U.S. Fish and Wildlife Service

Draft
Environmental Assessment
for the Issuance of an Eagle Take Permit for Courtenay Wind Farm

North Dakota

Docket Number FWS-R6-MB-2017-N185

Prepared by:
U.S. Fish and Wildlife Service Mountain-Prairie Region
Division of Migratory Bird Management
134 Union Boulevard, Lakewood, Colorado 80228
Contact: FW6WindEnergy@fws.gov, 303-236-4770

May 2018

page intentionally left blank

Table of Contents

Chapter 1: Introduction 1
1.1 Project Background 1
1.2 Purpose and Need for the Federal Action 5
1.3 Federal Regulatory Framework 5
1.3.1 Bald and Golden Eagle Protection Act 5
1.3.2 Migratory Bird Treaty Act 6
1.3.3 Endangered Species Act (16 U.S.C. 1531 *et seq.)* 7
1.3.4 Tribal Trust Coordination 7
1.4 Scope of Environmental Assessment 8
1.4.1 Resources Evaluated 9
1.4.2 Geographic Extent 9
1.4.3 Resources Evaluated and Dismissed from Further Analysis 9
Chapter 2: Alternatives 11
2.1 Alternatives Analyzed in this EA 11
2.1.1 Alternative 1 – The USFWS does not issue a Programmatic ETP for the Project (No Action) 11
2.1.2 Alternative 2 –The USFWS issues a five-year Programmatic ETP based on the Applicant's ECP (Proposed Action) 12
2.2 Alternatives Considered but Eliminated from Consideration 13
Chapter 3: Affected Environment 14
3.1 Environmental Setting 14
3.2 Eagles 16
3.2.1 Pre-Construction Eagle Point Counts 16
3.2.2 Pre-Construction Raptor Nest Surveys 16
3.2.3 Post-Construction Eagle Nest Surveys 18
3.2.1 Eagle Prey Base Assessment 20
3.2.2 Known Bald Eagle Mortality at the Project 20
3.2.3 Eagle Management Units 20
3.2.4 Local Area Population Scale 21

Chapter 4: Environmental Consequences 24
4.1 Impact Analysis for Take of Bald Eagles 24
4.1.1 Approach and Methods 24
4.2 Effects Common to Both Alternatives 24
4.2.1 Direct and Indirect Effects 24
4.2.2 Bald Eagle Collision with Wind Turbines 24
4.2.3 Electrocution 26
4.2.4 Disturbance and Displacement 27
4.2.5 Eagle Mortality and Demographics 27
4.2.6 Local Effects 28
4.2.7 Other Indirect Effects of the Project 28
4.2.8 Other Priority Uses 28
4.3 Cumulative Effects 28
4.3.1 Courtenay Wind Project LAP Analysis 29
4.3.2 Bald Eagle LAP Analysis 30
4.3.3 Cumulative Effects on Native American Cultural Values 34
4.4 Assessment of Alternatives 35
4.4.1 Alternative 1 35
4.4.2 Alternative 2 36
Chapter 5: Summary of Environmental Consequences 38
Chapter 6: References 39
Chapter 7: Preparers and Contributors 43
7.1 USFWS 43
7.2 Tetra Tech, Inc. 43

List of Tables

Table 1. Eagle Nest Information from Pre-Construction Aerial Raptor Nest Survey for the Courtenay Wind Farm, North Dakota 2014 18
Table 2. Bald Eagle Nest Data from Post-Construction Aerial Eagle Nest Survey for the Courtenay Wind Farm, North Dakota 2017 20
Table 3. Predicted eagle fatalities per year given the final 100 turbine layout with a 50-meter blade radius for the Courtenay Wind Project, North Dakota. 26
Table 4. Estimated Bald Eagle Local Area Population (LAP) for the Courtenay Wind Project in Stutsman County, North Dakota. 31
Table 5. Known Bald Eagle Mortalities Within 86 Miles of the Courtenay Wind Energy Project, 2007-2016. 34

List of Figures

Figure 1. Courtenay Wind Farm Project Area 3
Figure 2. Courtenay Wind Farm Project Facilities 4
Figure 3. Courtenay Wind Farm Project Land Cover 15
Figure 4. Bald Eagle Nest Locations for the Courtenay Wind Farm Project 22
Figure 5. Bald Eagle Management Units for the Courtenay Wind Farm Project Location 23

List of Attachments

Attachment A: Courtenay Wind Farm Eagle Conservation Plan

List of Acronyms and Abbreviations

ACP	Advanced Conservation Practices
Applicant	Northern States Power Company–Minnesota, doing business as Xcel Energy
APLIC	Avian Power Line Interaction Committee
CRM	USFWS Collision Risk Model
BMP	best management practice
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
EA	Environmental Assessment
EACP	Experimental Advanced Conservation Practices
Eagle Act	Bald and Golden Eagle Protection Act
ECP	Eagle Conservation Plan
ECP Guidance	*Eagle Conservation Plan Guidance Module 1: Land-based Wind Energy, Version 2*
EMU	Eagle Management Unit
ESA	Endangered Species Act
ETP	Eagle Take Permit
LAP	Local Area Population
MBTA	Migratory Bird Treaty Act
NEPA	National Environmental Policy Act
O&M	operations and maintenance
Project	Courtenay Wind Farm
USFWS	U.S. Fish and Wildlife Service

Chapter 1: Introduction

The United States Fish and Wildlife Service (USFWS) has prepared this Environmental Assessment (EA) pursuant to the National Environmental Policy Act (NEPA) (42 USC §4321 et seq.). This EA evaluates the effects of issuing a five-year programmatic Eagle Take Permit (ETP) for non-purposeful take of eagles that is incidental to otherwise lawful activities under the Bald and Golden Eagle Protection Act (Eagle Act) (16 USC §668–668d; 50 CFR §22.26) associated with continued operation of the Courtenay Wind Farm (Project).

Northern States Power Company–Minnesota, doing business as Xcel Energy (Applicant) applied for a five-year programmatic ETP for the take of bald eagles related to the operation and maintenance of the Project. The Applicant's Eagle Conservation Plan (ECP), provided in Attachment A, is the foundation of the Applicant's ETP application. USFWS' consideration of whether or not to issue a five-year programmatic ETP is an action that is subject to NEPA. In this EA, the USFWS analyzes the risk of eagle take associated with operation of the Project and assesses the potential effects of permit issuance and a No Action alternative on the human and natural environment.

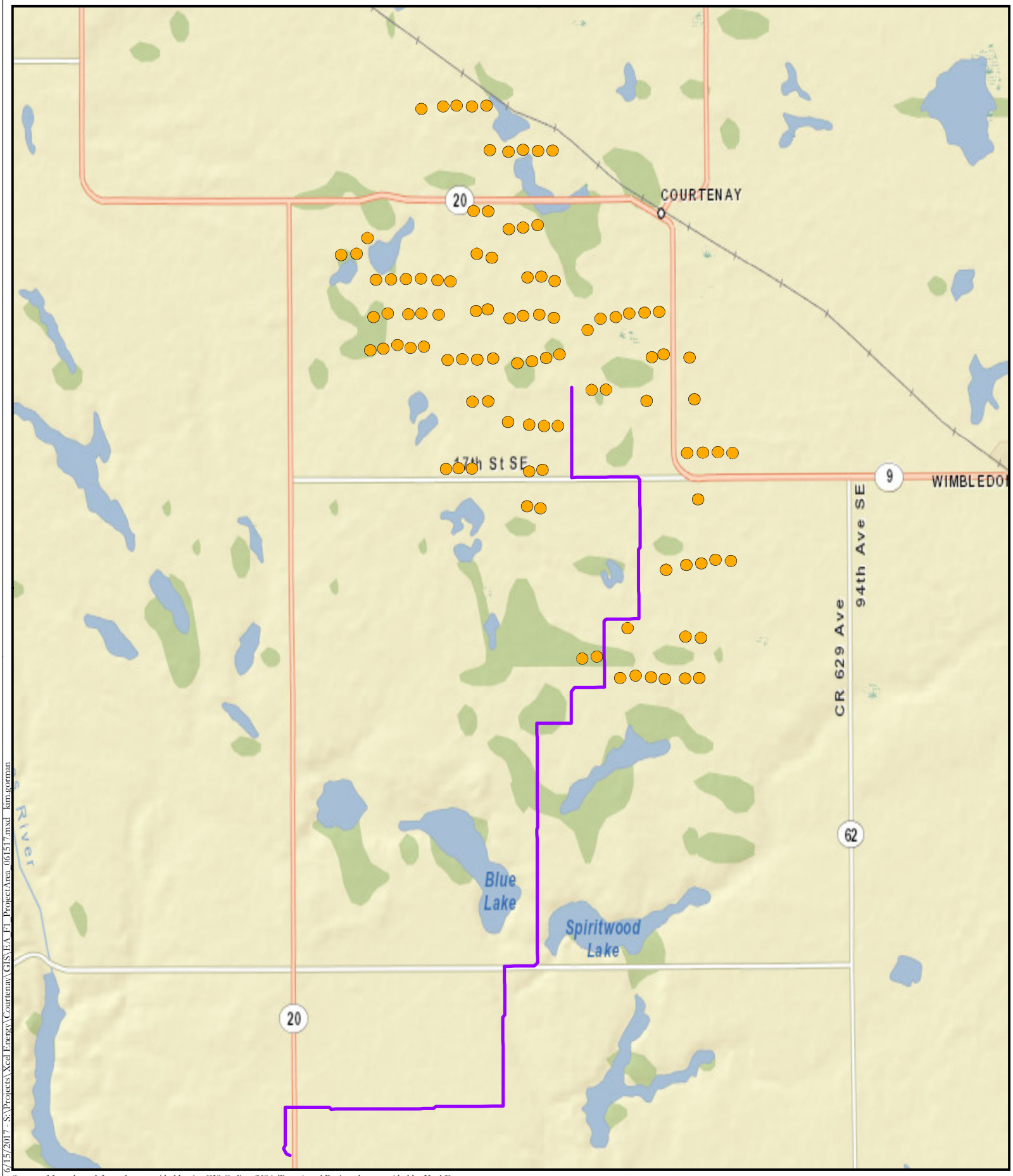
1.1 Project Background

The Applicant is currently operating and maintaining the 200.5 megawatt wind farm in Stutsman County, North Dakota, approximately 15 miles (24 kilometers) north of Jamestown, North Dakota, as shown on Figure 1. The Applicant purchased Courtenay Wind Farm, LLC in July 2015; however, coordination with USFWS in development of the ECP began prior to July 2015. A list of correspondence with USFWS for the Project is provided in Attachment A, Table 1.

The infrastructure components of the Project include: (1) 100 Vestas V100 wind turbines; (2) gravel access roads and improvements to existing roads; (3) underground electrical collection lines; (4) an operations and maintenance (O&M) building; (5) a collection substation; (6) one permanent meteorological tower; and (7) a 17-mile long transmission line (Figure 2). The Project interconnects to the Otter Tail Power 115/345 kilovolt substation, located approximately seven miles (11 kilometers) north of Jamestown, via an approximately 17-mile (27-kilometer) long overhead transmission line (Figure 1) and transmits power into the Midcontinent Independent System Operator grid. All of the Project facilities, shown on Figure 2, are located on privately owned land. In consideration of other site alternatives (Chapter 2) the current site for the Project was selected based on landowner support, transmission and interconnection suitability, wind resources, and impact on environmental resources (Attachment A, Section 4.0). Courtenay Wind Farm LLC obtained a Certificate of Site Compatibility from the North Dakota Public Service Commission on November 13, 2013. The final Project turbine layout incorporated avoidance and minimization measures to minimize impacts to eagles that were

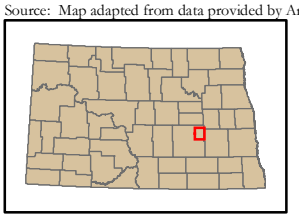
developed in coordination between the Applicant and USFWS (Attachment A, Section 6.0). The in-service date of the Project was December 1, 2016.

The Applicant's ECP, provided in Attachment A, is the foundation of the Applicant's ETP application. The Applicant has worked with the USFWS in development of the ECP to ensure that it contains commitments to avoid, minimize, and mitigate adverse effects on eagles. Because USFWS has not approved any Advanced Conservation Practices (ACPs) for wind energy projects, ACPs issued pursuant to the 2009 regulations are implemented at wind energy facilities on an experimental basis and are referred to as experimental Advanced Conservation Practicess (EACPs). Additional information on adaptive management and EACPs considered in our analysis are provided in Chapter 2.0, Alternatives. Eagle use surveys and other efforts to support an ETP application, including coordination with USFWS during development of the ECP, began in 2014, continuing through 2015 and 2016 during which EACPs and a post-construction monitoring plan were developed (Attachment A, Section 10.0), and the NEPA process discussed. A detailed outline of the agency coordination process relative to the ECP and ETP is provided in Attachment A, Table 1. As part of the Project construction and operation, the Applicant has employed best management practices (BMPs), as included in the ECP (Attachment A, Section 8.0), to reduce risk to eagles and decrease eagle fatalities.



