations and were not recovered at METs or transmission lines.

The most prominent source of bat fatalities at wind facilities is direct collision (i.e., blunt-force trauma) with turbine blades (National Renewable Energy Laboratory [NREL] 2013). The barotrauma mortality hypothesis suggests that bat fatalities at wind facilities are attributed to the sudden barometric pressure change that occurs as bats pass through the path of rotating turbine blades (AWWI 2018b, Grodsky and Drake 2011). However, Lawson et al. (2018) suggest that the area with sufficient pressure changes to cause barotrauma is small and close to the blade surface, and it is most likely that bats collide with the blade.

Twenty-four of the 47 bat species in North America have been documented as fatalities at wind energy facilities (Arnett and Baerwald 2013). Most of the bat mortalities have been attributed to hoary, eastern red, and silver-haired bats, accounting for 72 percent of fatalities within the United States, and 83.6 percent of fatalities within the USFWS Midwest region (Arnett et al. 2008, Johnson 2005, Kunz et al. 2007, AWWI 2020). Mortality risk is greatest for these species from late summer to early fall when they are migrating (Arnett et al. 2008, Johnson 2005, Kunz et al. 2007).

Weather variables, such as ambient temperature and wind speed can influence bat activity and mortality at wind farms (Amorim et al. 2012, Baerwald and Barclay 2011). Low wind speeds and warmer temperatures may result in heightened bat activity and a concomitant increase in bat fatalities. For this reason, turbine curtailment is occasionally employed during periods of greater bat use during low –wind conditions in an effort to reduce bat fatalities.

According to the AWWI (2020), the national bat median fatality rate ranges from 3.0 - 6.0 bats/MW/year (AWWI 2020). However, bat fatality rates within the USFWS Midwest region are higher; with estimates of 8.4 bats/MW/year (16.4 bats/turbine/year) (AWWI 2020).

Based on PCMM results from the Prairie Rose Wind Project, estimated fatality rates (0.4 bats/MW/year) were lower than the AWWI (2020) median (WEST 2015), while bat mortality rates at the Odell Wind Farm ranged from 6.7 and 8.5 bats/MW/year (WEST 2018a). According to Johnson et al. (2000), annual mortality rates of bats at the Buffalo Ridge wind sites ranged from 0.3 - 2.0 bats/turbine.

Although direct collision-related impacts often receive the most attention, indirect impacts should also be considered. Although few studies exist to evaluate and quantify the effects of land transformation on bats, land clearance for the construction of turbines, pads, and associated facility have the potential to impacts forested areas, grasslands, and other habitat that provide necessary roosting and foraging space.

As noted in **Section 4.1.1**, the Project Area is located in a landscape dominated by agricultural land cover. The impact to agricultural habitat is likely to be of minor consequence for the local or migratory bat communities due to the demonstrated preference for forested and open water habitat by many bat species that may occur within the Project Area. As with all wind energy facility within the range of bats, operating WTGs present a risk of bat fatality due to collisions or barotrauma; even in open, non-forested areas.

Although some geographic variation exists between the sites, CWS bat mortality rates are anticipated to be comparable to rates reported from the Prairie Rose and Odell sites given their close proximity and similar land use coverages.

5.3.2 Special Status Bat Species

Only two species of concern bat species, the hoary and silver-haired bats were identified during acoustic bat monitoring (Tetra Tech 2012). Species of concern are not afforded legal protections. However, the results from the acoustic monitoring study do not indicate that other bat species are absent from the Project Area, as some calls were classified as big brown bat/silver-haired bat or tri-colored bat/eastern red bat (Tetra Tech 2012).

5.3.3 Use of Pre-Construction Acoustic Monitoring to Predict Post-Construction Bat Fatalities

Attempts to correlate pre-construction acoustic bat data with post-construction fatalities at wind energy facilities suggests that the relationship is complicated (Baerwald and Barclay 2009, Gruver et al. 2009, Johnson et al. 2003). Hein et al. (2013) conducted a meta-analysis from 94 pre-construction bat acoustic surveys and 75 post-construction bat fatality studies at proposed and operating wind energy facilities across the United States and Canada. Results from 12 facilities (located throughout the United States) with paired pre- and post-construction data suggests a non-significant positive trend. However, the studies used in the meta-analysis did not use the same survey methods, further complicating the ability to identify a relationship between pre-construction bat acoustic surveys and post-construction fatality rates.

If Project-specific pre-construction bat acoustic results were correlated with post-construction bat fatalities, it would imply that the species at greatest risk of Project-related fatalities are to silver-haired and hoary bats, based on pre-construction acoustic monitoring results (Tetra Tech 2012). The species that comprised most of the bat calls within the Project Area, also two of the species that comprise many of the observed bat fatalities at other wind energy facilities (AWWI 2020, Arnett et al. 2008, Johnson 2005, Kunz et al. 2007). Furthermore, the two most common species from the Project's pre-construction acoustic monitoring study species are the second and third most commonly observed species as wind-related fatalities at PCMM studies in the USFWS Midwest Region (AWWI 2020). Based on the AWWI (2020) summary analysis of PCMM studies in the Midwest (n = 69), eastern red bats accounted for 39.9 percent of fatalities, followed by the hoary (28.2 percent), and silver-haired (15.5 percent). This appears consistent with nearby wind facility data. Although 2014 Prairie Rose fatality surveys only documented one fatality (silver-haired bat, WEST 2015), most bat carcasses at the Odell Wind Farm were of hoary (n = 4), eastern red (n = 2) and silver-haired (n = 2) (WEST 2018a). Similar results were reported during the Buffalo Ridge Study; most of the identifiable bat fatalities involved in the Buffalo Ridge study were from hoary bats (66 percent, n = 108), followed by 36 eastern red bats (23 percent), silver-haired (4 percent, n = 6), and tri-colored bats (4 percent, n = 6) (Johnson et. al 2000) (**Table 5.2.3**).

