Eagle Conservation Plan
for the
Black Oak Getty Wind Project
Stearns County, Minnesota

September 2020

BLACK OAK WIND, LLC

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List of Abbreviations and Acronyms

ABPP	avian and bat protection plan
AGL	above ground level
APLIC	Avian Power Line Interaction Committee
BBCS	Bird and Bat Conservation Strategy
BEBHM	Bald Eagle Breeding Habitat Model
BGEPA	Bald and Gold Eagle Protection Act, or Eagle Act
BOGY	Black Oak Wind, LLC, and Getty Wind Company, LLC
CFR	Code of Federal Regulations
CN	Certificate of Need
DDT	dichlorodiphenyltrichloroethane
DNR	Minnesota Department of Natural Resources
DOC	Minnesota Department of Commerce
ECPG	*Eagle Conservation Plan Guidance: Module 1 – Land-Based Wind Energy*
EFP	Energy Facility Permitting
E & E	Ecology and Environment, Inc.
ECP	Eagle Conservation Plan
EMU	Eagle Management Unit
EO	Executive Order
ESA	Endangered Species Act
GAP	Gap Analysis Program
GIS	geographic information system
GRE	Great River Energy
HDR	HDR Engineering, Inc.
HMANA	Hawk Migration Association of North America
IEUA	Important Eagle Use Area
km	kilometer
kV	kilovolt
LIDAR	Light Detection and Ranging

List of Abbreviations and Acronyms (cont.)

LWECS	Large Wind Energy Conversion Systems
MBTA	Migratory Bird Treaty Act
MW	megawatts
NEPA	National Environmental Policy Act
O&M	operation and maintenance
OEC	Owners Environmental Coordinator
the Owner	Black Oak Wind, LLC
PEIS	Programmatic Environmental Impact Statement
PLSS	Public Land Survey System
Project	Black Oak Wind LWECS and Getty Wind LWECS
PUC	Minnesota Public Utilities Commission
ROW	right-of-way
RSA	rotor-swept area
RSZ	rotor-swept zone
SNA	Scientific and Natural Areas
SODAR	Sonic Detection and Ranging
USACE	United States Army Corps of Engineers
USC	United States Code
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UTM	Universal Transverse Mercator
WIRS	Wildlife Incident Reporting System
WPAs	Waterfowl Production Areas
WMA	Wildlife Management Area
WTG	wind turbine generator

Section 1

Stage 1 – Landscape-Scale Site Assessment

1.1 Introduction

Black Oak Wind, LLC (the Owner) has developed the Black Oak Wind Farm and Getty Wind Project (collectively, the Black Oak Getty Project, or the Project) in Stearns County, Minnesota. The Owner is committed to siting, constructing, operating, and decommissioning the facilities in an environmentally responsible and sustainable manner. This environmental responsibility includes avoiding and minimizing impacts to natural resources, including Bald Eagles *(Haliaeetus leucocephalus*), Golden Eagles (*Aquila chrysaetos*), and their associated habitats. The Owner is developing this Eagle Conservation Plan (ECP) to address the Project's potential impacts on eagles via cooperative, effective, and responsive planning and operations.

1.2 Wind Project Overview

1.2.1 Permitting and Agency Coordination Background and History

The Project is subject to the State of Minnesota's Wind Siting Act (MN Statute 216F; the Wind Siting Act) and Wind Permitting Rules (Minnesota Rules Chapter 7854) for Large Wind Energy Conversion System (LWECS) over 5 megawatts (MW). These regulations place the permitting review and coordination authority in the hands of the Minnesota Public Utilities Commission (PUC). The Wind Siting Act provides that the site permit application is the environmental document for the wind farm, with no other environmental documentation required by state or local governments (i.e., such as an Environmental Assessment, Environmental Assessment Worksheet, or an Environmental Impact Statement). A site permit application to the PUC under this Wind Siting Act is the source of most of the operational conditions and protocol that define standard procedures at the Project. The following section describes the steps and associated timeline for the LWECS permitting of the Project. It also summarizes the other agency coordination that has occurred in association with the development of this ECP, which is a voluntary process separate from the LWECS.

On December 6, 2010, Black Oak Wind, LLC submitted a site permit application to the PUC under docket number IP-6853/WS-10-1240. On January 14, 2011, the site permit application was accepted by the PUC, which began a period of public comment and informational meetings and agency review and response. On January 28, 2013, the PUC issued Black Oak Wind, LLC a site permit authorizing the owner to construct and operate an up to 42-MW LWECS (PUC 2013a).

On October 11, 2011, Getty Wind Company, LLC submitted its site permit application to the PUC under docket number IP-6866/WS-11-831. On November 14, 2011, the site permit application was accepted by the PUC, which opened a roughly year-long period of public comment and informational meetings and agency review and response. On January 28, 2013 the PUC issued Getty Wind Company, LLC a site permit authorizing the owner to construct and operate an up to 40-MW LWECS (PUC 2013b).

Additionally, on October 11, 2011, the Getty Wind Company, LLC and Black Oak Wind, LLC jointly submitted a petition for a Certificate of Need (CN) for the Project, and on December 31, 2012, the CN was granted by the PUC. On July 20, 2016, Getty Wind Company, LLC and Black Oak Wind, LLC requested that the PUC approve the transfer of the Getty Site Permit to Black Oak Wind, LLC, and on September 7, 2016, the PUC granted the Site Permit transfer.

Following Minnesota Department of Commerce (DOC) Energy Facility Permitting (EFP) review of the site permit applications, and before the site permits were issued by the PUC, the Owner revised the Project layout to minimize impacts to high-quality habitat such as native prairie, wetlands, woodlots, and grasslands; selected turbine technology that would reduce the number of turbines; and sited turbines to avoid creating potential flight barriers and detected flight paths between public lands.

This ECP is independent of the Wind Siting Act process and is part of continued coordination with the United States Fish and Wildlife Service (USFWS) and Minnesota Department of Natural Resources (DNR) regarding eagle issues. As part of this ongoing agency coordination, the Owner has had multiple meetings or conference calls with the USFWS to discuss eagle issues during 2015. On February 10, 2015, a meeting was held to provide an update on the Project construction schedule and a summary of the 2014 and 2015 eagle use survey results. The USFWS' comments on an initial draft of the ECP were also discussed, and the USFWS indicated that the ECP was close to being ready to use towards an ETP application.

On July 28, 2015, a meeting with the USFWS was held to provide an update on Project schedule and discuss the updated layout. The results of the 2015 eagle nest survey were discussed, as well as the ECP, including the potential approach to risk modeling, take levels and adaptive management thresholds, post-construction monitoring and conservation practices.

On September 22, 2015, a follow up meeting was held with the USFWS to continue discussing the ECP and other eagle issues that were discussed in the July meeting. The current turbine layout was presented to the USFWS, and the USFWS provided additional information on the agency's recommended approach to the ETP, particularly which risk model to use (the ECPG baseline approach),

and approach to converting annual risk model output to a 5 year permit term (multiply the annual risk model output by five and then round that final number up to get a 5 year take number).

On October 26, 2015, a conference call with the USFWS was held to discuss the anticipated schedule for the ECP/ETP process, as well as the anticipated approach to post-construction monitoring. During that call, the Project made a commitment to surveying all turbines at least once a month.

As described further in Section 4.2, the Owner provided the results of the Padua nest monitoring that was conducted in March 2016 to the USFWS on March 31, 2016, and the USFWS responded on the same day agreeing that neither a biological monitor nor a disturbance permit was needed for this nest during the construction phase.

On August 17, 2016, the Owner provided a revised ECP to the USFWS. The Owner then initially applied for take coverage for the Project on November 10, 2016, under the 2009 Eagle Rule. On December 15, 2016, a conference call was held with the USFWS to discuss the take application, the ECP, the timeline for the NEPA review, and to discuss the anticipated revisions to the Eagle Rule that was expected to be published by the end of 2016.

On January 26, 2017, a conference call was held with the USFWS, where the revised Eagle Rule was discussed. During the call, the Owner notified the USFWS that it intended to refile a revised ECP and request that the permit application be changed to a 30-year term and therefore reviewed under the revised Eagle Rule. Monthly calls with the USFWS have been held since then to discuss the ECP and the the NEPA review for the Project.

The Owner has now applied for take coverage for the Project under the revised 2016 Eagle Rule for a 30-year permit term. Multiple calls have occurred in 2017, 2018 and 2019 regarding the NEPA process associated with review of the take permit application. Comments provided at these meetings and conference calls, and comments on the draft ECP, have been incorporated in this ECP as well as the proposed approach to the post-construction monitoring plan (Appendix A). Meeting/conference call notes are included in Appendix B.

1.2.2 Project Description

The Project is collectively permitted as an up to 82-MW wind energy facility, with Black Oak Wind contributing 21 turbines, and Getty Wind contributing 18 turbines. The turbines and related infrastructure are located on a total of 14,719 acres (approximately 22 square miles) in Stearns County, Minnesota (see Figure 1-1). The Getty Wind project is located within both Sauk Centre and Getty Townships, and its project boundary encompasses approximately 7,635 acres. The Black Oak Wind Farm is located within Ashley and Raymond Townships, and its project boundary encompasses approximately 7,084 acres.

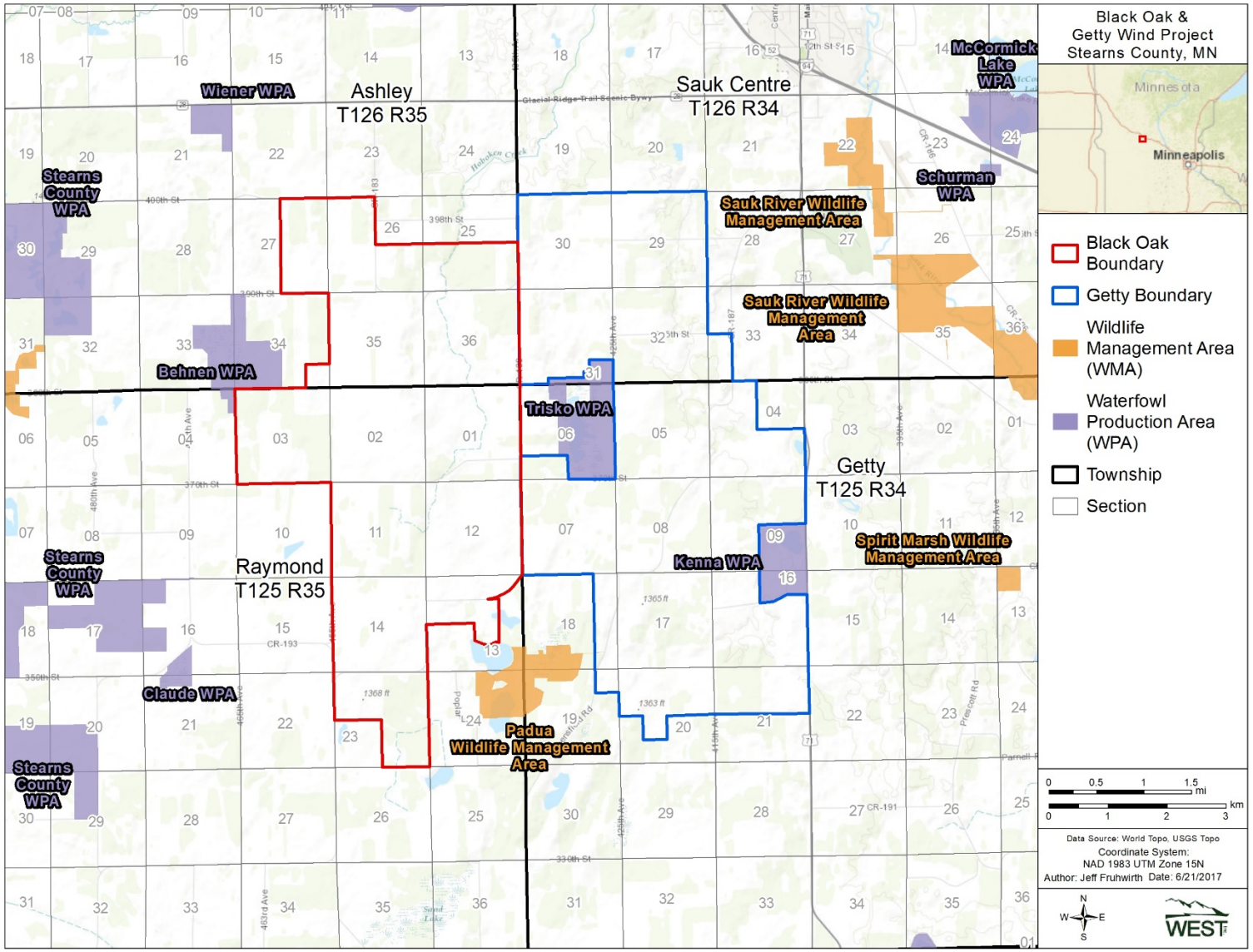


Figure 1-1 Project Location

The projects share common facilities, which include a substation, a transmission line, an operations and maintenance facility, and associated roads. Project facilities are shown on Figure 1-2. Both projects also include access roads, collection systems, permanent meteorological towers, and a Sonic Detection and Ranging (SODAR) or Light Detection and Ranging (LIDAR) weather monitoring station. Table 1-1 identifies the Public Land Survey System (PLSS) locations within both project boundaries.

Table 1-1 Project PLSS Locations

Project Name	County	Township Name	Township	Range	Section
Black Oak	Stearns	Ashley	126N	35W	25-27, 34-36
Black Oak	Stearns	Raymond	125N	35W	1-3, 11-14, 23
Getty	Stearns	Getty	125N	34W	4-9, 16-21
Getty	Stearns	Sauk Centre	126N	34W	29-33

Construction of the Project began in late 2015; the Project became operational on December 23, 2016. The Project consists of generation and transmission components (see Figure 1-2). More specifically, the Project includes the following:

- Thirty-nine Vestas V110 conical tubular steel tower wind turbine generators. Each turbine is a three-bladed, upwind, horizontal axis wind turbine with a rotor diameter of 361 feet and blades measuring 177 feet.
- The total height for each turbine is 440 feet when a rotor blade is in the vertical position at the top of its rotation. Blades of the wind turbines are no closer than 85 feet at the closest point to the ground.
- Approximately 12 miles of 14 – 16 feet wide access roads connecting each wind turbine to a county roadway. The access roads provide equipment and vehicle access for maintenance of the facilities, as well as for emergency services, if needed.
- An underground electrical collection system (22.5 miles), which allows delivery of electricity to a new substation in Raymond Township.
- A new substation within Raymond Township at the southwest corner of County Road 188 and 370th Street, which ties the electrical collection system into a new 69-kilovolt (kV) transmission line. The substation footprint is less than 1 acre.
- A 6.8-mile-long overhead 69-kV transmission line that runs from the substation along 370th Street and County Highway 28 to 395th Avenue, terminating at the point of interconnection at Great River Energy's (GRE) Black Oak Substation.
- An operations and maintenance (O&M) building in the southwestern portion of the Project, approximately 1,000 feet west of the County

Highway 18/County Road 192 intersection to provide office space and storage for Project maintenance and operations.

- Two temporary meteorological (met) towers that were installed prior to construction have been removed in early 2017; one permanent met tower was installed in 2016.

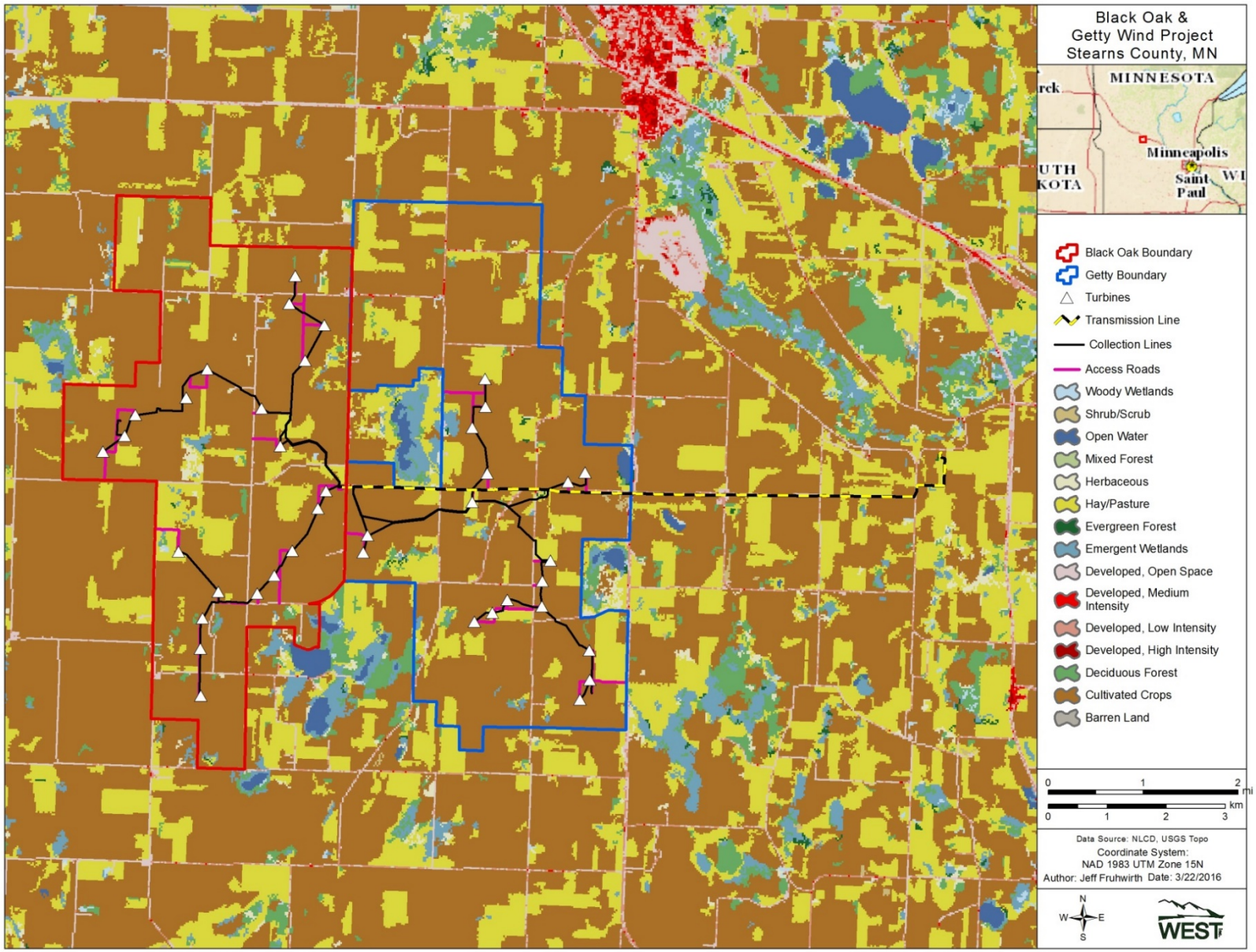


Figure 1-2 Project Facilities

1.3 Regulatory Framework

The USFWS is responsible for implementing and enforcing federal wildlife laws, including the Bald and Golden Eagle Protection Act (BGEPA, or Eagle Act), Migratory Bird Treaty Act, and the Endangered Species Act. Minnesota DNR is responsible for implementing and enforcing State regulations regarding threatened and endangered species.

