Grande Prairie Wind Farm
Wildlife Conservation Strategy

Project #193701626

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This Wildlife Conservation Strategy (WCS) is being developed in coordination with both the NGPC and USFWS. Please note that this is a draft document subject to change.

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Table of Contents

1.0 INTRODUCTION 1.1
1.1 STATEMENT OF PURPOSE 1.1
1.1.1 WCS Terms 1.1
1.1.2 WCS Project Area 1.2
1.2 CONSULATION HISTORY 1.2

2.0 REGULATORY FRAMEWORK 2.4
2.1 FISH AND WILDLIFE LAWS, REGULATIONS, AND POLICIES 2.4
2.1.1 Migratory Bird Treaty Act (MBTA) 2.4
2.1.2 Bald and Golden Eagle Protection Act (BGEPA) 2.5
2.1.3 Endangered Species Act (ESA) 2.6
2.2 OTHER FEDERAL, STATE, COUNTY, LOCAL AND TRIBAL LAWS, REGULATIONS, AND POLICIES 2.6
2.2.1 Nebraska Nongame and Endangered Species Conservation Act 2.6
2.2.2 Local Regulations and Zoning 2.7

3.0 PROJECT DESCRIPTION 3.7
3.1 PROJECT AREA, SITING, AND FACILITIES SITING 3.7
3.2 PROJECT COMPONENTS 3.7
3.2.1 Wind Turbines 3.8
3.2.2 Access Roads and Crane Paths 3.8
3.2.3 Underground Electrical Collection System 3.9
3.2.4 Collector Substations and Interconnection Switchyard 3.9
3.2.5 Generation-Tie Line 3.10
3.2.6 Meteorological Towers (MET towers) 3.10
3.2.7 Operations and Maintenance Facility 3.10
3.2.8 Other Associated Facilities 3.11
3.3 PROJECT CONSTRUCTION 3.11
3.4 OPERATIONS AND MAINTENANCE 3.12
3.4.1 Post Construction Mortality Monitoring 3.12
3.5 DECOMMISSIONING 3.13

4.0 PROJECT HISTORY OF WILDLIFE PRESENCE, AND RISK ASSESSMENTS 4.14
4.1 PRELIMINARY SITE EVALUATION (WEG TIER 1) AND SITE CHARACTERIZATION (WEG TIER 2) 4.14
4.1.1 Site Description 4.15
4.1.2 Wildlife Status Assessments 4.16
4.1.3 Evaluation and Decisions 4.20
4.2 FIELD STUDIES TO DOCUMENT WILDLIFE AND HABITAT (WEG TIER 3) 4.21
4.2.1 Bird Surveys 4.22
4.2.2 Bat Surveys 4.25
4.2.3 American Burying Beetle Surveys 4.26

DRAFT

5.0 RISK ASSESSMENTS AND DECISIONS BASED ON ASSESSMENTS 5.26
5.1 BIRDS 5.27
5.1.1 Project Risk Assessment 5.27
5.2 BATS 5.32
5.2.1 Project Risk Assessment 5.32
5.3 AMERICAN BURYING BEETLE 5.38
5.3.1 Project Risk Assessment 5.39
5.4 RISK ASSESSMENT DECISIONS 5.44
5.4.1 Decision Criteria to either Abandon Site or Advance Project 5.44
5.4.2 Decision of Need for Other Conservation Plans 5.45

6.0 CONSERVATION MEASURES TO AVOID AND MINIMIZE ADVERSE IMPACTS 6.45
6.1 SUMMARY OF MEASURES INCORPORATED INTO THE PROJECT SITING PROCESS 6.45
6.2 SUMMARY OF MEASURES INCORPORATED INTO THE PROJECT DESIGN 6.45
6.2.1 General 6.45
6.2.2 Surveys 6.46
6.2.3 Surface Water, Soils, and Vegetation 6.46
6.2.4 Site Management 6.48
6.2.5 Collision Risk 6.49
6.2.6 Fencing 6.51
6.2.7 Hazardous and Solid Wastes 6.51
6.2.8 Fire Protection 6.51
6.2.9 Weeds 6.52
6.2.10 Noise 6.52
6.2.11 Northern Long-Eared Bat 6.52
6.2.12 Whooping Crane 6.53
6.2.13 Bald Eagle 6.55
6.2.14 American Burying Beetle 6.55

7.0 POST-CONSTRUCTION STUDIES TO ESTIMATE IMPACTS (WEG TIER 4) 7.57
7.1 MONITORING 7.57
7.1.1 Monitoring Goals 7.57
7.1.2 Species to be Monitored 7.57
7.1.3 Study Design 7.58
7.1.4 Field Methods 7.59
7.2 PERMITS AND WILDLIFE HANDLING PROCEDURES 7.61
7.2.1 Permits 7.61
7.2.2 Wildlife Handling Procedures 7.61
7.3 DATA ANALYSIS AND REPORTING 7.62
7.3.1 Data Analysis 7.62
7.3.2 Statistical Methods for Estimating Fatality Rates 7.62
7.3.3 Reporting 7.62

8.0 OTHER POST-CONSTRUCTION STUDIES AND ADAPTIVE MANAGEMENT (WEG TIER 5) 8.62

DRAFT

8.1 CONTINUED MONITORING AND COORDINATION PROCESSES 8.62
8.2 ADAPTIVE MANAGEMENT 8.63
8.3 WHOOPING CRANE CONTINGENCY PLAN 8.65
8.3.1 Construction 8.65
8.3.2 Operation 8.65

9.0 CONTACTS/KEY RESOURCES 9.67
9.1 LIST OF CONTACTS AND KEY RESOURCES 9.67
9.2 LIST OF PREPARERS 9.67

10.0 LITERATURE CITED 10.67

LIST OF TABLES

Table 5-1: Results of publically available post-construction bird mortality monitoring studies in Nebraska and surrounding states. 5.30
Table 5-2: Results of publically availably post-construction bat mortality monitoring studies in Nebraska and surrounding states. 5.34
Table 5-3. Temporary and permanent impacts used for calculation of impacts[1] to American burying beetle habitat at the Grande Prairie Wind Farm, Holt County, Nebraska 5.39
Table 5-4. Temporary and permanent impacts from the Grande Prairie Wind Project, Holt County. Nebraska on American burying beetle habitat, as determined by a 2014 habitat survey. 5.40
Table 5-5. Estimated take of American burying beetles during construction of the Grande Prairie Wind Farm (Holt County, NE) based on the 2014 habitat assessment.. 5.41
Table 5-6. Estimated take of American burying beetles during construction of the Grande Prairie Wind Farm (Holt County, NE) based on the 2014 habitat assessment and assuming construction occurs in 2016 rather than 2015. ..... 5.43

LIST OF FIGURES

Figure 1 Project Layout
Figure 2 Transmission and Interconnect
Figure 3 Index of Sensitivity of Wildlife Habitats in Nebraska to Wind Energy Development
Figure 4 Conservation Areas

DRAFT

1.0 Introduction

Grande Prairie Wind, LLC (Grande Prairie), a subsidiary of Geronimo Wind Energy, LLC d/b/a Geronimo Energy, is proposing the construction of a commercial, utility-scale wind energy generation facility in Holt County, Nebraska. The Grande Prairie Wind Farm (Project) would include up to 266 wind turbines, with a combined generating capacity of up to 400 megawatts (MW) of renewable energy.

1.1 STATEMENT OF PURPOSE

Grande Prairie, as part of their due diligence process, is developing this Wildlife Conservation Strategy (WCS) to avoid and reduce potential impacts to wildlife at the Project. This WCS will also document Grande Prairie's scientific analysis of the Project's potential impacts to wildlife species and their habitats, and the systematic processes which will be used for evaluating these impacts. The Project is using the tiered approach described in the U.S. Fish and Wildlife Services' (USFWS) Land Based Wind Energy Guidelines (WEG; USFWS 2012) as well as the Nebraska Wind and Wildlife Working Group's (NWWWG) Guidelines for Wind Energy and Wildlife Resource Management in Nebraska (NWWWG 2013) to assess the potential impacts to wildlife.

This WCS will be in effect throughout the life of the Project as a working document. The main goals of the Grande Prairie WCS are to:

- Minimize bird, bat, and American burying beetle (*Nicrophorus americanus*; ABB) fatalities and secondary effects on wildlife at the Project;
- Comply with federal and state wildlife regulations (e.g., Migratory Bird Treaty Act);
- Effectively document any bird, bat or ABB injuries or fatalities to provide a basis for ongoing development of avian and bat protection procedures;
- Outline ongoing surveys, monitoring, and management efforts to avoid and minimize adverse wildlife impacts throughout the Project;
- Implement adequate training for all personnel and subcontractors; and
- Plan for effective and continuous coordination between Grande Prairie, the USFWS and the Nebraska Game and Parks Commission (NGPC).

1.1.1 WCS Terms

This WCS will be in effect through development, construction, operation, maintenance, and decommissioning of the Project (Term). This Term will cover the 20-year minimum functional life of the turbines following completion of construction, and potential extended operations and/or

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decommissioning of the Project. Grande Prairie will update this WCS, as needed, through adaptive management (see Section 8.2) throughout the Term. Should the Project be repowered at the end of the Project's expected life, Grande Prairie will re-initiate consultation with the USFWS and NGPC. This WCS's avoidance and minimization measures (Section 6.0), continued monitoring (Sections 7 and 8) and adaptive management plans (Section 8.2) will remain in effect until the Project is decommissioned.

1.1.2 WCS Project Area

This WCS applies to all lands leased by Grande Prairie for construction and operation of the Project. These lands include the locations for up to 266 turbines and associated facilities.

1.2 CONSULATION HISTORY

The following is a summary of correspondence and meetings held with, and material submitted by Grande Prairie to the USFWS, and NGPC regarding the proposed Project:

April 25, 2012: A meeting was held at the Nebraska Field Office (NEFO) in Grand Island, NE with the USFWS and NGPC to discuss the biological concerns and potential issues associated with the proposed Project. A strategy for assessing potential whooping crane (*Grus Americana*; Federally and State endangered) issues was outlined, and development of an Avian Protection Plan (APP; this became a Bird and Bat Conservation Strategy [BBCS], and is now a WCS) for reducing potential Project impacts to all birds in general.

August 16, 2012: A biology meeting was held at various locations within the Project boundary between USFWS, NGPC biologists, and Western to identify areas of concern.

August 30, 2012: A letter was provided to Stantec Consulting Services, Inc. from NGPC regarding comments to the Whooping Crane Desktop Risk Assessment.

December 17, 2012: A preliminary technical assistance letter for the Project was provided by USFWS, which identified three federally endangered and threatened bird species: whooping crane, interior least tern (*Sterna antillarum*) and piping plover (*Charadrius melodus*). The letter requested an analysis of both direct and indirect potential effects from construction and operation of the Project. Additionally, the letter provided other Fish and Wildlife statutes (in addition to the ESA) which are applicable to the Project, including BGEPA and MBTA, and provided recommendations for compliance.