6/15/2017 - S:\Projects\Xcel Energy\Courtenay\GIS\EA_F1_ProjectArea_061517.mxd kim.gorman

Source: Map adapted from data provided by ArcGIS Online (USA Topos) and Project data provided by Xcel Energy.

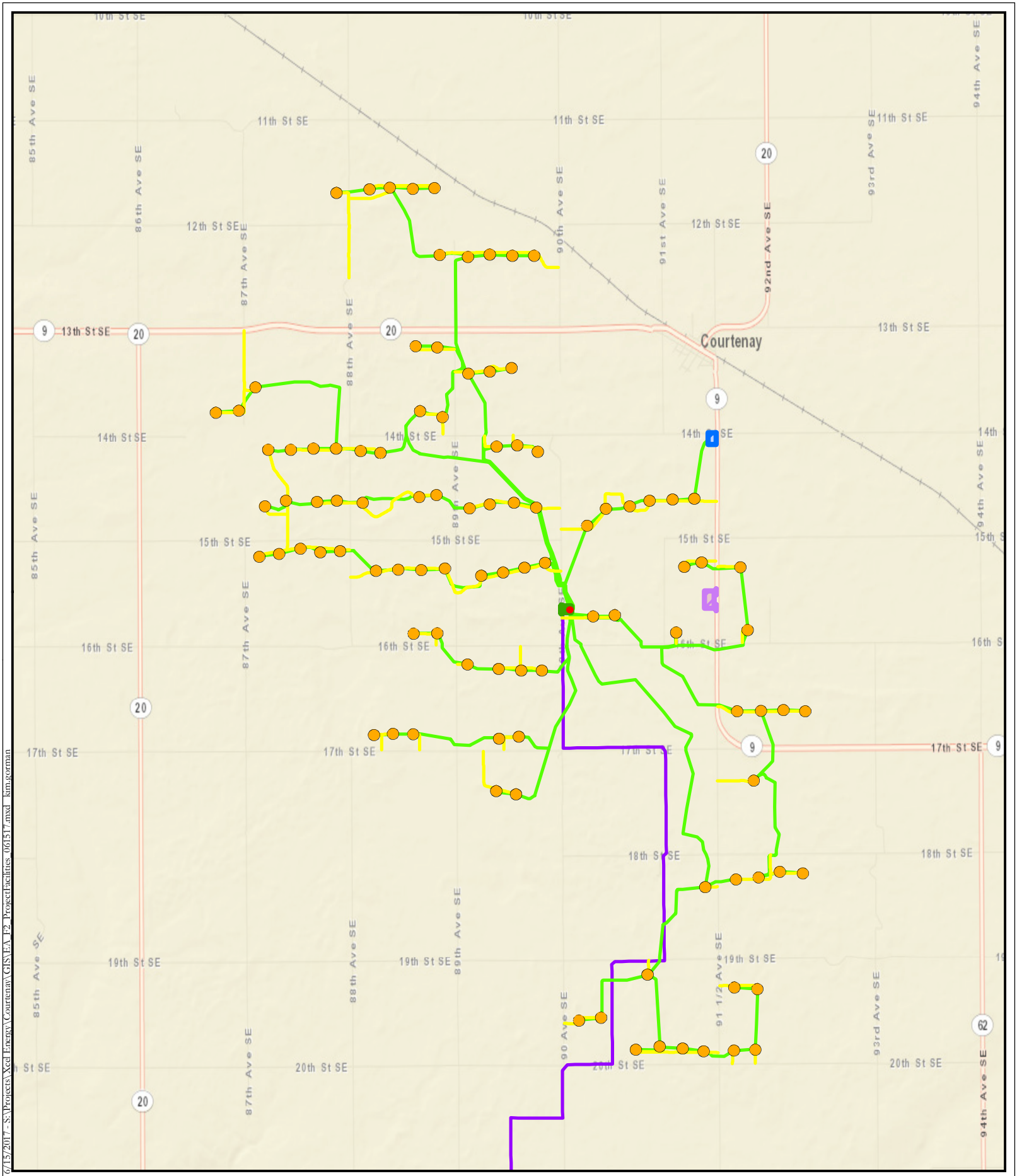


Turbine Location (n=100)

Transmission Line Corridor

0 0.5 1 1.5 Miles

Figure 1
Wind Farm Area
Courtenay Wind Farm Project
Stutsman County, North Dakota



Source: Map adapted from data provided by ArcGIS Online and Project data provided by Xcel Energy.

- Vestas V100 Location (n=100)
- Access Road
- Collection Line
- Substation
- O&M Building
- Laydown Area
- Permanent Meteorological Tower
- Transmission Line Corridor

0 0.5 1 1.5 Miles

Figure 2
Wild Farm Facilities
Courtenay Wind Farm Project
Stutsman County, North Dakota

COURTENAY WIND FARM
Stutsman County, ND

6/15/2017 - S:\Projects\Xcel Energy\Courtenay\GIS\EA_F2_ProjectFacilities_061517.mxd kim.gorman

1.2 Purpose and Need for the Federal Action

On April 11, 2016, the USFWS received a permit application package from the Applicant for a five-year programmatic ETP for the Project. The purpose of the federal action is to review the permit application package, including the ECP that was submitted as part of the application package. Upon completion of USFWS review of the application package and the associated NEPA process, the USFWS also is obligated to decide whether or not to issue the ETP under the Eagle Act and the permit issuance criteria at 50 Code of Federal Regulations (CFR) §22.26(f) to the Applicant for operation of the Project and, if so, under what conditions. Another purpose is to evaluate, consistent with 50 CFR §22.26(c)(1), the reasonableness of the avoidance, minimization, and mitigation measures in the ECP to support timely ETP issuance. To issue an ETP, the USFWS must determine that the take authorized under the Eagle Act is consistent with the preservation standard, currently defined as consistent with the goals of maintaining stable or increasing breeding populations in all eagle management units, and the persistence of local populations throughout the geographic range of the species (USFWS 2016b).

The need for this action is to respond to the Applicant's request for a five-year ETP while fulfilling these legal obligations.

1.3 Federal Regulatory Framework

Three primary Federal statutes, the Eagle Act, the Migratory Bird Treaty Act (MBTA), NEPA, and Tribal Trust Coordination, provide the basis for our review of the Proposed Action.

1.3.1 Bald and Golden Eagle Protection Act

The USFWS oversees the administration, implementation, and enforcement of the Eagle Act (16 USC §668–668d), which makes it illegal to knowingly, or with wanton disregard for the consequences of the act, import, possess, export, transport, take, sell, purchase, or barter any bald eagle or golden eagle, eggs, nests, or parts thereof without a permit from the USFWS. Under the Eagle Act, "take" is defined as to "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest, or disturb" (50 CFR §22.3). "Disturb" is defined as "to agitate or bother a bald eagle 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" (50 CFR §22.3). The regulations that implement the Eagle Act prohibition on taking a bald eagle or golden eagle, applies to "an individual, corporation, partnership, trust, association, or any other private entity" (definition of "person").

In 2007, the bald eagle was removed from the Endangered Species Act (ESA) list of threatened and endangered species (USFWS 2007). While the bald eagle was listed under the ESA, a

permit from the USFWS was available to allow eagle take incidental to an otherwise lawful activity. Because there were no provisions for issuing permits under the Eagle Act for activities that may disturb or incidentally take bald eagle or golden eagle, the USFWS subsequently issued regulations that allow for the limited take of bald and golden eagle ETPs under the Eagle Act, where the take that may be authorized is associated with otherwise lawful activities (non-purposeful "take").

The USFWS published the Eagle Permit Rule on September 11, 2009 (USFWS 2009b; 50 CFR §22.26 and §22.27), and the related Final Environmental Assessment (EA): *Proposal to Permit Take as Provided Under the Bald and Golden Eagle Protection Act* (USFWS 2009a) to fulfill the NEPA compliance requirements related to the new eagle take regulations. In December 2016, USFWS published the *Programmatic Environmental Impact Statement for the Eagle Rule Revision* and on December 16, 2016, the USFWS published its final changes to eagle permitting regulations (USFWS 2016b, 81 FR 91494), which took effect on January 15, 2017. Although the 2016 revised regulations pertain to all non-purposeful take of eagles and eagle nests, some of the requirements are specific to the wind energy industry. Applicants who submit permit applications before July 14, 2017, may choose to be considered for issuance of an eagle take permit under either the original 2009 regulations or the 2016 revised regulations. The Applicant has chosen to submit their ETP application, and to be considered, under the 2009 regulations.

1.3.2 Migratory Bird Treaty Act

The USFWS also administers the MBTA, which protects migratory birds and prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when authorized by the USFWS under a permit (16 USC §703; 50 CFR §21; 50 CFR §10). Under the MBTA, "take" is defined as "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture or collect" (50 CFR §10.12). Actions that result in taking or the permanent or temporary possession of a protected species or nests containing eggs or young may constitute a violation of the MBTA. The list of the bird species protected by the MBTA is located in 50 CFR §10.13. Most of the bird species that occur in the vicinity of the Project are protected under the MBTA.

The USFWS Migratory Bird Permit Memorandum (USFWS 2003) states that the destruction of most unoccupied bird nests (containing no birds or eggs) is an allowable action under the MBTA. However, unoccupied nests of eagles and federally listed threatened or endangered bird species are fully protected under the Eagle Act (16 USC §668) and the ESA (16 USC §1531, §1543), respectively, and they cannot be removed without a permit from the USFWS.

The USFWS has coordinated for many years with the wind industry to develop guidelines to avoid and minimize impacts on wildlife from construction and operation of wind energy facilities. In the 2012 *U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines*, the

USFWS urges "voluntary adherence to the Guidelines and communication with the Service when planning and operating a facility" (USFWS 2012). The USFWS will regard such actions as "appropriate means of identifying and implementing reasonable and effective measures to avoid the take of species protected under the MBTA" (USFWS 2012). The USFWS also will consider such voluntary adherence and communication when exercising discretion with regard to any potential referrals to the U.S. Department of Justice for prosecution related to the take of species protected under the MBTA (USFWS 2012).

The MBTA has no provision for allowing unintentional or unauthorized (that is, incidental) take, and issuance of ETPs shall not be interpreted as providing any authorization for take of migratory birds other than eagles. Although eagles are protected by both the MBTA and the Eagle Act, MBTA authorization for eagle take is not required for those who hold ETPs because the Eagle Permit Rule contains an exemption from the requirement to obtain a MBTA permit (50 CFR §22.11[a]) if they have an ETP.

1.3.3 Endangered Species Act (16 U.S.C. 1531 *et seq.)*

The ESA directs the Service to identify and protect endangered and threatened species and their critical habitat, and to provide a means to conserve their ecosystems. The ESA requires specifically that [the], "… Federal agency shall… insure that any action authorized, funded, or carried out by such agency … is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of designated critical habitat of such species..." (16 U.S.C. 1536 (a)(2)). Because issuance of the Permit is a Federal Agency action, the ESA is applicable and addressed in this EA (Chapter 1.4.3).

1.3.4 Tribal Trust Coordination

Tribal consultation is an integral part of the USFWS's NEPA process. In accordance with Executive Order 13175, signed by the President on November 6, 2000 and published on November 9, 2000, the USFWS establishes regular and meaningful consultation with federally recognized tribal governments in the development of federal regulatory practices that significantly or uniquely affect their communities. This consultation process is also intended to ensure compliance with the National Historic Preservation Act and the American Indian Religious Freedom Act. According to USFWS guidance (Monette et al. 2011), consultation with Native American tribal governments also occurs whenever actions taken under the authority of the Eagle Act may affect tribal lands, resources, or the ability to self-govern. USFWS invited 38 tribes to participate in government-to-government consultation regarding this action. USFWS identified the tribes that would potentially be interested in this process by including all tribes with lands that fall within the Rocky Mountains and Plains and Great Lakes eagle management units (EMUs; Chapter 3.2.6). Of tribes invited to participate, the Lower Sioux Indian

Community, Tribal Historic Preservation Officer has provided comment, requesting careful, culturally sensitive evaluation and assessment of the "immediate need" of the Applicant's request in consideration of their ECP, and operational measures to avoid or mitigate eagle impacts.

1.4 Scope of Environmental Assessment

This EA considers the Proposed Action and the No Action Alternative related to the Applicant's application for an ETP to authorize the incidental take of bald eagles resulting from operation of the Project. The proposed federal action includes the issuance of an ETP, and as such, it is not within the scope of our review to evaluate impacts associated with the siting and construction of the Project. Resources and the affected environment evaluated and included in this EA are those that may be directly, indirectly, or cumulatively impacted by the Proposed Action and the No Action Alternative (Chapter 3). Resources that will not be impacted by the Proposed Action or No Action Alternative are briefly described in Chapter 1.4.3, but are thereafter excluded from discussion and analysis.