1.3.1 Bald and Golden Eagle Protection Act (BGEPA)

The BGEPA provides for the protection of the Bald Eagle and the Golden Eagle by prohibiting, except under certain specified conditions, the taking, possession, and commerce of such birds. The BGEPA prohibits anyone, without a permit issued by the U.S. Secretary of the Interior, from taking eagles, including their parts, nests, or eggs. The Eagle Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." The BGEPA provides civil and criminal penalties for persons who violate the law or regulations.

Under 50 Code of Federal Regulations (CFR) 22.3, "disturb" is defined 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." The BGEPA's definition of "disturb" also addresses effects associated with human-induced alterations at the site of a previously used nest during a time when eagles are not present. Upon an eagle's return, if such alterations agitate or bother an eagle to a degree that interferes with or interrupts normal breeding, feeding, or sheltering habits, and causes injury, death, or nest abandonment, then this would constitute disturbance.

In September 2009, the USFWS established rules (50 CFR 22.26 and 22.27) authorizing limited legal take of Bald and Golden Eagles and their nests "when the take is associated with, but not the purpose of, an otherwise lawful activity, and cannot practicably be avoided." Such authorization is provided in the form of a take permit issued by the USFWS, consistent with the regulatory criteria. As part of the 2009 Eagle Permit Rule (USFWS 2009), thresholds of take were established, under which a regional population of Bald Eagles, or an Eagle Management Unit (EMU), would maintain stable or increasing eagle populations. Regulations under 50 CFR 22.26 distinguish take that might result from short-term or one-time actions from take that might result from ongoing, long-term actions (programmatic take).

In April 2013, the USFWS issued the *Eagle Conservation Plan Guidance: Module 1 – Land-Based Wind Energy* (ECPG). The purpose section states that the ECPG:

> . . . explains the Service's approach to issuing programmatic eagle take permits for wind energy projects under [the authority of the Eagle Permit Rule], and provides guidance to permit applicants (project developers or operators), Service biologists, and biologists with other jurisdictional agencies (state and tribal fish and wildlife agencies, in particular) on the development of *Eagle Conservation Plans* (ECPs) to support permit issuance… The [*ECP Guidance*] is intended to provide interpretive guidance to Service biologists and others in applying the regulatory permit standards as specified in the rule. They do not in and of themselves impose additional regulatory or generally-binding requirements. An ECP *per se* is not required, even to obtain a programmatic eagle take permit. As long as the permit application is complete and includes the information necessary to evaluate a permit application under 50 CFR 22.26 or 22.27, the Service will review the application and make a determination if a permit will be issued. However, Service personnel will be trained in the application of the procedures and approaches outlined in the [*ECP Guidance*], and developers who choose to use other approaches should expect the review time on the part of the Service to be longer. The Service recommends that the basic format for the ECP be followed to allow for expeditious consideration of the application materials (USFWS 2013a).

On December 9, 2013, the USFWS issued a rule extending the maximum term for programmatic eagle permits from five to 30 years if wind farms adopt measures to minimize harm to eagles. This rule went into effect on January 8, 2014 (USFWS 2013b). On August 11, 2015, a Federal Court (Northern district of California) set aside the 30-year Eagle Permit Rule, finding that the USFWS failed to show an adequate basis in the record for deciding not to prepare a NEPA document prior to increasing the maximum eagle take permit duration. On December 16, 2016, the USFWS issued a revised rule that includes changes to the regulations for eagle incidental take permits and eagle nest take permits. The Service also issued a final Programmatic Environmental Impact Statement (PEIS) analyzing the revisions. The revisions to the Eagle Rule went into effect on January 17, 2017, and include changes to permit issuance criteria, duration (including a maximum permit term of 30 years), compensatory mitigation standards, and permit application requirements. Additionally, the revised Eagle Rulefurther defines the USFWS-approved protocols for pre-construction eagle use surveys (referencing the ECPG) and post-permit fatality monitoring requirements.

To assist wind project proponents in meeting the requirements of 50 CFR 22.26, the ECPG outlines a five-stage approach to developing successful ECPs. These five stages are:

1. Initial landscape-scale site assessment;
2. Site-specific surveys and assessment;

3. Fatality prediction;
4. Application of conservation practices that avoid and minimize risk to the maximum extent practicable, and application of compensatory mitigation for remaining take (for Bald Eagles, if take is over designated thresholds); and
5. Post-construction monitoring.

These five stages build upon one another and in conjunction are used to predict the annual eagle fatalities using a USFWS-developed model that employs a mix of Project-specific and existing information regarding eagle behavior. The overall goal of this five-stage approach is to use Project-specific information and modeling to minimize the number of predicted annual eagle fatalities to the maximum extent practicable.

The Project is applying for a 30-year incidental take permit due to the potential for Bald Eagle take during the operating life of the Project.

The Owner has been in consultation with USFWS regarding Golden Eagle risk at the Project, and while the Owner is not seeking take of Golden Eagles at this time, the presence of Golden Eagles in Minnesota will be evaluated in this ECP.

1.3.2 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA; 16 United States Code [USC] 760c-760g), as amended, implements protection of all native migratory game and non-game birds with exceptions for the control of species that cause damage to agricultural or other interests. The MBTA prohibits the take of any migratory bird, part, nest, egg, or product. "Take," as defined in the MBTA, includes by any means or in any manner any attempt at hunting, pursuing, wounding, killing, possessing, or transporting any migratory bird, nest, egg, or part thereof.

The MBTA does not explicitly include provisions for permits to authorize incidental take of migratory birds. Executive Order (EO) 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds* (January 10, 2001), however, provides requirements for all federal agencies to incorporate considerations of migratory birds into their decision-making, including the conservation of migratory birds, the proper evaluation of them in the NEPA process, and avoidance, minimization, and mitigation of migratory birds impacts and take where appropriate. More recently, on December 22, 2017, the Office of Solicitor of the U.S. Department of the Interior released a new legal opinion, M-37050, addressing the issue of incidental take under the MBTA, which withdraws and replaces a previous M-Opinion on the same topic issued near the end of the Obama administration, M-37041. The new M-Opinion concludes that, "consistent with the text, history, and purpose of the MBTA, the statute's prohibitions on pursuing, hunting, taking, capturing, killing, or attempting to do the same apply only to affirmative actions that have as their purpose the taking or killing of migratory birds, their nests, or their eggs" (DOI 2017). Accordingly, the current

policy of the Department of the Interior is that incidental take of migratory birds that results from the operation of a wind farm is not regulated by the MBTA.

The USFWS has provided, and continues to provide, wind power developers with guidance in making a good-faith effort to comply with the MBTA. The USFWS finalized their *Land-Based Wind Energy Guidelines* (USFWS 2012a), which include recommendations that are advisory in nature and do not, in and of themselves, represent or reflect agency law or policy. The *Land-Based Wind Energy Guidelines* describe how the USFWS exercises its law enforcement discretion in the absence of an explicit incidental permit program:

> The USFWS urges voluntary adherence to the [*Land-Based Wind Energy*] Guidelines and communication with the USFWS when planning and operating a facility. While it is not possible to absolve individuals or companies from MBTA or BGEPA liability, the Office of Law Enforcement focuses its resources on investigating and prosecuting those who take migratory birds without identifying and implementing reasonable and effective measures to avoid the take. The USFWS will regard a developer's or operator's adherence to these Guidelines, including communication with the Service, as appropriate means of identifying and implementing reasonable and effective measures to avoid the take of species protected under the MBTA and BGEPA. The Chief of Law Enforcement or more senior official of the Service will make any decision whether to refer for prosecution any alleged take of such species, and will take such adherence and communication fully into account when exercising discretion with respect to such potential referral. Each developer or operator will be responsible for maintaining internal records sufficient to demonstrate adherence to the Guidelines and response to communications from the USFWS. Examples of these records could include: studies performed in the implementation of the tiered approach; an internal or external review or audit process; a BBCS [Bird and Bat Conservation Strategy]; or a wildlife management plan.

It also notes that federal agencies, including the USFWS, are "bound by their own agency-specific statutes, as well as by the MBTA, BGEPA, ESA [Endangered Species Act], EOs, such as EO 13186, and NEPA. These guidelines should be viewed as complementary to other federal law and policy that may direct information collections and considerations in siting projects."

The Owner has relied to some degree on the USFWS's recommendations, as well as other previous USFWS guidance in developing an Avian and Bat Protection Plan (ABPP) for the Project (Black Oak Getty Wind 2012). This ABPP is similar

to the Bird and Bat Conservation Strategy (BBCS) identified in the *Land-Based Wind Energy Guidelines* (USFWS 2012a).

1.3.3 Endangered Species Act (ESA)

Federally listed threatened and endangered species and designated critical habitat are governed by the Endangered Species Act (ESA) of 1973, as amended (16 USC §§ 1531–1544) and the USFWS's implementing regulations at 50 CFR Parts 13 and 17. The USFWS is authorized to identify species in danger of extinction and provide for their management and protection. The USFWS also maintains a list of species that are candidates for listing pursuant to the ESA.

Section 9 of the ESA makes it unlawful for a person to "take" a listed species. "Take" is defined as "…to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct." The U.S. Secretary of the Interior, through regulations, defined the term "harm" as "an act which actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering." However, permits for "incidental take" can be obtained from USFWS for take of an endangered species that would occur as a result of an otherwise legal activity.

Section 10 of the ESA, among other things, authorizes the USFWS to issue permits to incidentally take ESA-listed species and allows for the development of "Habitat Conservation Plans" for endangered species on private lands or for the maintenance of facilities on private lands.

The ABPP provides more information on ESA-listed species with the potential to occur in the Project area.

1.3.4 State Regulations

Under Minnesota law, a person "may not take, import, transport, or sell any portion of an endangered species of wild animal or plant, or sell or possess with intent to sell an article made with any part of the skin, hide, or parts of an endangered species of wild animal or plant," except as provided in the statute, Minn. Stat. 84.0895. The statute directs the Commissioner of the DNR to develop lists of endangered species, threatened species, and species of concern. This list of state-listed species can be found on the DNR website.[1] Bald and Golden Eagles are not listed as endangered, threatened, or classified as being a special concern species within Minnesota.

1.4 Decision Framework

Black Oak Wind, LLC has adopted the decision framework and "tiered" or "staged" process as outlined in the USFWS ECPG (USFWS 2013a) and *Land-Based Wind Energy Guidelines* (USFWS 2012a) as applicable to the timing of development and construction. The Owner previously prepared a joint ABPP that

[1] http://files.dnr.state.mn.us/natural_resources/ets/endlist.pdf

was submitted to the PUC for review in February 2012 and subsequently resubmitted in July 2012 to reflect new USFWS guidelines and corporate standards, and to address comments provided by USFWS, DNR, and EFP. The ABPP was updated and resubmitted in October 2016 to reflect the final Project layout and incorporate the results of additional studies that had been conducted since 2012.

For the landscape-scale site assessment in Stage 1 of the ECP, the Owner conducted similar site characterization steps by reviewing public information, consulting with agencies, and performing field surveys. Updated accounts of this due diligence activity are presented in the remainder of Section 1 of this ECP, including a review of the life history and local distribution of Bald and Golden Eagles, and a review of the Project area habitat.

Stage 1 of the ECPG is meant to identify an initial risk category, determine whether sites exhibit any obvious substantial risk for eagles, and to help decide whether site-specific surveys are needed to help with the assessment. As site-specific surveys were conducted as part of Stage 2, answers for the Stage 1 questions from the ECPG are included at the end of Section 2.

1.5 Bald Eagle Life History

Bald Eagles are a carnivorous raptor and seek out aquatic habitats for foraging, as their food preference is fish (Buehler 2000). They attempt to take most prey on the wing and will hunt from perches or while soaring over suitable habitat. Although they prefer fish, Bald Eagles are opportunistic feeders and will hunt a variety of aquatic and terrestrial mammals, reptiles, amphibians, crustaceans, and birds. They will also scavenge for carrion, though this behavior is more commonly observed during winter months when other food sources may be limited.

In winter, Bald Eagles are typically found near aquatic areas with some open water for foraging. In the Midwest, they begin moving to their wintering grounds in the fall with the greatest numbers migrating in late October and November (USFWS 2014). Ideal winter habitat generally includes an abundance of food, presence of roost sites, which provide protection from inclement weather, and absence of human disturbance. Bald Eagles will tolerate some human activity in areas of high prey availability, such as below hydroelectric facilities along rivers (Buehler 2000). Bald Eagles may concentrate in large numbers (several hundred to over 1,000) at ideal wintering sites. They require perching habitat associated with their winter foraging areas, which generally consists of tall trees less than 50 meters from the foraging area. Additionally, in winter, Bald Eagles will roost communally. Winter roosts typically contain large trees that are open and accessible, and are generally associated with aquatic foraging areas, but may be located farther from water than nests. They are also generally located away from houses and roads (Buehler 2000).

In Minnesota, Bald Eagles return to their breeding territories in late winter, dependent upon the availability of food sources. Some eagles will remain near their nesting areas through the winter if adequate foraging potential is available. In central Minnesota, courtship begins in late January, and Bald Eagles have typically returned to their nest sites by the end of the first week of February (DNR 2014b). Nesting typically takes place in forested areas relatively close (usually less than 2 kilometers [km]) to suitable foraging opportunities, typically large bodies of water (Buehler 2000). Large nests of sticks and finer materials are typically built in the tops of the largest trees in the area and are re-used for many years. Once paired, male and female Bald Eagles will remain together for life. Females lay a clutch of typically one to three dull, white eggs, which lack distinct markings. Bald Eagles may build one or more alternate nests within their territory and may switch to an alternate nest in successive years, particularly after nesting failure (Buehler 2000). Generally in the Midwest, female Bald Eagles begin laying eggs near the end of February.

According to the USFWS Midwest-Region Bald Eagle Conservation website (USFWS 2013c), the chronology of typical reproductive activities of Bald Eagles within the Midwest, including Minnesota, is as follows:

- Nest building (mid-January through March);
- Egg laying/incubation (March through May);
- Hatching/rearing young (April through July); and
- Fledging young (mid-June through August).

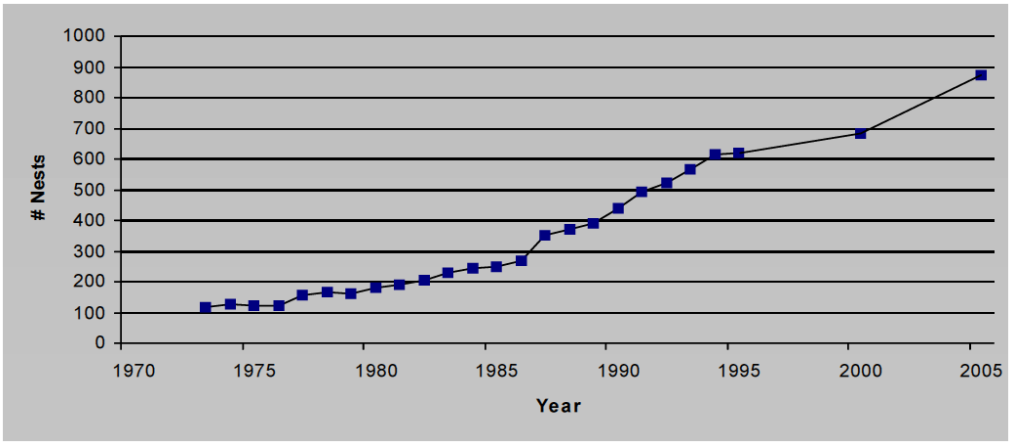
These are the time periods during which Bald Eagles are sensitive to anthropogenic disturbances, with nest building considered to be when eagles are most sensitive. After fledging, juvenile Bald Eagles usually roam up to 0.25 miles from their respective nest location and are still dependent upon adults to feed them for approximately six weeks (USFWS 2007).

1.6 Historical Data on Minnesota Bald Eagle Populations

Bald Eagle populations in Minnesota have been in steady recovery since the mid-1900s, when the use of pesticides (primarily dichlorodiphenyltrichloroethane [DDT]), caused reproductive impairment and direct mortality to eagles via bio-accumulation in fish populations, which made up the majority of the Bald Eagles' diet. The continued use of pesticides, illegal shooting, and loss of habitat due to human development had led to a severe decline in the population of Bald Eagles throughout most of its range. In 1972, DDT was banned and in 1973 Minnesota conducted its first Bald Eagle survey and found 115 active nests. Minnesota was part of the Northern States Bald Eagle Recovery Plan (USFWS 1983) designed to take the actions believed necessary to reestablish Bald Eagle populations within the Northern States Region. The plan established a goal of 300 occupied breeding

areas within the state by 2000, and that goal was exceeded in 1987 when 350 breeding areas were documented (DNR 2014b).

Bald Eagles have continued to expand their range and numbers in Minnesota since the goal of Northern States Bald Eagle Recovery Plan was exceeded in 1987. Between 1973 and 2005, DNR conducted comprehensive Bald Eagle nest surveys. Figure 1-3 shows the number of documented known Bald Eagle nests in Minnesota. In 2005, the year the last of formal statewide surveys was conducted, 872 active nests were identified, and DNR estimated that there were 1,312 (± 220) nests in Minnesota based on a random plot survey (Baker and Monstad 2005).



Baker and Monstad 2005.

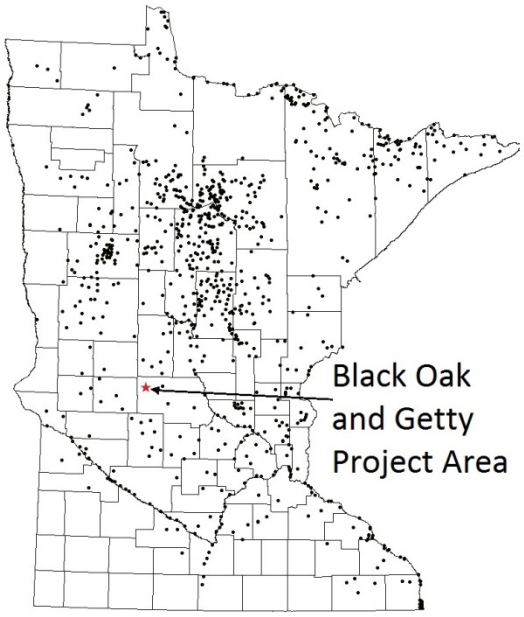
Figure 1-3 Number of Known Active Bald Eagle Nests in Minnesota, 1973-2005

1.7 Current Distribution of Bald Eagles

Bald Eagle populations in Minnesota have been steadily increasing over the past 30 years, and populations increased by 28% between 2000 and 2005 (Baker and Monstad 2005). As described in the USFWS' *Population Demographics and Estimation of Sustainable Take in the United States* (USFWS 2016), the USFWS has recalculated the Bald Eagle population for the Great Lakes region (which includes Minnesota) and determined that the population is higher than previously estimated in 2009, indicating that a higher take threshold is sustainable. Bald Eagles can be found throughout the state of Minnesota year-round, especially during the breeding and migratory seasons, and they over-winter along the Mississippi River as well as elsewhere with potential for open water.

Breeding Bald Eagles occur with greater frequency in the northern portion of the state and along the Mississippi and Minnesota rivers. Figure 1-4 depicts known active nests in 2005. A concentration of nests is located in north-central Minnesota within the Laurentian Mixed Forest Province. This province is characterized by broad areas of conifer forest, mixed hardwood and conifer forests, conifer bogs and swamps, and rugged lakes (DNR 2014c). Results of the 2005 DNR nest survey indicate that known active nests increased in 52 of 87

counties between 2000 and 2005, with the greatest increase observed on the edge of the Bald Eagle's typical range in the state, indicating the species is expanding into southern and western Minnesota (Baker and Monstad 2005). The year 2005 was the last year that Minnesota DNR conducted Bald Eagle nest surveys due to the success and recovery of Bald Eagle populations in Minnesota and the United States. This data should be used as general reference as the DNR nesting data is over 10 years old and has likely changed as the Bald Eagle population has continued to increase in the state resulting in expanding ranges, shrinking territory sizes, and nesting in secondary habits such as agricultural fields and areas away from major water bodies.