November 2013: Multiple phone calls, emails, and letters were exchanged with USFWS and NGPC to support Grande Prairie's review under the Nebraska Power Review Board. The group discussed Grande Prairie's development of pre-and post- construction surveys and avoidance, minimization, and mitigation measures, as well as revisions to the Project's 2011 Whooping Crane Desktop Risk Assessment. Based on the results of this correspondence, NGPC

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	provided a letter dated November 7, 2013 to the Nebraska Power Review Board that stated "*the proposed project "may affect, but is not likely to adversely affect" state-listed endangered or threatened species*". Grande Prairie's commitments regarding pre- and post- construction surveys and avoidance, minimization, and mitigation measures are outlined in this BBCS.
January 15, 2014:	A meeting and conference call was held at the USFWS Grand Island, Nebraska Field Office. Participating in the meeting was USFWS, NGPC, Grande Prairie, and Western EcoSystems Technology, Inc. (WEST, Inc.). The objective of the meeting was to provide an update on the Project and discuss Grande Prairie's implementation of the Eagle Conservation Plan Guidance: Module 1 – Land-based Wind Energy, Version 2. WEST distributed Grande Prairie's eagle survey plan via email to USFWS on January 29, 2014 and February 24, 2014.
April 3, 2014:	A conference call was held to discuss the northern long-eared bat and the conferencing process. Participating in the meeting were USFWS, NGPC, Grande Prairie, and Fredrikson & Byron. Notes from this conference call were distributed by Grande Prairie via email on April 11, 2014.
April 28, 2014:	A second conference call was held to discuss northern long-eared bat and the conferencing process. Participating in the meeting were USFWS, NGPC, Grande Prairie, and Fredrikson & Byron. Notes from this conference call were distributed by Grande Prairie via email on May 7, 2014.
May 1, 2014:	A conference call was held to discuss agency review of the BBCS (Version 1 of the draft BBCS was provided by Grande Prairie via email on February 24, 2014). Notes from this conference call were distributed by Grande Prairie via email on May 6, 2014. Participating in the meeting were USFWS, NGPC, Western, Grande Prairie, Fredrikson & Byron, and Stantec. Comments on the draft BBCS were discussed and detailed meeting minutes were recorded. NGPC suggested adding the rufa red knot (*Calidris canutus rufa)*, a species proposed for federal listing, to the Project documentation, including the BBCS. This comment, and others brought up at the meeting, was incorporated into the May 14, 2014 version of the BBCS (Version 2, which was distributed by Grande Prairie via email on May 14, 2014), as well as subsequent versions.
May 5, 2015:	As a result of the conference calls held April 3 and April 28, 2014, Western sent a letter to USFWS requesting northern long-eared bat conferencing.
June 3, 2014:	In a letter dated June 3, 2014, USFWS acknowledged Western's request for informal conferencing for the northern long-eared bat.
June 25, 2014:	A second conference call was held to discuss agency review of the BBCS. Participating in the meeting were USFWS, NGPC, Western, Grande Prairie, WEST, Inc., and Stantec. Notes from this conference call were distributed by Grande Prairie via email on July 30, 2014. Grande Prairie also answered questions about the

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	eagle nest discovered in the northeast part of the Project area earlier in the month, and the results of the 2014 ABB surveys. Comments on the draft BBCS were discussed and detailed meeting minute notes were recorded. Comments brought up at the meeting were incorporated into this current draft of the BBCS.
August 6, 2014	A third conference call was held to discuss agency review of the BBCS, as well as to update the agencies on the results from 2014 surveys and reports including ABB, northern long-eared bat and bald eagles. It was decided that the BBCS would be altered into a WCS to include the ABB. USFWS, NGPC, and Grande Prairie met in person in Lincoln, NE while Western, WEST, Inc., Fredrikson & Byron, and Stantec joined via phone. Notes from this conference call/meeting were distributed by Grande Prairie via email on August 20, 2014.
August 19, 2014	A conference call was held to discuss the Section 7 process. Participating in the meeting was USFWS, NGPC, Western, Grande Prairie, Fredrikson & Byron, and Stantec. Grande Prairie did not distribute notes from this conference call.
September 9, 2014	A conference call was held to discuss the agency's reviews of the draft Final Biological Assessment (BA), timeline, and comments. In attendance were USFWS, NGPC, Grande Prairie, Western, Fredrikson & Byron, Stantec and WEST, Inc. USFWS, NGPC, and Grande Prairie met in person in Lincoln, NE while Western, Fredrikson & Byron, WEST, Inc., and Stantec joined via phone. Grande Prairie did not distribute notes from this conference call.
October 1, 2014:	Western sent a letter to USFWS requesting concurrence on the Final BA, formal consultation on ABB, and formal conferencing on northern long-eared bat.
October 8, 2014	A conference call was held to discuss the Final BA for the Project. Participating in the meeting were USFWS, NGPC, Western, Grande Prairie, Baird Holm, Fredrikson & Byron, Stantec, and WEST, Inc. Comments and responses from draft versions of the BA were discussed via a comment-response log, as well as the eagle take permit process and Section 7 consultation/conferencing process. The previous 2014 conference calls and meetings on the BBCS/WCS were recapped.

2.0 Regulatory Framework

2.1 FISH AND WILDLIFE LAWS, REGULATIONS, AND POLICIES

2.1.1 Migratory Bird Treaty Act (MBTA)

The Migratory Bird Treaty Act (MBTA; 16 U.S.C. §§ 703-712) prohibits the taking, killing, injuring or capture of listed migratory birds. Neither the MBTA nor its implementing regulations found in 50 Code of Regulations (CFR) Part 21 provide for the permitting of "incidental take" of migratory

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birds that may be killed or injured by wind turbines. To avoid and reduce potential impacts to species protected under the MBTA at the Project, Grande Prairie will implement this WCS throughout the life of the Project. This WCS incorporates results from pre-construction avian habitat and use surveys within the Project area, patterns of bird mortality reported at other wind energy facilities, and recommendations obtained through consultation with USFWS and NGPC for reducing impacts to birds. Avoidance and minimization measures for reducing MBTA-listed species at the Project were developed based on these data and are described in this WCS.

2.1.2 Bald and Golden Eagle Protection Act (BGEPA)

The Bald and Gold Eagle Protection Act of 1940 (BGEPA; 16 USC 668-668d and 50 CFR 22.26), and its implementing regulations, provides additional protection to bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) such that it is unlawful to take an eagle. In this statute, the definition of "take" is to "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, or molest, or disturb." The term "disturb" is defined at 50 CFR 22.3 to include "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best available scientific information available: (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior."

The USFWS published a final rule (Eagle Permit Rule) on September 11, 2009 under the BGEPA (50 C.F.R. 22.26) authorizing limited issuance of permits to take bald eagles and golden eagles. This permit term was extended to a maximum of 30-years in the December 9, 2013 ruling (78 FR 73704). A permit would authorize the take of bald eagles and golden eagles where the take is compatible with the preservation of the bald eagle and the golden eagle; necessary to protect an interest in a particular locality; associated with but not the purpose of the activity; and

1) for individual incidences of take: the take cannot be practicably avoided and
2) for programmatic take: the take is unavoidable even though advanced conservation practices are being implemented.

On May 2nd, 2013, the Service announced the availability of the Eagle Conservation Plan Guidance: Module 1 – Land-based Wind Energy, Version 2 (the Guidance[1]). The Guidance provides a means of compliance with the BGEPA by providing recommendations and in-depth guidance for:

- Conducting early pre-construction assessments to identify important eagle use areas;
- Avoiding, minimizing, and/or compensating for potential adverse effects to eagles; and
- Monitoring for impacts to eagles during construction and operation.

The Guidance interprets and clarifies the permit requirements in the regulations at 50 CFR 22.26 and 22.27, and does not impose any binding requirements beyond those specified in the

[1] http://www.fws.gov/windenergy/PDF/Eagle%20Conservation%20Plan%20Guidance-Module%201.pdf

regulations. As for other MBTA-listed species, this WCS incorporates site-specific, regional, and agency information and measures developed based on this information to avoid and reduce impacts to bald and golden eagles at the Project.

2.1.3 Endangered Species Act (ESA)

The federal Endangered Species Act (ESA) of 1973 (16 U.S.C. §§1531 et seq.) provides for the listing, conservation, and recovery of endangered species. Section 9 of the ESA prohibits the take of any endangered or threatened species of fish or wildlife listed under the ESA. Under the ESA, the term "take" is defined to mean "…to harass, pursue, hunt, shoot, wound, kill, trap, capture, or collect: species listed as endangered or threatened, or to attempt to engage in any such conduct. The siting, design, and operation components of the Project incorporate measures to ensure the potential for impacts to ESA-listed species is reduced; these measures are described in this WCS.

2.2 OTHER FEDERAL, STATE, COUNTY, LOCAL AND TRIBAL LAWS, REGULATIONS, AND POLICIES

2.2.1 Nebraska Nongame and Endangered Species Conservation Act

The Nebraska Nongame and Endangered Species Act (Nebraska Revised Statutes §§37-801 to 37-811) accords protection as is necessary to maintain and enhance the numbers of wildlife species normally occurring within the state which may be found to be threatened or endangered within the state of Nebraska. The NGPC maintains a list of state threatened and endangered species[2].

Three bird species are currently listed as endangered at both the state and federal level within Nebraska; eskimo curlew (*Numenius borealis*), whooping crane (*Grus americana*) and interior least tern (*Sternula antillarum athalassos*). The piping plover (*Charadrius melodus*) is threatened at both the state and federal level, and the mountain plover (*Charadrius montanus*) is state-threatened. The rufa red knot (*Calidris canutus rufa)* is currently proposed for federal listing (threatened) under the ESA. Should this species become federally listed, it would automatically become state-listed under Nebraska's Nongame and Endangered Species Conservation Act (Neb. Rev. Stat. §37-801 - 11.)

Three bat species are considered "at risk" species of concern within Nebraska (Schneider et al. 2011) but none are state-listed. These species include the evening bat (*Nycticeius humeralis*), northern long-eared bat (*Myotis septentrionalis*) and tri-colored bat (*Perimyotis subflavus*). The northern long-eared bat is currently proposed for federal listing under the ESA. Should this species become federally listed, it would automatically become state-listed under Nebraska's Nongame and Endangered Species Conservation Act (Neb. Rev. Stat. §37-801 - 11.)

[2] http://outdoornebraska.ne.gov/wildlife/programs/nongame/pdf/E_T_Species_List.pdf

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Additional wildlife species include the ABB, which is endangered at both the state and federal level in Holt County. The river otter (*Lutra canadensis*) is state threatened, but is not federally-listed.

2.2.2 Local Regulations and Zoning

Article 5 of the Holt County zoning regulations for wind energy conversion facilities states that commercial/utility grade wind energy systems shall be permitted as a Conditional Use within any district where the use is listed and allowed if all requirements and information are met and supplied for the Conditional Use permit. Article 5 requires wind turbines to be set back at least the diameter of the turbine itself from public conservation lands (including Wildlife Management Areas and State Recreation Areas), and one-half the diameter from river bluffs of over 15 feet.