Table 5.2.3. Bat fatality species percent composition reported from post-construction mortality monitoring studies reported at wind farms in the U.S. Fish and Wildlife Service Midwest Region.

Species	Prairie Rose Wind Farm (2014) Minnesota n = 1	Odell Wind Farm (2018) Minnesota n = 10	Buffalo Ridge Study (2000) Minnesota n = 163
Big-brown bat (*Eptesicus fuscus*)	--	--	<1
Eastern red bat (*Lasiurus borealis*)	--	20	23
Hoary bat (*Lasiurus cinereus*)	--	40	66
Silver-haired bat (*Lasionycteris noctivagans*)	100	20	4
Little brown bat (*Myotis lucifugus*)	--	--	3
Evening bat (*Nycticeius humeralis*)	--	10	--
Tri-colored bat (*Perimyotis subflavus*)	--	--	4
Unidentified	--	10	--

Project-specific post-construction monitoring studies are when evaluating whether adverse impacts to bats occur as a result of Project operation. Also, the post-construction mortality monitoring results could be used to determine if a correlation exists between pre-construction acoustic monitoring and post-construction fatalities on-site.

5.3.4 Conclusion

Based on nearby and regional estimates, bat mortality rate estimates at the Project (after repowering) are expected to be between 0.41 and 8.56 bats/MW/year (WEST 2015, WEST 2018a) with most fatalities attributed to migratory tree bat species including the silver-haired, hoary, and eastern red bats (AWWI 2020). However, risks to northern long -eared bats are possible. **Sections 6.0** and **7.0** describe measures that CWS has and will continue to implement to avoid, minimize, monitor, and adaptively manage risk to bats at the repowered Project. Preventative measures under consideration by CWS include seasonal feathering (i.e., April 1 to October 31) of turbine blades when operating below equipment cut-in speeds as explained in **Section 6.3**.

6.0 AVOIDANCE AND MINIMIZATION MEASURES

CWS will implement (or continue) measures to avoid or minimize impacts to birds and bats in the repowering, operation, and decommissioning phases of the Project as presented in the following sections.

6.1 Project Siting and Design

The Project was originally sited and designed to avoid sensitive habitats to the greatest extent possible. The repowering effort will not result in changing the location of turbines, rather it involves replacing nacelles and blades on existing turbines. Previous wind farm studies have identified a variety of design measures and BMPs that minimize adverse effects on habitat and wildlife (USFWS 2012a). Avoidance and mitigation measures were incorporated into this BBCS

and the original Project siting, and original and repowering design for the Project, to minimize risks to bird and bat species. The following have been, or will be, taken into consideration throughout the planning, design, and construction process.

6.1.1 Avoidance of Migratory Pathways and Other Important Use Areas

The Project Area is located within the Mississippi Flyway; however no other critically important areas of wildlife congregations, staging, nesting sites, migration stopovers or corridors, special management areas, or other areas of seasonal importance are known to occur within the Project Area.

Although no winter roosts, mines, caves or karst regions that may attract bats are known to occur within or near the Project Area, there are potential movement corridors for bats within the Project Area, specifically the riverine features and their associated wooded riparian corridors. Since, CWS will be using the previously constructed and permitted turbines, access roads, collection lines, transmission lines, and other project infrastructure, riverine features and their associated wooded riparian corridors will be avoided.

6.1.2 Facilities and Turbine Layout and Design

In order to minimize impacts to wildlife, CWS incorporated or will incorporate the following avoidance and minimization measures into siting decisions for the turbines and associated infrastructure during development of the Project or during the repowering of the Project.

1) The original Project was sited to minimize impacts to habitats used by grassland and riparian birds to the maximum extent practicable;
   a. Turbines were sited in agricultural fields to minimize impacts to grassland or other habitat sensitive bird species.
   b. Native prairie or other sensitive habitats were avoided to the maximum extent practicable.

2) CWS will be using the previously constructed and permitted access roads to minimize impacts during the repower;
   a. Some minor upgrading of public roadways and intersections may be required to allow for delivery of turbine parts (i.e., rotor blades, tower, and nacelles) to each turbine location. A temporary five-acre laydown yard will be constructed on agricultural lands to stage the turbine components prior to installation and up to three temporary sites will be used to construct turbine parts on the ground.

3) CWS will use the previously constructed and permitted underground electrical collection and transmission lines for the repowered turbines to minimize potential for avian and bat collisions and electrocutions;
   a. All of the 34.5 kilovolt (kV) electrical collection lines are buried underground.

b. Transmission lines, if not buried underground, are equipped with insulated and shielded wire to minimize electrocution risks to birds and bats.

4) Operational lighting is and will continue to be minimized to the maximum extent practicable;
   a. Lighting will continue to be directed downward and programmed to automatically turn-off after two hours of continuous lighting.