Baker and Monstad 2005.

Figure 1-4 Locations of Known Active Bald Eagle Nests, 2005

A spike in Bald Eagle activity likely occurs throughout Minnesota during periods of regular migration. There are currently two sites in Minnesota that regularly report results to the Hawk Migration Association of North America (HMANA) database (HMANA 2013). Bethany HawkWatch in Mankato, Minnesota has conducted fall raptor surveys since 2009, and is located approximately 115 miles southeast of the Project along the Minnesota River in south-central Minnesota. Hawk Ridge HawkWatch site in Duluth, Minnesota has conducted spring (very minimal effort) and fall raptor surveys since 1972, and is 165 miles northeast of the Project along Lake Superior. The Bethany HawkWatch site identified a total of 1,880 Bald Eagles, and four Golden Eagles during the 2016 fall migratory period (HMANA 2017), and an average of 981.9 Bald Eagles and 2.1 Golden Eagles per year over the last eight years (2009 through 2016). The Hawk Ridge HawkWatch identified a total of 5,925 Bald Eagles and 164 Golden Eagles during

the 2016 fall migratory period (HMANA 2017) and an average of 5,018.5 Bald Eagles and 190.3 Golden Eagles per year over the last eight years.

Because the Project is not immediately adjacent to the shorelines of the Great Lakes, the Mississippi River, or lengthy ridgelines, raptor migration in the Project area is diffuse, and without regularly occurring concentration points, such as near Bethany HawkWatch. There are no geographical or topographical features within the Project area that attract or concentrate large numbers of migrating raptors. Hawk Ridge is situated along the tip of Lake Superior, a major migratory concentration point. Raptors are reluctant to cross large bodies of water, and as they encounter Lake Superior tend to migrate along the shores until they reach Duluth, Minnesota before dispersing south (in fall) or north (in spring).

In the fall, as Bald Eagles migrate from their breeding grounds from the north to their wintering grounds to the south, they stage and forage along the Mississippi River south of the Twin Cities. This area of the river, especially between the cities of Red Wing and Wabasha, Minnesota, maintains open water throughout the winter and is a favorite overwintering location for hundreds of eagles (DNR 2014a). In milder winters, Bald Eagles may be generally more dispersed depending on the amount of snow cover and open water allowing for increased foraging opportunities.

Midwinter Bald Eagle surveys were conducted annually in Minnesota along four survey routes the first two weeks of January from 1986 to 2005 by a series of government agencies, most recently by the United States Geological Survey (USGS) and the United States Army Corps of Engineers (USACE), using standardized survey protocol in order to document eagle populations and areas of important winter habitat (Steenhof et al. 2008). Survey route 01 followed the Minnesota River from Shakopee, MN to Ortonville, MN. Survey Route 02 followed the Mississippi River and Minnesota River from Black Dog Lake to Hastings, MN. Survey routes 03 and 04 followed the Mississippi River from Wabasha, MN to Red Wing, MN, and from Wabasha, MN to La Crescent, MN, respectively. Survey route 01 runs east-west, and is the closest route to the Project. The other three routes run north-south along the eastern edge of Minnesota.

The majority of eagle sightings occurred along the Mississippi River on survey routes 03 (1,478 Bald Eagles) and 04 (867 Bald Eagles), with the least occurring along survey route 01, the route closest to the Project (242 Bald Eagles) (see Table 1-2). In 2001, the last time all four surveys were conducted in the same year, survey route 01 had only eight Bald Eagle sightings, compared to 165 along route 03, indicating overwintering populations primarily occur near the Mississippi River. The data gathered at the Project area supports this, showing relatively low use in the winter; see Section 2.3.2

Table 1-2 Midwinter Bald Eagle Survey Results

Survey Route	Location	Number of Years Surveyed Between 1986 and 2005	Number of Days Surveyed	Total Bald Eagle Sightings	2001 Eagle Sightings
01	Minnesota River	14	17	242	8
02	Minnesota and Mississippi Rivers	19	20	392	35
03	Mississippi River	20	20	1,478	165
04	Mississippi River	12	12	867	76

Source: Steenhof et al. 2008.

Between 2005 and 2014, 664 Bald Eagle observations in Stearns County have been submitted to the Minnesota Ornithologist Union (MOU) (Table 1-3). USFWS, in correspondence with the Owner, has defined Bald Eagle seasons in Minnesota into three categories: winter (November 1 – February 28), breeding (March 1- July 31) and fall (August 1 – October 31). Most Bald Eagle observations in Stearns County were recorded during the breeding season (309) followed by winter (283) with the least amount of observations made during the fall (72).

Table 1-3 Stearns County Bald Eagle Observations 2005-2014

Winter		Breeding						Fall		Winter	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
54	41	46	86	89	44	44	29	18	25	49	139

Source: MOU 2015

Winter	Breeding	Fall	Total
283	309	72	664

The Minnesota Christmas Bird Count has been collecting data between December 14 and January 5 since 1905 and has grown to include almost 70 census circles within the state. There are seven census circles that form a loose perimeter around the Project. A total of 535 Bald Eagles have been recorded between the seven census circles since their inception (Table 1-4). The highest observed Bald Eagle count is at the Little Falls census circle, with 153 Bald Eagles. In comparison, the Winona and Wabasha census circles, located along the Mississippi River, have recorded 1,649 and 1,424 Bald Eagles, respectively (MOU 2015b).

Table 1-4 Bald Eagle Christmas Bird Count Observations

Census Circle	County	Distance from Project (mi)	Bald Eagles
St. Cloud	Stearns	38 E	144
Little Falls	Morrison	38 NE	153
Long Prairie	Todd	23 N	80

Table 1-4 Bald Eagle Christmas Bird Count Observations

Census Circle	County	Distance from Project (mi)	Bald Eagles
Alexandria	Douglas	26 NW	18
Morris	Stevens	43 W	39
Willmar	Kandiyohi	31 S	65
Northern Meeker	Meeker	41 SE	36

1.8 Distribution of Golden Eagles

Golden Eagles are mainly found in the western North America from Alaska to central Mexico in open areas that provide hunting opportunities and near cliffs that offer suitable nesting and perching habitat (Kochert et al. 2002). Small breeding populations occur in northern Ontario and Quebec with wintering populations across the eastern United States (NEC 2015). Golden Eagles do not breed in Minnesota. According to the MOU, there have been reports of Golden Eagles throughout Minnesota in the spring, fall and winter from most counties and generally are seen migrating through the state between October and mid-April (MOU 2015a).

A small wintering population of Golden Eagles inhabits the coulees and bluffs in southeast Minnesota along the Mississippi River from Red Wing, MN to La Crosse, WI. They are often observed in dense forests utilizing open upland prairies as hunting grounds (NEC 2014). Field surveys and telemetry indicate that the breeding origins of this wintering population are in Eastern Canada from the west side of Hudson Bay to the Atlantic Coast (National Audubon Society 2015).

As part of the Golden Eagle Project, a partnership between the National Eagle Center and Audubon Minnesota, wintering surveys are conducted within Minnesota, Iowa and Wisconsin to better understand Golden Eagle population size, habitat needs, prey requirements, and to determine breeding origins of the wintering population of Golden Eagles along the Mississippi River. Surveys are conducted the third Saturday in January. In the most recent survey, 147 Golden Eagles were observed on January 16, 2016 (NEC 2016). Since 2010, a total of 833 Golden Eagles have been recorded with the most eagles observed in 2016 (147) and the least in 2011 (83).

Data collected via MOU indicate that Golden Eagles have been recorded in Stearns County six times, with the first observation reported in November 1999 (MOU 2015a). Golden Eagle observations have not been reported to eBird within Stearns County.

A total of five Golden Eagles have been recorded between the seven Christmas Bird Count Census circles as described in Section 1.7 since their inception (Table 1-5). The highest observed Golden Eagle count was at the Long Prairie Christmas Bird Count Census circle. In comparison, the Winona and Wabasha census

circles, located along the Mississippi River, have recorded 15 and 35 Golden Eagles, respectively (MOU 2015b).

Table 1-5 Golden Eagle Christmas Bird Count Observations

Census Circle	County	Distance from Project (mi)	Golden Eagles
St. Cloud	Stearns	38 E	0
Little Falls	Morrison	38 NE	1
Long Prairie	Todd	23 N	2
Alexandria	Douglas	26 NW	0
Morris	Stevens	43 W	1
Willmar	Kandiyohi	31 S	0
Northern Meeker	Meeker	41 SE	1

1.9 Habitat Review

The Project is located on 14,719 acres in Stearns County, Minnesota within the transition zone between the Minnesota River Prairie Ecological Subsection of the Prairie Parkland Province and the Hardwood Hills Ecological Subsection of the Eastern Broadleaf Forest Province (DNR 2006).

According to the USGS Gap Analysis Program (GAP) land cover data obtained from DNR, cropland (12,141.3 acres, or 82%) is the dominant land cover within the Project, followed by grassland (2,347.8 acres, or 16%). The breakout of land use by cover type within the Project area is shown in Table 1-6 and can be seen on Figure 1-2. Based on field observations, most of the mapped grassland areas have been converted to cropland, and the few parcels of grassland that exist within the Project consist of pasture or wetlands. Substantially less grassland exists within the Project area than suggested by the GAP land cover map. Numerous drained and undrained wetlands, along with pasture, homesteads, fencerows, and occasional small woodlots are also present. Open water accounts for 22.9 acres, or 0.2%, of the land cover within the Project boundary while forested areas represent 9.3 acres, or 0.1%.

Table 1-6 GAP Land Cover Within the Project Area

Cover Type	Black Oak Wind Area (acres)	Getty Wind Area (acres)	Grand Total (acres)
Cropland	5,927.4	6,213.9	**12,141.3**
Grassland	1,023.3	1,324.5	**2,347.8**
Marsh	78.0	43.5	**121.5**
Shrubland	46.5	29.6	**76.1**
Aquatic	2.6	20.3	**22.9**
Forested	5.9	3.4	**9.3**
Grand Total	**7,083.8**	**7,635.2**	**14,719.0**

The very limited numbers of forested stands within the Project are represented by black ash (*Fraxinus nigra*) and aspen/white birch (*Populus tremuloides/Betula*

papyrifera) at Black Oak Wind, and aspen/white birch at Getty Wind according to the GAP breakout. Mature forested stands sit adjacent to the southern portion of the Project, within and surrounding the Padua Wildlife Management Area (WMA). The Project area is dominated primarily by agriculture, which offers fewer opportunities for nesting Bald Eagles, but is in proximity to several WMAs and waterfowl production areas (WPAs) that offer both nesting and foraging opportunities, especially those close to open water sources where fish are prevalent.

The following are open water sources, WMAs, WPAs, and Scientific and Natural Areas (SNA) that have been identified in the vicinity of the Project that could provide foraging opportunities for Bald Eagles due to their habitat and proximity to the Project area (Figure 1-5). Known nest locations are described later in Section 2.3.1.

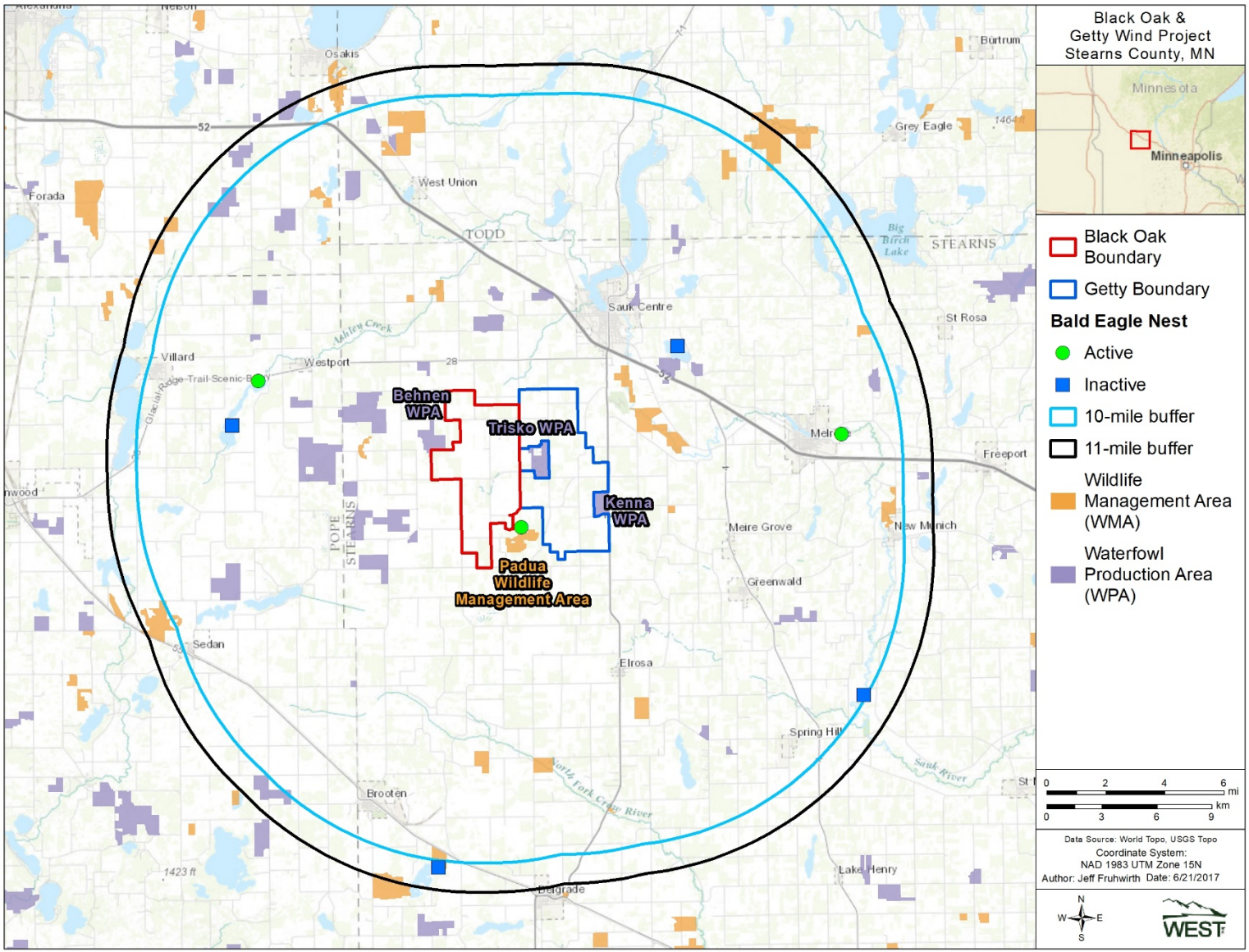


Figure 1-5 Biological Resources

1.9.1 Lakes

Several open-water lakes are found within 10 miles of the Project that provide suitable Bald Eagle foraging habitat. Furthermore, numerous smaller (less than 200 acres), shallow lakes and prairie potholes are scattered throughout the area and may provide additional foraging opportunities (DNR 2014d).

Sauk Lake

This 2,126-acre lake is approximately 2.9 miles north northeast at the closest point to the Project area boundary, and approximately 4.8 miles north northeast of the nearest turbine. The lake offers foraging opportunities (fish and ducks) for Bald Eagles and is a very popular fishing lake; however, its shoreline is heavily developed. The Sauk River flows through the lake, and water levels are controlled by a dam on its southern end.

Fairy Lake

This 297-acre clear water lake is approximately 5.5 miles north at the closest point to the Project area boundary, and approximately 6.6 miles north of the nearest turbine. The lake offers perching and foraging opportunities (fish and ducks) for Bald Eagles; however, the forested areas surrounding the lake are developed with homes and cottages.

Westport Lake

This 203-acre lake is approximately 6.0 miles west at the closest point to the Project area boundary, and approximately 7.2 miles west of the nearest turbine. The shallow lake offers foraging opportunities (fish and ducks) for Bald Eagles; however, it suffers from frequent winterkills that limit the fish community.

Swan Lake

This 738-acre lake sits just to the south of Westport Lake and is approximately 6.6 miles west at the closest point to the Project area boundary, and approximately 7.1 miles west of the nearest turbine. The lake offers perching and foraging opportunities (fish and ducks) for Bald Eagles, and is a popular angling lake. A portion of the shoreline is developed but the remainder of the shoreline offers ample perching and nesting opportunities for Bald Eagles.

Grove Lake

This 379-acre lake is approximately 5.6 miles southwest at the closest point to the Project area boundary, and approximately 6.1 miles southwest of the nearest turbine. The lake supports self-sustaining fish populations and offers perching and foraging opportunities (fish and ducks) for Bald Eagles.

George Lake

This 488-acre shallow-basin lake is approximately 6.5 miles southeast at the closest point to the Project area boundary, and approximately 7.0 miles southwest of the nearest turbine. The lake is primarily surrounded by agricultural lands to

the west; however, the eastern side is surrounded by forest and offers perching opportunities for Bald Eagles on this eastern edge.

1.9.2 Sauk River

At its closest point, the Sauk River lies approximately 1.6 miles east of the Project area boundary, and approximately 2.6 miles northeast of the nearest turbine. The river begins at Lake Osakis and empties into the Mississippi River just north of St. Cloud, Minnesota, and generally meanders in a northwest to southeast direction. Furthermore, the river provides important stream corridor habitat and is vegetated along its banks with trees, which provide potential perching and roosting opportunities for eagles. The Sauk River is home to a broad array of fish species, which serve as prey to eagles (DNR 2014e).

1.9.3 Minnesota DNR Wildlife Management Areas (WMAs)

WMAs were established to protect land and waters that have a high potential for wildlife production, public hunting, trapping, fishing, and other compatible recreational uses (DNR 2014f). There are 24 WMAs within 10 miles of the Project, and 6 of the 24 are within 5 miles and detailed below.

Padua

This 330-acre site sits immediately to the south of the Project boundary (approximately 0.9 miles southwest of the nearest turbine) and is a mixture of restored prairie, larger, shallow, open water wetlands, and an older-growth hardwood forest. Raymond Lake also sits at the northern edge of this WMA. This WMA has the food sources and hardwood forests available for perching, nesting, and foraging that would attract nesting and foraging Bald Eagles.

Sauk River

At 900 acres, most of this WMA is situated along the Sauk River south of Sauk Centre, MN, and is 1.55 miles from the Project boundary and approximately 2.0 miles northeast of the nearest turbine. Habitat includes open water, emergent wetlands, and a riparian corridor consisting of mixed hardwoods that provide foraging and nesting opportunities for Bald Eagles.

Spirit Marsh

This small 39-acre site is approximately 2 miles east of the Project area (approximately 2.5 miles east of the nearest turbine) and is composed of partially drained cattail-dominated wetlands, restored prairie grassland, and a 3-acre woody cover planting. With no forested plots and potentially seasons without open water, this WMA would not be expected to attract nesting or foraging Bald Eagles.

Tower

Tower WMA is 2.3 miles west of the Project boundary (approximately 2.8 miles from the nearest turbine) and is 81 acres in size. It is composed of connected wetland basins surrounded by upland grass. This WMA is also surrounded by

several larger WPAs that contain open water and forested plots that may attract Bald Eagles.