3.0 Project Description

3.1 PROJECT AREA, SITING, AND FACILITIES SITING

The Project area is located in Holt County, Nebraska, in the townships of Willowdale, Antelope, Grattan, Iowa, Scott and Steel Creek (Figure 1). The Project will be approximately 400 MW in size, consisting of up to 266 wind turbines and approximately 14 miles (19 to 23 km) of overhead generation-tie (gen-tie) line from the Project substation to an interconnect with Western's 345-kv Fort Thompson to Grand Island transmission line located on the eastern edge of the Project.

The Project would encompass approximately 54,250 acres (21,954 hectares [ha]) of privately and publicly owned cropland and pasture ground. Grande Prairie is responsible for all land acquisition and has obtained the necessary easements from landowners for the development, construction, and operation of up to 266 turbines, associated facilities, and the gen-tie line.

The Project would site wind turbine generators and supporting infrastructure to optimize wind and land resources in the area while minimizing environmental impacts to the extent practicable, as described in this WCS. Only a portion of the Project area will actually host wind farm facilities. Approximately 3,468 acres (1,403 ha), included within the Project area but not contiguous, will be directly affected by the construction of up to 266 Project turbines, Western's interconnection switchyard, two Project collector substations, O&M facility, gen-tie line, and access roads. Approximately only 264 acres (107 ha) would remain impacted during operation itself for up to 266 turbines. Grande Prairie proposed to begin construction in early 2015. The life of the Project is anticipated to be a minimum of 20 years and up to 30 or 40 years.

3.2 PROJECT COMPONENTS

The Project would be located on approximately 54,250 acres of public and private property, which is primarily cropland and pasture ground. The public lands are owned by the State of Nebraska Board of Educational Lands and Funds, and are managed as agricultural land. As

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part of the Project, Grande Prairie proposes to build up to 266 wind turbines, access roads, an underground electrical collection system, and other associated ancillary facilities, including two collector substations, Western's interconnection switchyard, a gen-tie line, meteorological monitoring stations (both temporary and permanent), and an O&M Facility (Figure 1).

3.2.1 Wind Turbines

The Project may include up to 266 wind turbines. A total of 317 locations have been selected, including 266 primary locations and 51 alternate turbine locations. Individual alternate turbine locations may be used in place of primary turbine locations if the primary turbine locations are not used. Grande Prairie is considering a variety of wind turbine generator types, with capacities ranging from 1.5 to 3.3 MW. Each wind turbine generator would be mounted on a tubular tower between 262 feet and 329 feet tall, and have a rotor diameter ranging from 252 feet to 410 feet, depending on the wind turbine generator model selected. Approximate total height would be between 388 feet and 521 feet when the tip of the blade is at the 12 o'clock position. No matter which turbine model is chosen for this Project, the turbines would be a three-bladed, upwind, horizontal-axis turbine. The turbine rotor and nacelle would be mounted on top of a tubular tower and would employ an active yaw control, designed to steer the machine with respect to the wind direction. It would also contain an active blade pitch control (designed to regulate turbine rotor speed) and a generator/power electronic converter system.

Construction of each turbine would require a temporary construction laydown area. This area would extend out to an approximately 150 to 400-foot radius from the center of the turbine foundation and would have enough area for the temporary crane pad and temporary laydown area at each turbine location. Turbines located at the end of an access road (end circuit turbines) will require additional; disturbed area to accommodate turnarounds of large delivery and erection equipment.

Permanent disturbance for each wind turbine generator location would be approximately 0.06 acre. Contained within this area, below ground level, would be a cone-shaped foundation designed to support the turbine with the necessary anchors and conduit needed to connect the turbine to the rest of the Project.

Project turbines would be marked/lighted in accordance with Federal Aviation Administration (FAA) Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, white paint/synchronized red lights – Chapters 4, 12, and 13 (Turbines).

3.2.2 Access Roads and Crane Paths

For up to 266 turbines, between 45 and 85 miles of new access roads would be constructed but their exact location and design is underway and dependent upon final design. New roads are located in consultation with landowners to minimize disturbance, maximize transportation efficiency, and avoid cropland damage to the extent feasible. New roads are also located to minimize impacts to environmental resources like wetlands or archaeological resources. The temporary width of access roads would be approximately 45 feet as a result of construction

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activities; the permanent width of access roads would be up to 20 feet. Surface disturbance would be contained within road ROWs, which would average a width of 40 to 60 feet along turbine/crane path access roads. All widening of roads to accommodate turning of over-length vehicles that Grande Prairie can reasonably foresee are included.

Additionally, between 30 and 160 miles of existing roads would be temporarily maintained to serve as access roads for the Project to facilitate component deliveries, Project construction, and operations and maintenance activities. The roads which would be maintained would all be within the existing road right-of-ways. Prior to the start of Project construction, Grande Prairie would negotiate a County Road Agreement with Holt County for public road maintenance. The County Road Agreement would provide for the restoration of any roads damaged due to use associated with Project construction to a condition at or better than when construction began.

The Project would create temporary disturbances from the crane paths between the turbines, both during construction and periodically for maintenance of the turbines. The crane path's temporary disturbance width is up to 45 feet. For up to 266 turbines, 14 miles of crane path are not contained within the temporary impacts for access road and collection line.

3.2.3 Underground Electrical Collection System

For up to 266 turbines, the underground electrical collection system for the Project would consist of 100 to 155 miles of trenching with a minimum depth of 36 inches. For a majority of the Project area, the collection line will be trenched and installed at 36 to 60 inches. However, there may be a few site specific instances where the collection line is installed deeper than 60 inches (e.g. soil/subsurface conditions or presence of existing utilities). The collection systems would consist of three individual 6-inch insulated circuits rated at 34.5kV; collection routes would be "daisy chained" to connect the turbines in each chain. Additionally, each trench would contain a low voltage fiber optic communications cable. This fiber optic cable would be separated from the collection system cable by 6 or 12 inches. The collection system would not interfere with normal farming operations in the Project area. Construction of collection line would require a temporary construction trench up to 25 feet wide.

It may be necessary at some locations to install a junction box that either joins two separate electrical circuits into one, or splices together two pieces of an electrical circuit (i.e. if a long stretch of cable is needed and the spool on which it is supplied runs out). The junction box is an approximately 3'x3' plastic enclosure and would be installed underground where possible.

3.2.4 Collector Substations and Interconnection Switchyard

The proposed Project would interconnect to Western's 345-kV Fort Thompson to Grand Island transmission line. The Project proposes up to three electrical substations: two collector substations to "step-up" the electricity from the collector system voltage (likely 34.5-kV) to the voltage of the Project gen-tie line and one interconnection switchyard to make the connection to Western's 345-kV transmission line. Each of the collector substations would occupy between 7 and 10 acres and be of similar size and shape as the interconnection switchyard located near the existing 345-kV line.

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3.2.5 Generation-Tie Line

The Project would install an above-ground generation-tie (gen-tie) line with potential voltage ranging from 115kV to 345kV, and 14 miles in length to connect the collector substations and the interconnection switchyard. The structures for the gen-tie line would be self-supporting galvanized or weathering steel, wood or concrete. They would be designed to best blend with the broader visual environment and would be between 65 and 120 feet tall with spacing intervals of between 400 and 1,000 feet. The structures would carry three conductor wires and one fiber optic and shield wire. The fiber optic and shield wire would be marked with bird diverters at intervals of 20 feet. Where two shield wires are required the bird diverters would be placed at alternating intervals of 40 feet such that the over-all interval between bird diverters on both wires is 20 feet. The conductor wires would be attached to the poles via davit arms, brace post or post mount insulators and arms as needed to meet local utility practice and rural utility specifications. All conductor wire spacing and other features would follow the guidelines developed by the Avian Power Line Interaction Committee (APLIC) working group guidelines as they are written at the time of installation.

3.2.6 Meteorological Towers (MET towers)

Up to eight permanent meteorological (MET) towers would be installed within the Project area. The permanent MET towers would be free standing (un-guyed), painted and lit lattice structures extending to a height of 260 to 350 feet, with a 36-square-foot foundation. Towers will be fit with red-strobed, white-strobed lighting and/or painted per FAA regulations. A sonic detection and ranging (SODAR) unit or a light detection and ranging (LIDAR) unit would be installed at the MET towers and would have a small concrete pad (6 feet by 6 feet) for a foundation or sit on a mobile trailer. The permanent MET towers would be used for the measurement of wind flow and direction, vertical turbulence structure, and wind profile in and around the Project site. Data collected at these towers would contribute to energy forecasting and performance optimization of the Project.

Periodically throughout the life of the Project, up to two temporary monitoring stations would need to be installed to assess the productivity of the Project at different locations depending upon turbine performance. These mobile SODAR or LIDAR systems would be mounted on trailers approximately 15 feet long by six feet wide and would typically be in place for a year or less, depending upon turbine performance. These stations are not included in impact calculations since they are mobile trailers that will be moved throughout the Project to locations unknown at this time. Towers will be fit with red-strobed, white-strobed lighting and/or painted per FAA regulations. Any temporary, guyed meteorological towers requiring lighting will also be marked at 15-ft intervals with bird diverters or aviation marker balls (as required by the State of Nebraska).

3.2.7 Operations and Maintenance Facility

The Project Operations and Maintenance (O&M) building would be approximately 2,000 to 5,000 square feet in size. The facility may require up to 35 acres of temporary disturbance, including any parking facilities and outdoor storage yards. The O&M building may be a new structure and building site or may make use of an existing building site in or around the Project area. The O&M facility would include fiber optic or radio communication facilities that would connect the Project's SCADA system to the Project control center. The permanent size of the O&M facility may be up to 14 acres.

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3.2.8 Other Associated Facilities

Central laydown area: The Project may have one temporary central laydown area where tower sections, turbine blades, nacelles, cranes, trucks, temporary office buildings, and other large components would be staged during construction. The central laydown yard typically comprises up to 10 acres depending on the number of turbines served from the area.

Temporary staging areas: The Project may have up to two temporary staging areas that would be smaller in nature than a central laydown area. Temporary staging areas typically comprise 5 to 10 acres and may host a smaller number of tower sections, turbine blades, or nacelles that are scheduled for installation within 3 or 4 miles of the Project construction sites.On-site concrete batch plants: Due to the need for each turbine foundation to have a continuous pour of concrete, the Project may have one or more temporary on-site concrete batch plants. These batch plant(s) may be located within one of the central laydown or temporary staging areas or, depending on the Project's logistical needs, up to one batch plant may be placed on its own 5-acre site.