5) Federal Aviation Administration (FAA) lighting (FAA 2015) is minimized to the maximum extent practicable while complying with FAA guidelines and will continue to be after Project repowering.
   a. FAA lighting will be attached to the top of some of the repowered nacelles, per specifications of the FAA, will be a single, medium intensity aviation warning light.
   b. Minimum standards for pilot warning and obstruction avoidance lighting specified by the FAA were met and will be met following Project repowering (FAA 2015).
   c. FAA lights are anticipated to be flashing red strobes (L-864) that operate only at night. CWS will continue to use the lowest intensity lighting allowed by the FAA.
   d. To the extent possible, the USFWS-recommended lighting schemes will continue to be used on nacelles, including reduced intensity lighting and lights with short flash durations that emit no light during the off-phase.
   e. Lighting of METs currently meets the minimum standard required by the FAA.
   f. METs were designed to minimize the potential for avian collision.

6.2 Construction

The following construction phase measures were incorporated into the BBCS to avoid construction activities near sensitive habitats during critical periods in bird and bat life histories, and to minimize impacts to wildlife habitats. These measures were derived from industry- based BMPs, the USFWS (2012) WEGs, and Applicant Proposed Measures (APM; i.e., voluntary measures proposed by CWS).

1) Clearing and construction practices will reduce soil disturbance and allow for the reestablishment of natural vegetation;
   a. Where possible, vegetation will be cleared without grubbing or removal of stumps or roots.
   b. All construction equipment will be restricted to designated travel areas to minimize ground disturbance.
   c. During construction, travel and equipment staging will be restricted to designated access roads and work areas to minimize disturbance to nearby vegetation. The extent of these areas will be shown on the construction plans and clearly marked in the field with stakes, flagging, or fencing.
   d. Areas cleared for construction materials storage and laydown, staging areas, or crane paths not required for long-term operation of the Project will be stabilized

and revegetated and as required by Construction Stormwater Discharge Permit requirements.

e. As part of the construction process, a large crane will be used to construct and install the rotors and nacelles, and the same measures used during construction to limit clearing of vegetation and disturbance of soil will be employed.

2) BMPs will be used to avoid the introduction and spread of invasive species;
   a. Construction vehicles and equipment will be cleaned on closed loop wash racks prior to entering the Project Area; waste water will be contained for appropriate off-site disposal.
   b. Following construction, non-agricultural areas will be re-seeded and stabilized using native seed, to restore natural habitat. Re-seeding will be consistent with state requirements to avoid or minimize the introduction of invasive plant species.
3) Using construction activity BMPs will minimize the degradation of water quality from storm water runoff and sedimentation from construction;
   a. A plan note will be incorporated into the construction contract requiring that contractors adhere to all provisions of National Pollutant Discharge Elimination System (NPDES) permits and the Storm Water Pollution Prevention Plan (SWPPP).
   b. Federal and state measures will be followed for handling toxic substances to minimize endangering water and wildlife resources from spills.
4) Maintenance activities will help to avoid the availability of foraging opportunities for raptors or scavengers, or the collection of materials that could be harmful to birds;
   a. Rock and brush piles that could create habitat for raptor prey will be removed from turbine areas.
   b. Any road-kill or other dead animals observed during the course of construction activities will be cleared from roads and turbine pads, and where ever else they are encountered to avoid attracting scavenging raptors (including vultures and eagles).
   c. To avoid attracting wildlife to the construction site, littering will be prohibited and appropriate trash collection receptacles will be placed throughout the Project Area to collect construction related waste materials, including garbage and refuse.
5) Fire potential will be minimized by;
   a. Using spark arrestors on all electrical equipment.
   b. Restricting smoking to designated areas on site.

6.3 Operation and Maintenance

The following operational-phase measures were implemented during the original Project operational phase and were incorporated into this BBCS to continue to avoid operation activities near sensitive habitats during critical periods in bird and bat life histories, and to minimize impacts to wildlife habitat.

   a. All O&M personnel were trained to identify potential wildlife conflicts and the appropriate response to situations should they arise. CWS developed an incidental bird and bat mortality reporting process requiring that (O&M) personnel document

all bird and bat fatalities encountered within the Project Area that were reported on a quarterly basis to the MPUC (see **Section 7.2.1**).

b. New Project personnel will be advised and current Project personnel will be reminded of speed limits on Project-owned roads (25 mph) to minimize wildlife-vehicle collisions.

c. Fires will continue to be handled in accordance with the CWS Fire Protection and Prevention Plan. The plan will include pre-fire planning with the local fire department, fire prevention through maintaining a clean site and regular equipment maintenance, reporting fires to the local fire authorities and CWS management, and limited fire suppression using fire extinguishers by trained CWS personnel. At all times during operation, spark arresters will be maintained on internal combustion engines.

d. Mechanical measures will continue to be used to the extent practicable to control noxious weeds in all surface-disturbed areas. The use of herbicides and pesticides will continue to be minimized and limited to spot treatments when possible to avoid or minimize contamination of any nearby water resources.

e. Turbine blade cut-in speeds will continue to be feathered from 30 minutes before sunset to 30 minutes after sunrise during the period of April 1 to October 31.

f. All applicable hazardous material laws and regulations existing or hereafter enacted regarding hazardous or solid wastes will continue to be complied with and a Spill Prevention, Control and Countermeasure Plan (SPCCP) will be implemented as required under applicable federal and state regulations. Hazardous chemicals contained in diesel fuel, gasoline, coolant (ethylene glycol), and lubricants including gearbox oil will continue to not be stored in or near any wetland or other waterway, nor will any vehicle refueling, or routine maintenance occur in or near waterways without appropriate secondary containment.