Miller

This small, 39-acre WMA is 3.0 miles north of the Project boundary (approximately 4.8 miles from the nearest turbine) and consists of brome grassland with some small, low, wet areas dominated by cattails. The surrounding area near this WMA is relatively undisturbed and sits a half mile west of Victor Winter WMA.

Victor Winter

This 160-acre WMA is 3.0 miles north of the Project boundary (approximately 4.3 miles from the nearest turbine) and consists of restored prairie, lowland and upland brush, and has the Ashley Creek flowing through it. The restored prairie offers excellent nesting cover for smaller mammals that eagles may prey upon, and the riparian corridor along the creek offers suitable perching and nesting opportunities; however, the site lacks open water.

1.9.4 USFWS Waterfowl Production Areas (WPAs)

As part of the Litchfield Wetland Management District, there are a total of 33 WPAs within 10 miles of the Project turbines, and 19 of the 33 WPAs are within 5 miles of turbines. Specifically, three of the WPAs are within or immediately around the Project (USFWS 2014).

Trisko

This 397-acre WPA is centrally located within the Project area and consists of open water, wetlands, grassland, and a very small tract of forest. The nearest turbine is approximately 0.3 miles to the east. This WPA provides open water and a food source that would provide foraging opportunities for Bald Eagles; however, the area lacks the type of forested areas used for perching, roosting, or nesting.

Kenna

This 251-acre WPA is located on the eastern edge of the Getty Wind Project area, and consists of a large prairie pothole with open water surrounded by grassland. The nearest turbine is approximately 0.3 miles to the south. The WPA offers foraging opportunities; however, it is void of perching or roosting areas.

Behnen

Situated on the western edge of Project area, Behnen WPA is 371 acres composed mainly of grasslands and wetlands. The nearest turbine is approximately 0.4 miles to the southeast. There is a minimal amount of open water, but several small woodlots are present that may provide perching or roosting opportunities.

1.9.5 Minnesota DNR Scientific and Natural Areas (SNAs)

Sedan Brook Prairie

Roughly 225 acres surrounding the Sedan Brook and associated broad wetland make up the Sedan Brook Prairie SNA. This SNA is located approximately 5 miles south of the Project boundary (approximately 5.7 miles south of the nearest turbine) and is one of the few prairies over 10 acres remaining in the state. While mixed deciduous forest is present in the southeast portion of the site, which offers perching and roosting opportunities for Bald Eagles, the lack of open water indicates this may not be a preferred area for foraging eagles (DNR 2014g).

1.10 Summary of Foraging Areas

There is a relatively low occurrence of high-quality Bald Eagle foraging habitat such as open water and wetlands in the actual Project area as it is composed mainly of cropland and void of large stands of forest or open water. According to the USGS GAP land cover data, only 144.4 acres (0.9%) of the Project area consists of wetlands. While cropland likely provides suitable habitat for smaller mammals that eagles may prey upon, foraging is less likely to occur in the Project area as nearby WMAs, WPAs, and waterbodies provide better foraging opportunities during the breeding and migratory seasons. During the migratory season, WMAs and WPAs offer stopover habitat for wading birds, shorebirds, and waterfowl (waterbirds) and have the potential to attract migrating eagles. Additionally, agricultural fields in the Project area may be susceptible to temporary and seasonal ponding, especially in spring due to melting snow pack. Temporary ponding has the potential to vary significantly year to year based on precipitation; however, ponding most likely will coincide with peak waterbird migration through the area. Flight paths between adjacent WMAs and WPAs are discussed in Section 2.3.1.

While several open water sources exist within 10 miles of the Project that may potentially be utilized by eagles for foraging opportunities, in any given year these water sources will most likely be frozen over during wintering months, drastically reducing food sources in the area. As a result, Bald Eagles mainly overwinter in areas with open water such as the Mississippi River Valley well to the east of the Project.

Section 2

Stage 2 – Site-Specific Surveys and Assessment

2.1 Introduction

Various site-specific surveys were conducted by HDR Engineering, Inc., (HDR) in 2011, 2012, 2014, and 2015 to investigate the degree to which the Project area is utilized by eagles, and to help determine the potential risk to eagles from the development of the Project. In cooperation with USFWS, along with guidance provided by DNR and Minnesota Department of Commerce EFP staff, HDR biologists conducted eagle nest activity surveys and Bald Eagle use monitoring surveys, including monitoring the active Bald Eagle nest just north of Padua WMA (see section 2.3.1).

Surveys in the spring of 2011 were conducted to gather general information on avian use within the Project area and all species were recorded (BOGY 2012). At that time the ECPG had not been issued and the current turbine array had not been developed.

The surveys conducted in the winter of 2011/2012 were developed in collaboration with USFWS staff and focused on Bald and Golden Eagle fall, winter, and spring movements within the Project area and to document eagle nests within a 5-mile buffer around the Project area. Surveys conducted in 2014 and 2015 were consistent with Stage 2 of the ECPG to develop Project-specific predictions of the mean annual number of eagle fatalities and to determine whether Important Eagle Use Areas (IEUA) or migration concentration sites are present. According to the BGEPA, an IEUA is defined as "an eagle nest, foraging area, or communal roost site that eagles rely on for breeding, sheltering, or feeding, and the landscape features surrounding such nest, foraging area, or roost site that are essential for the continued viability of the site for breeding feeding, or sheltering eagles" (USFWS 2013a).

The revised eagle permit rules requires implementation of survey and monitoring protocols that are "Service-approved." Generally, the Owner assumes this means strict adherence to the survey protocols described in Appendix C and D of the ECPG. However, the requirements could be specifically waived if approved by the USFWS. Specific requirements of pre-construction surveys and application data requirements described in the rule change are summarized in Appendix D of

this ECP, along with descriptions of how and whether the surveys done for the Project are consistent.

2.2 Methodology

2.2.1 Bald Eagle Stick Nest Surveys and Nest Monitoring

Based on comments received from the USFWS and potential nest habitat, HDR conducted Eagle Nest Activity surveys to identify nest locations and use areas in the Project vicinity in 2011, 2012, 2014, and 2015. In 2011 and 2012, experienced avian biologists conducted stick nest activity surveys within approximately 5 miles of the Project area to identify current Bald Eagle and other raptor breeding use at known current and historic nest sites (HDR 2012). The biologists conducted searches for new nests from public roads by scanning forested areas and woodlots for stick nests and eagle activity weekly from April 7 through July 12, 2011 and from December 2, 2011 through March 1, 2012.

In 2014, HDR conducted a review of the Project by using a Bald Eagle Breeding Habitat Model (BEBHM) to filter out areas considered to be unlikely nesting habitat (Schubbe et al. 2013). The BEBHM was developed by HDR using ArcGIS™ and publicly available electronic data such as GAP land cover, DNR water feature layers, NWI wetlands, and topographic data. HDR created a list of correlative habitat influences built on peer-reviewed studies about Bald Eagle nesting characteristics, habitat use studies, species narratives, and a professional understanding of eagle nesting characteristics. Habitat characteristics known to be highly correlative to the presence of primary or secondary Bald Eagle nesting territories, such as forest canopy and proximity to water, were overlaid on other critical data layers using ArcGIS™ within the study area. Small patches of forest or individual trees with suitable nesting characteristics that were filtered out were also scanned by trained biologists.

The off-site habitat assessment analyzed Bald Eagle habitat characteristics using existing land use information. The resulting model was used as a pre-survey tool to separate non-eagle use areas from potential nesting areas, and allowed HDR to focus field survey efforts. Additional Bald Eagle data was derived from breeding bird survey information, Minnesota Breeding Bird atlas projects, observations made by HDR staff, USFWS database information, and other anecdotal data.

In 2015, HDR conducted an aerial Bald Eagle nest survey within about 10 miles of the Project area following the recommendations of the USFWS, in order to observe previously documented nest locations and locate any other previously undocumented nests, and establish a mean inter-nest distance for the Project area. The aerial survey was conducted by helicopter on April 23, 2015, and included a route that covered previously documented nest locations as well as potentially suitable Bald Eagle nesting habitat within 10 miles of the Project area, defined as mature forest or copses within approximately half a mile of open water (HDR 2015).

As described in Section 2.3.1, an activity check on one known nest was conducted in March 2016 prior to the start of construction in the area;, the status of this nest was also checked in 2017 and 2018, after the Project was operational.

2.2.2 Eagle Point-Count Surveys

2.2.2.1 Spring 2011

HDR conducted fixed-radius point counts to provide baseline data regarding the temporal and spatial use of the Project area by Bald Eagles and other birds. These studies were developed in response to recommendations from the Department of Commerce (March 8, 2011), and included spring avian use/flight path surveys in order to better understand species use and flight patterns in the Project area during spring migration. Weekly monitoring occurred on 12 occasions between April 1, 2011 and June 24, 2011. During each survey period, 11 survey points were sampled for 30 minutes, and locations were established to provide a wide view of the surrounding landscape with unobstructed sight lines to areas of potential avian concentrations (see Figure 2-1 for locations and Appendix D for additional information on the survey points). Standardized point-count techniques were used to reduce methodological variance between observers or points (Ralph et al. 1995). Table 2-1 summarizes the survey effort from April – June 2011 at the Project.

Table 2-1 Survey Effort from April 1 – June 24, 2011

	Survey Effort (Hours)			
Point	April	May	June	Total
B1	2	2	2	**6**
B2	2	2	2	**6**
B3	2	2	2	**6**
B4	2	2	2	**6**
B5	2	2	2	**6**
B6	2	2	2	**6**
G1N	2	2	2	**6**
G1S	2	2	2	**6**
G2	2	2	2	**6**
G3	2	2	2	**6**
G4	2	2	2	**6**
Total	22	22	22	**66**

In addition to the fixed-point survey, variable ground-based transects were evaluated within 5 miles of the Project footprint to identify eagle use sites such as nest locations or roost sites. Transects were driven during each sample date and areas with the potential to harbor nests and roost sites (i.e., large, mature, super-canopy trees capable of supporting an eagle nest within 1 mile of water, and open water areas during winter months) were scanned for Bald Eagles.

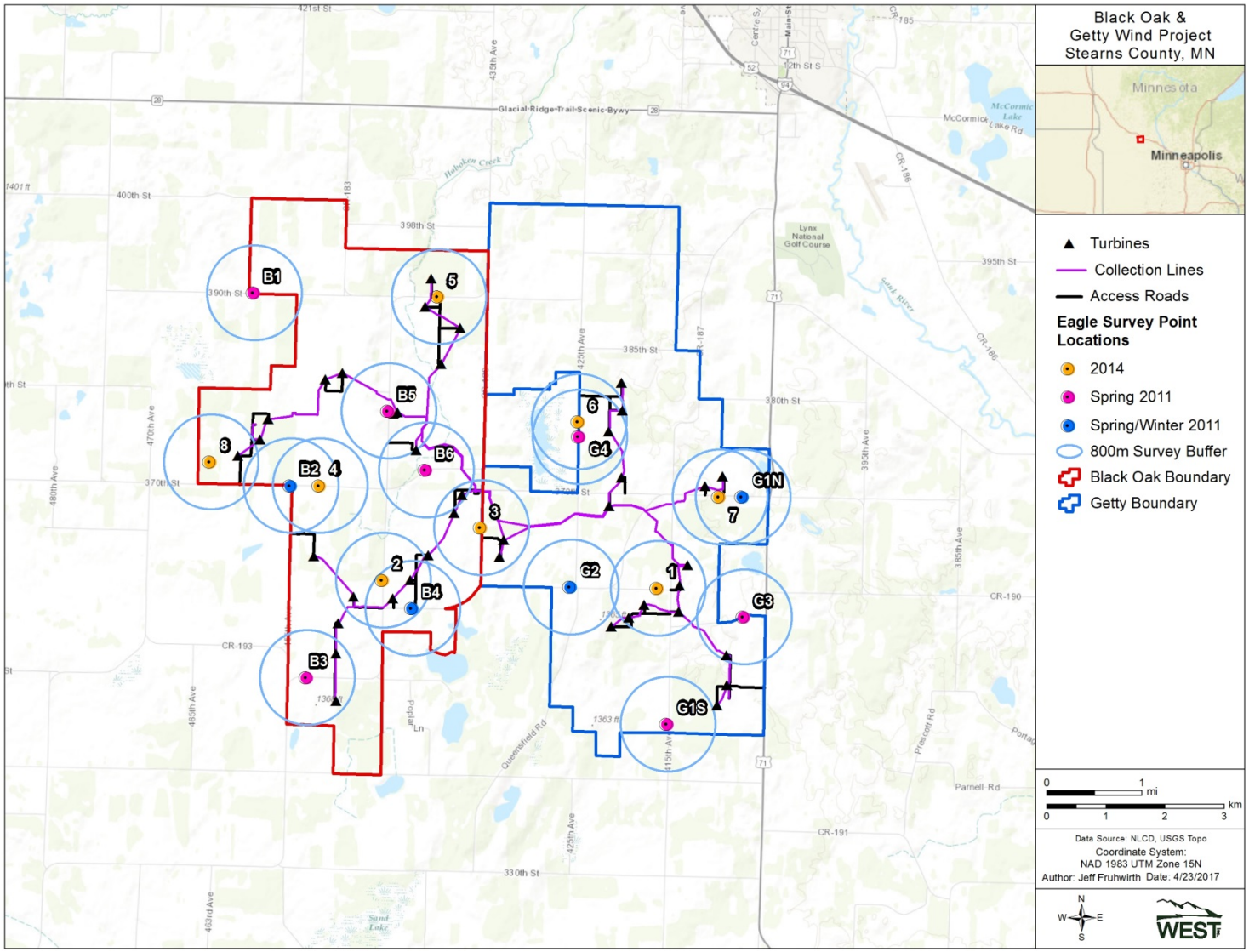


Figure 2-1 Bald Eagle Point Count Survey Locations

2.2.2.2 Winter 2011/2012

Weekly monitoring occurred on 13 occasions between December 2, 2011 and March 1, 2012. During the survey period, four survey points (points B2, B4, G2 and G1N) were sampled for 60 minutes during each visit (see Figure 2-1). These four survey points were also survey points during the spring 2011 survey period and were chosen to provide consistency between data sets, to provide coverage of areas most likely to be utilized by Bald and Golden Eagles, and to provide coverage of the largest part of the Project area. Table 2-2 summarizes the survey effort from December 2011 – March 2012 at the Project.

Table 2-2 Survey Effort from December 2, 2011 – March 1, 2012

	Survey Effort (Hours)				
Point	**Dec**	**Jan**	**Feb**	**March**	**Total**
B2	3	5	4	1	**13**
B4	3	5	4	1	**13**
G2	3	5	4	1	**13**
G1N	3	5	4	1	**13**
Total	**12**	**20**	**16**	**4**	**52**

Ground-based transects were conducted during the winter of 2011-2012, and followed the same methodology as the spring 2011 surveys (see Section 2.2.2.1).

2.2.2.3 2014/2015

Eight eagle point-count survey locations were established within the Project area for the 2014 survey season (see Figure 2-1). These survey points were selected at different locations than the 2011/2012 survey points because they were developed to follow the ECPG guidance that was released in 2013 to gather eagle use data at the site, whereas the previous survey points were selected for different purposes (documenting spring and winter use and overall patterns). Survey points were established to maintain the minimum spatial coverage and included an 800-meter radius to avoid any overlapping survey areas as per the ECPG. Point locations were concentrated in the areas of proposed turbines and covered approximately 30% of the area within 1 kilometer of Project turbine locations as per the ECPG. Before the start of the 2014/2015 survey, HDR used ArcInfo™ to buffer each of the preliminary turbine locations and place point count plots at locations that covered the requisite percentage (30%) of the resulting Project footprint. The Project footprint of the final turbine layout (a merged 1-km buffer of the turbines) is calculated to be 51.9 km² and the 2014/2015 point count plots cover 14.35 km², or 28% of the final Project footprint. When initially set up in 2014, the survey points were laid out to cover 30% of the preliminary layout's merged 1-km buffer. Additionally, point count plots were inclusive of 24 of the preliminary proposed 41 turbine sites (including two alternates) which equated to 59 percent coverage of all turbines that were proposed for the Project at the time of the survey design. The 800-m search radii of the 2014 survey points cover 19 of the 39 final turbine locations, or 49 percent of turbines.

Surveys were conducted monthly between February 2014 and January 2015. Surveys began and ended at various times during the day, with emphasis placed on the midday period, per the ECPG, as eagles are most active during this time. Surveys were conducted in all weather conditions, with the exception of those that limit visibility to below 200 meters vertically and 800 meters horizontally. Surveys were conducted with alternating start and end times to limit temporal bias.

Each point-count survey spanned a period of one hour. To provide an efficient and standardized account of eagle exposure rates, eagles observed in flight were documented within 1-minute intervals. An HDR observer documented the times, directions, behavior, age, number of individuals, and approximate flight height for eagle flights during the point-count period. Estimated flight heights were described as above or below 200 meters above ground level (AGL).

Meteorological information such as temperature, wind direction, wind speed, cloud cover, site conditions, and ice cover were collected for each survey date to gain a better understanding of eagle use as it relates to weather. Table 2-3 summarizes the survey effort from February 2014 – January 2015 at the Project.

Table 2-3 Survey Effort from February 26 2014 – January 28, 2015

	Survey Effort (Hours)												
Point	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Total**
1	1	1	1	1	1	1	1	1	1	1	1	1	**12**
2	1	1	1	1	1	1	1	1	1	1	1	1	**12**
3	1	1	1	1	1	1	1	1	1	1	1	1	**12**
4	1	1	1	1	1	1	1	1	1	1	1	1	**12**
5	1	1	1	1	1	1	1	1	1	1	1	1	**12**
6	1	1	1	1	1	1	1	1	1	1	1	1	**12**
7	1	1	1	1	1	1	1	1	1	1	1	1	**12**
8	1	1	1	1	1	1	1	1	1	1	1	1	**12**
Total	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**96**

2.3 Results

2.3.1 Bald Eagle Stick Nest Surveys and Nest Monitoring

There are seven known Bald Eagle nests plus two historical or otherwise desktop-identified listings of unconfirmed nests within 11 miles of the Project area. Table 2-4 summarizes the status of each of these nests, and further information is provided below.

Table 2-4 Eagle Nests within 11 Miles of Project

Nest	Year first Detected	Activity Status (Most Recent Survey Year)	Distance (Miles) from Nearest Turbine	Direction from Nearest Turbine
Padua Nest	2011	Active (2017)	1	S
Westport Lake Nest	2011	Active (2015)	7	NW
Pope Nest	2015	Inactive (2015)	7	N
Sauk Centre Nest	Historical	Nest not located in surveys 2011 - 2015	NA (historical nest no longer present)	NA
Sauk Lake Nest	Historical	Nest not located in 2015	NA (nest appears to be no longer present)	NA
Melrose Nest	2015	Active (2015)	8.5	E
Brooten Nest	2015	Inactive (2015)	11	S
Spring Hill Nest	2012	Inactive (2015)	10..5	SE
McCormic Nest	2015	Inactive (2015)	5	NE

- HDR discovered the "Padua nest" in April 2011 during the first week of pre-construction avian surveys designed to assess bird use within the Study Area. The nest was centrally located on the western edge of Getty Township Section 18 just north of the Padua WMA, approximately one mile south of the nearest turbine. The nest was monitored throughout the 2011 breeding season from April 7 through July 12, 2011. Two adult Bald Eagles were observed regularly at the nest during visits in April and May 2011, and most eagle observations during that season were of the resident adults tending to their nest and young. At least one young was raised in 2011.