3.3 PROJECT CONSTRUCTION

Grande Prairie proposes to begin construction in early 2015. The Project would be constructed using standard construction procedures and equipment used for other wind farms and would follow this general process:

- Initial mobilization will focus on the construction of the laydown/staging areas. From there, existing road improvements will take place along with build-out and the access roads, crane paths and crane pad construction. These activities will begin sometime during spring 2015, dependent upon weather and road restrictions;

- Once substantial infrastructure is in place, focus will center on material deliveries, excavation and construction of the foundations for turbine towers, meteorological towers, and transformers. Again, based on spring weather and dependent on the roads being in place, this work is roughly scheduled to begin in mid to late spring and continue into late summer / early fall;

- Construction of the gen-tie line will begin in late spring with the structure foundations, then delivery and assembly of structures, next setting of the structures which should occur mid-summer and finishing with the terminations of the line at the end of the summer;

- The trenching and placement of underground collection and communications cables will be an ongoing effort, as turbine foundations are formed these lines are placed and can then begin to be installed along the route to one of two substations that collect the power produced. At the same time, beginning in early spring the construction of the (2) substations will begin with grading and foundations, then material deliveries and equipment installations, ending with cable terminations and testing around the beginning of fall;

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- The turbine tower and component activities will begin mid-summer with deliveries of roughly 15 units per week. Tower erection will begin and move through the project in a coordinated manner that minimizes road usage and maximizes crane/crew usage (this will be determined by erection contractor along with delivery schedule). This install process is a multi-step process that utilizes crews for base and mid tower erection, top-off erection that includes setting of the nacelle, hub and blades and a final crew preps the unit for commissioning and start-up activities;

- At the same time, the turbine commissioning will begin as dictated with interconnection power availability. This process will allow specific turbines to begin production. This process will begin in mid- to late-fall and continue into the winter. As turbines are brought on-line and into production, all temporary pads/areas will be removed and de-compaction, seeding and reestablishment of stabilization efforts will commence. The final road preparation, erosion control removal, reclamation and site restoration will proceed through fall, winter and into spring of 2016 and beyond as weather allows and dictates.

Construction, including restoration activities, is expected to take approximately 18 to 24 months to complete. Following the start of Project operation, topsoil removed during construction would be replaced in all areas of temporary disturbance and seeded, in non-cropped areas, to promote re-vegetation. Relevant Conservation Measures and Best Management Practices (BMPs; Appendix A) would be followed at all times during Project construction. National Pollutant Discharge Elimination System permits will be obtained by the Balance of Plant contractor and a Storm Water Pollution Prevention Plan (SWPPP) will be enforced.

3.4 OPERATIONS AND MAINTENANCE

A permanent, local staff would operate out of the operations and maintenance building and provide support activities for the life of the Project. Typical operations and maintenance activities would include regular turbine inspections, implementation of a preventative maintenance schedule, and other maintenance activities as required. Some repair activities may require the use of heavy equipment, such as cranes, to assist in the repairs of components such as the rotor, turbine blades, and nacelle components. Periodic mowing may also be necessary to maintain previously-cleared areas associated with Project infrastructure (e.g., access roads) or for post-construction mortality monitoring plots.

3.4.1 Post Construction Mortality Monitoring

Grande Prairie would conduct a bird and bat post-construction mortality study for a minimum of 1 year following Project commissioning using a protocol developed in coordination with NGPC and USFWS as well as industry standard methods. In coordination with the NGPC and USFWS, Grande Prairie will evaluate the need for subsequent surveys using guidelines outlined in the WEG (USFWS 2012) for Tier 4 surveys.

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3.5 DECOMMISSIONING

The life of the Project is expected to be a minimum of 20 years, with a potential Project life of up to 30 or 40 years. The Holt County zoning regulations specifically require that once the useful life of the turbines has ended, Grande Prairie would assess the viability of either repowering the Project by installing new or refurbished turbines or completely decommissioning the Project. If it were determined that the wind turbines would not be replaced or repowered, the following sequence for removal of components will be implemented:

1. Mobilize a crane to the site for decommissioning of the wind turbines.

2. Dismantle and remove the rotor, nacelle, and towers and transport entire wind turbine generator off-site.

3. Expose applicable portions of each foundation using an excavator. Then with an air hammer or comparable equipment, remove the concrete foundations and transformer pads to 5 feet (1.5 m) below ground surface.

4. Within the foundation excavation limits, remove the metal and cable to a depth of 5 feet (1.5 m) below ground surface. Where possible, separate and recycle the metal and cable items.

5. Backfill the holes with the soil that was excavated and regrade the foundation areas to as close as reasonably possible to the original ground contours. Disturbed areas that will not be returned to crop production will be seeded using a seed mix developed through coordination with the wildlife agencies and landowner preferences.

6. Remove and restore to preconstruction conditions access roads owned by the wind plant operator, other than those roads that the landowners wish to retain. Regrade areas as close as reasonably possible to the original ground contours and reseed using a seed mix developed through coordination with the agencies and landowners. For the purposes of the decommissioning cost estimate, it is assumed that all the site access roads would be removed.

7. Remove from the site the transformer and all other substation equipment associated with the Project. Remove all concrete foundations, gravel and fencing, and regrade area as close as reasonably possible to the original substation conditions.

8. Underground cable circuits are anticipated to be buried at a depth of 5 feet (1.5 m) below grade. All cable would be cut off and abandoned in place. For the purposes of the decommissioning cost estimates, it is assumed that the facility equipment would be removed to a depth of 5 feet (1.5 m) below ground surface.

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9. Recycle or resell materials and components that can be salvaged.

In addition to the foregoing, all decommissioned gearboxes, transformers, and hydraulic systems would be drained of fluids and placed in appropriate containers before dismantling and would be transported and disposed of in accordance with all Federal and State environmental regulations. Moreover, to the extent that it is determined that it is more cost-effective to remove the turbine foundations using blasting techniques, a Blasting Plan would be developed and prior approval would be obtained from Holt County. All blasting operations would be conducted in accordance with State Fire Marshall and Occupational Safety and Health Administration (OSHA) rules and regulations.

4.0 Project History of Wildlife Presence, and Risk Assessments

4.1 PRELIMINARY SITE EVALUATION (WEG TIER 1) AND SITE CHARACTERIZATION (WEG TIER 2)

Tier 1 (Preliminary Site Evaluation), as described in the WEG (USFWS 2012), is a landscape-scale screening process using existing information sources to identify blocks of native habitat, ecological communities, and other areas of broad-scale wildlife value. The objective of Tier 1 is to answer the following questions at the landscape level (USFWS 2012):

1. *Are there species of concern present on the potential site(s), or is habitat (including designated critical habitat) present for these species?*

2. *Does the landscape contain areas where development is precluded by law or areas designated as sensitive according to scientifically credible information? Examples of designated areas include, but are not limited to: federally-designated critical habitat; high-priority conservation areas for non-government organizations (NGOs); or other local, state, regional, federal, tribal, or international categorizations.*

3. *Are there known critical areas of wildlife congregation, including, but not limited to: maternity roosts, hibernacula, staging areas, winter ranges, nesting sites, migration stopovers or corridors, leks, or other areas of seasonal importance?*

4. *Are there large areas of intact habitat with the potential for fragmentation, with respect to species of habitat fragmentation concern needing large contiguous blocks of habitat?*

Tier 2 (Site Characterization) focuses on site-specific natural resource information and existing information specific to the Project area to evaluate potential risks to sensitive or protected natural resource features. The objective of Tier 2 is to answer the following questions at the site level (USFWS 2012):

1. *Are known species of concern present at the proposed site, or is habitat (including designated critical habitat) present for these species?*

2. *Does the landscape contain areas where development is precluded by law or designated sensitive according to scientifically credible information? Examples of designated areas include, but are not limited to: federally designated critical habitat; high priority conservation areas for NGOs or other local, state, regional, federal, tribal, or international organizations.*

3. *Are there plant communities of concern present or likely to be present at the site?*

4. *Are there known critical areas of congregation of species of concern, including but not limited to: maternity roosts, hibernacula, staging areas, winter ranges, nesting sites, migration stopovers or corridors, leks, or other areas of seasonal importance?*

5. *Using best scientific information has the developer or relevant federal, state, tribal, and/or local agency identified the potential presence of a population of a species of habitat fragmentation concern?*

6. *Which species of birds and bats, especially those known to be at risk by wind energy facilities, are likely to use the proposed site based on an assessment of site attributes?*

7. *Is there a potential for significant adverse impacts to species of concern based on the answers to the questions above, and considering the design of the proposed project?*

4.1.1 Site Description

The general topography across the Project area is flat or gently sloped in the southern and central portions, and is undulating with gentle to moderate slopes in the western, northern, and eastern portions. Several creeks and drainages occur within the Project area; all are direct or indirect tributaries of the Niobrara River. The Niobrara River itself is located approximately 6 miles north of the Project area, and the Elkhorn River is approximately 7 miles (11.3 km) southwest of the Project area.

The Project is located within the Mixedgrass Prairie Ecoregion of Nebraska (Schneider et al. 2011). There are two main vegetation communities within the Project area: grasslands (approximately 57%) and cultivated crops (43%). In the central and southern parts of the Project area, land has predominately been converted to cultivated farmland for corn (*Zea mays*) and soybean (*Glycine max*) production, irrigated by center pivots. Small, fragmented tracts of grassland are present but these habitats have been modified to serve as pasture through the introduction of forage species, including smooth brome (*Bromus inermis*) and Kentucky bluegrass (*Poa pratensis*).

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Conversely, the western, northern, and eastern parts of the Project area include mostly native or remnant-native mixedgrass prairies and riparian corridors, with small areas of modified grasslands, cultivated farmland, and wooded ravines scattered throughout. In the native and remnant-native mixedgrass prairies, needleandthread (*Hesperostipa comata*), indiangrass (*Sorghastrum nutans*), and little bluestem (*Schizachyrium scoparium*) are the dominant species. The riparian corridors include large wetland complexes dominated by flooded and subirrigated sedge meadows with minor inclusions of ponds (impoundments), scrub-shrub, and forested wetlands. In the uplands, the small (<100 acres), widely scattered woodlands are typically dominated by eastern red cedar (*Juniperus virginiana*) and elm species (*Ulmus* spp.) and mostly occur as planted shelterbelts near farmsteads and pastures. Forested wetlands throughout the riparian corridors are dominated by peachleaf willow (*Salix amygdaloides*) and cottonwood (*Populus deltoides*).

4.1.1.1 Sensitive Areas

Utilizing the NGPC "Wind Energy and Wildlife" map (Figure 3), the proposed Project location is in an area of relatively low sensitivity for wildlife habitats to wind energy development, though the eastern edge of the Project does fall within a biologically unique landscape. Additionally, the Project is located on the far eastern edge of the Central Flyway and does not include any features that may funnel migrating birds such as rivers, forested corridors, or ridgelines.

The eastern half of the Project area is located within the Verdigris-Brazile Biologically Unique Landscape (BUL) as established by the Nebraska Natural Legacy Project (Schneider et al. 2011). The Verdigris-Brazile BUL consists primarily of a mosaic of cropland, restored native grasslands, native tall-grass and mixedgrass prairie, and exotic cool-season grasslands. A total of 18 at-risk terrestrial communities are known to exist within this landscape. One of these at-risk communities, the freshwater seep, occurs within the Project area and is a conservation priority for the Verdigris-Brazile landscape. One seep was observed, and several more are suspected, along the south-facing slopes of North Branch Verdigree Creek (Olsson Associates 2012). Remnants of two other at-risk communities were also observed within the Project area: dry mesic bur oak forest and woodland and cottonwood-peachleaf willow riparian woodland. However, these remnants are too small in size (all < 100 acres) to be considered intact at-risk communities.