6.4 Decommissioning

Once the repowered Project has reached the end of its operational life, the decommissioning process will target restoration of the baseline ecosystem to the extent practicable and will be completed in coordination with appropriate regulatory agencies.

a. Decommissioning activities will avoid additional site disturbances and removal of native vegetation to the extent practicable.

b. Foundations will be removed to a depth of 4 feet below the surrounding grade and covered with soil to allow for reestablishment of native vegetation or crops or as otherwise prescribed by conditions specified in the Site Permit for the repowered Project.

c. If topsoil is removed during decommissioning, it will be stockpiled and used as topsoil for replanting. Once decommissioning activities are complete, topsoil will be restored, reseeded, and stabilized.

d. Overhead pole lines that are no longer needed will be removed.

e. Erosion and sediment control measures will be implemented in all disturbance areas where potential for erosion exists, consistent with storm water management objectives and requirements.

f. Any fencing erected for the repowered Project will be removed unless required by the landowner.

7.0 POST-CONSTRUCTION MONITORING AND ADAPTIVE MANAGEMENT STRATEGIES

It is likely that bird and bat mortality rates at CWS will be comparable to those observed at the nearby windfarms. As such, Westwood conducted a literature review and subsequent meta-analyses of post-construction bird and bat mortality studies from wind energy facilities in southern Minnesota and eastern South Dakota. All results used in the meta-analyses are from publicly available mortality studies. The results of the literature review are discussed in **Section 7.1** below.

7.1 Literature Review and Meta-Analysis of Regional Bird and Bat Mortality Studies

Results from eight publicly available post-construction bat mortality studies indicate that mean estimates of annual bat mortalities per MW in southern Minnesota and eastern South Dakota range from 0.16 to 20.19 (**Table 7.1a**). The output of the wind energy facilities where the 16 studies were conducted ranged in size from 25 MW (73 turbines) to 210 MW (105 turbines) (**Table 7.1a**).

Results from seven publicly available post-construction bird mortality studies indicate that mean estimates of annual bird mortalities per MW in southern Minnesota range from 0.26 to 4.69 (**Table 7.1b**). The output of the wind energy facilities where the eight studies were conducted ranged in size from 25.0 MW (73 turbines) to 205.5 MW (137 turbines).

Meta-analyses were performed following the methods outlined in Borenstein et al. (2009), where:

The mean of means (or grand mean) is;

$$\bar{X}_G = \frac{\sum(\bar{x}_1 n_1 + \bar{x}_2 n_2 \ldots + \bar{x}_i n_i)}{\sum(n_1 + n_2 \ldots . + n_i)}$$

$\bar{X}_G$ = Mean of means or grand mean of bird or bat fatality estimates derived from post-construction surveys at other wind energy facilities in southern Minnesota and eastern South Dakota.

$\bar{x}_1$ = Mean bird or bat fatality estimate of study one.

n_1 = Sample size (i.e., number of turbines searched) of study one.

$\bar{x}_i$ = Mean bird or bat fatality estimate of studies to the i[th] iteration.
n_i = Sample size (i.e., number of turbines searched) of studies to the i[th] iteration.

The variance of the combined studies is;

$$s^2 = \frac{1}{\sum(n_1 + n_2 \ldots . + n_i)}$$

the standard error of the combined studies is;

$$SE = \sqrt{s^2}$$

and the confidence interval for the combined studies is:

$$90\%\ CI = \bar{X}_G \pm (1.645 * SE)$$

Where 1.645 is the Z score for 90% confidence intervals.

Only studies that reported mean mortality rates and an associated measure of variance (i.e., standard deviation, standard error, or confidence interval) were included in the meta-analyses. The number of studies that met our criteria for meta-analysis inclusion were eight for bats and seven for birds.

Table 7.1a. Estimated annual bat mortality rates per MW at 16 wind energy facilities in southern Minnesota and eastern South Dakota range from 0.16 to 20.19.

Wind Energy Facility	County	Bat Mortality Estimates	Number of Turbines Searched	Number of Turbines	Total MW
Buffalo Ridge, MN[3*] (Phase II 1999)	Lincoln	2.37	40	143	107.25
Buffalo Ridge, MN[3*] (Phase III 1999)	Pipestone & Lincoln	2.72	30	138	103.50
Buffalo Ridge II, SD[3*] (2011)	Lincoln	2.81	--	105	210.00
Buffalo Ridge I, SD[3*] (2010)	Lincoln	0.16	--	24	50.40
Buffalo Ridge, MN3* (Phase I 1999)	Lincoln	0.74	21	73	25.00
Buffalo Ridge, MN[3]* (Phase III 2002/Lake Benton II)	Pipestone & Lincoln	1.81	--	138	103.50
Buffalo Ridge, MN[3]* (Phase II 2002/Lake Benton I)	Lincoln	1.64	--	143	107.25
Wessington Springs, SD[3]* (2009)	Jerauld	1.48	--	34	51.00
Elm Creek, MN[3]*	Jackson	1.49	--	67	100.00
Elm Creek II, MN[3]*	Jackson	2.81	--	62	148.80
Lakefield, MN[8]	Jackson	20.19	26	137	205.50
Prairie Rose, MN[1]	Rock	0.41	10	119	200.00
Big Blue, MN[2]	Faribault	4.95	10	18	36.00
Grand Meadow, MN[2]	Mower	3.89	13	67	100.50
Oak Glen, MN[2]	Steele	4.28	10	24	36.00
Odell, MN[4]	Cottonwood & Jackson	6.74	15	100	200.00
Meta-analysis mean (± 90% CI)		6.64 bats/MW/year (CI = 6.51 – 6.76)			

*Data summarized in Chodachek et al. 2014.