  During the first survey visit to the Project on February 26, 2014, HDR was unable to re-locate the Padua nest. The tree that once held the nest appeared damaged and was slumped over. It is unknown what may have caused damage to the tree and the last time the nest was observed intact was in March of 2012. Padua WMA was monitored during each survey visit in February and March to check on the presence of nest building or other eagle activities. In addition, two eagle point-count survey locations provided visual contact with Padua WMA allowing further observations of the IEUA.

  On April 9, 2014 HDR confirmed the Padua nest was active as the resident pair of Bald Eagles had re-built the nest even as the nest tree continued to list, and the pair was observed incubating. During the June 19, 2014 site visit, no nesting structure was visible from several angles and it appeared that the tree supporting the nest had collapsed completely. The success of the 2014 breeding season is not known. The woodlot and surrounding

forest was surveyed from a distance during every subsequent site visit to try and determine whether the nest had been re-built. Bald Eagles continued to be seen perching near the wetlands in the Padua WMA, although in January 2015, no new nest structures were visible from public access points.

On April 23, 2015, HDR confirmed that a new nest was constructed in a neighboring tree, adjacent to the collapsed original nest tree. A single adult Bald Eagle was observed incubating on the nest.

The Padua nest was checked in March 2016 from the ground. Although the nest was not visible, eagle activity near the nest location was noted, and the nest was assumed to be active in the 2016 breeding season. In 2017, the nest was again checked and activity was noted on March 10 and an adult Bald Eagle was observed from the ground sitting low in the nest. The nest was therefore assumed to be active in the 2017 breeding season. In April 2018, the nest was checked and adult Bald Eagles were observed from the ground flying near the nest on two occasions. The nest was therefore assumed to be active in the 2018 breeding season.

- The "Westport Lake nest" occurs approximately 7 miles northwest of the nearest turbine on the northern end of Westport Lake. This nest was discovered while conducting ground transects surveys in the winter of 2011-2012, and was documented as occupied in 2012. No breeding activity was documented in 2013 or 2014. On April 9, 2014, a second platform stick nest was observed in an adjacent tree; however, there was no activity observed at either of the nests. On April 23, 2015, the original nest was occupied, with a single adult Bald Eagle observed incubating.

- The "Pope nest" was documented by HDR on April 23, 2015. It is located approximately 7 miles west of the nearest turbine, on the northeastern shore of Pope Lake. HDR identified it as unoccupied, although it appeared to have been active within the last five years. The nearest Bald Eagle documented during HDR's survey was at the Westport Lake nest, approximately 1.7 miles north, and it is thought that the Pope nest is likely an alternative nest site for the breeding pair that was utilizing the Westport nest.

- The "Sauk Centre nest" documented in the DNR Natural Heritage Inventory System has never been relocated and is considered to be a historical listing. Records indicate the nest is located approximately 2.6 miles north of the Project area near Sauk Centre. The approximate location of this nest and the surrounding Sauk River area has been checked during every survey period.

- The "Sauk Lake nest" was discovered during a desktop search of the Minnesota Breeding Bird Atlas (BBA), as preliminary results indicate an active nest with young was detected in 2010 in BBA survey block

T127R34a (BBA 2014). It is located on the northern end of Sauk Lake approximately 8.5 miles north of the Project boundary. However, the aerial survey conducted during HDR's 2015 nest survey flew over the location of this previously documented nest, but no nest was located.

- The "Melrose nest" is located approximately 8.5 miles east of the nearest turbine, east of Melrose, MN. The approximate location of this nest was provided by USFWS in January 2015. On April 23, 2015, HDR confirmed that the nest was occupied, with two adult Bald Eagles observed.
- The "Brooten nest" is located approximately 11 miles south of the nearest turbine, southeast of Brooten, MN, along the shore of Tamarack Lake. On April 23, 2015, HDR located the nest, and identified it as unoccupied, although it appeared to have been active within the last five years. An adult Bald Eagle was observed flying approximately 0.7 miles southeast of this nest.
- The "Spring Hill nest" is located approximately 10.5 miles southeast of the nearest turbine. In April 2012, breeding activity was observed at this nest (one adult Bald Eagle in the nest). In the 2015 nest survey, HDR documented that the nest was unoccupied and in disrepair.
- The "McCormic nest" is located approximately five miles northeast of the nearest turbine and was documented by HDR on April 23, 2015 on the northern shore of McCormic Lake. The nest appeared to be unoccupied but in fairly good shape and appeared to have been active in the last five years. The nearest Bald Eagle observed was approximately 1.8 miles away from the nest, perched along the Sauk River.

Using the Padua, McCormic, Westport/Pope, Melrose, Spring Hill and Brooten nests, WEST calculated a mean inter-nest distance of 8.63 miles (see Figure 2-2). Because the Westport and Pope nests are thought to be part of the same territory, the mean distance of these two nests to the nearest adjacent nesting territory (Padua nest) was used. Per the ECPG, eagle pairs at nests within one-half the mean inter-nest distance, in this case 4.32 miles, are susceptible to disturbance take and blade strike mortality. The Padua nest/IEUA is the only active nest within one-half the mean inter-nest distance from the Project footprint; the 4.32 mile buffer overlaps all proposed turbines (Figure 2-2). The Sauk Centre historical nest is located approximately 2.6 miles north east of the Project boundary; however, this nest has never been located and there has been no eagle activity in the vicinity of this record since Project specific surveys began in 2011.

2.3.2 Eagle Point-count Surveys

2.3.2.1 Spring 2011

Eighteen Bald Eagle sightings were observed within or in the vicinity of the Project area between April 1, 2011 and June 24, 2011. Of the 18 Bald Eagle sightings, six were made during the point-count surveys and were observed flying

for a total of 11 minutes (3 minutes within the 800-m plots and 8 minutes farther than 800-m). No Golden Eagles were observed. Most Bald Eagle observations were incidental sightings (sighted by the HDR observer in the Project area but outside of the point-count survey areas or time period) primarily of the resident adults tending to their nests and young, or engaged in foraging forays. Two immature birds and a sub-adult bird were also observed perching or following the northward migration of waterfowl. On one occasion, a single adult from the Padua nest shadowed the flight of a sub-adult eagle while it was within 1.5 miles of the active nest. Juvenile eagles were seen conducting feeding forays that originated near waterfowl concentrations or were seen soaring from the northeast to the west end of the Project (BOGY 2012).

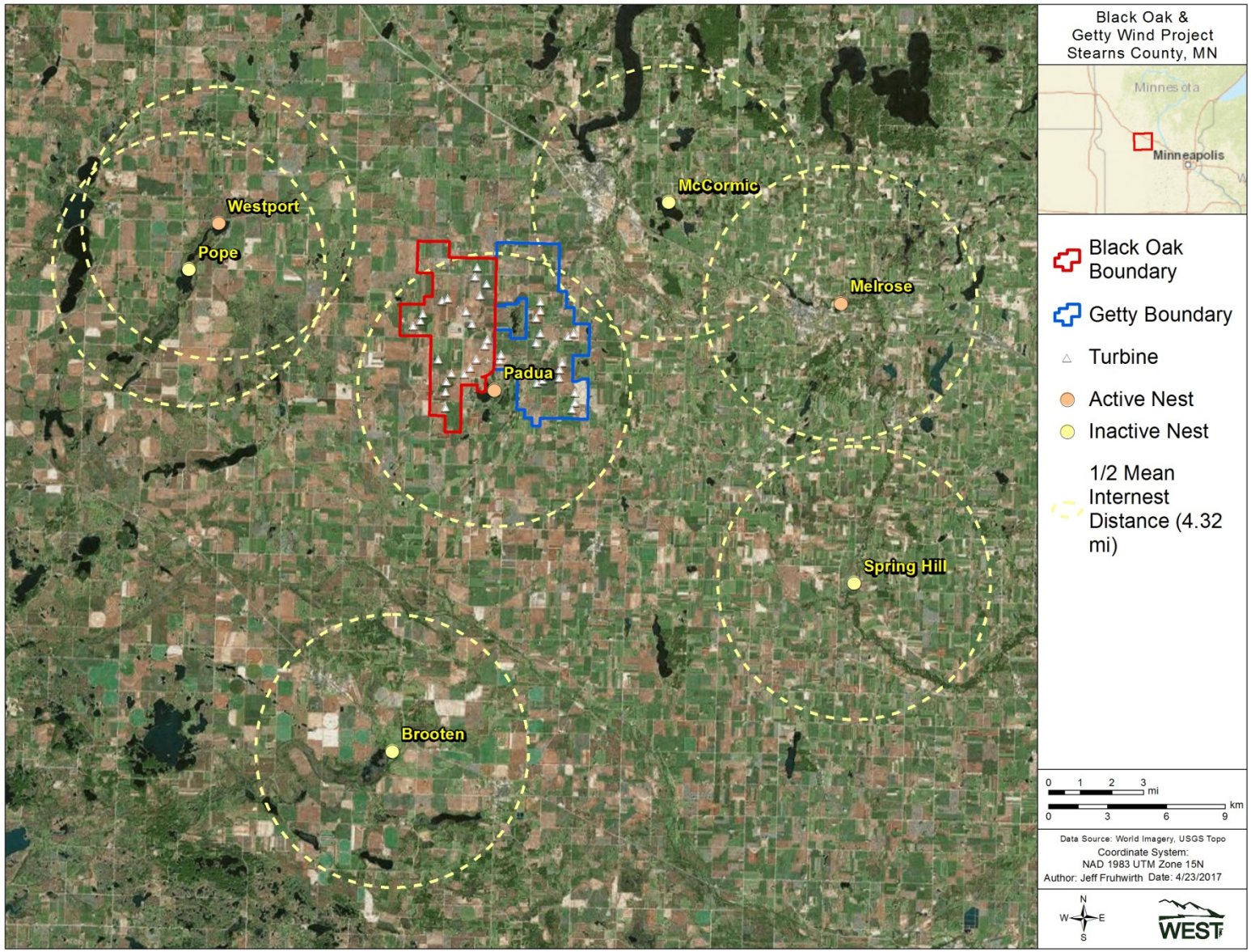


Figure 2-2 Bald Eagle Nest Mean Inter-Distance

The total survey effort during Spring of 2011 amounted to a total of 66 hours of survey time, or 3,960 minutes. Six Bald Eagle flights were documented during these surveys, including flights both inside and outside the 800 m radius; all flights were less than 200 meters AGL. The observed flights consisted of four flights for foraging or territorial defense by the resident eagle pair and two flights by migratory eagles that were observed during April and May in the northern half of the Project (see Figure 2-3 and Figure 4 of ABPP).

Of the six Bald Eagles observed in-flight during the survey period, three were adults and three were immature. Two of these were determined to be spring migrants based on their flight path and other characteristics.

2.3.2.2 Winter and Early Spring 2011/2012

The total survey effort during winter and early spring 2011/2012 amounted to a total of 52 hours of survey time, or 3,120 minutes: 2,880 minutes in the winter season (November 1 - February 28) and 240 minutes on March 1 (breeding season). Twelve Bald Eagles were observed within or in the vicinity of the Project area between December 2, 2011 and March 1, 2012. One Bald Eagle sighting was made during the point-count surveys, and was documented flying for one minute. The additional incidental sightings were recorded outside of the survey period. No Golden Eagles were observed. The immature Bald Eagle observed in the winter (December 2011) was within the 800 m plot around point 1 and exhibited powered flight to the southeast at approximately 100 meters AGL.

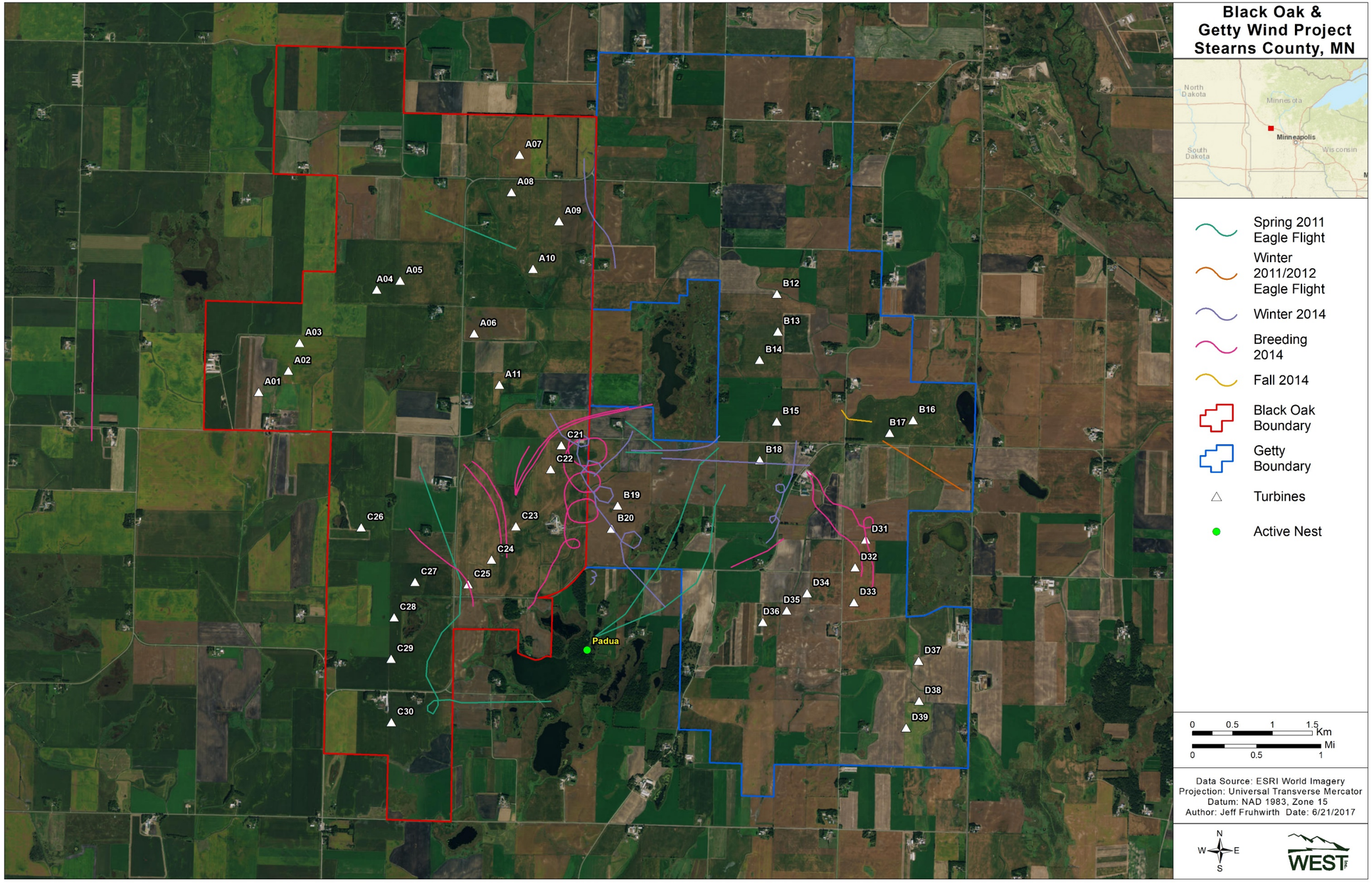


Figure 2-3 Observed Bald Eagle Flight Patterns

2.3.2.3 2014/2015

The total survey effort during 2014/2015 amounted to a total of 96 hours, or 5,760 minutes. Thirty Bald Eagles were observed within or in the vicinity of the Project area between February 26, 2014 and January 28, 2015. Twenty-two of the 30 Bald Eagle sightings were made during the point-count surveys, for a total of forty minutes of observed flight (30 minutes within 800-m of survey point and below 200 m height). No Golden Eagles were observed. Nineteen of the 22 point-count sightings occurred in the southern half of the Project near Padua WMA and seven of the 22 sightings were from survey point 3, which is on the western edge of the known flight path between Padua WMA to the south and Trisko WPA to the northeast. Survey point 3 was biasedly placed to attempt to detect the most eagles, in order to monitor both the previously recognized avian flight corridor and the Padua nest; however, all 2014/2015 flight paths recorded appeared to be of general use and not associated with the Padua WMA.

Three Bald Eagle sightings were documented in February, all from point 3, and all sightings appeared to be of local movements and not of migrants. Eight Bald Eagle sightings occurred during the March survey period. On March 31 three Bald Eagles were seen perched in a small cluster of trees along a seasonal flooded depression approximately 820 m to the west of survey location 3. Two of the eagles took flight towards Trisko WPA and the third flew into a nearby wetland. The remaining five Bald Eagle sightings in March were seen in-flight only and determined to be migrants. Two immature Bald Eagles were detected in April soaring above the Project area. The eagle detected near survey point 2 was seen circling over a concentration of waterfowl before riding a thermal northeast. Additionally in April, three Bald Eagles were observed within the Project area; however, these were not observed during a 60 minute point count. Only one Bald Eagle was observed in May. The eagle was observed immediately upon initiation of the point count and flew off behind a farm house and did not reappear.

No Bald Eagles were observed in the Project area spanning a four-month period between June and September. An incidental sighting of a Bald Eagle in June was made in Padua WMA during the Padua nest reconnaissance. Two adult Bald Eagles were recorded in late October along with six incidental observations; the two sightings recorded during point counts were associated with survey point 7. Four Bald Eagles (three adult and one immature) were observed in November; one each at survey points 1 and 3, and two at survey point 7. One adult Bald Eagle was observed in December at survey point 5 and there were no eagle sightings recorded in January.

In total, 16 of the 22 Bald Eagles observed in-flight during the 2014/2015 survey period were adults, with five immature eagles, and one sub-adult eagle. Five Bald Eagles, all observed in March, appeared to be spring migrants based on their flight path and other characteristics.

2.4 Discussion

A total of 62 Bald Eagle sightings have been documented in the Project area since surveys began in the spring of 2011. Twenty-nine Bald Eagles have been recorded during the survey point count period and 33 Bald Eagles have been incidental observations either occurring outside of the survey period or outside of the Project area. The observations of Bald Eagles both during and incidental to surveys indicate that Bald Eagles appear to be a relatively regular occurrence in the area.

Based on USFWS defined seasons: winter (November 1- February 28), breeding (March 1 – July 31) and fall (August 1 – October 31), there have been nine Bald Eagle observations and 22 flight minutes recorded during the winter, 17 Bald Eagle observations and 39 flight minutes recorded during the breeding season, and 3 Bald Eagle observations and three flight minutes recorded during the fall (see Table 2-5).

Table 2-5 Bald Eagle Observations and Minutes by Season

Season	Eagle Observations (during point counts)	Eagle Minutes (during point counts)*	Survey Effort (Hours)
Winter	**9**	**22**	**80**
2011	1	1	12
2012	0	0	36
2014	8	21	24
2015	0	0	8
Breeding	**17**	**39**	**110**
2011	6	11	66
2012	0	0	4
2014	11	28	40
Fall	**3**	**9**	**24**
2014	3	9	24
Total	**29**	**66**	**214**

*includes all flight minutes recorded during survey periods at any distance or height

As noted in Section 3.3, 34 minutes of the 70 total documented Bald Eagle flight minutes were recorded as risk minutes (within 800 m of the observer and under 200 m in height) and were therefore included in the collision risk model; 14 risk minutes were recorded in winter, 17 minutes in the breeding season, and 3 minutes in the fall. The most eagle observations were documented during the breeding season, which also overlaps the spring migratory season. These results show that most Bald Eagle sightings occur during spring migration and the breeding season compared with winter and fall migration as discussed in Stage 1 Section 1.7.