4.1.2 Wildlife Status Assessments

4.1.2.1 Birds

The Project is located in the Mixedgrass Plains Ecoregion of Nebraska, which has documented more than 350 species of resident and migratory birds. Common grassland birds include grasshopper sparrow (*Ammodramus savannarum*), dickcissel (*Spiza americana*), western meadowlark (*Sturnella neglecta*), bobolink (*Dolichonyx oryzivorus*), northern bobwhite (*Colinus virginianus*), field sparrow (*Spizella pusilla*), northern harrier (*Circus cyaneus*) and greater prairie-chicken (*Tympanuchus cupido*)(Schneider et al. 2011).

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4.1.2.1.1 Threatened and Endangered Species

The USFWS identified three federally listed endangered and threatened bird species in a technical assistance letter dated December 17, 2012. These include the whooping crane (federally and state endangered), interior least tern (*Sterna antillarum*; federally and state endangered), and piping plover (*Charadrius melodus*; federally and state threatened). The rufa red knot was proposed for listing as threatened by the USFWS (78 FR 189) following issuance of the technical assistance letter and is now included in the WCS.

Based on range maps from the Nebraska Natural Heritage Program[3], both the piping plover and the interior least tern are limited to the Niobrara River within Holt County for their breeding range. A county level range for the rufa red knot within the state has not yet been determined, however this species is considered to be a rare transient throughout the upper Great Plains, and would select wetland habitats similar to those selected by other shorebirds such as the interior least tern and piping plover.

4.1.2.1.1.1 Whooping Crane Desktop Stopover Analysis

A whooping crane desktop stopover analysis was conducted by Stantec in 2011 and revised in 2014 to determine the potential impacts of the Project on migrating whooping cranes (Stantec 2014). Whooping Cranes pass through Nebraska twice yearly as they migrate between their wintering grounds at the Aransas National Wildlife Refuge in Austwell, Texas and their breeding grounds in the wetlands of Wood Buffalo National Park in Alberta and the Northwest Territories of northern Canada (USFWS 2009). Holt County is included in the Whooping Crane's migration use area. The UWFWS has also designated critical habitat for the Whooping Crane (43 FR 20938), which is located along the Platte River (more than 100 miles from the Project area). The nearest confirmed Whooping Crane records to the Project area are located in the vicinity of the Niobrara and Elkhorn rivers, and there are no confirmed records within the Project area. Based on both this desktop evaluation and data from a field-based wetland survey (Olsson Associates 2012), the Project area does not appear to have many characteristics which may attract whooping cranes or increase the potential for cranes to occur in the area; specifically, the site is located approximately 6 miles (10 km) from the nearest major river and there are limited suitable wetlands within the Project area.

4.1.2.1.1.2 Bald Eagle Stage 1 Assessment

The Eagle Conservation Plan Guidance (see Section 2.1.2) defines Stage 1 assessments as a landscape-level evaluation, which is conducted using technical literature, agency files, online database, and information from experts. WEST Inc. conducted an Initial site Assessment in March 2014 (WEST 2014a). There were no important eagle use areas or migration concentration sites documented or thought to occur in the Project area. Additionally, there is not currently any information suggesting habitat for abundant bald eagle prey within the Project, including a lack of large waterbodies which would concentrate fish or waterfowl. The Project area was found to be less likely than the surrounding areas to support high bald eagle use because the biological resources eagles rely on are found primarily outside of the Project area, especially to the north along the Missouri and Niobrara Rivers. There had been one bald eagle nest documented

[3] http://outdoornebraska.ne.gov/wildlife/programs/nongame/Heritage/ET_Ranges.asp

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approximately 0.8 mile from the Project boundary, and additional potential nesting habitat does exist along some of the limited riparian habitat associated with the tributaries of the Niobrara River that penetrate the Project area.

4.1.2.2 Bats

Although the Project area is primarily comprised of pasture and agricultural lands, these areas may provide foraging habitat for some bat species. The streams and riparian corridors that traverse the Project area likely provide foraging habitat and drinking sources for bat species. Additionally, the fencerows, windbreaks, and other linear woodlands scattered throughout the Project area may provide roosting habitat and/or habitat for tree-roosting bats to commute across the Project area. Decrepit and abandoned dwellings, barns, and other structures in the Project area may provide roosting and/or maternity habitat for some species.

Eight bat species have geographic ranges that overlap the Project area, including; big brown bat (*Eptesicus fuscus*), evening bat, eastern red bat (*Lasiurus borealis*), hoary bat (*Lasiurus cinereus*), silver-haired bat (*Lasionycteris noctivagans*), northern long-eared bat, little brown bat (*Myotis lucifugus*), and the tri-colored bat.

4.1.2.2.1 Threatened and Endangered Species

Of the species occurring in Holt county, there are three species of bat (evening bat, northern long-eared bat, and tri-colored bat) considered "at risk" species of concern within Nebraska (Schneider et al. 2011), but are not state-listed.

On October 2, 2013, the USFWS announced a 12-month finding on a petition to list the northern long-eared bat as endangered or threatened under the Endangered Species Act of 1973, as amended, and to designate critical habitat (78 FR 61046 – 61080). After review of the best available scientific and commercial information, the USFWS proposes to list the northern long-eared bat as endangered throughout its range. No critical habitat is designated at this time. The USFWS accepted comments on the proposed listing through January 2, 2014, after which, the USFWS will make a final decision on the proposal. Additionally, the USFWS is voluntarily undertaking a status review of the little brown bat, due to significant population declines from White Nose Syndrome (reviewed in Kunz and Reichard 2010).

The evening bat is found only within the southeastern portion of the state, and is not found in Holt County (Freeman et al. 1997). The tri-colored bat's range within Nebraska is restricted to the limestone quarries of Cass and Sarpy counties, and the little brown bat is restricted to the eastern quarter and the northwestern corner of the state (Freeman et al. 1997). The northern long-eared bat occurs in eastern Nebraska, and along the Niobrara and Republican rivers further into the state (Freeman et al. 1997). The distributions of the northern long-eared bat and the little brown bat in Holt County are limited to larger forests near the Niobrara and Elkhorn Rivers and their tributaries (Russ Benedict, personal communication).

4.1.2.2.1.1 Northern Long-eared Bat Habitat Assessment

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A desktop screening analysis for the northern long-eared bat was conducted for the Project area to determine the suitability of the Project area as suitable northern long-eared bat habitat (Stantec 2014). A follow-up study was conducted by WEST Inc. to confirm the presence/absence of the species during the summer months within the Project area and a 2.5-mile buffer. A desktop assessment for northern long-eared bat habitat showed that a moderate density of patches of forested habitats that could be used for foraging, roosting, and commuting habitat occurs within the Project boundary, with a higher concentration of these habitats within the eastern half of the Project. Desktop analysis for northern long-eared bat habitat revealed approximately 2,496 acres of woodlots, 1,441 acres of forested riparian habitat, and 305 acres of shelterbelts (approximately 5.6% of Project area).

The proposed Project is located within the known range of the northern long-eared bat and summer records are known from Holt County along the Niobrara River north of the Project area. Therefore, potential exists for this species to use woodlands within the Project area as summer habitat. In addition, the bats have the potential to fly through the Project area during migration.

4.1.2.3 Other Wildlife

Wildlife habitat within the Project area consists primarily of agricultural fields and pasture/hay fields. The fields and modified grasslands in the southern parts of the Project area are of limited habitat quality, but may be used by bird and mammal species tolerant of human disturbance such as deer (*Odocoileus virginianus, Odocooileus hemionnus*), raccoon (*Procyon lotor*), coyote (*Canis latrans*), black-tailed prairie dog (*Cynomys ludovicianus*), mice (*Peromyscus* spp., *Reithrodontomys* spp.), and wild turkey (*Meleagris gallopavo*).

The more intact, native grasslands in the northern part of the Project area may provide habitat for a greater variety of grassland birds and other wildlife species. Fencerows and other woodlands adjacent to fields in the Project area may provide cover and other resources, and streams and riparian corridors may provide habitat for many species of fish, amphibians, and reptiles. Mammals such as muskrat (*Ondrata zibethicus*) and beaver (*Castor canadensis*) may also use the streams; woodland mammal species are likely to use forested habitat within the riparian corridors. Other wetlands within the Project area may provide habitat for amphibians and reptiles.

4.1.2.3.1 Threatened and Endangered Species

Of the non-bird and bat listed wildlife species occurring in Holt County, only the ABB is believed to occur in the Project area. The federally-listed gray wolf (*Canis lupus*) and the black-footed ferret (*Mustela nigripes*) are not expected to occur within the Project area based on habitat requirements and known distributions.

The state-threatened river otter occurs along large rivers, typically living in marshes and along wooded rivers and streams with sloughs and backwater areas. The only large rivers in the area (Niobrara and Elkhorn) are located 6-7 miles from the Project area, and the river otter is thus unlikely to occur in the Project area.

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4.1.2.3.1.1 American Burying Beetle Habitat Assessment

A habitat assessment of the Project area was completed by WEST Inc. and Dr. Wyatt Hoback in 2014. Areas were classified into one of five habitat types:

- Poor: Both sides of the survey route contain row crop agriculture or habitat with the potential for large amounts of light pollution or disturbance associated with town or city edge.
- Marginal: Potential habitat on one side of the survey route, with row crop or unsuitable habitat on the other side.
- Fair: Grassland with exotic species, soil moisture lower than for prime or good habitat, row crop agriculture within one-mile.
- Good: Native grassland species with forbs. Low wetland meadows grazed by cattle or used for haying. Trees (such as cottonwood) present. Sources of water within a mile, but some cropland or sources of light pollution within a mile.
- Prime: Undeveloped wet meadows with some trees or forest areas visible. Water sources such as the presence of a river, stream, or sub-irrigated soils. Cropland not visible or is at a distance of greater than 2 miles.

No "prime" habitat was found in the Project area, but there is approximately 5,375 acres of "good" habitat (7.0%), 10,205 acres of "fair" habitat (13.4%), 23,611 acres of "marginal" habitat (30.9%), and 37,215 acres of poor habitat (48.7%). It was concluded that the majority of the rangeland within the Project area may be suitable for the beetle, but that the areas devoted to crop production were unlikely to support the beetle. The northern and western edges of the Project area were considered to have the greatest likelihood of containing ABB.

4.1.3 Evaluation and Decisions

4.1.3.1 Decision to Abandon Site(s) or Select Site(s) for Additional Assessments in WEG Tier 2

While some species or habitats of concern may be present, there are currently no areas designated as sensitive within the proposed Project area (Figure 3). Additionally, there are no conservation areas, either federally or state owned, within the proposed Project area or a 1-mile buffer from any turbines per NWWWG guidelines (Figure 4). Based upon this information, the lack of large tracts of intact habitat for species of habitat fragmentation concern, and the lack of any known features which may funnel migrating birds or bats, the decision to select the site for additional assessments in WEG Tier 2 was made.