Applicants who submit permit applications before July 14, 2017, may choose to be considered for issuance of an ETP under either the original 2009 regulations or the 2016 revised regulations. The Applicant has chosen to submit their ETP application under the 2009 regulations. As such, this EA evaluates impacts to the human environment resulting from issuance of an ETP under the 2009 eagle rule. Pursuant to the "high quality" information standards of the NEPA regulations (40 C.F.R. 1500.1(b), this EA also incorporates by reference the best available science, specifically updated population estimates and other information pertaining to eagles documented in the *Bald and Golden Eagles: Population demographics and estimation of sustainable take in the United States, 2016 update* (USFWS 2016a) and the *Programmatic Environmental Impact Statement for the Eagle Rule Revision (*USFWS 2016b).

This EA analyzes the effects of USFWS' proposed issuance of a five-year programmatic ETP, subject to a possible renewal, on the human environment and evaluates impacts over the 30-year life of the Project. In addition, the EA discusses the environmental impacts that will occur whether or not the USFWS issues an ETP. This EA evaluates the effects of the following two alternatives:

- Alternative 1 – The USFWS does not issue a Programmatic ETP for the Project (No Action)
- Alternative 2 – The USFWS issues a five-year Programmatic ETP based on the Applicant's ECP (Proposed Action)

Chapter 2 provides a detailed description of the two alternatives analyzed in this EA.

1.4.1 Resources Evaluated

The following resource areas may be impacted by the proposed action and are included in the alternative analysis presented in Chapter 2 and evaluated in Chapter 4 in this EA:

- Bald Eagle (*Eagle Permit Rule*, 74 FR 46836, September 11, 2009);
- Tribal Religious and Cultural Resources, including evaluation of trust responsibilities and assessing any impacts to the religious and cultural significance of the Bald Eagle to Native American communities (Executive Order 13175, *Consultation and Coordination with Tribal Governments*, 65 FR 67249, November 9, 2000).

1.4.2 Geographic Extent

The geographic scale of review for the affected environment includes three distinct areas:

- *Project Level* – The Project area is the actual Project footprint and an associated 10-mile buffer.
- *The Local Area Population Level* – The Local Area Population (LAP) is based on the average natal dispersal distance for eagles. In the case of bald eagles this is 86 miles. It represents the average distance traveled by an individual bald eagle from its place of birth to the place where it reproduces (USFWS 2016b).
- *USFWS Eagle Management Unit Level for Bald Eagles* – This is a regional level review. The Rocky Mountains and Plains EMU and Great Lakes EMU (USFWS 2009) are the EMUs used to manage bald eagles in the area where the Project occurs.

1.4.3 Resources Evaluated and Dismissed from Further Analysis

This EA discusses the environmental impacts that will occur whether or not the USFWS issues an ETP. Several resources were identified which do not have the potential to be impacted by the Proposed Action or No Action alternatives. Because wind project operators are not legally required to seek or obtain an ETP (i.e., the ETP does not authorize the project), the Applicant has the option of continuing Project operations without filing an ETP application. Additionally, this Project is already built and operational. As the USFWS is only evaluating whether or not to issue an ETP for existing Project operation and maintenance, which includes full consideration of all the required determinations by USFWS before an ETP can be issued, we have concluded that a number of resources would not be impacted by the Proposed Action or No Action alternatives, these include: air quality, climate change, environmental justice, land use, fisheries, geology and soils, human health and safety, noise, social and economic values, surface waterbodies and floodplains, vegetation, visual resources, wetlands, migratory birds, bats, and other wildlife. Therefore, these resources are not further evaluated in this EA.

On July 28, 2017, the USFWS Migratory Bird Management Program and the North Dakota Field Office engaged in an Intra-Service Section 7 Biological Evaluation addressing six species listed as federally endangered or threatened under the ESA that may occur in Stuntsman County, North Dakota. These species include the, piping plover (*Charadrius melodus*), rufa red knot (*Calidris canutus rufa*), whooping crane (*Grus Americana*), Dakota skipper (*Hesperia dacotae*), gray wolf (*Canis lupus*), and northern long-eared bat (*Myotis septentrionalis*). It was determined that the Project will have "No Effect" on gray wolf and "No Effect" on designated critical habitat for the piping plover. It was determined that the Project "May Affect, but not Likely to Adversely Affect" the piping plover, rufa red knot, whooping crane, Dakota skipper, and northern long-eared bat. Based on this determination, these species are not further evaluated in this EA.

Chapter 2: Alternatives

The CEQ regulations for implementing NEPA require that federal agencies explore and objectively evaluate reasonable alternatives to a proposed federal action, and briefly discuss the rationale for eliminating any alternatives that were not considered in detail. In developing alternatives, the USFWS considered, among other factors, the criteria that would be used to screen alternatives; USFWS management of eagles, adherence to the *Eagle Conservation Plan Guidance Module 1: Land-based Wind Energy, Version 2* (ECP Guidance; USFWS 2013a), and compliance with the Eagle Act.

In the analysis of Alternatives, the degree to which each Alternative will conform to the Eagle Take Permit Issuance Criteria for the ETP was considered. An ETP may not be issued under the Eagle Act unless the following issuance criteria are met as required in 50 CFR 22.26(f)(1–6):

- The direct and indirect effects of take and required mitigation, together with the cumulative effects of other permitted take and additional factors affecting eagle populations, are compatible with the preservation of bald eagles and golden eagles;
- The taking of an eagle is necessary to protect a legitimate interest in a particular locality;
- The taking of an eagle is associated with, but not the purpose of, the activity;
- The taking of an eagle cannot practicably be avoided; or for programmatic authorizations, the take is unavoidable;
- The Applicant has avoided and minimized impacts to eagles to the extent practicable, and for programmatic authorizations, the taking will occur despite application of advanced conservation practices; and,
- Issuance of an ETP will not preclude issuance of another federal permit necessary to protect an interest of higher priority as set forth in paragraph (e)(4) of 50 CFR 22.26.

2.1 Alternatives Analyzed in this EA

After considering the range of alternatives to be analyzed in this EA, the alternatives development criteria and ECP Guidance (USFWS 2013a) along with the fact that the facility is in operation, the USFWS determined that two alternatives would be considered in full. These two alternatives are described in the following chapters:

- Alternative 1 – USFWS does not issue a Programmatic ETP for the Project (No Action)
- Alternative 2 – USFWS issues a five-year Programmatic ETP based on the Applicant's ECP (Proposed Action)

2.1.1 Alternative 1 – The USFWS does not issue a Programmatic ETP for the Project (No Action)

Under Alternative 1 (No Action), the USFWS would take no action, which means denying the Applicant's request for a programmatic ETP for operation of the Project and we would not issue an ETP. The Applicant is not legally required to have an ETP to continue operating the Project; however, any take of eagles at the Project in the future would not be authorized under the no-action alternative. As a result, any eagle take that occurred would be illegal, and the Applicant would assume all legal liability for operating the Project without an ETP. Without an ETP, the Applicant is not legally obligated to implement continued mortality monitoring or the adaptive management identified in the ECP.

In addition to Alternative 1 (No Action) being a potential outcome of the permit review process, analysis of the No Action alternative is required by Council on Environmental Quality regulation (40 CFR §1502.14) and provides a baseline against which to compare the environmental impacts of the Proposed Action. We could deny the ETP because the permit application failed to meet one or more of several issuance criteria under 50 CFR §22.26 or the risk to eagles is so low that an ETP is unnecessary.

2.1.2 Alternative 2 –The USFWS issues a five-year Programmatic ETP based on the Applicant's ECP (Proposed Action)

Under Alternative 2 (Proposed Action), we would issue a five-year programmatic ETP allowing for the non-purposeful take of up to five bald eagles, with associated permit conditions, as allowed by 50 CFR §22.26(f) under the 2009 regulations. We used our Collision Risk Model (CRM)to estimate the number of annual bald eagle fatalities resulting from the Project O&M (see Chapter 4.1.2 for further details on predicted eagle take). The programmatic five-year ETP would include specific permit conditions, including implementation of the EACPs, BMPs, monitoring, reporting, and adaptive management, as discussed in the following chapters and described in Attachment A, Sections 8.0 through 10.0.

The ETP is issued for five years, but reevaluation of the Eagle Take Permit is required every five years (50 CFR 22.26(h); *Revised* Dec. 9, 2013, FR 73704–73725). The permit would apply to the operation of all 100 turbines and ongoing operation of site infrastructure, effective immediately upon issuance of the permit.

Monitoring

Consistent with our Eagle Conservation Plan Guidance (USFWS 2013a) we will require monitoring of eagle fatalities and eagle nests as part of the stipulations of any ETP issued for the Project, and as described in the ECP for post-construction monitoring (Attachment A, Section 10.0). Post-construction monitoring for the Project would be required at 100% of the turbines to estimate the mean annual fatality rate associated with Project O&M (Attachment A, Section 7.0), and to ensure that the permitted level of eagle take is not exceeded. We also will require

monitoring of eagle nests during operation of the Project to assess possible disturbance take effects on eagles.

2.2 Alternatives Considered but Eliminated from Consideration

The Project is an operational facility so many alternatives that might be appropriate to consider for a facility that has not been constructed are therefore not appropriate for this analysis. The scope of this federal action is to consider the Proposed Action and the No Action Alternative related to the Applicant's application for an ETP to authorize the incidental take of bald eagles resulting from operation of the Project. The original developer of the Project (not the Applicant) utilized the USFWS Land Based Wind Energy Guidelines (USFWS 2012) tiered process to evaluate multiple alternative sites before selecting the site that was developed into the Applicant's Project. Information concerning this process is detailed in Attachment A, Table 1.

Chapter 3: Affected Environment

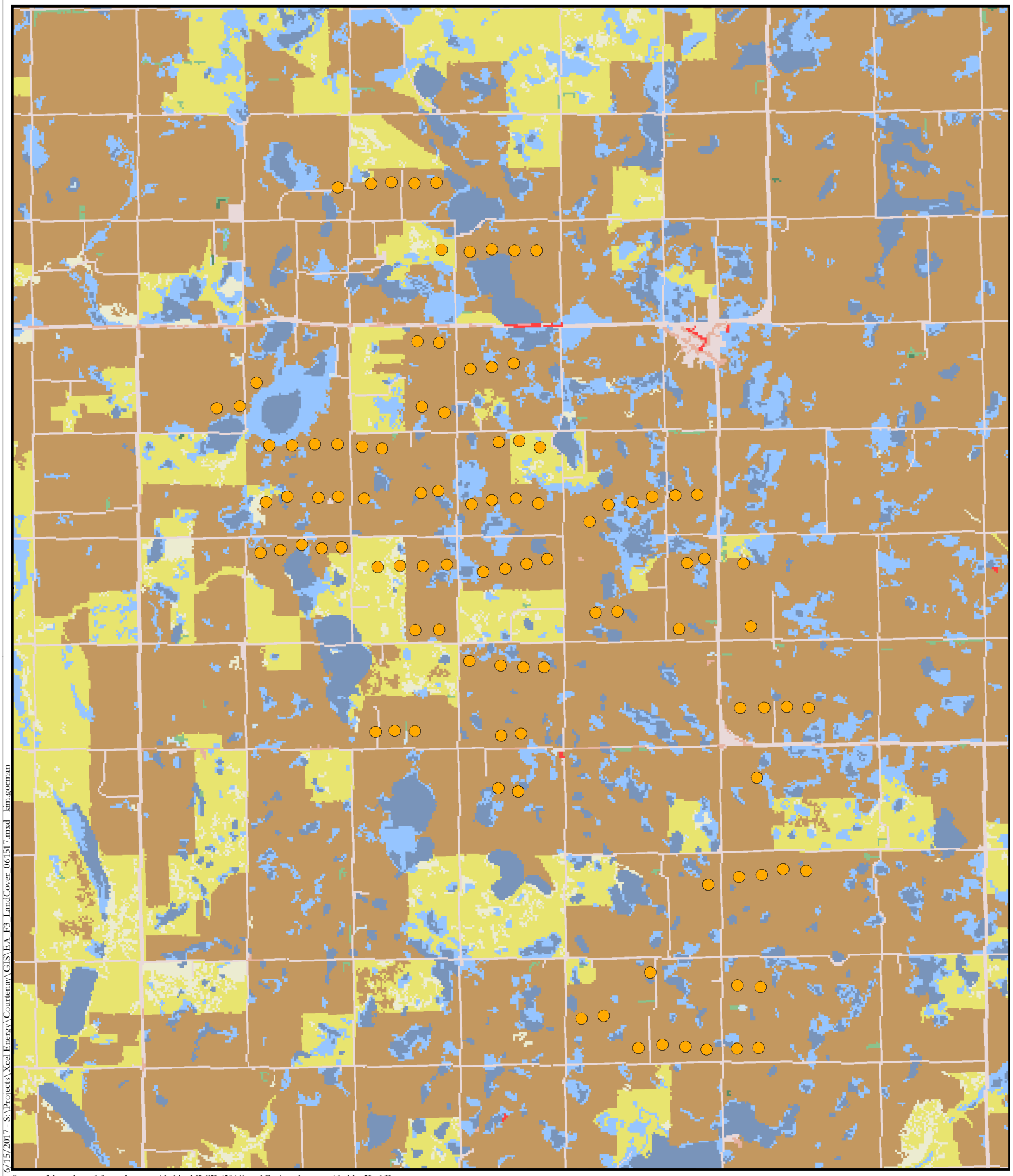
3.1 Environmental Setting

The Project area is located in Stutsman County, North Dakota, approximately 15 miles (24 kilometers) north of Jamestown, North Dakota (Figure 1). The Town of Courtenay, North Dakota is located adjacent to the northeast side of the Project.