Table 7.1b. Estimated annual bird mortality rates per MW at eight wind energy facilities in southern Minnesota range from 0.26 to 4.69.

Wind Energy Facility	County	Bird Mortality Estimates	Number of Turbines Searched	Number of Turbines	Total MW
Buffalo Ridge, MN (Phase I 1999)7	Pipestone & Lincoln	2.86	10	73	25.00
Buffalo Ridge, MN (Phase II 1999)7	Pipestone & Lincoln	3.03	40	143	107.25
Lakefield, MN8	Jackson	1.07	26	137	205.5
Prairie Rose, MN1	Rock	0.26	10	119	200.00
Big Blue, MN2	Faribault	0.74	10	18	36.00
Grand Meadow, MN2	Mower	0.72	13	67	100.50
Oak Glen, MN2	Steele	0.72	10	24	36.00
Odell, MN4	Cottonwood & Jackson	4.69	15	100	200.00
Meta-analysis mean (± 90% CI)		2.41 birds/MW/year (CI = 2.27 – 2.55)			

The meta-analysis of bat mortality rates resulted in a mean estimate of 6.64 bats/MW/year (90% CI = 6.51 – 6.76). The estimated bat mortality rate for wind energy facilities located in southern Minnesota and eastern South Dakota is slightly greater, but similar to the median bat mortality rate reported for the entire Midwest Region (6.2 bats/MW/year; range 1.4 - 32.0) (Allison and Butryn 2018). Allison and Butryn (2018) calculated the median bat mortality rate from results of 45 bat mortality studies in the entire Midwest. The total output of the studies used in the Allison and Butryn (2018) report was 3,750 MW.

The bird mortality rate meta-analysis resulted in a mean estimate of 2.41 birds/MW/year (90% CI = 2.27 – 2.55). The estimated bird mortality rate for wind energy facilities in southern Minnesota is slightly greater, but similar to that of the entire Great Plains Region (Loss et al. 2013). Loss et al. (2013) reported the estimated mean bird mortality rate within the Great Plains Region as 1.81 birds/MW/year (95% CI = 1.00 – 2.62). The Loss et al. (2013) study included bird mortality data from 10 wind energy facilities located in the Great Plains Region. The average number of turbines per facility used in their meta-analysis was 81.8 and a total of 271 turbines from the 10 facilities were searched for bird carcasses.

Mean bird and bat mortality estimates from the meta-analyses of mortality studies at wind energy facilities in southern Minnesota and eastern South Dakota are similar to mean bird and bat mortality estimates reported from meta-analyses of mortality studies in the Midwest (for bats; Allison and Butryn 2018) and the Great Plains Region (for birds; Loss et al. 2013).

7.2 Incidental Post-Construction Monitoring and Adaptive Management Strategies

CWS will continue to implement an incidental Wildlife Response and Reporting System (WRRS) that is submitted to the MPUC on a quarterly basis at the start of operations following repowering that will remain in effect for the life of the Project.

7.2.1 Incidental Monitoring and Coordination Process

The WRRS was designed to provide a means of documenting and reporting bird and bat fatalities incidentally found at the repowered Project site during routine maintenance of WTGs. WRRS data will continue to aim to enhance the understanding of wind turbine - wildlife interactions and to track Project-related fatality trends during the life of the repowered Project. The WRRS will provide a set of standardized instructions for repowered Project personnel to follow if a wildlife incident occurs within the Project Area. Each incident will be documented on a data form and all findings will be reported to the MPUC, USFWS, or MNDNR on a quarterly basis, as appropriate. If an injury or fatality of a federal or state-protected species or an eagle is found, it will be reported to the USFWS and MNDNR within 24 hours of discovery. All data will be logged and maintained within a spreadsheet by the Site Manager or other designated personnel. All site personnel will be required to receive training regarding WRRS procedures including the process of completing and submitting a WRRS report.

This long-term operational effort will consist of managerial, operations, and maintenance staff documenting and reporting any fatality discovered during the Project's operation. The WRRS will provide a set of standardized instructions for repowered Project personnel to follow in response to wildlife incidents within the Project Area. These instructions will include the following:

a. A WRRS form will be completed with one or more photo(s) taken of each fatality or injury and the Site Manager will be notified,
b. CWS O&M personnel will report any large animal carcass(es) found along county or state roadways within the vicinity of the Project to the appropriate agency for removal,
c. Any carcass, partial carcass, portion of animal including feathers or bones of any animal species found within the vicinity of turbines will be reported even if the carcass or parts are not thought to be associated with wind plant operations,
d. Species identification will be performed by a qualified biologist for all bird and bat fatalities,
e. Bird and bat carcasses will be removed or disposed of per site permits,
f. The Site Manager will be notified of any nests observed in, on or around a turbine, power pole, substation, or transformer,
g. Annual training of repowered Project personnel should be done on-site unless coronavirus-19 guidelines require training to occur remotely,

h. If injured wildlife are found, a rehabilitation center will be contacted to remove and care for injured wildlife, and if the individual(s) are state- or federally listed or an eagle, the incident will be reported to USFWS and MNDNR within 24 hours.