In Tier 2, only remnants of two of the at-risk communities were found within the Project area, and given their small size (all < 100 acres), they are not considered intact at-risk communities. One other at-risk community, the freshwater seep, occurred within the Project area. These areas would be completely avoided by any construction or maintenance activity. Additionally, the desktop whooping crane stopover analysis, utilizing existing knowledge on whooping cranes in the area and their stopover ecology, suggests a low level of risk for whooping cranes. The amount of suitable habitat for bat species, including the northern long-eared bat which is proposed for federal listing under the ESA, is extremely limited within the Project area, reducing

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the likelihood of severe impacts. There was no "prime" habitat for the ABB, and only limited amounts of suitable habitat overall, reducing the likelihood of severe impacts to the species. The decision to advance to field surveys was made based on this information.

4.1.3.2 Determine Need for Other Conservation Plans

Based upon the possible presence of species of concern, bird surveys (i.e., raptor nest surveys, breeding bird surveys, eagle use surveys, and lek surveys) and acoustic bat surveys were conducted during Tier 3 (Section 4.2). Further consultation with USFWS and NGPC will be needed before determining whether additional conservation plans would be necessary. Western submitted a Biological Assessment (BA) to USFWS for review and concurrence regarding all federally-listed or proposed species which could occur within the Project area. The BA was also provided to NGPC for review.

4.2 FIELD STUDIES TO DOCUMENT WILDLIFE AND HABITAT (WEG TIER 3)

Studies conducted as part of Tier 3 assess the potential risk of the proposed project, further evaluating the site to determine whether the wind energy project should be developed or abandoned. Additionally, the results from these studies can help to design and operate the site in a manner which avoids or minimizes significant adverse impacts, and help to determine the level of post-construction monitoring (Tier 4) which need to be conducted. The objective of Tier 3 is to answer the following questions after conducting site-specific surveys (USFWS 2012):

1. *Do field studies indicate that species of concern are present on or likely to use the proposed site?*

2. *Do field studies indicate the potential for significant adverse impacts on affected population of species of habitat fragmentation concern?*

3. *What is the distribution, abundance, behavior, and site use of species of concern identified in Tiers 1 or 2, and to what extent do these factors expose these species to risk from the proposed wind energy project?*

4. *What are the potential risks of adverse impacts of the proposed wind energy project to individuals and local populations of species of concern and their habitats? (In the case of rare or endangered species, what are the possible impacts to such species and their habitats?)*

5. *How can developers mitigate identified significant adverse impacts?*

6. *Are there studies that should be initiated at this stage that would be continued in post-construction?*

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4.2.1 Bird Surveys

Breeding bird surveys, raptor nest surveys, and lek surveys were conducted within the Project area, and eagle use surveys are on-going through January 2015. No federally or state-listed migratory bird species were observed during the surveys. Seven species listed as Tier I (globally or nationally at-risk) or Tier II (at-risk within Nebraska but stable globally or nationally) species of concern in Nebraska's Wildlife Action Plan (Schneider et al. 2011) were observed:

- Greater prairie-chicken (Tier I);
- Burrowing owl (*Athene cunicularia*; Tier I);
- Loggerhead shrike (*Lanius ludovicianus*; Tier I);
- Henslow's sparrow (*Ammodramus henslowii*; Tier I);
- Bald eagle (Tier II);
- Swainson's hawk (*Buteo swainsoni;* Tier II); and
- Wilson's snipe (*Gallinago delicate*; Tier II)

Although not observed in these surveys, the federally listed whooping crane may occasionally pass through the Project area during migration (see Section 4.1.2.1.1.1 for the desktop stopover analysis).

4.2.1.1 Lek Surveys

Curry & Kerlinger, LLC and Olsson Associates conducted aerial and ground-based lek surveys for the greater prairie chicken and the sharp-tailed grouse within the Project area (Curry and Kerlinger, LLC and Olsson Associates 2012a). Surveys were conducted from April 3 to April 26, 2012. Although not listed under the ESA or by the NGPC, the greater prairie-chicken and the sharp-tailed grouse are both considered to be species of concern for wind development in Nebraska due to the species' sensitivity to human development and disturbance.

4.2.1.1.1 Greater Prairie-Chicken

A total of 56 greater prairie-chicken leks were recorded, of which 45 were considered active (traditional or regularly attended) and 11 were considered marginal (nontraditional or irregularly attended by a small number of birds). Based upon these surveys, the study area was found to have a population of 713 greater prairie-chickens (538 males), though not all birds attend leks simultaneously, so these numbers are only an estimate.

This population estimate yields a density of 1.5 males/100 hectares, which is close to the low end of the density range for this species (Johnson et al. 2011). Greater prairie-chicken leks were mostly located outside of irrigated crop circles, which accounted for roughly 50% of the Project

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area and a 0.6-mile buffer. The greatest density of leks occurred in the northernmost portion of the Project area, where there were more hills and pastureland, and almost no center-pivot irrigation. When irrigated areas were excluded, male greater prairie-chicken density increased to about 3.0 males/100 hectares.

4.2.1.1.2 Sharp-tailed Grouse

Only three sharp-tailed grouse leks were found in the study area. One of these was considered marginal, and the other two were considered active. Based upon these surveys, the study area was found to have a population of at least 22 sharp-tailed grouse (17 males), though not all birds attend leks simultaneously, so these numbers are only an estimate.

Connelly et al. (1998) estimated lek density for sharp-tailed grouse in Nebraska at 0.02-0.025 leks/100 hectares. Only two active leks were found within the Project area and the 1-km buffer, which yields a density of 0.01 leks/100 hectares for the Project area.

4.2.1.2 Breeding Bird Surveys

4.2.1.2.1 2012 Surveys

Curry & Kerlinger, LLC and Olsson Associates conducted a breeding bird survey at the Project between June 4 and June 11, 2012 (Curry and Kerlinger, LLC and Olsson Associates 2012b). A total of 1,585 migratory birds of 50 species were detected at the 175 point counts. The five most numerous species were western meadowlark, dickcissel, grasshopper sparrow, brown-headed cowbird (*Molothrus ater*), and mourning dove (*Zenaida macroura*). No bald or golden eagles were observed during the breeding bird survey.

The overall density within the Project area (grassland and farmland combined) was estimated to b 346.3 ± 6.7 birds/km^2 (1 square km = 247 acres; density=1.4 birds/acre). Bird density within the grassland habitat (398.1 ± 8.4) was estimated to be about 12% greater than farmland habitat (353.1 ± 13.4). At the species level, certain grassland birds were found to be in much higher densities in grassland habitat, such as the grasshopper sparrow, which was found to be 10 times more abundant in grassland than farmland. In general, bird densities within the Project area was found to be similar to densities reported by a study in the Sandhills region immediately west of the Project area (Kempema 2007), with certain disturbance-adapted species (e.g., western meadowlark, red-winged blackbird [*Agelaius phoeniceus*]) exhibiting higher densities within the Project area, likely due to the abundance of cultivated land.

4.2.1.2.2 2014 Surveys

WEST Inc. is currently conducting fixed-point bird use surveys at the Project, which began 13 February 2014 and will continue through January 2015. As of April 2014, a total of 120 60-minute surveys had been conducted over the course of three site visits. A total of 5,429 birds of at least 13 species were observed at the 40 points within the Project area. The majority of these observations (5,367) were waterfowl, including snow goose (*Chen caerulescens*), Canada goose (*Branta canadensis*), common goldeneye (*Bucephala clangula*) and mallard (*Anas platyrhynchos*).

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As of April 2014, a total of 8 bald eagles have been observed during the surveys, and 1 bald eagle was observed incidentally, though some of these observations may be of the same individual bird (WEST 2014b; see Section 4.2.1.4 for more information on eagle use within the Project area).

4.2.1.3 Raptor Nest Surveys

4.2.1.3.1 2012 Surveys

Curry & Kerlinger, LLC and Olsson Associates conducted aerial and ground-based raptor nest surveys in April 2012 (Curry and Kerlinger, LLC and Olsson Associates 2012c). Surveys were conducted within the Project area and a 0.6-mile buffer. A total of 10 active or probably occupied raptor nests were found, as well as seven unoccupied raptor nests. Of the 17 nests discovered, six were located within the Project area:

- Three active, probable burrowing owl nests;
- One active, confirmed red-tailed hawk (*Buteo jamaicensis*) nest; and
- Two unoccupied, unknown nests.

Three nests were located outside of the Project area, but within the 0.6-mile buffer:

- One active, confirmed red-tailed hawk nest;
- One active, probably red-tailed hawk nest; and
- Two unoccupied, unknown nests.

The remaining nests were located outside of the 0.6-mile buffer:

- Four active or probably occupied, unknown nests; and
- Three unoccupied, unknown nests.

Two bald eagles were seen in the vicinity of one of the unoccupied nests along the eastern border of the Project area, but no nesting was observed. Raptor species recorded on-site included: turkey vulture (*Cathartes aura*), northern harrier (*Circus cyaneus*), bald eagle, Swainson's hawk, red-tailed hawk, and American kestrel (*Falco sparverius*). A second nest survey will occur in March 2014. Per the USFWS, a known bald eagle nest in Knox County, NE which was inactive in 2012 and unsuccessful in 2013 is located 4.7 miles (7.6 km) from the nearest proposed turbine.

4.2.1.3.2 2014 Surveys

Eagle stick nest surveys/monitoring conducted by WEST Inc. in April 2014 documented three occupied bald eagle nests along the Niobrara River. Two unoccupied potential bald eagle

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nests were also identified during this survey: one along the Niobrara River and one about 0.6 mile east of the Project boundary in the southeast corner of the stick nest survey buffer (WEST 2014a).

An additional occupied bald eagle nest was discovered by a landowner in June 2014 near the headwaters of Steel Creek in the northwest portion of the Project area. This nest was confirmed occupied by biologists on June 14, 2014 and two bald eagle fledglings were seen near the nest. Activity at the nest was monitored from June 21, 2014 through August 15, 2014. Four 800-m points were monitored in all cardinal directions around the nest in order to document flight paths to determine the nesting territory and use of the surrounding area within the Project area. During 187 survey observation hours, two bald eagle fledglings and two adult bald eagles were documented at the nest. The majority of juvenile bald eagle flights were clumsy, low height flights from the nest tree to nearby trees. Adult bald eagles were most commonly seen perching near the nest tree or conducting short flights between trees near the nest. When further from the nest, the adult bald eagles were generally to the east and southeast of the nest, utilizing Steel Creek to forage. The nearest proposed turbine is located approximately 880 feet from this nest

4.2.1.4 Bald Eagle Stage 2 Assessment

Bald eagle point counts began in February 2014 to evaluate the site-specific eagle use within the Project area. Surveys are being conducted at forty observation points within the Project boundary, covering approximately 30% of the Project area. During the first three visits from 13 February to 24 April 2014, a total of eight bald eagles were observed. This results in a late winter/spring mean bald eagle use of 0.022 bald eagles/800-m plot/20-min survey. This survey is ongoing, and results will be updated as additional data is made available.

Nest surveys in 2012 did not confirm any bald eagle nesting in the area; however, an occupied nest was discovered in the northeast portion of the Project area in June 2014, and three occupied bald eagle nests were observed along the Niobrara River during surveys conducted in April 2014 (WEST 2014a; see Section 4.2.1.3.2).