The Project is located within the Level III Northern Glaciated Plains Ecoregion (Ecoregion 46), and Level IV End Moraine Complex (Ecoregion 46f) and Drift Plains (Ecoregion 46i) ecoregions (Bryce et al. 1996). Both of these Level IV ecoregions have been affected by glacial activity. The Drift Plains Ecoregion is flatter with higher concentrations of temporary and seasonal wetlands, whereas the End Moraine Complex is characterized by parallel moraine ridges, and other glacial features such as eskers, kames, and thrust ridges (Courtenay Wind Farm, LLC 2013). Within the Project area, glaciation has resulted in significant variation in soil conditions, consisting of glacial till and clay deposits. Glaciation also created a large prairie pothole complex in and around the Project site.

Topography of the Project area is glaciated, gently rolling plains with elevations ranging from 1,507 to 1,592 feet (459 to 485 meters) above sea level (National Elevation Dataset Digital Elevation Model; Courtenay Wind Farm, LLC 2013). The climate of Stutsman County is usually quite warm in the summer, with an average daily maximum temperature during July of 81 degrees Fahrenheit (27 degrees Celsius), with frequent spells of hot weather and occasional cool days (Tetra Tech 2013b). Winters are cold due to arctic air that frequently surges over the area, providing an average daily minimum temperature in January of 2 degrees Fahrenheit (17 degrees Celsius). Average annual total precipitation for Stutsman County is approximately 18 inches (46 centimeters), with 75 percent of precipitation falling in April through September (USDA NRCS 1995).

Historically the Project site was predominantly tallgrass prairie, which left rich, deep topsoil deposits and abundant organic material. Because of the productive soil and relatively level topography, the region has been almost entirely cultivated and tilled (Tetra Tech, Inc. [Tetra Tech] 2013a). Figure 3 provides a map of current land cover types for the Project area.



6/15/2017 - S:\Projects\Xcel Energy\Courtenay\GIS\EA_F3_LandCover_061517.mxd kim.gorman

Source: Map adapted from data provided by NLCD (2011) and Project data provided by Xcel Energy.

- Cultivated Crops
- Deciduous Forest
- Developed, High Intensity
- Developed, Low Intensity
- Developed, Medium Intensity
- Developed, Open Space
- Evergreen Forest
- Hay/Pasture
- Grassland/Herbaceuous
- Woody Wetlands
- Emergent Herbaceous Wetlands
- Open Water
- Turbine Location (n=100)

0 0.5 1 1.5 Miles

N

Figure 3
Wind Farm Land Cover
Courtenay Wind Farm Project
Stutsman County, North Dakota

COURTENAY WIND FARM
Stutsman County, ND

3.2 Eagles

Bald eagles typically nests in forested areas located adjacent to large bodies of water (Buehler 2000; USFWS 2016c). They most commonly nest in tall, sturdy, conifer trees that provide easy flight access and good visibility; but will nest on cliff faces or ground sites where tall trees are not available (Buehler 2000; Cornell Lab of Ornithology 2015). For perching, bald eagles prefer tall, mature coniferous or deciduous trees that afford a wide view of the surroundings (Buehler 2000). In winter, they may occur within dry, open uplands if there is access to open water for fishing.

Bald eagles nest sparsely in central North Dakota and migrants could pass through the Project area (Buehler 2000). As of 2009, an estimated 67 occupied bald eagle nests were located in North Dakota (USFWS 2016a). The number of bald eagle nests in North Dakota has increased markedly since 2009. By 2015 the North Dakota State Wildlife Action Plan estimated that there were about 165 occupied bald eagles nests in the state in 2015 (Dyke 2015). In April 2013, North Dakota Game and Fish Department (NDGFD) documented one occupied bald eagle nest and one unoccupied bald eagle nest near the Project (Attachment A, Section 4.2).

3.2.1 Pre-Construction Eagle Point Counts

Pre-construction eagle point counts (to determine eagle use) for the Project were completed between August 15, 2013 and September 26, 2014. These surveys were not completed to current USFWS standards, mainly in that they were only conducted for 14 months instead of the minimum recommended survey effort of two years (USFWS 2013a). However these survey results are sufficient to use in our CRM and for purposes of analyzing impacts to bald eagles in this EA. A total of 392 hours of eagle use surveys were completed during the sample period (392 individual surveys with each survey lasting 1hour). During these surveys eight bald eagle observations were recorded. A total of 26 minutes of bald eagle flight (minutes of eagle use) at or below 656 feet (200 meters) and within 2,625 feet (800 meters) of the point location (Attachment A, Figure 5) were associated with these eight eagle observations. These eight bald eagle observations were used in the CRM analysis to predict eagle take associated with the Project per the ECP Guidance (USFWS 2013a). No golden eagles were observed during any pre-construction eagle use surveys (Attachment A, Section 5.0)

3.2.2 Pre-Construction Raptor Nest Surveys

Pre-construction raptor nest surveys were completed for the Project in 2013 and 2014. This included searching for eagle nests and only the results for eagles are presented in this EA. These surveys were not completed to current USFWS standards; however these survey results are sufficient to analyze impacts to bald eagles in this EA. A ground-based raptor nest survey completed for the Project in March 2013 identified one unoccupied stick nest (2013-1; Attachment A, Section 5.2.1). Aerial raptor nest surveys completed in March and May of 2014

identified three occupied active bald eagle nests (2014-1, 2014-3, and 2014-4) and two unoccupied bald eagle nests (2013-1 and 2013-2) within 10 miles (16 kilometers) of the Project (Tetra Tech 2014a, 2014b). Follow-up ground-based raptor nest surveys completed in July 2014, March 2015, and August 2015 determined Nests 2013-1 and 2013-2 to be unoccupied, and Nest 2014-4 as occupied (Attachment A, Sections 5.1 and 5.2, Figure 6). Follow-up aerial surveys were completed in April 2016 and May 2016 and it was determined that Nest 2014-3 was occupied by an adult bald eagle and three chicks and Nest 2014-4 was occupied by two adult bald eagles and two chicks, and although Nest 2014-1 was occupied during the April survey, it was no longer occupied at the time of the May survey (Tetra Tech 2016a, 2016b). No golden eagle nests were found during any pre-construction raptor nest surveys, both for ground-based and aerial surveys (Attachment A, Section 5.0). A summary of the nest survey results for eagles is provided in Table 1 and nest locations are provided in Figure 4.

Table 1. Eagle Nest Information from Pre-Construction Aerial Raptor Nest Survey for the Courtenay Wind Farm, North Dakota 2014

Nest	Species[1]	Distance to Nearest Turbine (miles)[2]	Adult Present?	Number Eggs or Young	Activity[3]	Condition	Comments
2014-1*	BAEA	9.16	Yes	0	OA	Excellent	BAEA adult on nest, mate near nest
2014-3	BAEA	3.51	Yes	1	OA	Excellent	One BAEA chick in nest, one adult perched on edge of nest
2014-4	BAEA	1.05	Yes	1	OA	Excellent	One BAEA chick in nest, one adult BAEA perched on edge of nest, one adult perched within 164 feet (50 meters)
2013-1	BAEA	1.12	No	0	UN	Excellent	Adult BAEA on nest per North Dakota Game and Fish Department record
2013-2	BAEA	1.07	No	0	UN	Fair	Adult Canada goose on nest with five eggs

1 – BAEA = Bald Eagle; UNKN = Unknown species

2- Aerial nest surveys completed within 10 miles of the Project

3 – OA = Occupied Active; OI = Occupied Inactive; UN = Unoccupied

* – Nest 2014-1 and 2014-2 were not visited during the second phase of the aerial survey completed in May 2014, and the characteristics reported in Table 1 reflect observations made only during the first phase of the aerial survey.

3.2.3 Post-Construction Eagle Nest Surveys

As identified in the ECP's post-construction monitoring plan (Attachment A, Section 10.0), aerial eagle nest surveys were completed at the Project on March 21, 2017 to document activity of known bald eagle nests and to locate any new bald eagle nests at the Project within vicinity of the turbines (area within 0.6 mi [1 km] of turbines) and a 5-mile buffer of the Project turbines (Tetra Tech 2017). No bald eagle nests were found within 0.6 mile (1 km) of the Project turbines during this 2017 nest survey; however, three bald eagle nests were identified between 0.6 mile (1km) and within the 5-mile buffer of turbine locations. These nests represent two distinct territories that have been active since at least 2014 (Table 2). Nest 2014-3, identified as an

alternate nest, is located approximately 3.5 mi (5.7 km) northwest of the nearest turbine. The nest was in good condition, but no adults were observed in or near the nest (Tetra Tech 2017). Nest 2017-1, approximately 100 meters from Nest 2014-3, was in-use with one adult bald eagle sitting on the nest, presumably incubating one or more eggs based on its posture and behavior. This nest had not been previously recorded, but was likely built by the same eagle pair that previously used Nest 2014-3 based on spacing between the two nests. Nest 2014-4 is located 1.05 miles (1.7 km) from the nearest turbine location. This nest was also in-use, with two adult bald eagles in the vicinity of the nest and two eggs in the nest. In addition to the eagles observed in and around nests, an additional three adult bald eagles were observed flying during the survey, but were not associated with any nests (Tetra Tech 2017). A follow-up aerial survey was completed in April 2017 to further evaluate occupancy, productivity, and condition of these bald eagle nests. Nests 2014-3 and 2017-1 were in the same condition, and Nest 2014-4 had an adult and two chicks in the nest. Results from the 2017 eagle nest survey are provided in Table 2 and Figure 4 provides locations for these nests.

Table 2. Bald Eagle Nest Data from Post-Construction Aerial Eagle Nest Survey for the Courtenay Wind Farm, North Dakota 2017

Nest	Species[1]	Distance to Nearest Turbine (miles)[2]	Adult Present?	Number Eggs or Young	Activity	Condition	Comments
2014-3	BAEA	3.51	No	0	Alternate	Good	No BAEA adults seen in vicinity of nest; presumed to be alternate for Nest 2017-1
2014-4	BAEA	1.05	Yes	2	In-use	Excellent	2 adult BAEAs seen in vicinity of nest; 2 eggs in nest
2017-1	BAEA	3.51	Yes	Unknown	In-use	Excellent	Adult BAEA sitting on nest

1 – BAEA = Bald Eagle
2 – Aerial survey completed for a 5 mile buffer of the Project turbines

3.2.1 Eagle Prey Base Assessment

Pre-construction avian and eagle use surveys and the habitat assessment at the Project determined there is prey available for bald eagles, such as fish, small mammals, and occasional carrion, however, there are no concentrated prey resources that would draw eagles into the Project Area (Attachment A, Section 5.3).

3.2.2 Known Bald Eagle Mortality at the Project

On August 1, 2017 the USFWS, Region 6, Migratory Bird Management Office received notification from the Applicant that a dead bald eagle had been found at the Project near one of the wind turbines. There were reportedly no outward signs of the mortality being attributed to collision with a wind turbine. The dead bald eagle was sent to the USFWS Forensics Lab in Ashland, Oregon for a necropsy to determine the cause of death, which is yet to be determined. The Applicant will work with USFWS Office of Law Enforcement to resolve this unpermitted eagle take.