7.3 Adaptive Management for Unanticipated Bird, Bat, or Habitat Impacts

CWS is committed to an adaptive management approach regarding evaluating adverse effects that the repowered CWS Project may have to birds and bats. The adaptive-management approach allows for flexible decision-making that can be adjusted as understanding of bird and bat – wind energy interactions are improved. The underlying goal is to identify operational standards that could minimize adverse impacts based on incidental on-site observations and results from nearby wind energy facility studies.

Based on the results of the nearby PCMM studies described in **Section 7.1.1**, adaptive management measures may be considered to further avoid, minimize, or compensate for unanticipated or significant Project-related impacts to wildlife. Factors considered when determining potential need for an adaptive response include:

a. Mortality of an eagle, or a species listed as endangered or threatened under the federal ESA or Minnesota's Endangered Species Statute,
b. A significant number of bird or bat fatalities are discovered at a single turbine or across the site in a 24 hour period, with a significant number defined as >5 at a single turbine,
c. Or a turbine displays consistent, seasonal trends of bird or bat fatalities occurring.

If any of the above mentioned factors occurs during repowered Project operations, CWS will notify the MNDNR and USFWS. CWS will consult with a qualified biologist for species identification of fatalities, and if needed, to investigate the circumstances under which the fatalities occurred based on data, the species affected, and whether population-level impacts are possible. CWS will coordinate with MNDNR and the USFWS regarding the conclusions of the investigation and discuss whether the implementation of additional operational changes or mitigation measures may be appropriate. Bat and bird carcasses will be reported regularly to CWS's environmental staff.

7.4 Additional Adaptive Management Considerations

Potential adaptive management options that could be considered, depending on trends identified through incidental mortality monitoring at the repowered Project site include:

a. Installation of, or modifications to, anti-perching or anti-nesting devices.
b. Other technological advances that have been shown to reduce turbine-related bird or bat fatalities without affecting the financial viability or functionality of the repowered Project.

7.5 Action Plan Should New Risks Arise

Additional adaptive management measures will be considered as results from other studies or incidental wildlife observations become available. Any further decisions regarding a scope for survey efforts (if needed) or adaptive management will be coordinated with the MNDNR, MPUC, and UFSWS, as necessary.

New risk scenarios may arise during the operational period of the repowered Project (such as finding a new bald eagle nest near turbines), that may require additional measures such as monitoring individual turbines closely for use or fatalities. The intent of monitoring is to document changes in use (specifically greater use) in a timely manner such that management (e.g., removal of carcasses) or operational changes can be implemented and impacts to special status species can be minimized. Lastly, CWS will consider implementing adaptive management measures if the status of any species with potential to occur within the Project Area changes (i.e., if a species becomes federally- or state-listed during the operational phase of the repowered Project), or the status of a species is changed.

8.0 BBCS IMPLEMENTATION

Monitoring and reporting measures detailed in the BBCS were developed based on industry standards and the perceived Project-related risks. This document will be modified with the inclusion and interpretation of PCMM results from other wind-energy facilities during the life of the repowered Project. Updates to the BBCS will be distributed to the USFWS and MNDNR.

8.1 Key Contacts

CWS has identified individuals with the goal of connecting bird and bat experts with company decision makers (**Table 8.1**). The individuals identified are currently considered to be primary contacts for questions regarding this BBCS. Additional contacts to be identified for the repowered Project include the Site Manager.

Table 8.1. Contact information of key personnel identified for the Community Wind South Repower Bird and Bat Conservation Strategy.

Title	Contact	Phone	Email
Project Developer	TBD	TBD	TBD
Site Manager	TBD	TBD	TBD
Westwood Project Manager	David Weetman	952-906-7419	David.Weetman@westwoodps.com
Westwood Wildlife Lead	Lucas Wandrie	952-697-5773	Lucas.wandrie@westwoodps.com
Westwood Biologist	Erica Pratt	720-531-8367	Erica.Pratt@westwoodps.com
MNDNR Contact	Cynthia Warzecha	651-259-5078	Cynthia.warzecha@state.mn.us
MPUC Contact	Jamie MacAlister	651-539-1775	Jamie.macalister@state.mn.us
USFWS Contact	Dawn Marsh	952-252-0092 ext. 202	Dawn_marsh@fws.gov

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Exhibits

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Map Document: N:\0026682.00\GIS\BBCS Exhibits\CWS_BBCS_2.0a_ProjectAreaVicinityMap_210204.mxd 2/4/2021 1:02:34 PM

Slayton
Avoca
Iona
Fulda
Murray County
Nobles County
Kenneth
Lismore
Wilmont
Rock County
Nobles County
Magnolia
Adrian
Rushmore
Worthington
Ellsworth
Rock County
Lyon County
Minnesota
Iowa
Nobles County
Lyon County
Nobles County
Osceola County
Bigelow
Minnesota
Iowa
Lyon County
Osceola County

N
0 3 Miles

Data Source(s): Westwood (2021); ESRI WMS USA Topo & National Geographic Basemaps (Accessed 2021); U.S. Census Bureau (2019).