4.2.2 Bat Surveys

4.2.2.1 General Bat Acoustic Monitoring

North East Ecological Services conducted a pre-construction bat survey for the Project in 2012 (North East Ecological Services 2012). This included a Project site assessment to determine the extent of suitable habitat within the Project area. Additionally, the temporal and spatial distribution of bat activity was monitored at six monitoring stations at two meteorological towers, one in the NE portion of the site and one in the NW portion of the site, effectively looking at activity on both "sides" of the Project per NWWWG guidelines (NWWWG 2013). The results of pre-construction acoustic surveys conducted within the Project area indicate overall low summer bat activity in the Project area. In addition, the results of species identification analysis on bat calls recorded within the Project area indicate no northern long-eared or little brown bats were present at the acoustic monitoring sites in 2012 (WEST 2014c).

DRAFT

A total of 15,492 bat passes were recorded over a 245 day sampling period (North East Ecological Services 2013). Bat activity peaked during early October, suggesting that migratory bats utilize the area. Hoary bats were the dominant bat species recorded at all locations, and accounted for 72% of the bat activity identified to species. The NW portion of the site recorded twice as much bat activity as the NE detectors, and there were no differences between detector heights.

4.2.2.2 Northern Long-Eared Bat Survey

Acoustic presence/absence surveys were conducted by WEST, Inc. in the Project area following the USFWS guidelines (USFWS 2014). These surveys were conducted at 7 sites representative of northern long-eared bat habitat within the Project area (see Section 4.1.2.2.1.1), from June 11 to June 23, 2014. Northern long-eared bats were determined to be present at 5 of the 7 sites (WEST 2014d).

4.2.3 American Burying Beetle Surveys

Because potential beetle habitat was identified within the Project area, follow-up pitfall trapping surveys were conducted from June 12 to 17, 2012. A total of 15 traps were placed on road rights-of-way in the Project area so that all areas of the Project area rated as "good" or "prime" habitat were within the survey coverage area. No ABB were captured during this survey; however, 11 other species of carrion beetles were captured. Control traps were set approximately 30 miles from the Project area, in a location of known ABB occurrence near Chambers, Nebraska, during the same survey period. A total of 98 ABB were caught between the four control traps.

Because the negative survey results in 2012 expired in 2013, additional surveys were conducted in 2014 to confirm presence/absence of ABB in the Project area. These surveys were conducted from June 20 to 25, 2014. A total of 20 traps were placed within suitable habitat within the Project area. Two individual ABB were captured during the survey, one in the northwest portion of the Project area, and one in the southeast section of the Project area. The individuals were captured on 21 June (mature female) and 23 June (mature male). Four control traps were set outside of the Project area, which captured 45 ABB over the five survey nights.

5.0 Risk Assessments and Decisions Based on Assessments

This section analyzes existing habitat information for the Project area and research results from other wind energy facilities to evaluate and compare potential impacts from the Project to other similar operating wind energy facilities (i.e., Tier 2 of the WEG). In addition, site-specific survey data were analyzed in the context of the proposed Project layout (i.e., Tier 3 of the WEG).

DRAFT

Cumulative impacts to birds, bats, northern long-eared bats, whooping cranes, and American burying beetles are discussed in the Project's Final Environmental Impact Statement[4].

5.1 BIRDS

The pre-construction avian surveys described above (Section 4.2.1) were conducted to identify and quantify birds occurring within the Project area and vicinity for the purpose of determining overall impacts to all bird species, as well as to determine if certain bird species (particularly federal- or state-listed species and other species vulnerable to development) may experience negative impacts of concerning magnitude from the Project.

5.1.1 Project Risk Assessment

Wind energy facility impacts on birds can include varying degrees of displacement from the turbines and surrounding habitat, as well as mortalities resulting from collisions with turbines, gen-tie lines, and other facility structures (Winegrad 2004). To reduce the risk of these potential impacts, when possible the Project has been sited in dry field corners located entirely within previously altered habitat that is dominated by tilled agriculture (corn, soybeans, wheat, sorghum) and pasture used for livestock production. Within these habitat types, bird density is generally low, such that siting turbines within these habitats limits risks to all bird species, and especially to species of conservation concern.

5.1.1.1 Project Construction and Decommissioning

5.1.1.1.1 Direct Impacts

Incidental injury or mortality of juvenile birds may occur if vegetation clearing for construction takes place in non-tilled areas during the breeding season. However, habitat for ground- and shrub-nesting birds is limited within the Project area due to the predominance of active agriculture and heavy livestock grazing. Within these habitat types, bird density is generally low. Nesting habitat for ground- and shrub-nesting birds is very limited in the active agricultural areas within the Project area; only horned larks, killdeer, and a handful of other disturbance-tolerant bird species may nest in areas used for row crop production. Nesting is more likely to occur in the areas of pasture habitat, which may support nesting of grassland bird species as well as the more disturbance-tolerant species. Of the 54,250 acres within the Project area, construction of the Project would impact no more than 3,468 acres, with 3,204 acres consisting of temporary impacts that would affect at most only one nesting season. Therefore, significant bird mortality due to Project construction is not expected to occur.

5.1.1.1.2 Indirect Impacts

5.1.1.1.2.1 Habitat Fragmentation

The construction of turbines may displace birds from an area due to the creation of edge habitat, the introduction of vertical structures, and/or disturbances directly associated with

[4] http://www.wapa.gov/UGP/Environment/GrandePrairie.htm

DRAFT

turbine operation (e.g., sound or shadows). Disturbance impacts are often complex, involving shifts in abundance, species composition, and behavioral patterns. The magnitudes of these impacts vary across species, habitats, and regions. Although most research to-date has focused on collision mortality associated with wind energy facilities, a recent study by Pearce-Higgins et al. (2012) suggests that wind farm construction can have greater impacts on birds than wind farm operation. Limited available data indicate that avoidance impacts to birds generally extend approximately 246-2,625 feet (75-800 m) from a turbine, depending on the environment and the bird species affected (Strickland 2004). Studies in the western and Midwestern U.S. consistently show small-scale (<328 feet [100 m]) impacts on birds (Strickland 2004). Based on these studies, some degree of displacement of breeding birds in the vicinity of the Project turbines is anticipated. For species that are displaced, it is unclear if displacement impacts would persist for the life of the Project; certain species may adapt to the presence of turbines (The Ornithological Council 2007).

5.1.1.1.2.2 Displacement

The Project has been sited to minimize the impacts of potential displacement on bird populations and the overall composition of the avian community in the area. The Project area is located in a landscape already disturbed by human activity. Avian habitat within the Project area is predominately disturbed and fragmented, with little undisturbed (non-pasture) grassland habitat available. Project turbines, access roads, and other facilities have been sited on private and public lands used for active agricultural production and livestock grazing. Project construction for up to 266 turbines would affect 3,468 acres of grassland and cultivated cropland, of which 264 acres would remain disturbed for the life of the Project. There are two main vegetation communities within the Project area: grasslands (approximately 57%) and cultivated crops (43%). Using these percentages, the 3,468 acres of temporary disturbance may be split into 1,977 acres of grassland and 1,491 acres of cultivated cropland. Additionally, using these percentages, the 264 acres of temporary disturbance may be split into 150 acres of grassland and 114 acres of cultivated cropland.

Affected grassland includes native or remnant-native mixed-grass prairie and active pasture that has been modified through the introduction of forage species for livestock grazing. The loss of disturbed, agricultural and pasture habitat is likely to be inconsequential for the local bird community due to the large amounts of similar habitat available adjacent to all areas proposed for disturbance.

Pre-construction surveys have demonstrated that the Project area is not an area of high avian use or an area that supports many avian species of concern other than bald eagles. The overall density within the Project area (grassland and farmland habitat combined) was estimated to be 346.3 ± 6.7 birds/square kilometer[5] (Curry and Kerlinger, LLC and Olsson Associates 2012b). Thus, temporary impacts to the 3,468 acres would affect approximately 4,856 individual birds[6], though not all species may be affected. The majority of birds detected during pre-construction surveys

[5] 346.3 birds/km² = 1.4 birds/acre
[6] 3468 acres x 1.4 birds/acre = 4856 birds

DRAFT

within and near the Project area belonged to common species adapted to human disturbance (see Section 4.2.1.2; e.g., western meadowlark [Davis and Lanyon 2008], brown-headed cowbird [Lowther 1993], mourning dove [Otis et al. 2008], American robin [*Turdus migratorius*; Sallabanks and James 1999], etc.), except the grasshopper sparrow, a grassland species that may be sensitive to development (Vickery 1996). Grassland birds have the potential to be particularly susceptible to displacement; however, undisturbed or native grassland habitat within the Project area is limited and would be avoided by construction activities (Kerlinger 2002, Shaffer and Johnson 2008).

Displacement or disturbance of raptors within the Project area is not anticipated to be significant during Project construction or decommissioning. Although hunting by raptors may decrease in the vicinity during construction and decommissioning, similar hunting habitat is widely available throughout the rest of the Project area, construction and decommissioning will occur over a short duration, and raptors are highly mobile species with large home ranges.

An occupied bald eagle nest is present within the Project boundary (see Section 4.2.1.3.2 and Section 4.2.1.4). The only other raptors observed nesting within the Project area and 0.6-mile buffer were red-tailed hawk and burrowing owl (Curry and Kerlinger, LLC and Olsson Associates 2012c, WEST Inc. 2014). Red-tailed hawks are known to be disturbance-tolerant and adapted to human development (Preston and Beane 2009). Burrowing owls have also shown to be relatively tolerant of non-destructive disturbance near nests (Poulin et al. 2011).

Displacement and disturbance impacts to greater prairie-chickens and sharp-tailed grouse may be likely, given the species' sensitivity to disturbance. Leks in the vicinity of Project turbines may exhibit decreased attendance during construction and decommissioning. A total of 45 greater prairie-chicken leks and three sharp-tailed grouse leks were considered active, with the majority being located outside of irrigated crop circles. The greatest density occurred in the northernmost portion of the Project area, where there were more hills and pastureland. A recent study in Kansas found that the number of leks and the number of attending males on leks decreased in areas near to newly introduced turbines. However, the impacts of wind energy development on prairie-chicken population dynamics may be complex; the study found no evidence of decreased nesting or decreased nest survival rates closer to turbines. Adult survival was actually found to increase following construction of the facility, possibly due to disruption of hunting by raptors or other predators such as coyotes (Sandercock et al. 2012).

The effects of these potential displacements are unclear, as population-level consequences of displacement/disturbances from wind turbines are not yet understood. Initial studies indicate that when considered on a regional scale, reductions in habitat use by songbirds have been observed to be relatively minor and are not expected to have population consequences (Strickland 2004). However, displacement of breeding birds has varied across sites, leaving the impact of turbines on breeding success unclear (The Ornithological Council 2007). It is also unclear if species sensitive to disturbance would experience displacement impacts for the maximum expected 40-year life of the Project; some species may adapt to the presence of the

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turbines (The Ornithological Council 2007). Additional studies are needed to assess the broad-scale, population-level consequences of *displacement* impacts on other avian groups, as well as the cumulative effects that time and increased wind energy development may have on avian population dynamics.

The possible displacement impacts on birds from noise, vibration, and/or increased human activity and traffic associated with maintenance activities would be similar in character as those for construction activities, but they would occur intermittently and over shorter periods of time.