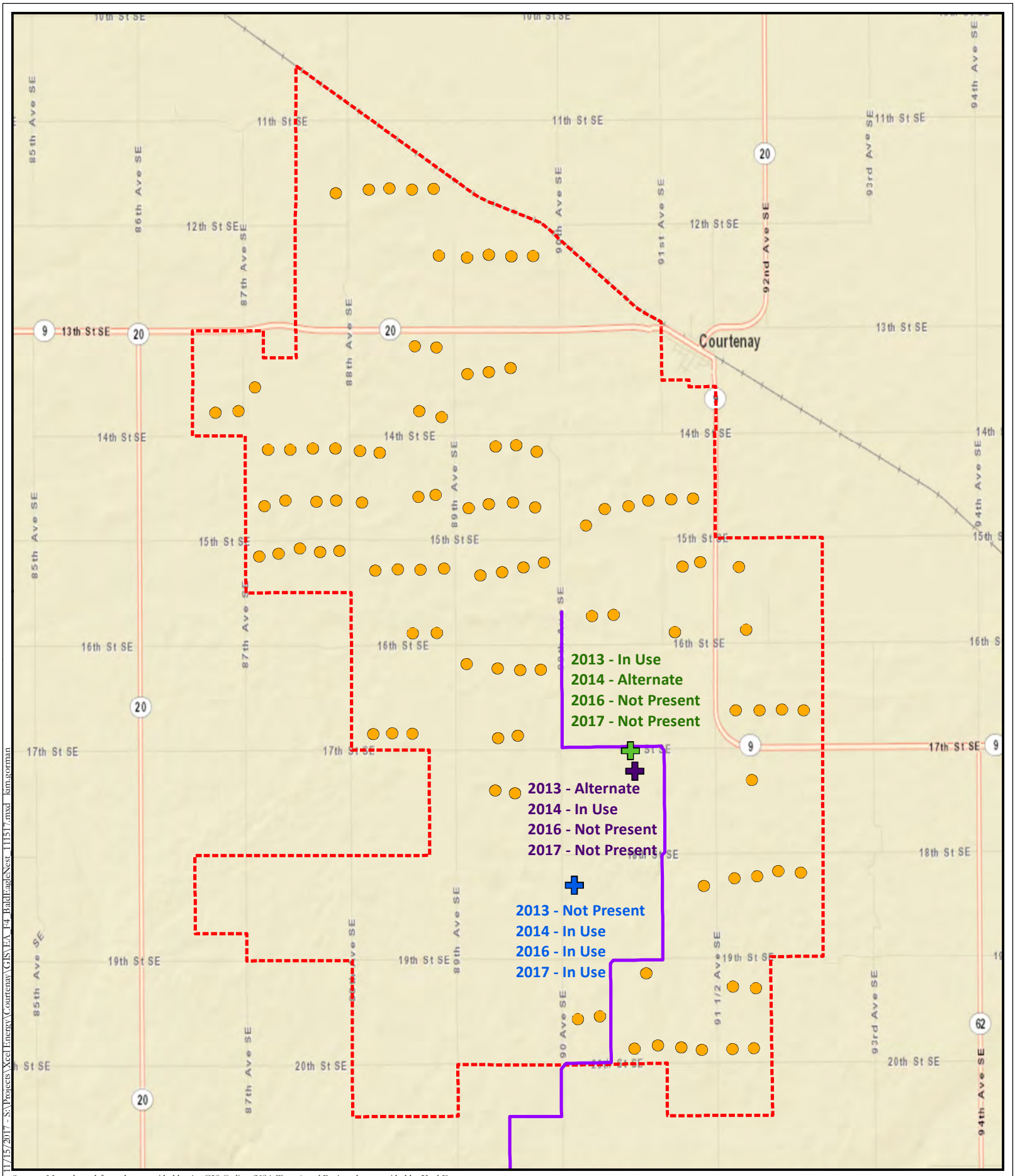
3.2.3 Eagle Management Units

The USFWS defined EMUs in the Final EA for the ETP rule (USFWS 2009) by using available data for bald and golden eagles to identify regional eagle population management areas for each species. The goal of establishing these EMUs was to ensure that the USFWS permit program does not cause declines in eagle populations at a regional or national scale (USFWS 2009). For bald eagles, the EMUs potentially affected by the Project are the Great Lakes EMU and Rocky

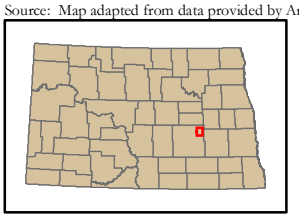
Mountains and Plains EMU (Figure 5). USFWS has identified annual take rates of between one and five percent of the total estimated eagle LAP as significant, with five percent being at the upper end of what might be appropriate under the Eagle Act's preservation standard. The preservation standard under the Eagle Act regulations requires that we not permit any eagle take unless such taking is consistent with the goal of stable or increasing breeding populations of eagles.

3.2.4 Local Area Population Scale

The LAP refers to the eagle population within a distance from the project footprint equal to the species median natal-dispersal distance (USFWS 2013). USFWS assesses annual take rates, both for individual projects, and for the cumulative effects of other activities causing eagle take within the LAP. For bald eagles, the USFWS conducted this analysis using an 86-mile (134-kilometer) radius around the Project. The LAP analysis for bald eagle for the Project includes areas of the Great Lakes EMU and the Rocky Mountains and Plains EMU that are located within 86 miles (134 kilometers) of the Project. There were no golden eagles seen during pre-construction general avian use surveys or the eagle use surveys, and no golden eagle nests were documented during raptor nest surveys (pre or post-construction). Therefore, we did not do any analysis for golden eagles at the LAP level as this species is not expected to be impacted by the Project.



Source: Map adapted from data provided by ArcGIS Online (USA Topos) and Project data provided by Xcel Energy.

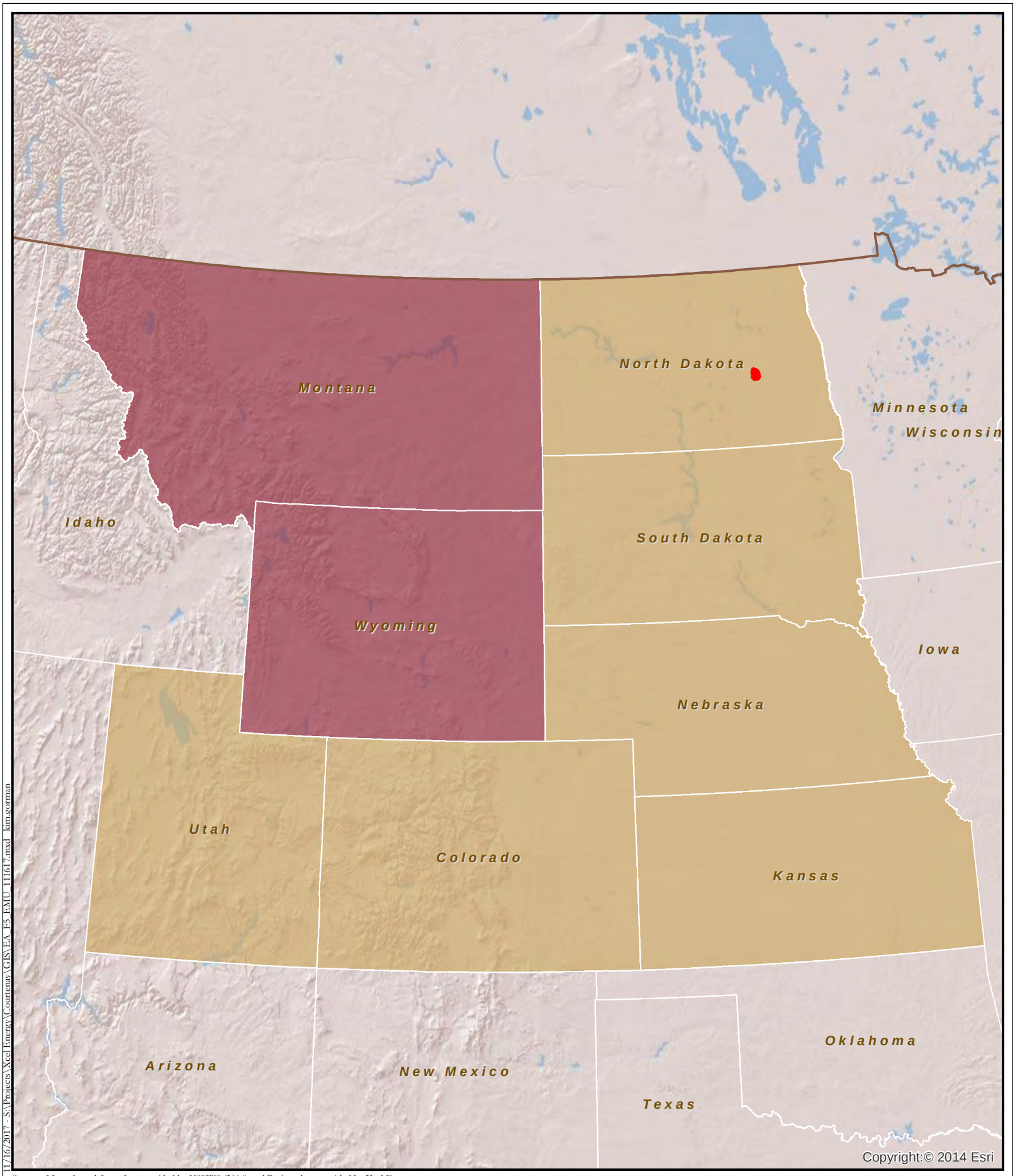


Surveyed Eagle Nest (Status by Year)
- 2013-1
- 2013-2
- 2014-4

- Turbine Location (n=100)
- Project Boundary
- Transmission Line Corridor

0 0.5 1 1.5 Miles

Figure 4
Bald Eagle Nest Locations
Courtenay Wind Farm Project
Stutsman County, North Dakota



11/16/2017 - S:\Projects\Xcel Energy\Courtenay\GIS\EA_P5_EMU_111617.mxd kim.gorman

Source: Map adapted from data provided by USFWS (2014) and Project data provided by Xcel Energy.

Eagle Management Units for Bald Eagles

- Northern Rocky Mountains
- Rocky Mountains and Plains
- Wind Farm Location

0 50 100 150 Miles

Figure 5
Bald Eagle Management Units for the Wind Farm Location
Courtenay Wind Farm Project
Stutsman County, North Dakota

Chapter 4: Environmental Consequences

In this chapter, environmental consequences (impacts and effects) of the No Action alternative (Alternative 1) and the Proposed Action (Alternative 2) are described. This provides for the scientific and analytic basis for comparison of the No Action and Proposed Action alternatives:

- Alternative 1 – The USFWS does not issue a Programmatic ETP for the Project (No Action)
- Alternative 2 – The USFWS issues a Five-Year Programmatic ETP based on the Applicant's ECP (Proposed Action)

4.1 Impact Analysis for Take of Bald Eagles

4.1.1 Approach and Methods

In determining the significance of effects of each alternative on bald eagles, each alternative is screened against the Eagle Act's Permit Issuance Criteria using the CRM (Appendix D of the ECP Guidance); and Cumulative Effects Analysis (Appendix F of the ECP Guidance).

4.2 Effects Common to Both Alternatives

Both of the alternatives include continued operation of the Project, and have the potential to result in permitted or unpermitted take of eagles.

4.2.1 Direct and Indirect Effects

Potential direct and indirect effects of continued operation of the Project on bald eagles include the risk of collision, electrocution, and disturbance/displacement, and other indirect effects, including habitat degradation/fragmentation, and displacement, disruption, and mortality of eagle prey species. The level of direct mortality in the local area population caused by the Project in relation to annual allowable take for bald eagles is provided below under cumulative effects (Chapter 4.3). As this document was developed after construction was completed, impacts from the construction of the Project are therefore not analyzed.

4.2.2 Bald Eagle Collision with Wind Turbines

We used the CRM provided in the in the ECP Guidance (USFWS 2013a) to provide a predicted estimate of the number of annual bald eagle fatalities at the Project associated with the wind turbines. The CRM is specific to wind turbines and does not provide a prediction of eagle fatalities due to electrocutions or collisions with power lines for the Project. During the planning process, the Project design was revised to reduce the risk of eagle electrocution or collision with Project facilities (Attachment A, Section 6.0). Revisions to the Project design and layout included:

- Siting turbines at least one mile from three known eagle nests in the Project area to reduce the risk of direct mortality and disturbance take of nesting eagles.
- Removal of nine turbines from the layout in the southwest portion of the Project area based on observations of eagles using these areas which both reduced the total number of turbines and the risk of collision for eagles using these same areas in the future.
- Design of the electrical collection system so that the electricity generated at each turbine is collected by underground power collection lines and delivered to the Project substation. Burying electrical collection lines avoids the risk of eagle collision or electrocution with power lines.
- Design of the transmission line to follow regional utility practices as well as the National Electrical Safety Code, the Rural Utility Service Code, and Avian Power Line Interaction Committee (APLIC) Suggested Practices manuals (APLIC 2006, 2012). Bird diverters have been installed on the entire 17-mile (27-kilometer) length of the Project transmission line to minimize collision risk to eagles and other avian species.