During the spring migratory season, Bald Eagles may be concentrated in areas with ponding water which attract waterfowl. Such was the case during the spring 2011 survey. There were more eagles in the area during the first year of avian

monitoring as ponded water was present in many of the crop fields on the Project. The Padua eagles were engaged in territorial defense of their nest and several sub-adult eagles were observed near wetlands and flooded fields where waterfowl were concentrated. Since the first spring of monitoring, crop fields have been drier, waterfowl presence has been scarce and there have been fewer eagles observed near the cropped areas. Seasonal, temporary ponding is highly variable and has the potential to vary significantly from year to year throughout the life of the Project.

An effort was made to monitor the Padua nest during each eagle point survey period in an attempt to determine how the Padua eagles were utilizing the Project area. For the 2011 general avian surveys, Black Oak point 4 and Getty point 2 provided views of the Padua nest and eagles flying to and from the nest. During the 2011/2012 winter eagle survey effort, Point 2 (located at the same location as Getty 2) and Point 3 (located at the same site as Black Oak 4) were established in the same locations as the general avian use survey. During the 2014/2015 eagle monitoring effort, Point 3 provided a distant view of the Padua nest. Additionally, approximately 15 minutes during every monitoring effort was spent scanning the nest site outside of the regular monitoring effort. Table 2-6 shows, by season, the minutes the Padua nest was observed during the point count surveys.

Table 2-6 Hours of Surveys in Viewshed of Padua Nest by Season

Season	Survey Effort with visual of Padua Nest (Hours)	Overall Survey Effort (Hours)
Winter	**28**	**80**
2011	6	12
2012	18	36
2014	3	24
2015	1	8
Breeding	**20**	**110**
2011	12	66
2012	2	4
2014	6	40
Fall	**3**	**24**
2014	3	24
Total	**51**	**214**

The Padua nest/IEUA was visible to trained biologists a total of 51hours of the 214 hours of survey effort, which equates to 23.8% of the survey period.

Flight path data from general avian use surveys in 2011 indicated a broad corridor stretching from the Padua WMA south of the Project, northward through the Trisko WPA, then northeast or northwest to the Sauk River. Waterbodies associated with the Raymond Lake/Padua WMA were the source or destination of many of the avian flights, including two Bald Eagles that were observed during the spring 2011 studies (BOGY 2012).

An examination of the proposed layout was compared to the flight paths, particularly WTG B20 and WTG B19, which are north of the Padua nest and south of Trisko WPA, and therefore could be within a potential flight path between the two foraging and nesting sites. However, both of the eagle flights from spring 2011 were documented to the southeast of WTG B20 and WTG B19 and did not cross paths with the proposed turbine locations. The eagle flight paths out of Padua WMA followed the wetland directly northeast of the WMA and continued in a northeast direction toward Trisko WPA. Additionally, most waterbird flights between Padua WMA and Trisko WPA followed the same flight pattern and did not cross WTG B20 or WTG B19. There were no Bald Eagle flight path observations between Padua WMA and Trisko WPA during surveys conducted in either winter 2011/2012 or in the 2014/2015 surveys. The two flight paths that crossed close to WTG B20 and WTG B19 during the 2014/2015 survey were not associated with Padua WMA and were general flight patterns through the Project area.

Most of the sightings in 2011 were of local eagles including the nesting pair at the Padua WMA and included both adult and immature birds. Twenty-five of the thirty Bald Eagles observed in 2014/2015 were determined to be locals and consisted mainly of adult eagles. In total only seven migrants have been observed to date since the inception of surveys in the spring of 2011 with five migrants detected during March 2014. The results of the surveys suggest occasional, general use Bald Eagle activity within the Project.

The potential risk of adverse effects, including injury and death, to Bald Eagles exists within the Project area, as eagles could occur either within or in the vicinity of the Project area throughout the year, and the "Padua nest" is located within one-half the mean inter-nest distance from the Project footprint. Survey results to date suggest that movement within the Project area is greatest during the spring migratory season, when local eagle numbers may be supplemented with migrants heading north.

Based on suitable foraging habitat and relative proximity to the Padua nest, Bald Eagles may enter the Project area en route to visit the Trisko WPA, Kenna WPA, Behnen WPA, the Sauk River, and Sauk Lake. It has been documented during the eagle point-count surveys that some flights within the Project area are expected by residents and migrants. Eagle populations in Minnesota are rapidly expanding; as populations continue to increase, greater nest densities may occur in preferable habitats, and eagles may also begin to nest in less ideal habitats farther from foraging areas.

Golden Eagles have not been observed in the Project area. Of the 214 eagle survey hours conducted between 2011 and 2015, 102.5 survey hours (47.9%) were logged between October 1 and April 4, when Golden Eagles are most likely to occur in Stearns County.

2.5 Review of the ECPG Site Assessment Questions

The five questions included in the Stage 1 assessment from the ECPG (USFWS 2013a) are reviewed in this section following the availability of site-specific data. The answers to these questions have also been discussed in previous sections.

1. *Does existing or historical information indicate that eagles or eagle habitat (including breeding, migration, dispersal, and wintering habitats) may be present within the geographic region under development consideration?*

   Yes. While there are no known nests within the boundary of the Project area, the Padua nest is located approximately one mile south of the nearest turbine and within one-half the mean inter-nest distance from the Project footprint, which is the minimum convex polygon that is inclusive of all turbines as defined in the ECPG. There are also six other known nests and two historical or otherwise desktop-identified nests located within 11 miles of the Project boundary. There is no prime Bald Eagle foraging habitat within the Project area, but there are several waterbodies in the vicinity of the Project area that may serve as foraging areas, and eagles could fly through the Project area en route to foraging areas. Additionally, temporary ponding and seasonal flooding, especially in the spring, provide stopover habitat that has the opportunity to attract migrating waterfowl and in turn may also attract eagles to the area.

   The site layout design took into account a flight corridor between Padua WMA and Trisko WPA. This siting adjustment was discussed with the USFWS in a January 21, 2014 meeting and the updated layout in Febraury 2015 that was provided to the USFWS also took into account this potential flight corridor (February 2015 meeting notes). At this meeting the two turbines north of the Padua nest (labeled T14 and T38 in the preliminary layout and WTGs B20 and B19 in the final as-built nomenclature) were also discussed due to their relative proximity to the nest and general proximity to some documented flightpaths. The final locations of these two turbines were placed so they do not intersect any documented flightpaths, but it is possible that Bald Eagles (adults and juveniles) associated with the nest could be at risk from the Project. It is also possible that more Bald Eagle pairs could nest in the future within 10 miles of the Project boundary if the regional population continues to expand; however, it is considered unlikely that eagles would nest in the actual Project area given the location of the Padua nest during the Project's eagle surveys and the general lack of tall, mature, super-canopy trees. The Project area is not considered to be in a pathway of increased raptor migration. Most waterbodies in the vicinity of the Project area are frozen during the winter, limiting foraging opportunities; however, it is possible that Bald Eagles could still forage, fly, or roost within the Project area during the winter season, especially in milder winters and if trying to protect a nesting location.

2. *Within a prospective project site, are there areas of habitat known to be or potentially valuable to eagles that would be destroyed or degraded due to the Project?*

   No. There is minimal impact to wetlands from the Project design, and no potentially valuable habitat that will be destroyed or degraded by the Project. The proposed turbine locations are primarily in agricultural areas and away from riparian areas and waterbodies. The turbine layout avoids immediate encroachment upon the Padua WMA and Trisko WPA; the nearest turbines are 0.9 and 0.3 miles from these managed lands, respectively.

3. *Are there important eagle use areas or migration concentration sites documented or thought to occur in the Project area?*

   Yes. Analysis of flight path data from the spring 2011survey indicates a broad corridor for eagle movement stretching from the Padua WMA northward toward the Trisko WPA, then northeast or northwest towards Sauk River and Sauk Lake. This observed eagle use area was used chiefly by the resident pair and offspring during 2011, and the Project area as a whole is not considered to be in a pathway of increased raptor migration. During the 2014/2015 survey period, no eagle flights were observed between Padua WMA and Trisko WPA.

4. *Does existing or historical information indicate that habitat supporting abundant prey for eagles may be present within the geographic region under development consideration?*

   There are several waterbodies in the vicinity of the Project area that likely serve as foraging areas, including the water features associated with the Trisko, Kenna and Behnen WPAs and Padua WMA, which are adjacent to the Project boundaries, and eagles could fly through the Project area en route to foraging areas. Fish are considered the primary prey for Bald Eagles in this area, with ducks, mammals, and carrion considered other likely sources of food. While these types of wildlife are present, none would be considered to be abundant prey for Bald Eagles in the area.

   During the spring migratory season, Bald Eagles may be concentrated in areas with ponding water which attract waterfowl and, from year to year, may provide low quality forage. Such was the case during the spring 2011 survey. There were many more eagles in the area during the first year of avian monitoring as ponded water was present in many of the crop fields on the Project. The Padua eagles were engaged in territorial defense of their nest and several sub-adult eagles were observed near wetlands and flooded fields where waterfowl were concentrated. Since the first spring of monitoring, crop fields have been drier, waterfowl presence has been scarce and there have been fewer eagles observed near the cropped areas. Seasonal, temporary

ponding is highly variable and has the potential to vary significantly from year to year.

The project boundaries were modified to exclude the WPAs and WMAs, additional use surveys were conducted to further document any potential higher use corridors, and turbines were sited to set back from the water features associated with these managed lands as much as feasible.

5. *For a given prospective site, is there potential for significant adverse impacts to eagles based on answers to above questions and considering the design of the proposed project?*

   No significant adverse impact to the local-area Bald Eagle population is anticipated from construction or operation of this Project; however, there is potential for non-purposeful take to occur. Bald Eagles may occur in the Project area throughout the year; however, they are less likely to be present in winter or fall compared to the breeding season. Thus, there is potential for direct mortality or injury to Bald Eagles resulting from collision with wind turbines and the potential for displacement impacts. To date, relatively few impacts on Bald Eagles resulting from collision with wind turbines have occurred, with 55 Bald Eagle fatalities reported at wind energy facilities in North America, 27 of which have been documented in the Mississippi Flyway(Kritz et al. 2018, Pagel et al. 2013; Allison 2012).

   While Golden Eagles have been documented in Stearns County and reported to the MOU six times between 1999 and 2009, there have been zero Golden Eagle observations in the Project area during the 214 eagle/avian use survey hours conducted in 2011, 2012 and 2014/2015, or the additional time spent surveying Padua WMA. Of the 214 eagle survey hours conducted, 102.5 of the eagle survey hours were logged between October 1 and April 4, when Golden Eagles are most likely to occur in Stearns County. Based on data collected, no significant adverse impacts to Golden Eagle populations are anticipated.

   The Owner has sited turbines away from the detected flyway between the Padua WMA and Trisko WPA, and are continuing to coordinate with the USFWS regarding eagle permitting issues. While the potential for Bald Eagle-related impacts exists, it is anticipated that the Project would not significantly impact local or migrating Bald Eagle populations. Permit conditions that would be part of the USFWS take permit would include measures to avoid and minimize potential impacts to the maximum extent achievable.

   The assessment for Stage 2 is that the Project fits within the Category 1 definition because the Padua nest is within one-half of the mean inter-nest distance from the Project footprint; however, based on survey results indicating moderate eagle use and the opportunity to mitigate impacts, a

Category 2 classification is more appropriate for this Project. The Project Owner has developed a series of avoidance, minimization and conservation measures to help address the risk that the Project may pose to eagles in the area (see Stage 4).

Section 3

Stage 3 – Fatality Prediction

3.1 Introduction

Stage 3 of the ECP utilizes a model developed by the USFWS that predicts the number of eagle fatalities that would be expected at any given wind project site throughout the United States. The modeling approach used by the USFWS and the input and output of the model for the Project area are described in this Section 3.

3.2 USFWS Approach to Predicting Eagle Fatalities

The USFWS uses a Bayesian estimation framework to predict the number of eagle fatalities that would be expected for a wind energy facility. This model uses a variety of variables specific to the wind project in addition to project-specific eagle exposure rates, which are generated from Stage 2 assessments (see Section 2.3.2). Model results are based on specific information from the Stage 2 assessment of the Project, including eagle exposure rate, probability of eagle exposure, and an expansion factor, which expands the resulting fatality rate into an annual predicted fatality estimate for the Project.

The number of fatalities per year is predicted from the product of exposure rate and collision probability. The exposure rate is defined as the number of eagle flight minutes in the project footprint (in proximity to turbine hazards) calculated from point-count surveys. The collision probability is the probability that an eagle will collide with a turbine during 1 minute of exposure within the Project area. The collision probability is based on the above-mentioned risk assessment and takes into account the proportion of the Project area that actually represents a collision risk to eagles (the rotor-swept area (RSA) around a turbine or proposed turbine), as well as the total number of turbines and number of daylight hours (time of expected eagle activity) per year. The resulting collision probability is the cumulative probability across all turbines. The USFWS model assumes that collisions will always result in an injury or fatality.

3.3 Collision Probability Model

As stated previously, the collision probability model uses data gathered from the Project area to determine annual estimations of eagle fatalities as a result of the Project. The model uses four primary variables (exposure, collision probability, expansion, and fatalities) to determine collision probability, which is the probability of an eagle colliding with a turbine under the assumption that all collisions

are considered fatal. Each of these variables is discussed in the following sections (see Table 3-1 for definitions of the USFWS model variables).

Table 3-1 Description of Variables Used in the USFWS Collision Probability Model

Abbreviation	Variable	Description
F	Annual Fatalities	Annual eagle fatalities from turbine collisions
λ	Exposure Rate	Eagle minutes flying below 200 m in height within the Project footprint (in proximity to turbine hazards) per hr per km^2
C	Collision Probability	The probability of an eagle colliding with a turbine given exposure
ε	Expansion Factor	Product of daylight hours and total hazardous area (hr x km^2)
K	Eagle Minutes	Number of minutes that eagles were observed flying below 200 meters AGL during survey counts
δ	Turbine Hazardous Area	Rotor-swept area around a turbine or proposed turbine from 0 to 200 m (km^2)
N	Trials	Number of trials for which events could have been observed (the number of hr x km^2)
τ	Daylight Hours	Total daylight hours (e.g., 4,383 hours per year)
n_t	Number of Turbines	Number of turbines (or proposed turbines) for the Project

Key:
m = Meter.
km^2 = Square kilometers.

Table 3-2 presents the turbine specifications used in the USFWS model for the Project.

Table 3-2 Turbine Specifications Used for the USFWS Eagle Collision Probability Model

Turbine	Turbine Size (MW)	No. of Turbines	Rotor Diameter (m)	Hub Height (m)
Vestas V110	2	39	110	80

Exposure Rate

Exposure rate (λ) is the expected number of exposure events (eagle-minutes) per survey hour per square kilometer (hr/km^2). The USFWS prior probability distribution ("prior distribution" or "prior") for exposure rate was derived from data from a range of projects under USFWS review and the projects from Whitfield (2009). The statistical term prior distribution is the distribution used in Bayesian modeling to express the probability of events or outcomes in advance of empirical evidence. In this case, the prior distribution is intended to model exposure rates for any wind energy facility, prior to post-construction mortality results. The USFWS defines the prior distribution for exposure rate as:

Prior $\lambda \sim$ Gamma (α, β), with shape and rate parameters $\alpha = 0.415$ and $\beta = 2.76$.

Pre-construction eagle exposure data are used to update the prior distribution to estimate the parameters for the posterior distribution. By assuming the exposure minutes follow a Poisson distribution with rate parameter λ, the posterior distribution for exposure rate is:

$$\text{Posterior } \lambda \sim \text{Gamma } \left(\alpha + \sum_{i-1}^{n} k_i, \beta + n\right)$$

where $\sum k_i$ is the total observed eagle minutes, *n is* the number of trials, and α and β are from the prior distribution. The number of trials is the number of hr/km^2 that were conducted in the pre-construction survey.

Table 3-3 shows the data used to calculate the exposure rate for Bald Eagles at the Project. A *Gamma* (α=0.97, β=2.76) prior distribution with mean (0.35) and standard deviation (0.357) has been recommended by the USFWS for the exposure prior. Posterior exposure distributions of eagle use at the Project were estimated as distributions with the α parameters equal to the sum of the prior α and total flight minutes below 200 meters, and the β parameters equal to the sum of the prior β and effort (hours of surveys x km^2 of area surveyed) by season. To analyze the seasonal risk patterns at the Project, the risk model was run by season, as shown in Table 3-3. Season dates used for the model were developed through coordination with the USFWS: winter (November 1 – February 29), breeding (March 1 – July 31) and fall (August 1 – October 31). During all 214 hours of survey, 14 minutes of Bald Eagle flights below 200 meters within 800 meters of the survey points were recorded in the winter, 17 Bald Eagle flight minutes were recorded in the breeding season, and three Bald Eagle flight minutes were recorded in the fall. This resulted in a posterior distribution for the Bald Eagle exposure rate (Bald Eagle flight minutes observed per hour per km^2) of 0.091 for the winter, 0.080 for the breeding season and 0.078 in the fall.

Table 3-3 Estimated Exposure Rate (λ) for Bald Eagles from eagle observations made during Point Count surveys at the Project

Variable	Winter	Breeding	Fall
1) Number of Surveys	80	110	24
2) Average Length of Surveys (hours)	1.00	1.00	1.00
3) Survey Hours	80	110	24
4) Survey Radius (m)	800	800	800
5) Recorded Flight Minutes below 200 m at points	14	17	3
6) Eagle Flight Minutes (α: Line 5 + 0.415)	14.97	17.97	3.97
7) Effort (β; survey hours x sq km of area surveyed+2.76)	163.610	223.928	51.015
8) Mean Exposure Rate (Line 6 / Line 7)	0.091	0.080	0.078

Expansion Factor

The expansion factor (ε) is used to scale the per unit fatality rate (fatalities per hr per km^2) to the daylight or operational hours (τ) in one year and total hazardous area (km^2) within the project. The expansion factor is:

$$\varepsilon = \tau \sum_{i-1}^{n} \delta_i,$$

where *n* is the number of turbines, and δ is the circular area (2-D hazardous area) centered at the base of a turbine having radius equal to the rotor-swept radius of the turbine (or proposed turbine). The expansion factor is dependent on the number of proposed turbines as well as the proposed rotor diameter.

Based on meteorological data for the area, a conservative estimate of 4,465 annual operating hours (total daylight hours in this location) was used with which to predict eagle exposure. Table 3-4 provides details on the seasonal Expansion Factors that were assumed for the risk model.

Table 3-4 Estimated expansion factor (*ε*) by season at the Project

Variable	Winter	Breeding	Fall
9) Hours per season	1142.175	2184.84	1137.409
10) Rotor radius (meters)	55.00	55.00	55.00
11) Turbine Hazardous Area	0.010	0.010	0.010
12) Number of turbines	39	39	39
13) Expansion Factor (Line 9 x Line11 x Line 12)	423.324	809.766	421.557

Collision Probability

The collision probability, *C,* is the probability of an eagle colliding with a turbine given exposure in the hazardous area, where all collisions are considered to be fatal. The prior distribution presented by USFWS was estimated using results taken from the Whitfield (2009) study of avoidance rates. The *Beta* distribution is intended to model collision probabilities across all sites considered for prediction of annual eagle fatalities. The USFWS collision probability prior distribution is given as:

Prior $C \sim$ Beta (v, v'), with parameters $v = 2.31$ and $v' = 396.69$.