Project Boundary
State Boundary
County Boundary
Municipal Boundary
Major Highway
Major Road

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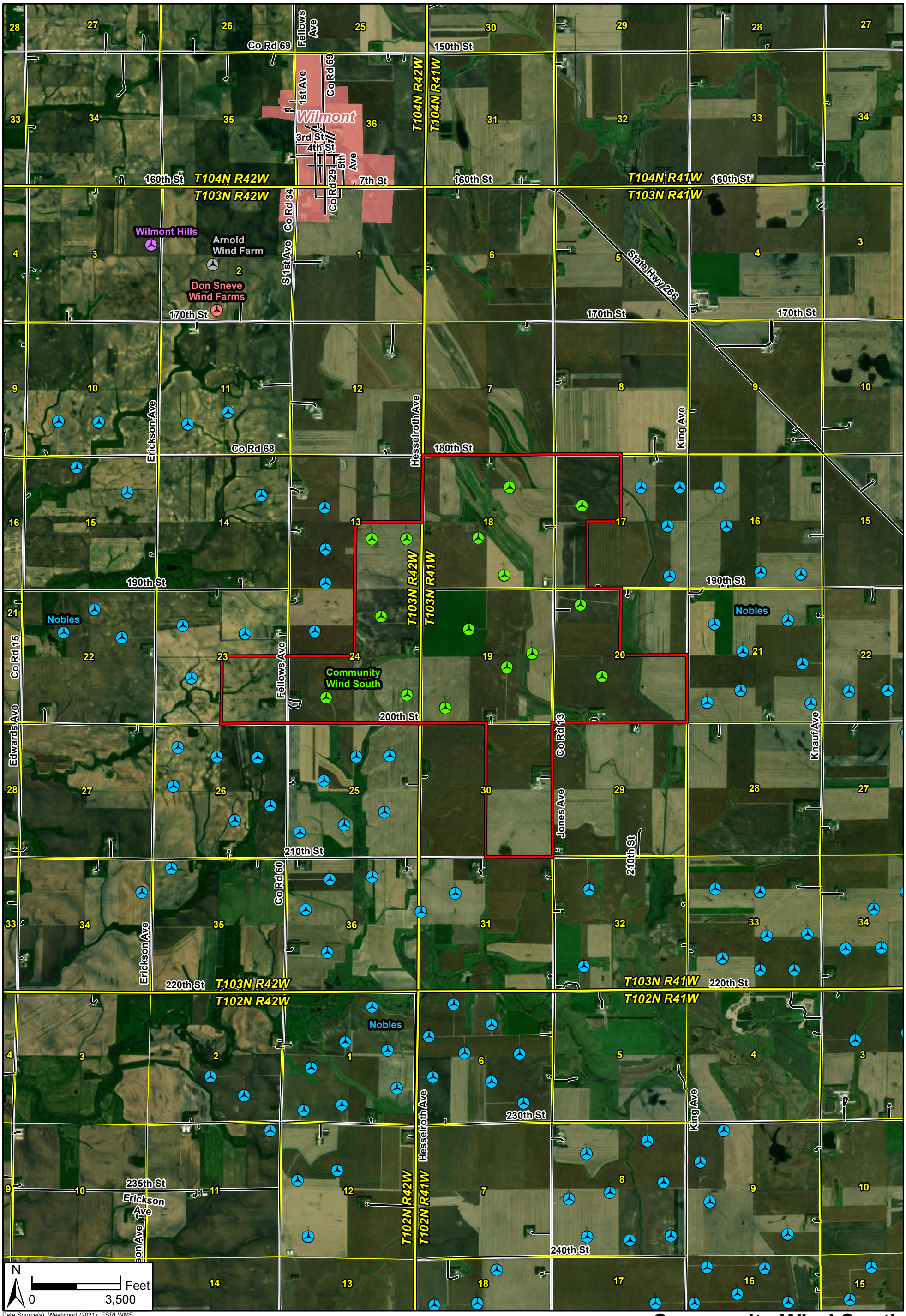
Community Wind South Repower Project

Nobles County, Minnesota

Project Area Vicinity Map

Exhibit 2.0a

Map Document: N:\0026682.00\GIS\BBCS Exhibits\CWS_BBCS_2.0b_ProjectAreaSiteMap_210204.mxd 2/5/2021 8:01:27 AM



Data Source(s): Westwood (2021); ESRI WMS World Imagery Basemap (Accessed 2021); U.S. Census Bureau (2019); USGS (2019).