Despite these BMPs we predict eagle mortalities due to collisions with wind turbines for the Project. There is still some risk of eagle mortalities due to the Project transmission line, although we would expect this risk to be low because APLIC guidance was incorporated in the design and construction of this power line.

The Breeding Bird Survey (BBS) index trend estimate for the bald eagle over the entire BBS coverage area for the period 1966 to 2012 is 5.3% (Sauer et al., 2014 as cited in USFWS PEIS 2016) and this survey area includes North Dakota. According to the North Dakota State Wildlife Action Plan, the number of bald eagle nests in North Dakota has increased significantly over the past 10-20 years; currently there are approximately 165 occupied bald eagle nests in the state (Dyke et al. 2015).

4.2.2.1 USFWS Collision Risk Model and Predicted Eagle Take for the Project

A fundamental component of the USFWS's decision process for a programmatic ETP is the evaluation of eagle fatalities likely to occur from operation of the Project. An eagle fatality estimate assists the Applicant in developing a balanced ECP and programmatic ETP application that include sufficient avoidance, minimization and mitigation measures, monitoring, and adaptive management. The USFWS then uses the eagle fatality estimate to determine if the level of take, with the mitigation measures proposed in the ECP, is compatible with the eagle preservation standard in the Eagle Act and the appropriate level of NEPA analysis.

Collision risk for the Project wind turbines was predicted using our peer-reviewed CRM (USFWS 2013a, USFWS 2013b; New et al. 2015). The outcome was a prediction of mean number of fatalities per year resulting from an analysis of the input data, which assumes that risk is proportional to use (USFWS 2013a). Bayesian Models use existing information to estimate

the statistical distribution (referred to as prior probabilities in Bayesian analysis) of variables of interest in a hypothesis test, and then use new data to update the distribution (New et al 2015). Our CRM predicts collision risk at a project based on the rate of eagle exposure to wind turbines, as measured by eagle point-count surveys, and the probability that such exposure will result in a collision with a turbine.

The eagle fatality predictions for the Project, using the CRM include a mean of 0.6591 bald eagles per year (standard deviation [sd] = 0.3150) with a 80th upper credible interval of 0.922 bald eagles per year, (Table 3). Thus, at the 80th credible interval level the model predicts that over the five-year life of the ETP, 4.61 bald eagles will be killed incidentally to the operation of the Project.

Table 3. Predicted eagle fatalities per year given the final 100 turbine layout with a 50-meter blade radius for the Courtenay Wind Project, North Dakota.

Variable	Bald Eagles
Estimated average (mean) annual eagle fatalities	0.6591
Upper 50th Credible Interval	0.6410
Upper 80th Credible Interval	0.922
Upper 90th Credible Interval	1.108
Upper 95th Credible Interval	1.289

Annual fatality rates corresponding to these estimates would result in five bald eagle fatalities (4.61 predicted eagles from the CRM results above rounded up) over a five-year permit term or 30 bald eagle fatalities over 30 years.

4.2.3 Electrocution

Power lines, predominately distribution lines, can cause electrocutions, collisions, or simultaneous electrocution/collisions resulting in bald eagle injuries or mortalities (APLIC 2006). This is because bald eagles have a wing span that is large enough to allow for circuit completion (i.e., flesh-to-flesh contact between energized parts or an energized and grounded part) (APLIC 2006). The Project Applicant designed the electrical collection lines connecting the turbines to the Project substation so that the lines have been buried underground. This BMP reduces the risk of bald eagle electrocution and/or collision at the Project. The 17-mile (27-kilometer) overhead transmission line also has been designed to APLIC (2006, 2012) recommendations for overhead utilities to reduce the risk of eagle electrocution and collision with electrical components, and has been equipped with bird diverters. But current APLIC guidance is based on the spacing necessary to prevent electrocution of eagles when their feathers are dry and conversely they will not prevent eagle electrocution when and eagle's feathers are

wet (APLIC 2006). Overall given implementation of these Project design measures for power lines associated with the Project we would expect that the potential for bald eagle electrocution as a result of Project operations is relatively low. Placing electrical collection lines underground eliminated any collision risk for eagles but since the Project transmission line is above ground there is an associated risk of collision for bald eagles with this line.

4.2.4 Disturbance and Displacement

Project operations may disturb or displace bald eagle if the presence of operational turbines causes eagles to avoid using the Project area, primarily at nests within the Project area ½-mean inter-nest distance (4.5 miles) of Project facilities (Attachment A). A buffer of one mile was established around nests identified within the Project area (Nests 2013-1, 2013-2, and 2014-4) with no turbines constructed within these nest buffers (Attachment A, Section 6.0) to minimize disturbance to the extent practicable during operation of the Project. Additionally, to minimize the potential for eagle disturbance during the construction period to the extent practicable, a non-disturbance construction buffer of 0.5 mile was established around nest 2014-4 from January to August (Attachment A, Section 8.1).

The Applicant is currently conducting year-round eagle fatality monitoring, concurrent with the first two years of general fatality monitoring being completed at the Project (Attachment A, Section 10.1). All Project wind turbines are monitored and eagle fatality surveys occur every 28 days. Additionally, the Applicant is conducting aerial eagle nest surveys within the Project footprint plus a 5-mile (8-kilometer) buffer throughout the first two years of operations to document the activity of known eagle nests and to locate any eagle nests not documented previously during pre-construction surveys (Attachment A, Section 10.2.1). Nest searches within the Project footprint plus a 5-mile (8-kilometer) buffer are being conducted to both monitor known eagle nests and to try to locate newly constructed eagle nests within this area. Both known and newly discovered eagle nests will be monitored once per month during the nesting season each year to determine occupancy, productivity, and nest success. Long-term eagle fatality monitoring is currently being conducted, and under Alternative 2, will continue throughout the life of the Project (Attachment A, Section 10.1). Eagle nesting and fatality data will be analyzed periodically to assess possible eagle displacement and disturbance effects during Project operations. Disturbance and displacement of bald eagles from preferred habitats due to operation and maintenance of the Project could lower foraging and nesting success.

4.2.5 Eagle Mortality and Demographics

The magnitude of bald eagle take on the local eagle population would depend on the age, origin, and breeding status of the birds killed. The loss of a migrant bald eagle would not directly affect the local population but could affect the breeding population to which it belonged. The loss of an immature bird would mean the loss of future breeding potential and its contribution to the

overall population. Bald eagles do not generally reach breeding age until their fifth year of life and may disperse an average of 86 miles from their place of birth, the average natal dispersal distance, before establishing a breeding territory (Buehler 2000 and USFWS 2016c). Effects from the loss of an immature bald eagle would probably take years to be noticeable within the population; the amount of time it would have taken it to reach breeding maturity. The loss of an immature bald eagle affects the local population less than the loss of an adult at breeding age. Small changes in population dynamics might occur, such as decreased competition for resources. The predicted take at the Project is well below the maximum allowable cumulative take for the EMU which was established through a NEPA analysis (FWS 2009a) of sustainable take within each EMU. Therefore, while small changes in the local population may impact bald eagles at the LAPlevel they are not expected to impact the species at the EMU population level.

4.2.6 Local Effects

Bald eagles have been documented nesting in the Project's vicinity (Chapters 3.2.2 and 3.2.3). Although the Project has been sited to include a buffer of at least one mile (1.6 kilometers) around all known bald eagle nests to avoid unintentional take as recommended by USFWS during the Project consultation process, nesting adults and juveniles are still at risk from Project operations. Mitigation measures to reduce risk of collision and electrocution that were implemented for the Project should reduce the risk of eagle take associated with operation of the Project.

4.2.7 Other Indirect Effects of the Project

Other indirect impacts, including habitat degradation and fragmentation, and displacement, disruption, and mortality of eagle prey species from Project operation and maintenance activities will likely impact bald eagles. We acknowledge these other indirect effects, but we have determined that our federal action will have no positive, negative, or neutral effects on our decision, and therefore we are not including analysis on these indirect effects relative to our federal action.

4.2.8 Other Priority Uses

Other priority uses described in USFWS regulations include safety emergencies, activities necessary to ensure public health and safety, or renewal of programmatic nest-take permits. Operation of the Project, including any potential take of bald eagle, is not expected to interfere with other priority uses or permits.

4.3 Cumulative Effects

The purpose of this cumulative effects analysis is to identify situations where take, either at the individual project level, or in combination with other present or foreseeable future actions and

other known eagle take at the LAP scale, may be approaching levels that are a concern for bald eagle populations. To ensure that any authorized take of bald eagle does not exceed the Eagle Act's preservation standard, the USFWS has set regional thresholds (i.e., upper limits) for take of bald eagle, using methodology in the Final EA of the Eagle Permit Rule (USFWS 2009a). We used population estimates of bald eagle for each EMU and set annual take thresholds based on estimates of sustainable take in published literature (upper limits on the number of eagle mortalities that can be allowed under ETPs each year in the EMUs). The analysis in the 2009 Final EA identified annual take thresholds greater than zero for bald eagles in most bald eagle EMU's (USFWS 2009) ;Chapter 3.2.6).

USFWS also recommends measures to ensure that LAPs are not depleted by take that would be otherwise regionally acceptable. The LAP refers to the eagle population within a distance from the project footprint equal to the species median natal-dispersal distance (USFWS 2013). USFWS assesses annual take rates, both for individual projects, and for the cumulative effects of other activities causing eagle take within the LAP. The LAP for bald eagles is the bald eagle population within a distance of 86 miles from the Project (USFWS 2016b). USFWS has identified annual take rates of between one and five percent of the total estimated eagle LAP as significant; with five percent being at the upper end of what might be appropriate under the Eagle Act's preservation standard.

4.3.1 Courtenay Wind Project LAP Analysis

To assess cumulative impacts to the LAP we followed methods outlined in Appendix F of the Eagle Conservation Plan Guidance (USFWS 2013) and we used our USFWS Cumulative Effects Tool (CET) to complete an analysis of the local area population. Further for this analysis we used eagle mortality records available to us in a USFWS eagle mortality database. A major caveat with the our eagle mortality records is that they were obtained based on opportunistic or incidental reporting of eagle mortalities and they were not obtained from regular or systematic survey efforts to detect eagle mortalities using a statistically valid protocol or sampling methodology. Except possibly for some of the wind energy industry mortality records, there were no searcher efficiency or carcass persistence trials associated with any of these records, so that a bias correction factor could be applied to them, as would be the case for mortality studies conducted using statistically valid sample designs. Also, some industries that impact eagles have self-reported eagle mortalities at a higher rate than other industries, and some types of eagle mortalities lend themselves better to discovery and reporting. Hence there are many types of bias associated with these records given this caveat. Still we elected to use the eagle mortality records in the USFWS database because this was the best scientific information available to us regarding eagle mortalities within the LAP for bald eagles.

We employed key decision criteria while working with the records in the USFWS eagle mortality database according to guidance developed by USFWS, Region 6, Migratory Bird

Management Office. Based on the Region 6 guidance we used eagle mortality records from the USFWS database for only the most recent 10 full years (so for this Project 2007–2016). We used this approach for several reasons. First the Courtenay Wind project proponent has applied for a programmatic eagle take permit under the 2009 Eagle Act regulations. Also work on the EA for the 2009 Eagle Act regulations for non-purposeful take of eagles started about nine to ten years ago. Also, the 2009 Eagle Act regulations themselves were issued about eight years ago and there has likely been an increase in reporting of eagle mortalities to USFWS since these went into effect, which provides us with a better estimate of eagle mortalities compared to the preceding 20 or 30 years. Lastly most wind energy facilities operating in North Dakota became operational within the last 10 years and this is also when some of these facilities have voluntarily reported eagle fatalities to USFWS.

Using our USFWS eagle CRM (USFWS ECPG 2013), and information provided to us by the Courtenay Wind project proponent on turbine blade size and eagle use, we developed predictions for take of bald eagles for the Project. Given 100 wind turbines for the project (all with 50 meter blade radius), the 80 percent upper credible interval (80% UCI) from the USFWS peer-reviewed Collision Risk Model (CRM) for eagles predicts 0.922 bald eagle fatalities annually for the Project. Below we present our analysis of how take of 0.992 bald eagle fatalities per year affects bald eagles respectively at the LAP level. Also in the analysis below we rounded up the CRM predictions of annual eagle take from 0.922 to 1.0 bald eagles per year.

Finally, the 2009 Eagle Act regulations (FR 71, 46836) and the related April, 2009 Environmental Analysis (EA) for these regulations did not provide any methods for conducting an LAP analysis nor any mention of the one percent and five percent benchmarks (USFWS 2009). Hence we have elected to use the most current information and methodology to assess the cumulative effects of eagle take at the LAP level since this is the most appropriate and conservative approach towards conserving eagle populations. This LAP analysis was completed using the information and guidance provided collectively in the USFWS 2016 eagle science report (USFWS 2016), USFWS 2016 Eagle rule revision (FR 81; 91494), and the USFWS Programmatic Environmental Impact Statement for the Eagle Rule Revision (USFWS 2016). In analyzing the effects of the Project this was the only case where we applied analysis criteria from the 2016 eagle rule revision to a permit application submitted under the 2009 eagle rule.