The USFWS estimates the parameters for the collision probability prior distribution using results from the Whitfield (2009) study of avoidance rates, including Golden Eagle data from four wind facilities: Altamont, Tehachapi, San Gorgonio, and Foote Creek Rim Wind Resource Areas. Based on the limited understanding of Bald Eagle and wind facility interaction and the fact that the model is based primarily on Golden Eagle data at projects using older turbine

technology, it is probable that the model generates conservative estimates of Bald Eagle collision probability (i.e., may overestimate take); however, it is difficult to evaluate this point because so few Bald Eagles have been taken at wind projects and therefore the relationship of fatality rates to preconstruction use is less clear.

Predicted Annual Fatalities

The distribution of predicted annual fatalities can be estimated as the product of the expansion factor, the exposure rate posterior distribution, and the collision probability distribution:

$$F = \varepsilon \cdot \text{posterior } \lambda \cdot \text{prior } C.$$

The distribution of estimated annual fatalities is used to obtain statistics such as estimates for the mean, standard deviation, and 80th credible interval of annual fatalities.

Credible intervals (i.e., Bayesian confidence intervals) were calculated using a simulation of 10,000 Monte Carlo draws from the posterior distribution of eagle exposure (λ) and the collision probability distribution over 5 years of simulated project activity (*C;* Manly 1991). The product of each of these draws, with the exposure area corresponding to turbine type, was used to estimate the distribution of possible fatality at the Project annually. Following the ECPG, the mean and upper 80-percent credible interval limit were used to predict annual fatality rates at the Project.

A configuration-specific expansion factor is included to account for the turbine hazardous area within the Project, which is multiplied by the seasonal eagle exposure rate listed in Table 3-3 to estimate the potential seasonal eagle-wind turbine interactions (minutes of flight within the turbine hazardous area). Expansion factors (ε) were calculated using the estimated annual operating time and the proposed turbine layout. The seasonal mean estimated eagle fatalities are shown in Table 3-5.

Table 3-5 Estimated Bald Eagle Fatalities at the Project

Variable	Winter	Breeding	Fall	Annual
Estimated mean seasonal Bald Eagle fatalities	0.22	0.38	0.19	0.79
Estimated Bald Eagle fatalities (Upper 80th)	0.33	0.56	0.28	1.05
Total Requested Take (30 Year Term)	32			

Based on the assumptions and input described above, the annual mean predicted Bald Eagle fatality rate is 0.79 fatalities per year (Table 3-5). The upper 80-percent credible interval provides a conservative prediction of facility-wide Bald Eagle fatalities in one year, which for this Project is estimated at 1.05 Bald

Eagles. The conservative five year fatality rate is therefore 6 Bald Eagles (1.05 x 5 = 5.25, rounded up), and a conservative 30-year fatality rate for the permit term is up to 32 Bald Eagles (1.05 Bald Eagles per year x 30 = 31.5, rounded up).

3.4 Discussion

The estimated annual mortality rates are a function of the Project-specific turbine specifications and layout, in addition to data collected during the Stage 2 assessment regarding Bald Eagle activity within the Project area. The results of this model likely represent an overestimation of annual eagle mortality. Overall, Bald Eagle fatalities as a direct result of wind turbines are relatively rare.

Based on the 80-percent credible interval predictions for the Project, the Owner is requesting a permit for the incidental take of up to 32 eagles over the duration of the 30-year take permit requested for the Project. Over any 5-year review interval, the model predicts that up to 6 Bald Eagles (1.05 x 5, rounded up) could be taken. The adaptive management approach (Section 6) has been developed to assess impacts to eagles at the Project, and 5-year check-in periods have been established to evaluate whether the estimated take indicates that the Project is on track to stay within the authorized take level, or whether additional avoidance or minimization measures may be warranted.

As with any model, there is some degree of uncertainty in the results. The model represents a general estimation of Bald Eagle mortality based on parameters used in the model and assumptions that the model is built upon. While the model suggests that approximately one Bald Eagle fatality will occur every year, it does not mean that these incidents will actually occur.

Golden Eagles were not observed in the Project area during 214 hours of surveys. As described in Section 1.8, Golden Eagles are only a rare winter migrant to the area and there have been only six incidental observations of Golden Eagles in Stearns County since 1999. Given there were no observations of Golden Eagles during the Project surveys and risk to this species is considered discountable, the USFWS's Bayesian model was not applied for an estimate of Golden Eagle fatalities.

The results from Stage 3 of this ECP are used to develop avoidance, minimization, and conservation measures to best address the potential adverse impacts that the Project may have on eagle populations.

Section 4

Stage 4 – Avoidance and Minimization of Risk Using Conservation Practices

4.1 Introduction

Based on the Project location, the number of active Bald Eagle nests within 11 miles of the Project area, and the results from Stages 2 and 3, the Project can be classified as a Category 2 site with the use of appropriate avoidance and minimization measures. A Category 2 site poses a moderate to high risk to eagles, but also carries a moderate to high opportunity to mitigate such impacts via implementation of avoidance, minimization, and conservation measures (USFWS 2013a).

Stage 4 of this ECP includes a review of avoidance, minimization, and conservation measures that will be implemented in an effort to reduce adverse impacts to Bald Eagles and a voluntary monetary contribution to conservation projects intended to benefit regional Bald Eagle populations.

Additionally, this section documents how the Project meets the criteria laid out in the 2016 PEIS for the Eagle Rule Revision for projects that qualify for tiering and associated streamlined review.

4.2 Conservation Measures

Applicants for incidental eagle take permits are expected to implement reasonable avoidance and minimization measures that may reduce take of eagles at a project to the maximum extent practicable (USFWS 2016), through the use of avoidance, minimization, and conservation measures.

The ECPG indicates that "there are no conservation measures that have been scientifically shown to reduce eagle disturbance and blade-strike mortality at wind projects" (USFWS 2013a). However, the USFWS indicates the best way to obtain needed scientific information is to work with the wind industry to develop avoidance, minimization, and conservation measures for wind projects as part of an adaptive management regime tied to the take permit process (USFWS 2016).

The ECPG lists several examples of conservation measures, which are intended for the developer to consider based on project-specific issues. Pertinent conservation measures are included here, and these practices will be further developed in coordination with the USFWS and DNR.

In consideration of the examples provided in the ECPG and what is already included in the Project ABPP, the following measures were developed to help avoid and minimize environmental impacts, including those to Bald Eagles, through the design, construction, and/or operation phases of the Project. Table 4-1 includes a summary of measures that the Project has already developed, is currently implementing, or has committed to as explained in detail below.

Table 4-1 Summary of Avoidance, Minimization, and Conservation Measures

Measure	Project Phase		
	Design	Construction	Operation
Project Siting	●		
Minimize Footprint	●		
Turbine Arrays	●		
Turbine Model	●		
Personnel Education		●	●
Project-Related Traffic		●	●
Existing Roads		●	
Avian Safe Power Lines			●
Met Tower Markers			●
Flight Diverters			●
Project Speed Limit		●	●
Eagle Nest/IEUA Monitoring		●	●
Road Kill Removal		●	●
Livestock Carcass Removal		●	●
Minimize Attracting Prey		●	●

Project Siting

There were multiple decisions made and actions taken during the design phase related to Project siting with the intention to avoid and minimize potential avian impacts including those to Bald Eagles. The design phase for the Project is complete and all turbine locations were selected in accordance with the following siting considerations:

- The Project was sited within agricultural lands to the extent practicable, thus reducing impacts to grassland and wetlands that may be either directly or indirectly utilized by Bald Eagles.
- Turbines were sited as far as possible from the active Bald Eagle nest (Padua nest), with a minimum setback of 1.0 miles.
- Turbine arrays were also designed to avoid known critical avian corridors to the extent feasible with direction from Minnesota DNR, most notably

the flight path between the Padua WMA, the site of the active Bald Eagle nest, and the Trisko WPA, a potential foraging area to the north. This turbine avoidance area can be seen in Figure 1-2 and is generally the area between WTG's B18 and B19. Please refer to the ABPP for avian flight paths detected (Figure 4 and Figure 5) during previous avian studies conducted at the site.

- The turbine model selected was based on minimizing the overall footprint of the Project while maintaining desirable efficiency. Originally slated for 54 turbines, the Owner selected a model that would reduce the number of turbines to 39, in part as an effort to reduce potential avian flight obstacles.

Project Personnel Education

As included in the ABPP, an Owner's Environmental Coordinator (OEC) will oversee environmental compliance and education for the overall Project, and the main construction contractor was the lead entity during the construction phase. An Eagle Awareness Training was held at the Project on January 18, 2017, where Project operations personnel were educated on general awareness of eagle issues, eagle identification, nesting locations, potential nesting habitat, and avoidance measures to avoid disturbing the active eagle nest closest to the Project area near the Padua WMA. All construction and operations Project personnel will be educated as to the issues that the Project could potentially have with Bald Eagles in addition to the steps that personnel will be expected to take to minimize (to the extent achievable) potential impacts to Bald Eagles, such as removal of animal carcasses and proper disposal of trash that could attract foraging eagles.

Project Traffic and Nest Avoidance

During the construction period, heavy trucks, light trucks, and other construction equipment accessed construction sites via existing county and gravel roads in an effort to minimize eagle nest disturbance. Specifically, County Road 28 between County Road 18 and 425 Avenue (Queensfield Road) was avoided during the 2016 breeding season (approximately February – August) to the maximum extent achievable to minimize disturbance of the Padua nest.

Dedicated alternate travel routes around the Padua nest were discussed with all construction personnel before Project construction commencement.

During the operational phase of the Project, traffic volume will be insignificant, consisting mainly of routine trips by technicians to check and maintain wind generation and transportation equipment (BOGY 2012). Further, based on the turbine array, Project-related travel on County Road 28 between County Road 18 and 425 Avenue (Queensfield Road) will be minimal as turbine access roads are not located on this stretch of road. Post-construction monitoring will be conducted by trained biologists along publicly accessible roadways within the Project.

Use of Existing Roads

The Owner designed the Project to use existing roadways to the maximum extent achievable, which will limit impacts to habitats throughout the Project area. The transmission line from the new substation to the existing switchyard follows existing county roads its entire length and is bounded primarily by agricultural fields.

Avian Safe Power Lines

The collection lines are constructed underground, with the exception of a riser pole at the Project substation, while the transmission line is constructed above ground. In an effort to minimize potential impacts to raptors, especially eagles in the Project area, overhead electric transmission lines and riser poles were built to Avian Power Line Interaction Committee (APLIC) standards for separation. Lines have a horizontal separation of 60 inches and a vertical separation of 40 inches between phase conductors or between a phase conductor and grounded hardware (APLIC 2012).

Met Tower Markings

The permanent met tower at the Project does not have guy wires, and is marked for high visibility, to minimize the potential for avian collisions.

Flight Diverters

Bird flight diverters are pre-formed, spiral-shaped devices made of polyvinyl chloride that are wrapped around overhead lines and designed to increase the lines' visibility.

In its comments on the Getty Wind portion of the Project, the USFWS recommended that bird diverters be installed on any aboveground collector, feeder, distribution, or transmission line to minimize the potential for bird collisions with aboveground electrical lines (USFWS 2012b). The site permits for both Black Oak Wind and Getty Wind contain a special condition requiring the Owner to install bird flight diverters on any overhead feeder lines within or adjacent to delineated wetland areas and waterways (PUC 2013a and 2013b). Flight diverters were installed at approximately 20-foot intervals along the overhead 69-kV transmission line at locations where the transmission line crosses Public Water Inventory streams. Flight diverter spacing appear as 20-foot intervals, when viewed from the side.

Project Road Speed Limits

All construction-related traffic was subject to a 25-mile per hour speed limit within the Project. Additionally, during the operational phase, a speed limit of 25 miles per hour will be established for Project turbine access roads, unless an otherwise lower speed limit is posted. This speed limit policy is for the life of the Project and includes only Project related personnel. All non-Project related vehicles will adhere to posted speed limits. This practice is included in the

Project ABPP and is intended to reduce vehicular collisions with wildlife, thereby also reducing road kill, which could attract foraging Bald Eagles.

Eagle Nest Monitoring During Construction

The Owner continued to coordinate with USFWS regarding the monitoring of the known Bald Eagle nest near the Padua WMA during construction. As included in the ABPP, the Owner committed to further monitoring if the Padua nest (or any new Bald Eagle nest within one mile of construction activities) was documented as occupied and active during the breeding season (April 15 and August 15, 2016) throughout construction. A total of over six hours of observation were conducted by WEST biologistis at the Padua nest in 2016: two hours on March 6 and over four hours on March 22. During the March 6 site visit, no eagle activity was seen or heard in the vicinity of the Padua nest. On the March 22 site visit, at least two Bald Eagles were documented flying in the vicinity of the Padua nest (at least one adult and one juvenile), indicating that the nest territory is likely occupied and the nest was likely active again in the 2016 season. Because the nest is located on private property that the Owners do not have access to, and the nest is not visible from public access points, WEST was unable to confirm the activity status (or continued existence) of the nest; but given the documented history of the nest being active in multiple recent years, the presence of Bald Eagles in the vicinity was taken as strong evidence that the nest was present and occupied during the 2016 breeding season. The topography, location of wooded habitat and intervening distance between the closest Project facilities and Padua nest were anticipated to prevent construction activities from disturbing the nest. The Owner provided the results of the Padua nest monitoring to the USFWS on March 31, 2016, and the USFWS responded on the same day agreeing that neither a biological monitor nor a disturbance permit was needed for this nest during the construction phase.

No other Bald Eagle nests were identified within a mile of the Project in 2016. During operation, the OEC will coordinate with USFWS and DNR regarding the status of the Padua WMA eagle nest as well as any additional nests that could occur in the future. See the Adaptive Management section for information regarding eagle nest monitoring during the operations phase.

Road Kill Removal

Animal carcasses and any animal parts (carcass remains) detected by Project personnel on or near Project access roads during the construction and operation phases will be removed within 24 hours of discovery to prevent the attraction of scavengers or other wildlife that may serve as prey to raptors. When possible, road kill will be held in an enclosed container until arrangements have been made with Stearns County Public Works department on proper disposal. For deer carcasses in particular, handling and disposal of remains will follow any current MNDNR guidelines applicable to Stearns County with regards to managing chronic wasting disease. Project personnel are trained to contact county or state agencies when animal carcasses are observed along county and state roads. Stearns County Public Works is responsible for removing road kill on county

roads. Removal of animal carcasses from roadsides could help prevent Bald Eagle mortality from vehicle collisions and prevent drawing scavenging Bald Eagles to the general Project area, thereby also minimizing collision risk with Project turbines. To date, wildlife carcass remains have been documented and removed on Project access roads by operations staff once; additionally, carcasses have been documented as part of formal third-party post-construction fatality studies conducted in 2017, 2018 and 2019.

Livestock Carcass Removal

Livestock farms are situated throughout the Project footprint. The Owner has coordinated with participating Project landowners to develop a plan to promptly remove dead livestock from fields in and/or near the Project area. To date, the Owner is not aware of any livestock carcasses that have been left in the vicinity of turbines and there have been no issues with carcasses attracting Bald Eagles. However, as necessary, Minnesota carcass disposal experts are available for assistance.

Carcass disposal expert for Stearns County: Brian Ziemer
651-769-3827
brian.ziemer@state.mn.gov

Participating landowners who raise livestock within or near the Project boundary have been advised of the potential for impacts to eagle or other raptor species attracted to carcasses in a wind project area. As standard practice, the Owner will remind the participating landowners of the importance of prompt livestock carcass disposal on regular intervals, and will include that in the agenda for recurring landowner meetings that are anticipated to occur at least once a year.

Minimize Attracting Prey

During the construction and O&M phase of the Project, all trash and food items will be disposed of properly in predator-proof containers with resealing lids. Trash will be emptied and removed from the Project area on a periodic basis. Removal of trash from the Project area will reduce the attractiveness of the area to opportunistic predators and scavengers that may serve as prey to eagles. In addition to trash disposal, other prey attractants will be minimized when practicable, such as the seeding of forbs (potential food source which will not be used for replanting below turbines), and minimizing storage of Project-related equipment near turbines, which may serve as potential perching media or refuge for potential prey.

4.2.1 Voluntary Conservation Project(s) to Offset Potential Take

Currently, there is much uncertainty about the vulnerability of Bald Eagles to wind turbine collision. Current assessment models use collision risk estimates developed for Golden Eagles which are considered more vulnerable to wind turbine collision than Bald Eagles. Therefore, current assessment models are believed to result in conservative estimates for Bald Eagles. Nevertheless, the

analysis included in this document estimated average annual Bald Eagle fatalities for this project of 0.79 Bald Eagles per year with an upper 80-percent credible interval of 1.05 Bald Eagles. Even at the upper 80-percent credible interval, this level of take is well below the local-area 5% mitigation benchmark (and is in fact less than the 1% benchmark), as described further in Section 4.3. This suggests that the Bald Eagle population could sustain this level of take without adverse impacts to the local population.

Despite the fact that compensatory mitigation is not required, the Owner plans to voluntarily contribute to ongoing eagle conservation projects to assist in offsetting the potential take of Bald Eagles as a result of the Project by providing funds towards conservation activities that aid the Bald Eagle population. The Owner will donate $14,000 for use by:

- a local rehabilitation center actively involved in the treatment, rehabilitation, and re-release of wild eagles to the local/regional eagle population (e.g., such as the Raptor Center at the University of Minnesota);
- a local non-profit environmental organization actively involved in educating the public on the negative impacts of lead in the environmental on eagles and other wildlife; and/or
- a local non-profit environmental organization actively involved in making non-toxic (lead-free) fishing tackle available to local anglers.

As long as the total mitigation contribution does not exceed the funds committed to above, the Owners are also open to considering other acceptable uses for mitigation funds. In discussions with the USFWS, this could include directing mitigation dollars towards power pole retrofits to minimize eagle electrocution risks, habitat protection/enhancement, or road kill carcass removal programs to reduce risk of eagle-vehicle collisions. Similar voluntary contributions will be made available to eagle conservation projects on 5-year intervals. The exact amount of voluntary contribution as well as the recipients will be reviewed during the five-year check-ins, and changes may be made by the Owner based on the results of post-construction monitoring.

4.3 Review of Compliance with Tiering Criteria

4.3.1 Introduction

The 2016 PEIS states that the USFWS anticipates tiering subsequent reviews for site specific projects off of the PEIS, which would involve a streamlined review, including a summary of the issues discussed in the PEIS and incorporation by reference of appropriate analysis included in the PEIS (USFWS 2016). This tiering approach is stated as being appropriate when a specific project meets the following three criteria:

a) The project "will not take eagles above the eagle management unit take limits (unless it is offset)";
b) The project "will not result in cumulative authorized take within the Local Area Population (LAP) exceeding 5%"; and
c) The project "will fulfill their compensatory mitigation requirements via methods that will offset the take."

The Project meets all three of these criteria, as described further below, and therefore qualifies for tiering to the PEIS. Appendix D of this ECP provides additional information on how and whether the pre-construction surveys for the Project followed the survey protocols described in Appendix C and D of the ECPG, and requests confirmation from the USFWS that the Project qualifies for a waiver from strict conformance with these protocols.

4.3.2 Eagle Management Unit Take Limits

The allowable annual threshold of Bald Eagle take in the USFWS Mississippi Flyway eagle management unit is 1,640 eagles (USFWS 2016). This sustainable annual take is based on the predicted population of Bald Eagles in this geographical area (27,334 for Mississippi Flyway) in conjunction with the harvest threshold for estimated annual production of the population (6.0%; USFWS 2016).