Project Boundary
Municipal Boundary
PLS Township
PLS Section
Road

Wind Farm Turbines

Arnold Wind Farm
Community Wind South
Don Sneve Wind Farms
Nobles
Wilmont Hills

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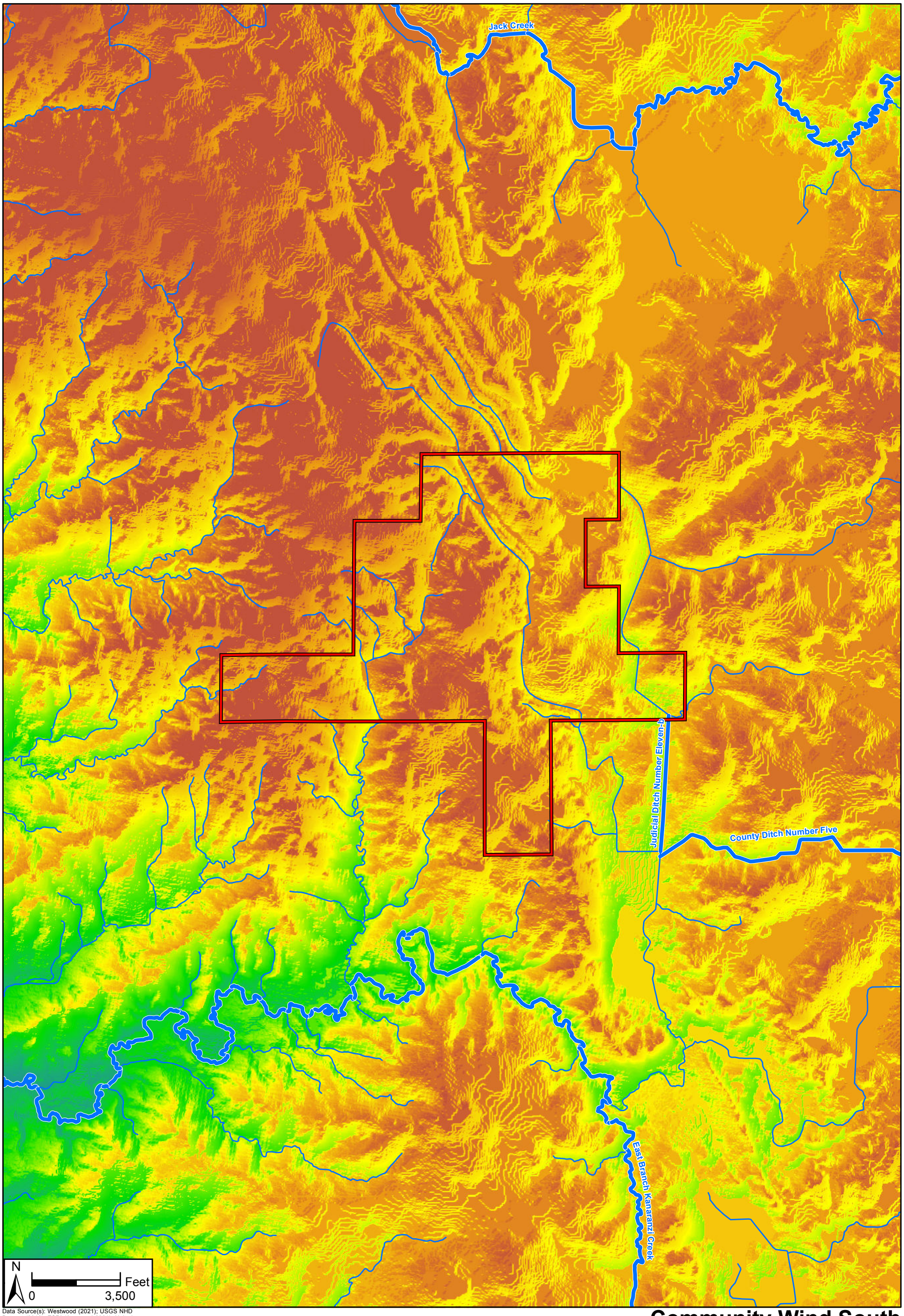
Nobles County, Minnesota

Project Area Site Map

Exhibit 2.0b

Map Document: N:\0026682.00\GIS\BBCS Exhibits\CWS_BBCS_3.0_Topo&DrainageFeatures_210204.mxd 2/4/2021 1:06:37 PM



Data Source(s): Westwood (2021); USGS NHD Dataset (2016); ESRI (Accessed 2021); United States Elevation Dataset (NED) (Accessed 2021).

Project Boundary

Minor Drainage Feature

Major Drainage Feature

Elevation

High : 1,793 ft

Low : 1,502 ft

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Community Wind South Repower Project

Nobles County, Minnesota

Topography & Major Drainage Features

Exhibit 3.0

Map Document: N:\0026682.00\GIS\BBCS Exhibits\CWS_BBCS_4.1.1a_LandCover_210204.mxd 2/4/2021 1:11:18 PM

Co Rd 69
Fellows Ave
150th St
1st Ave
Co Rd 69
N 4th Ave
3rd St
4th St
3rd Ave
4th Ave
7th St
160th St
Co Rd 34
S 1st Ave
State Hwy 266
170th St
Erickson Ave
Co Rd 68
Hesselroth Ave
180th St
King Ave
190th St
Co Rd 15
Co Rd 13
Knauf Ave
Edwards Ave
200th St
Jones Ave
Fellows Ave
210th St
Co Rd 60
Erickson Ave
220th St
230th St
235th St
240th St

N
0
Feet
3,500

Data Source(s): Westwood (2021); U.S. Census Bureau (2019); U.S. Geological Survey NLCD 2011 Land Cover (2016).

- Project Boundary
- Cultivated Crops (85.9%)
- Herbaceuous (6.2%)
- Developed, Open Space (5.8%)
- Developed, Low Intensity (0.3%)
- Developed, Medium Intensity (0.1%)
- Deciduous Forest (0.3%)
- Mixed Forest (0.2%)
- Emergent Herbaceuous Wetlands (1.1%)

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NLCD Land Cover Types

Exhibit 4.1.1a