4.3.2 Bald Eagle LAP Analysis

Using the above approach, the LAP for bald eagles is delimited by a circle with a radius of 86 miles around the project footprint. The eagle management units currently used by USFWS to manage bald eagle populations are the administrative flyways (USFWS 2016). However, for purposes of completing LAP analysis, USFWS has determined that the best approach is to continue to use the former EMU's for eagles developed for the 2009 Eagle Act take regulations, instead of the flyways used for general eagle population management purposes. Using this

approach for the Project the LAP is comprised of bald eagles in the Great Lakes EMU and the Rocky Mountains and Plains EMU. The LAP of bald eagles for the Project is approximately 71 eagles (Table 4) and the 1% and 5% benchmarks (or take rates) for this local-area population are about one and four bald eagles, respectively (Table 4). USFWS has identified that take rates of between 1% and 5% of the estimated total eagle population size at this scale as significant, with 5% being at the upper end of what might be appropriate under the Eagle Act preservation standard, whether offset by compensatory mitigation or not (USFWS 2013).

Table 4. Estimated Bald Eagle Local Area Population (LAP) for the Courtenay Wind Project in Stutsman County, North Dakota.

Eagle Management Unit (EMU)	Estimated No. of Bald Eagles
Great Lakes	5.39
Rocky Mountains and Plains	65.52
Total Local Area Population (LAP)	70.91
1% LAP Benchmark	0.71
5% LAP Benchmark	3.55

Based on the USFWS eagle mortality database there were 42 reported bald eagle mortalities within the LAP between 2007 and 2016 (Table 5). Of the total reported bald eagle mortalities between 2007 and 2016, four were due to natural causes (Table 5). For those mortalities due to natural causes two died from infection, in one case the eagle was killed /injured by an animal, and one died from emaciation (Table 5). The mortalities due to natural causes comprised 9% of the total reported bald eagle mortalities. Of the total reported bald eagle mortality records during this timeframe 23 (55%) were due to anthropogenic causes. These are the known eagle mortality records that should be considered as unpermitted take. The mortality records with anthropogenic causes included; two records of electrocution, three records of collisions with vehicles, one record of collisions with wind turbines, two collision records where the object the eagle collided with was not reported, two collision records where the eagles collided with a wire, four records of eagles that were shot, eight records where eagles died due to lead poisoning, and one record where the eagle died due to trapping (Table 5). For mortalities due to anthropogenic causes the most frequent causes were some type of collision (19%), poisoning due to lead (19%), and birds being shot (10%) (Table 5). For another 10 records the cause of death was unknown, which was 24% of all the total mortality records. And for another five records the cause of death was listed as other, which was 12% of the total mortalities. For mortality records that were recorded as either unknown or other the cause of death could have been due to either natural or anthropogenic causes and we have no way of determining this. With these data again a major caveat is that these records are biased due to the manner they were obtained and reported. Most

of the available bald eagle mortality records in the USFWS database where the cause of death was recorded were for types of collisions, lead poisoning, and shooting. However, we cannot say that these sources of eagle mortality are more important as factors in eagle mortality within the LAP than other mortality sources such as electrocution, or any other potential anthropogenic sources of eagle mortality for which there were fewer or no records. Regular vehicle traffic along highways make it more likely that this type of mortality would be reported versus other types. It is certainly possible that other eagle mortality factors such as electrocution on power poles are just as important, or more important, in terms of total eagle take within this area, we simply lack the data to fully assess this.

Using the USFWS CET we determined that USFWS has permitted other take of bald eagles under three different permits for other projects, which needs to be considered in the context of possible issuance of a take permit for the Project. All of these permits were for disturbance take of bald eagles at eagle nests and none of this take is associated with the Project. The combined overlapping take associated with these three ETPs is 0.51 bald eagles per year. We evaluated this eagle take, which was already permitted by USFWS, relative to the 1% and 5% benchmarks. Subtracting this permitted take from the benchmarks leaves about 0.49 eagles at the 1% level and 3.49 eagles at the 5% level.

For bald eagle mortalities due to collisions with wind turbines at wind energy facilities, we calculated that about 1.3 eagles per year are taken by existing online wind facilities at the LAP level. This take of eagles due to collisions with wind turbines is considered unpermitted take as USFWS has not previously issued ETPs for these wind facilities. A further caveat on this estimate is that it is only based on bald eagle mortality records that were self-reported to USFWS by online operating wind facilities. There are other online wind energy facilities within the LAP that are not reporting bald eagle mortalities to USFWS, but for which eagle mortalities are likely occurring at some level. However, in this analysis we elected not to assign a value for bald eagle mortalities to these wind facilities because this approach is too speculative. Still the above estimate of 1.3 bald eagles taken per year within this LAP by online wind facilities should be viewed as a minimum estimate for this type of take. For analysis purposes we combined this level of annual bald eagle take with the take above associated with three ETPs issued by USFWS. The combined level of eagle take associated with wind energy facilities and USFWS-issued take permits is about 1.81 bald eagles per year. Subtracting the estimate of 1.81 eagles associate with these two forms of take from the above 1% and 5% benchmarks leaves approximately -0.81 eagles at the 1% level and 2.19 eagles at the 5% level. This level of bald eagle take equates to about 2.5% of the LAP.

Using the USFWS eagle fatality prediction model (USFWS 2013) we used eagle data from pre-construction eagle surveys to predict the number of bald eagles the Project would take per year. At the upper 80th credible interval level we estimate the Project would take roughly one bald

eagle per year. Using this estimate, and the above combined reductions against the 1 % and 5% benchmarks due to both previously permitted eagle take and unpermitted take due to wind energy, if one bald eagle were taken by the Project per year then the combined cumulative take would be -1.81 eagles at the 1% level and 1.19 eagles at the 5% level. This combined level of take (USFWS permitted take, take due to wind energy facilities, and predicted take for the Project) would be 2.81 bald eagles per year, which is about 4% (2.81/71) of the estimated population of bald eagles within the LAP. We have some concerns about this level of take because it exceeds the 1% benchmark. However this level of take would not exceed the 5% benchmark and for us this would be the greater concern. Further, the take of bald eagles presented here due to wind turbines is mostly unpermitted or unauthorized take. And the take of one bald eagle per year predicted for the Project has yet to be permitted by USFWS. So at this time the authorized take of bald eagles within the LAP for the Project is limited to 0.51 eagles/year. Relative to the LAP analysis for the Project, a key consideration for us is whether the authorized take of bald eagles combined with the proposed take for the Project would exceed either the 1% or 5% benchmarks. For this Project, the permitted take of bald eagles combined with the estimated take for the Project LAP is 1.51 eagles per year or about 2% of the LAP. Hence, for the LAP for the Project this level of take would exceed the 1% benchmark, but not the 5% benchmark.

We also assessed the level of take for the LAP using available records of unpermitted take of bald eagle mortality for the years 2007 to 2016 (the time interval selected for the LAP analysis). Based on these mortality records the year with the highest reported take was 2016 with 16 records of bald eagle mortality due to anthropogenic (one record) or unknown/other (15 records) causes. Using 2016 data as the worst case scenario for the 10-year time period used for the LAP analysis, this level of unpermitted take due to multiple causes of eagle mortality is about 23%. However, this analysis is overly conservative in that the majority of the 2016 unpermitted mortality records for bald eagles were due to causes reported as either unknown or other. This means that it is equally likely that the 2016 mortalities could have been due to anthropogenic or natural causes. Relative to the USFWS 2016 rule revision this level of unpermitted take exceeds the 10% level for the LAP. Per a provision in the USFWS 2016 rule revision (81 FR 91494), we considered whether or not compensatory mitigation may be required because in the above scenario cumulative unauthorized mortality would exceed 10% of the LAP. However, unpermitted take over this 10-year interval averaged only 3.8 bald eagle mortalities per year which is only 5.4% of the LAP. And other factors to consider relative to this point are that our assessment of unauthorized take was deliberately conservative towards bald eagles, and that USFWS has documented that bald eagle populations are generally increasing in the U.S. (USFWS 2016). The Breeding Bird Survey (BBS) index trend estimate for the bald eagle over the entire BBS coverage area for the period 1966 to 2012 is 5.3% (Sauer et al., 2014 as cited in USFWS PEIS 2016). Also, USFWS has established take thresholds for bald eagle populations

by EMU in the Final Environmental Assessment (FEA) for the 2009 Eagle Act take regulations. For the Rocky Mountains and Plains EMU the annual take threshold is 13.02 bald eagles per year and for the Great Lakes EMU the annual take threshold is 224.39 bald eagles per year. Hence, even with the predicted take for the Project of bald eagles per year of one eagle taken out of this threshold level from the FEA, this would still leave 12.02 bald eagles per year that could be taken in the Rocky Mountains and Plains EMU and 223.39 that could be taken from the Great Lakes EMU per year. Therefore, the reduction in the USFWS thresholds for the Rocky Mountains and Plains EMU and the Great Lakes EMU (USFWS 2009) would be relatively minimal.

Table 5. Known Bald Eagle Mortalities Within 86 Miles of the Courtenay Wind Energy Project, 2007-2016.

	Number of Mortalities	Percent of Total Mortalities
Natural Causes		
Infection	2	5
Killed/injured by animal	1	2
Emaciation	1	2
Anthropogenic Causes		
Electrocution	2	5
Collision with Vehicle (Highway)	3	7
Collision with Wind Turbine	1	2
Collision with Wire	2	5
Shot	4	10
Poisoned (lead)	8	19
Trapped	1	2
Unknown Cause	10	24
Other	5	12
Total Mortalities	42	100

4.3.3 Cumulative Effects on Native American Cultural Values

To address the effects of bald eagle take on cultural practices, the USFWS assessed whether the No Action or Proposed Action would impact the religious and cultural significance of eagles to Native American communities. Cumulative effects from Alternative 2 from the non-purposeful take of Bald Eagles will not result in regional population declines as the take of bald eagles at the Project is expected to be below the sustainable take threshold for both the Rocky Mountains and Plains EMU and the Great Lakes EMU. In addition, USFWS will review take thresholds in the EMUs on a regular basis relative to bald eagle population and demographic parameters, and will

modify or adjust permitting accordingly. If there is evidence that demand for bald eagle take will exceed take thresholds for the EMUs, the regional structured-allocation process will ensure that authorized take necessary to meet the religious need of a Native American Tribe will not be denied due to other take being authorized for another purpose (USFWS 2009a). Also, if an ETP is issued it will include permit conditions to ensure all recoverable eagle carcasses, parts, and feathers are sent to the USFWS National Eagle Repository and could then be used for Native American cultural and religious purposes.

4.4 Assessment of Alternatives

In assessing whether there is a "significant" impact, consideration of both the context and intensity of the action and its effects (40 CFR 1508.27) have been applied to this analysis. Context refers to the affected environment in which a proposed action takes place and may include the socioeconomic, legal, and political situation surrounding an action. Intensity refers to the severity of a proposed action's impact on the environment and may consider environmentally beneficial actions, public health, unique characteristics of the geographic area, controversy, uncertainty, precedent-setting elements, cumulative effects, cultural resource effects, effects on endangered species, and consistency with environmental laws (40 CFR 1508.27[b]). In the case of the Proposed Action being evaluated—issuance of an ETP—the context is identified as the presence of an already operating wind energy facility within the larger bald eagle EMUs and the Project LAP where the take of bald eagles at the Project on a yearly basis has been estimated. Consideration of intensity addresses the relative severity of effects on bald eagle, the possibility of the federal action to establish a precedent for future ETPs, and the efficacy of the action in mitigating adverse cumulative effects.

4.4.1 Alternative 1

Under the No Action Alternative, USFWS would take no action, which means denying the ETP application and not issuing an ETP. Under the No Action Alternative, direct impacts of the Project to bald eagle populations would only be quantified through reporting of incidental finds during regular operation and maintenance activities. Under the No Action Alternative, the Project would continue to operate without an ETP and therefore would not meet the purpose and need for the federal action because USFWS would not issue an ETP and the Applicant would not have regulatory assurances under the Eagle Act over the life of the Project.

4.4.1.1 Native American Cultural and Religious Values

Bald eagle take is expected to occur under both alternatives, and may also have cultural and religious effects on Native American tribes. Under the no action alternative, the ECP and associated benefits to bald eagles would not be implemented. Take of bald eagles would likely be greater in the absence of the ECP. Post-construction monitoring would likely not be

implemented, and bald eagle take might go undetected. Therefore, bald eagles taken at the Project would not be collected, and would not be available for the National Eagle Repository and tribal nations. Selection of the no action alternative will result in a loss of bald eagles without any associated ECP benefits to the bald eagles valued by Native Americans.