The Owner's proposed estimated annual level of take at the Project, 1.05 eagles, is less than 0.01% of the overall take limit for the Mississippi Flyway eagle management unit. The Project therefore meets the first criteria for tiering to the PEIS because it does not result in take above the eagle management unit take limits.

4.3.3 Local Area Population Take Thresholds

To determine if the Project's impact on the local-area Bald Eagle population is biologically problematic, local-area 1% and 5% benchmarks were calculated (Table 4-2). This section is a summary of the USFWS' local-area population as estimated by the USFWS' Cumulative Effects Tool as provided to the Owner on October 10, 2019; the USFWS' EA will include the official local-area assessment as well as more details on potential cumulative effects and known permitted and unpermitted take. The local-area population of Bald Eagles is that number of Bald Eagles within a 86 mile radius of the turbines, or 1,254 Bald Eagles according to the USFWS' Cumulative Effects Tool output dated October 10, 2019 (see Figure 4-1 and Table 4-2). This population estimate is based on the median distance eagles disperse from the nest where they are hatched to where they settle to breed (USFWS 2016), and takes into account the portion of the 86-mile radius local-area that occurs within the Mississippi Flyway/Great Lakes Region (97%) and the Central Flyway/Rocky Mountains and Plains Region (3%) and their associated eagle densities and known information on nests that is contained in the USFWS' October 10, 2019 Cumulative Effects Tool output. Take rates between 1% and 5% of the estimated local-area eagle population size are considered

sustainable by USFWS, with 5% being at the upper end of what might be appropriate under the BGEPA preservation standard (USFWS 2013a) as well as one of the criteria considered when determining if a project can tier to the PEIS.

The conservative estimated level of take for the Project is 1.05 Bald Eagles per year. This level of estimated annual take represents 0.1% of the total local-area population of 1,254 Bald Eagles (as based on USFWS' Cumulative Effects Tool output from October 10, 2019). This level of take, should the USFWS authorize it, is far below the 5% threshold at the local-area level. Furthermore, the Project Owner is not aware of any wind projects that have obtained or applied for an incidentaltake permit for Bald Eagles within the Project's local-area population; therefore it is anticipated that this project will not result in cumulative authorized take within the LAP exceeding 5%, therefore meeting the tiering criteria.

The USFWS conducted a Cumulative Effects Analysis on this Project to look at other permits issued in the local-area population of this wind facility. There is overlapping permitted take of 5.87 eagles a year (0.47% of the local-area population). If the Project is permitted with 1.05 bald eagles/year, this will be a cumulative impact of 0.55% of the local-area population, which is well within the USFWS benchmark for permitted take.

4.3.4 Compensatory Mitigation Requirements

As stated above, the estimated annual take at the Project represents 0.1% of the total local-area population of 1,254 Bald Eagles and is well below the 1% sustainable annual take of the local-area population. Therefore, the Project is not required to provide compensatory mitigation.

As described in Section 4.2, the Owner is voluntarily donating to ongoing eagle conservation projects to assist in offsetting the potential take of Bald Eagles as a result of the Project. In addition, as Bald Eagle populations continue to increase in Minnesota and the Mississippi Flyway eagle management units, the level of take predicted by the conservative USFWS collision risk model for this Project is likely to stay well within the sustainable threshold for the regional Bald Eagle population for the foreseeable future. Therefore, the Project meets the third criteria for tiering to the PEIS.

Table 4-2 Calculated Local-area Annual Take Benchmarks

BAEA Management Unit	Region[a]	Maximum Take Rate (% local-area population per year)[b]	Local-area Population[c]	Local-area 5% Benchmark (eagles per year)[d]	Local-area 1% Benchmark (eagles per year)[e]
Mississippi Flyway	Great Lakes	5.0	1,251.8	62.3	12.5
Central Flyway	Rocky Mountains and Plains	5.0	2.1	0.1	0.02
Total			**1,253.9**	**62.7**	**12.5**

[a]Populations taken from USFWS' Cumulative Effects Tool Output Dated December 5, 2017.
[b] USFWS upper benchmark for Bald Eagle take at the local-area population scale.
[c] Local-area population , as calculated by USFWS LAP Tool.
[d] Local-area 5% benchmark = (local-area population) * 0.05.
[e] Local-area 1% benchmark = (local-area population) * 0.01

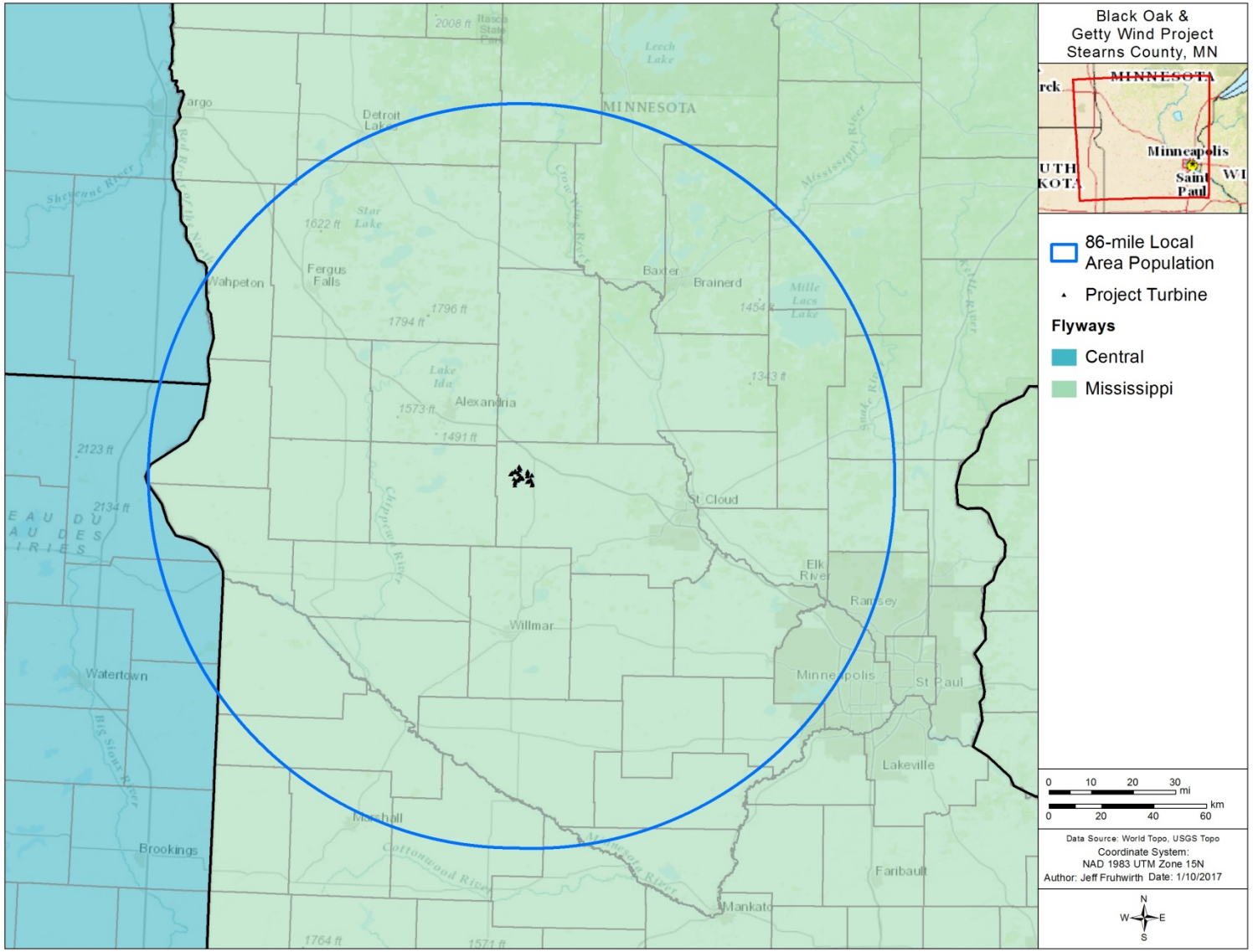


Figure 4-1 Bald Eagle Local-area Population

Section 5

Stage 5 – Post-Construction Monitoring and Continued Risk Assessment

5.1 Post-Construction Mortality Monitoring

In accordance with the Site Permits issued by the PUC (PUC 2013a, 2013b), the Owner has conducted two years of post-construction avian and bat fatality surveys at the Project. These surveys, which occurred in 2017 and 2018, consisted of cleared plot searches at five turbines in 2017 and four turbines in 2018 and road and pad searches at the remaining turbines, focusing on bat fatality and all-bird fatality estimates (Pickle et al. 2018; Pickle et al. 2019); in 2017, the Owner voluntarily conducted eagle scans as well. No injured eagles or eagle remains were documented during either year of these surveys .

As Appendix A details, the Owner proposes to conduct two years of third-party eagle fatality monitoring at the Project after an eagle take permit is received. All of the turbines will be surveyed twice a month, during which the third-party surveyor will visually scan the area around all directions of the turbine to a distance of 150 m. Due to the relatively flat terrain of the Project and the relatively large size of eagles (i.e., eagle remains will be visible from relatively far distances), plots will not be cleared and transects will not be walked; instead the 150 m area will be visually scanned from around the turbine. As described further in Appendix A, scans will not occur during the summer when crops are anticipated to inhibit visibility; if some turbines continue to have acceptable visibility through the summer, scans will continue. Specific search efficiency trials and carcass persistence trials using raptor carcasses as available (and as permitted through a Special Utility permit which the Owner plans to renew as needed) will be used for these surveys.

This eagle mortality monitoring will assist in establishing the Bald Eagle fatality rates for the Project and allow for comparison to the predicted rates per the USFWS collision risk model.

At the end of Year 2 of the Permit Term, the Owner's O&M staff will be trained, by the third-party monitors, on the eagle monitoring protocol that will be implemented in Years 3, 4 and 5. In Years 3 through 5 of the Permit Term, the Owner's O&M staff will visit each of the operating turbines on a quarterly basis and inspect roads, pads and any other area visible by binoculars (out to

approximately 150-m) from a vehicle. The frequency and number of turbines visited may be increased or reduced if deemed appropriate after the first two years of O&M monitoring.

Prior to implementing an O&M staff monitoring program, O&M staff searcher efficiency will be tested by a third-party (e.g., as part of the formal two-year fatality monitoring program described in Section 1.a). These searcher efficiencies (and carcass removal rates measured during the two-year third-party fatality monitoring program) will then be used on a yearly basis along with the number of eagles discovered during monitoring to estimate overall actual eagle fatality numbers.

For the remaining 25 years of the permit term, third-party monitoring will occur at five year intervals for the operational life of the Project (Years 6, 11, 16, 21 and 26), following the same general approach as described in Appendix A for the first year. In the years when third-party monitoring is not conducted in the remaining 25 years, operations staff will visit each turbine regularly; during visits, the staff will inspect roads, pads and any other cleared area in the immediate vicinity of turbines visible from their vehicle. Any eagle remains or injured eagles that are discovered by operations staff or incidentally observed will be reported. Appendix A provides more detail on the proposed approach to post-permit eagle fatality monitoring.

5.2 Reporting

If eagle remains or an injured eagle are discovered, the Owner will immediately contact the USFWS's Office of Law Enforcement and report the take to the USFWS Migratory Bird Office. If the eagle is injured, the Owner will coordinate with the Office of Law Enforcement and the USFWS Migratory Bird Office. If USFWS personnel are not immediately reachable, the Owner will implement the appropriate actions for transporting the injured eagle to the nearest licensed rehabilitation center; this will typically consist of contacting the rehabilitation facility in order to coordinate safe pick up and transport by permitted personnel. Additionally, the PUC and DNR will be notified within 24 hours of identification. A take data sheet will be completed and include the following information per the ECPG (USFWS 2013a):

1. Date and time of discovery.
2. Species.
3. Age and sex when possible.
4. Band number and notation if wearing a radio-transmitter or auxiliary marker.
5. Observer name.
6. Turbine or pole number or other identifying character.
7. Distance of the remains from the turbine or pole.
8. Azimuth of the remains turbine or pole.
9. Decimal-degree latitude-longitude or Universal Transverse Mercator (UTM) coordinates of the turbine or pole and remains.

10. Habitat/ground cover surrounding the remains.
11. Condition of the remains (entire, partial, scavenged).
12. Description of the remains (e.g., intact, wing sheared, in multiple pieces).
13. A rough estimate of the time since death (e.g., ≤ 1 day, > a week), and how estimated.
14. A digital photograph of the remains.
15. Information on remains disposition.

The Owner will provide a written annual report to the USFWS and DNR detailing the post-construction monitoring and results following each year of intensive fatality monitoring.

5.3 Wildlife Incident Reporting System (WIRS)

Since commissioning, the Project has employed the site-specific Wildlife Incident Reporting System (WIRS). The WIRS is designed to provide a means of recording avian and bat casualties found in the Project to increase the understanding of wind turbine and wildlife interactions. The WIRS provides a set of standardized instructions for the Project personnel to follow in response to wildlife incidents in the Project area. Each incident will be documented on a data sheet and reported by Project personnel to the OEC. The data will be logged into and maintained within a tracking spreadsheet by the Project environmental affairs staff, and regular review of the reported incidents will be undertaken by the same staff. Site personnel are required to receive training on WIRS procedures as well as how to complete and submit the WIRS report.

The long-term operational effort will consist of managerial, operations, and maintenance staff documenting and reporting fatalities discovered during the course of wind farm operation.

Quarterly reports are due to the PUC by the 15th of each January, April, July, and October, commencing the day following commercial operation and terminating upon the expiration of the permits. Each report will identify any dead or injured avian and bat species, locations of the find, and the date the species was discovered. A geographic information system (GIS) will also be used to generate maps and identify problem areas by tracking the specific locations where fatalities occur. Issue rectification and WIRS design configurations will also be tracked.

Section 6

Adaptive Management

Adaptive management is an iterative process implemented throughout the operational life of a project, which allows for continuous improvement regarding decisions and actions taken in an effort to avoid or minimize impacts to eagles. For the Project, adaptive management will consist of a program designed to monitor and assess impacts to eagles at the Project and an iterative process of assessing and implementing additional avoidance and minimization measures should results of the monitoring indicate that such additional measures are warranted.

Over the course of the life of the Project, eagle use patterns of the site may change, eagle populations may increase, risk management measures may evolve, and improved monitoring and mitigation measures may become available. The Owner commits to revisiting this adaptive management plan with the USFWS at every 5-year review to ensure that the best strategies for avoiding and minimizing eagle take are being implemented. Should both parties agree that modifications to this plan are warranted, such modification can occur as long as permit conditions are met.

Table 6-1 provides the adaptive management framework associated with estimated take that would be implemented for the Project. The Owner will follow responses described in Table 6-1 when the associated threshold is met; while the Owner is committed to following the processes described at each response level (assessing the specific cause of risk, consulting with the USFWS to determine the appropriate response), the specific corrective response (for example carcass removal, additional monitoring, implementation of additional conservation measures) cannot be proscribed at this time because that response will be determined through evaluation of the specific data relevant to the eagle take and through coordination with the USFWS to determine the most appropriate response at each level.

Table 6-1 Adaptive Management Guidelines*

Level	Threshold or Trigger	Adaptive Management Response
1	One eagle fatality estimated** within a 5 year period	• Continue implementation of ECP; assess the cause or likely contributing risk factor(s) to the eagle fatality and whether a management response is warranted and/or feasible; and • if warranted, develop a timeline for possible management response
2	Up to five eagle fatalities estimated** within a 5-year period	• Level 1 adaptive management responses; • Evaluate cumulative monitoring effort to date to assess if take estimate is inflated by limitations in survey design; and • consult with the USFWS to help determine if: o additional monitoring or change in monitoring design is warranted (if the estimate appears to be inflated by previous survey design limitations) o immediate response or management action is needed such as removal of a livestock carcass or refuse pile that is attracting eagles to a particular turbine; and/or o a longer term action plan or management response plan should be developed and implemented, such as additional carcass removal or landowner carcass disposal outreach efforts to minimize the presence of eagle attractants within the project; and • develop a timeline for each management response including check-ins and benchmarks, as well as measures to determine if the response has been successful
3	Six or more eagle fatalities estimated** within a 5-year period	• Level 1 and 2 adaptive management responses; • as appropriate and in consultation with the USFWS, implement and test the effectiveness of additional conservation measures to further avoid or minimize risk to eagles; and/or • consult with the USFWS on the option of amending the permit to increase the take level; and • develop a timeline for each management response, including check-ins and benchmarks, as well as measures to determine if the response has been successful

*Note: this table will be updated at 5-year intervals if appropriate. Because 5-year check-ins may adjust the permitted number, the number of eagle fatalities that trigger a change in action may also change. However, the adaptive management responses will stay the same.

** USFWS will estimate via Evidence of Absence using monitoring results, at the median (50th) level at five year periods. These triggers will also be evaluated immediately (within the same season) following the discovery of any eagle remains documented at the site; for example, if two Bald Eagle carcasses are documented during third-party or O&M monitoring season, in addition to reporting the remains to the USFWS per Section 5.2, the responses and processes described in Level 2 of this table would be followed, regardless of when the next official five year evaluation period would occur.

As described in Table 6-1, at Level 3, the Owner will consider the implementation of additional conservation measures (beyond those discussed in Section 4.2) that might include:

- seasonal, daily, spatially, or weather-related turbine shut-downs (targeting "problem" turbines);
- detect-and-curtail systems through the use of biomonitors, radar, or camera imaging systems (or other available systems) that could be used to identify at risk eagles and shut-down or slow turbine operations; or
- detect-and-deter systems that might detect eagles and use sound, light, or drones to deter eagles from the area, pending USFWS approval and legal feasibility.

Costs for implementation of any additional conservation measures would not be open ended, and would be subject to practicable considerations. The Owner will discuss with the USFWS additional measures to implement to reduce risk to eagles at the site if any of the triggers in Levels 2 or 3 in Table 6-1 are met, as well as the associated cost and practicability of such measures. Such measures would be implemented in a manner that attempt to specifically addresses the root cause(s) of take. For example, if take has only been documented during the winter months, additional measures may only be implemented during the winter months at the site. Or, if take has only occurred in one area of the site, additional measures would only be implemented in those areas where take has previously occurred. For Level 3 responses, as noted in Table 6-1, the Owner would test the effectiveness of any additional conservation measures; if the measure is proven effective, the Owner would continue to implement the measure as long as the specific risk it was designed for is still present at the Project. Additionally, as noted in Table 6-1, the Owner may discuss with the USFWS the possibility of amending the permit to allow for additional take, if the local-area bald eagle population has increased or other risk factors (such as nest density in the Project area) change to the point that bald eagle risk increases beyond what was analyzed during the initial permit issuance review.

In addition to the adaptive management framework described above, any new Bald Eagle nest that is documented within 1 kilometer of turbines will be reported to the USFWS and checked for activity status during the breeding season by trained on-site personnel. Depending on the specifics of the nest (proximity to turbines, any specific risks identified by the USFWS or by monitoring), further monitoring such as utility/flight path mapping surveys may occur, through

coordination with the USFWS, so that further adaptive management responses, if appropriate, may be identified.

Over the life of the permit and Project it is also possible that conservation measures that were once deemed effective will later become obsolete and be replaced by more effective measures. Should the implementation of additional conservation measures above what is committed to in Section 4.2 be necessary, and should more effective measures be identified that would reduce risk to a greater degree than existing, the Owner may propose revising the adaptive management strategy to the USFWS.

Section 7

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