4.4.2 Alternative 2

Under Alternative 2, the Proposed Action, USFWS would issue an ETP, and would incorporate as ETP conditions all of the avoidance, minimization, and mitigation measures described in the ECP (Attachment A, Sections 9.0 and 10.0). Under this alternative, USFWS recognizes that the Project is built and operational, and that all Applicant-committed measures and adaptive management requirements would be fulfilled. We predict that that up to five bald eagles (at the upper 80 percent credible interval) would be killed over the five-year ETP duration due to Project operations (Table A).

The Applicant adopted several avoidance and minimization measures applicable to the Project design, construction, and operations to reduce risks to wildlife species (Chapter 1.1 and Chapter 2.1.2). Baseline post-construction fatality monitoring for all birds and bats will occur during the first two years at a subset of turbines. Also, the Applicant will conduct eagle fatality monitoring at 100 percent of turbines, beginning in 2017 and continuing for at least the first two years of Project operation (Attachment A, Section 10.1.1). Additional eagle fatality monitoring would be required throughout the duration of an ETP if one were issued for the Project.

The Applicant has developed an adaptive management strategy for the implementation of EACPs and other conservation measures (Chapter 2.1.2) that would be implemented if bald eagle take is observed during post-construction monitoring. These measures represent the best available techniques to reduce eagle disturbance and ongoing fatalities (Attachment A, Table 12). The Applicant would engage with USFWS any time a trigger or threshold event occurs to collaboratively manage the process.

Based on our eagle take regulations (USFWS 2009b), the 2009 FEA (USFWS 2009 a), and our ECP Guidance (USFWS 2013), we have determined that compensatory mitigation to offset permitted mortality of bald eagles is not required for the Project. The ECP Guidance states that if eagle populations are not healthy enough to sustain additional mortality, applicants must reduce the unavoidable mortality to meet the no-net-loss standard (USFWS 2013a). Bald eagle populations have increased significantly, (Sauer et al., 2014 as cited in USFWS PEIS 2016) and the predicted eagle take for the Project is not expected to exceed that which can be sustained by the LAP or at the EMU level.

4.4.2.1 Native American Cultural and Religious Values

Bald eagle take is expected to occur under both alternatives. Under Alternative No. 2, the ECP and its associated benefits to bald eagles would be implemented; thus, reducing the risk of bald eagle take at the Project. Post-construction monitoring prescribed in the ECP would monitor bald eagle mortality due to the Project operations and provide fatality data. The fatality data would be used in mitigation efforts to offset bald eagle take and reduce the net impact of the Project. The implementation of the ECP will result in benefits to the bald eagle that Native Americans value.

Chapter 5: Summary of Environmental Consequences

In our NEPA analysis, we considered the Proposed Action and a No Action alternative:

- Alternative 1 – USFWS does not issue a Programmatic ETP for the Project (No Action)
- Alternative 2 – USFWS issues a Five-Year Programmatic ETP based on the Applicant's ECP (Proposed Action)

The alternatives were focused and narrow because the Project has been constructed and it is operational; however, they provide a reasonable range to assess differing potential environmental effects associated with issuance of an ETP. Alternative 1 does not ensure a net conservation benefit to eagles and would not meet the underlying purpose or need identified by USFWS in this EA. Alternative 2 evaluates implementation of the proposed ECP for the five-year ETP term. Under the Proposed Action (Alternative 2), USFWS would validate underlying assumptions that comprise this alternative, based on implementation of the ECP by the Applicant, and through ETP monitoring conditions in the permit. Overall impacts to eagles and Native American cultural and religious values would be reduced through the selection of Alternative 2 by implementing the adaptive management measures identified in the ECP.

Chapter 6: References

APLIC (Avian Power Line Interaction Committee). 2006. Suggested practices for avian protection on power lines; the State of the Art in 2006. Edison Electric Institute, APLIC and the California Energy Commission Washington, D.C and Sacramento, CA. Available online at: http://www.aplic.org/uploads/files/2613/SuggestedPractices2006(LR-2watermark).pdf

APLIC. 2012. Reducing avian collisions with power lines: the State of the Art in 2012. Edison Electric Institute and APLIC. Washington, D.C. Available online at: http://www.aplic.org/uploads/files/2613/SuggestedPractices2006(LR-2watermark).pdf

Audubon. No date. Guide to North American Birds. Golden Eagle (*Aquila chrysaetos*). Accessed November 29, 2016 from: http://www.audubon.org/field-guide/bird/golden-eagle

Bryce, S.A., J.M. Omernik, D.E. Pater, M. Ulmer, J. Schaar, J. Feeouf, R. Johnson, P. Kuck, and S.H. Azevedo. 1996. Ecoregions of North Dakota and South Dakota (color poster with map, descriptive text, summary tables, and photographs). Accessed November 4, 2016 from: ftp://newftp.epa.gov/EPADataCommons/ORD/Ecoregions/sd/ndsd_front.pdf

Buehler, D. A. 2000. Bald Eagle (*Haliaeetus leucocephalus*). In A. Poole and F. Gill (ed.). The Birds of North America. Vol. 506. The Birds of North America, Inc., Philadelphia, PA, USA.

Cornell Lab of Ornithology. 2015. All About Birds - Bald Eagle. Accessed November 25, 2016 from: https://www.allaboutbirds.org/guide/bald_eagle/lifehistory

Courtenay Wind Farm, LLC. 2013. Application to the North Dakota Public Service Commission for Certificate of Site Compatibility. Courtenay Wind Farm. Case No. PU-13-64. April 5, 2013. 132 pp.

Dyke, Steve R., Sandra K. Johnson, and Patrick T. Isakson. 2015. North Dakota State Wildlife Action Plan. North Dakota Game and Fish Department, Bismarck, ND.

Dakota Game and Fish Department, Bismarck, ND. Kochert, M.N., K. Steenhof, C.L. Mcintyre and E.H. Craig. 2002. Golden Eagle (*Aquila chrysaetos*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology. Accessed November 29, 2016 from: https://birdsna.org/Species-Account/bna/species/goleag/introduction

Monette, D.J., K. Greenwood, P. Gonzales-Rogers, and P. Durham. 2011. U.S. Fish and Wildlife Service Tribal Consultation Handbook. April 2013. Hadley, Massachusetts. 84. pp.

New, L., E. Bjerre, B. Millsap, M.C. Otto, and M.C. Runge. 2015. A Collision Risk Model to Predict Avian Fatalities at Wind Facilities: An Example Using Golden Eagles, *Aquila*

chrysaetos. PLoS ONE 10(7):e0130978. doi:10.1371/journal.pone.0130978. Available online at: http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0130978

North American Bird Conservation Initiative International. No date. Bird Conservation Regions. Accessed November 25, 2016 from: http://www.nabci.net/International/English/bird_conservation_regions.html

NDGFD (North Dakota Game and Fish Department). 2016a. Golden Eagle. Accessed November 29, 2016 from: https://gf.nd.gov/wildlife/id/raptors/golden-eagle

_____. 2016b. Bald Eagle. Accessed April 18, 2017 from: https://gf.nd.gov/wildlife/id/raptors/bald-eagle

Strickland, M.D., E.B. Arnett, W.P. Erickson, D.H. Johnson, G.D. Johnson, M.L. Morrison, J.A. Shaffer, and W. Warren-Hicks. 2011. Comprehensive Guide to Studying Wind Energy/Wildlife Interactions. Prepared for the National Wind Coordinating Collaborative, Washington, D.C., USA.

Tetra Tech (Tetra Tech, Inc.). 2013a. Whooping Crane Likelihood of Occurrence Report. Courtenay Wind Farm. Stutsman County, North Dakota. Prepared for Geronimo Energy. April 2013. 21 pp.

_____. 2013b. Wetlands and Waters Survey. Courtenay Wind Energy Center, Stutsman County, North Dakota. October 2013. 80 pp.

_____. 2013c. 2012 Fall Avian and Crane Surveys. Courtenay Wind Farm, Stutsman County, North Dakota. Prepared for Geronimo Energy. February 2013. 54 pp.

_____. 2013d. 2013 Spring Avian Surveys. Courtenay Wind Farm, Stutsman County, North Dakota. Prepared for Geronimo Energy. June 2013. 54 pp.

_____. 2014a. 2014 Raptor Nest Survey. Courtenay Wind Farm, Stutsman County, North Dakota. March.

_____. 2014b. 2014 Raptor Nest Survey. Courtenay Wind Farm, Stutsman County, North Dakota. May.

_____. 2016a. 2016 Raptor Nest Survey. Courtenay Wind Farm, Stutsman County, North Dakota. April.

_____. 2016b. 2016 Raptor Nest Survey. Courtenay Wind Farm, Stutsman County, North Dakota. May.

_____. 2017. March 2017 Aerial Survey Report. Courtenay Wind Farm, Stutsman County, North Dakota. April 2017.

USDA NRCS (United States Department of Agriculture, Natural Resources Conservation Service). 1995. Soil Survey of Stutsman County, North Dakota.

USFWS (U.S. Fish and Wildlife Service). 2003. Migratory Bird Permit Memorandum. MBPM-2. April 15. Available online at: http://www.fws.gov/policy/m0208.pdf.

_____. 2005. National Environmental Policy Act Reference Handbook. Available online at: http://www.fws.gov/r9esnepa/.

_____. 2007. U.S. Fish and Wildlife Service . Federal Register Vol. 72, No. 130, 37346. July 9, 2007. Available online at: https://www.gpo.gov/fdsys/pkg/FR-2007-07-09/html/07-4302.htm

_____. 2009a. Final Environmental Assessment: Proposal to Permit Take as Provided Under the Bald and Golden Eagle Protection Act. Division of Migratory Bird Management. Washington, D.C.: U.S. Fish and Wildlife Service. April. Available online at: http://www.fws.gov/alaska/eaglepermit/pdf/environmental_assessment.pdf.

_____. 2009b. U.S. Fish and Wildlife Service . Federal Register Vol. 74, No. 175, 46836. September 11, 2009. Available online at: https://www.fws.gov/policy/library/2009/E9-21589.pdf

_____. 2012. U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines. OMB Control Number 1018-0148. March 23. Available online at: http://www.fws.gov/ecological-services/es-library/pdfs/WEG_final.pdf

_____. 2013a. Eagle Conservation Plan Guidance. Module 1 – Land-based wind energy. Version 2. Available online at: http://www.fws.gov/migratorybirds/pdf/management/eagleconservationplanguidance.pdf.

_____. 2013b. Summary Report: Peer Review of the Scientific Findings in the U.S. Fish and Wildlife Service Eagle Fatality Model and its Application to Wind Energy Development Projects. Prepared by AMEC Environment & Infrastructure, Inc. for USFWS, Region 6, Division of Migratory Birds. March 14. Available online at: http://www.fws.gov/mountainprairie/science/PeerReviewDocs/FINAL_Summary_Report_Peer_Review_of%20Eagle_Fatality_Model_AMEC_03142013.pdf.

_____. 2016a. Bald and Golden Eagles: Population demographics and estimation of sustainable take in the United States, 2016 update. Division of Migratory Bird Management, Washington D.C., USA. Accessed November 29, 2016 from: https://www.fws.gov/migratorybirds/pdf/management/EagleRuleRevisions-StatusReport.pdf

_____. 2016b. Eagle Permits; Revisions to Regulations for Eagle Incidental Take and Take of Eagle Nests. Federal Register Vol. 81, No. 242, 91494. December 16, 2016. Available at: https://www.gpo.gov/fdsys/pkg/FR-2016-12-16/pdf/FR-2016-12-16.pdf

_____. 2016c. Programmatic Environmental Impact Statement for the Eagle Rule Revision; United States Department of the Interior, Fish and Wildlife Service, December, 2016. Available at: https://www.fws.gov/birds/management/managed-species/eagle-management.php.

_____. 2017. Riley, Clint Assistant Regional Director, Division of Migratory Birds, USFWS Region 6. Intra-Service Section 7 Biological Evaluation Form. July 28, 2017. Courtenay Wind Project, Mountain-Prairie Region, Region 6.

Chapter 7: Preparers and Contributors

7.1 USFWS

Louise Galiher, NEPA Assistant Manager, USFWS Region 6

Kevin Kritz, Wildlife Biologist, USFWS Region 6

Hillary White, Wildlife Biologist, USFWS Region 6

Clint Riley, Project Manager; Assistant Regional Director, Migratory Birds, USFWS Region 6

7.2 Tetra Tech, Inc.

Kimberely Gorman, Project Manager/NEPA Review/GIS Analyst

Susan Hurley, Senior Biologist, Deputy Project Manager/NEPA Review

Linda Rivard, Biologist/NEPA Preparation

Mike Wallgren, Avian Biologist

Rusty Childers, Technical Editor