5.1.1.1.3 Decommissioning

Decommissioning of the Project would minimize, but not preclude, the long-term impacts to birds (when compared with re-commissioning or re-powering the Project) by removing turbines from the Project area and restoring the area to the pre-existing land use and vegetation communities. Impacts on birds from decommissioning activities would be similar in character as those for construction activities, but they would occur intermittently and in shorter periods of time. Avoidance and minimization measures implemented for decommissioning would be similar to those prescribed for construction activities.

5.1.1.2 Project Operation

5.1.1.2.1 Direct Impacts

The Project turbines would pose a risk of mortalities from collisions for birds within the Project area. In the Midwest, publicly-available estimates of bird mortality at wind energy facilities in the Midwest range from 0.49 to 5.92 birds/MW/year (Table 5.1.1.2-1). The number of avian fatalities at wind energy facilities is generally low when compared to the total number of birds detected at these sites (Erickson et al. 2002).

No particular species has been identified as incurring significantly greater numbers of fatalities than other species which is likely due to differences in species abundance, use of habitat, and habitat availability at wind facilities. Passerines, a group of related species of birds representing over one-half of all bird species, both resident and migrant, represent the majority (approximately 75%) of mortalities at turbines nationwide (Erickson et al. 2001, Johnson et al. 2002) and result in spring and fall peaks of bird mortality rates at most wind energy facilities due to migration (Johnson et al. 2002). Although waterbird (a group of bird species consisting of waterfowl, shorebirds, and seabirds) mortality at wind energy facilities has been highly variable, national research has demonstrated that waterbirds rarely collide with inland turbines (Everaert 2003, Kingsley and Whittam 2007 as cited in NWCC [2010]). Raptor mortality rates at Midwest sites have been very low; generally limited to one or two carcasses found per study (Poulton 2010).

Table 5-1: Results of publically available post-construction bird mortality monitoring studies in Nebraska and surrounding states.

Study	State	Year	Birds/MW/Year[1]	Citation

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Study	State	Year	Birds/MW/Year[1]	Citation
NPPD Ainsworth	NE	2006	1.63	Derby et al. 2007
Top of Iowa	IA	2003	0.49	Jain 2005
Top of Iowa	IA	2004	1.07	Jain 2005
Buffalo Ridge Phase I	MN	1996	4.24	Johnson et al. 2000
Buffalo Ridge Phase I	MN	1997	2.60	Johnson et al. 2000
Buffalo Ridge Phase I	MN	1998	3.20	Johnson et al. 2000
Buffalo Ridge Phase I	MN	1999	1.44	Johnson et al. 2000
Buffalo Ridge Phase II	MN	1998	0.61	Johnson et al. 2000
Buffalo Ridge Phase II	MN	1999	3.57	Johnson et al. 2000
Buffalo Ridge Phase III	MN	1999	5.92	Johnson et al. 2000
Winnebago	IA	2009-2010	3.90	Derby et al. 2010b[2]
Foot Creek Rim I	WY	1999	2.96	Young et al. 2003
Foot Creek Rim I	WY	2000	2.1	Young et al. 2003
Foot Creek Rim I	WY	2001-2002	1.68	Young et al. 2003
Moraine II	MN	2009	5.5	Derby et al. 2010c[2]
Elm Creek	MN	2009-2010	1.4	Derby et al. 2010d[2]
Wessington Springs	SD	2009	8.2	Derby et al. 2010e[2]
Buffalo Ridge I	SD	2009-2010	4.9	Derby et al. 2010f[2]
Average Birds/MW/Year			3.08	
Minimum Birds/MW/Year			0.49	
Maximum Birds/MW/Year			8.2	

[1]Reported in birds/MW/year, as per the WEG guidelines (USFWS 2012)
[2]As cited in Strickland et al. 2011

The Project has been sited and designed to be a low-risk site for birds. The Project area has been located on the eastern edge of the Central Flyway, through which millions of waterfowl and other water birds, including the ESA-listed whooping crane, migrate and make stopovers in Nebraska (NWWWG 2013). Positioning the Project on the edge of the Flyway and away from the more concentrated use areas in the center of the Flyway greatly reduces the risk of collision-related mortality for these species. Additionally the Project area does not contain distinct topography, unique habitats or resources, or other features that could concentrate birds. No indicators of high avian risk in the Project area (e.g., presence of ESA-listed bird species, impacts to high quality avian habitat, high volume use as migration stopover habitat, etc.) were uncovered during either the site characterization (Tiers 1 and 2 of the WEG) or the pre-construction avian surveys, which were conducted in accordance with Tier 3 of the WEG. .A desktop analysis for the only ESA-listed bird species which may occur in the Project area, the whooping crane, determined that regular or consistent use of the Project area by whooping cranes is very unlikely (Stantec 2014; see Section 4.1.2.1.1.1).

5.1.1.2.2 Indirect Impacts

As mentioned above, pre-construction surveys have demonstrated that the Project area is not an area of high avian use or an area that supports many species of concern (see Section 4.2.1) other than the bald eagle. Only 264 acres would remain disturbed during operation for up to 266 turbines, which would displace only 370 individual birds[7]. No federally-listed species were observed during any of the surveys. Red-tailed hawks, bald eagles and burrowing owls were the only three raptor species observed nesting within the Project area. In 2012, there was one red-tailed hawk nest and two burrowing owl nests found within the Project area. Surveys in 2014 documented three red-tailed hawk nests and one bald eagle nest within the Project area.

Displacement and disturbance impacts to greater prairie-chickens may be likely, given the species' sensitivity to vertical structures on the landscape. Leks in the vicinity of Project turbines may exhibit decreased attendance or may cease to exist once Project turbines are erected.

In addition to the turbines at a wind energy facility, transmission lines (including the Project's gen-tie line) also have the potential to displace or disturb birds due to the creation of edge habitat and/or the introduction of vertical structures. Depending on structure design and configuration, transmission lines and associated electrical infrastructure such as substations may present avian collision or electrocution hazards (APLIC 2006). Additionally, there have been cases of mass avian mortality events at substations attributed to the disorientation of night-migrating passerines in foggy, low visibility conditions by steady burning lights at the substations, causing the birds to collide with the substations' structures or circle the substation long enough to die of exhaustion (Stantec 2011).

The results of the site characterization and pre-construction avian surveys provide good site-specific baseline information regarding bird use within and near the Project area. Post-construction monitoring conducted within an adaptive management framework for the Project will provide an accurate means of determining ongoing potential impacts to birds and a plan for implementation of mortality minimization measures if impacts are determined to be significant.

5.2 BATS

The pre-construction site characterization and the acoustic surveys described above (Sections 4.1.2.2 and 4.2.2) were conducted to assess the potential for bat use of the Project area to determine if bat species may experience negative impacts of concerning magnitude from the Project.

5.2.1 Project Risk Assessment

Wind energy facility impacts on bats can include varying degrees of displacement from the turbines and surrounding habitat, as well as mortalities resulting from collisions with turbines, the

[7] 264 acres x 1.4 birds/acre = 370 birds

DRAFT

gen-tie line, and other facility structures (Winegrad 2004). To reduce the risk of these potential impacts, the Project has been sited within previously altered habitat that is dominated by tilled agriculture (corn, soybeans, wheat, sorghum) and pasture used for livestock production.

5.2.1.1 Project Construction and Decommissioning

5.2.1.1.1 Direct Impacts

Construction of the Project is not expected to result in mortality or loss of reproductive fitness for bat species, including the northern long-eared bat, in the Project area due to the limited amount of suitable summer maternity habitat and the absence of hibernacula. If trees or man-made structures must be removed between 1 April and 30 September, a biologist will be consulted to confirm that there are no northern long-eared bats or nesting birds which would be displaced. To the extent possible, no trees or man-made structures would be removed during Project construction between 1 April and 30 September, which will avoid the maternity season for northern long-eared bats in Nebraska (USFWS 2014). Thus, construction is not expected to cause mortality of roosting bats since any activity which will impact potentially suitable roosting habitat will not occur while bats are present. In addition, impacts to potential roost trees, which includes live or dead trees and snags ≥3 inches dbh that have exfoliating bark, cracks, crevices or cavities, would be avoided. Trees surrounding potential roosts would not be removed in order to maintain the microclimate. Foraging bats are not expected to be at risk of mortality from Project construction because nighttime construction activities would be minimal and construction activities around areas of likely foraging activity (open water, riparian corridors, and fencerows/shelterbelts) would be avoided after sunset. Therefore, mortality of bats is not anticipated as a result of Project construction.

5.2.1.1.2 Indirect Impacts

Construction of the Project is not expected to result in any indirect impacts on bat species in the Project area. Construction activity at night will be minimal, so there should be no avoidance behavior for foraging bats. Additionally, turbines are placed away from woodlots and other potential roost sites, such that daytime construction activities should not affect any roosting bats. Grande Prairie will avoid or minimize fragmentation of large forested areas or tree lined corridors in order to improve the integrity of forest patches with known northern long-eared bat use.

5.2.1.1.3 Decommissioning

Decommissioning of the Project would minimize, but not preclude, the long-term impacts to bats (when compared with re-commissioning or re-powering the Project) by removing turbines from the Project area and restoring the area to the pre-existing land use and vegetation communities. Impacts on bats from decommissioning activities would be similar in character as those for construction activities, but they would occur intermittently and in shorter periods of time. Avoidance and minimization measures implemented for decommissioning would be similar to those prescribed for construction activities.

5.2.1.2 Project Operation

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5.2.1.2.1 Direct Impacts

Direct mortality at wind turbines is currently the greatest concern for bats in general at wind facilities (Cryan 2008). Commercial wind facilities have been found to impact many bat species (Arnett et al. 2008). The primary bat species affected by wind facilities are believed to be migratory, foliage- and tree-roosting species that mostly emit low frequency calls (Johnson et al. 2004, reviewed by Kunz et al. 2007a). The influence of landcover on bat mortality at wind turbine sites is unclear (Arnett et al. 2008). However, the highest levels of bat mortality have been recorded at sites on forested ridgetops in the eastern U.S., with documented mortalities as high as 69.6 bats/turbine/year (Kunz et al. 2007a). In the Midwest, bat fatality estimates range from 0.1 to 40.5 bats/turbine/year (Poulton 2010).

Weather conditions, such as wind speed, rainfall, and temperature, have been found to have a significant impact on bat mortalities (Arnett et al. 2008). Based on published literature, most bat fatalities decrease with increases in wind speed and precipitation intensity (Kerns et al. 2005; Good et al. 2011 and 2012, Arnett et al. 2009 and 2010, Baerwald et al. 2009).

Table 5-2: Results of publically availably post-construction bat mortality monitoring studies in Nebraska and surrounding states.

Study	State[1]	Year	Bats/MW/Year	Citation
NPPD Ainsworth	NE	2006	1.16	Derby et al. 2007
Top of Iowa	IA	2003	7.35	Jain 2005
Top of Iowa	IA	2004	9.82	Jain 2005
Buffalo Ridge Phase I	MN	1999	0.76	Johnson et al. 2000
Buffalo Ridge Phase II	MN	1998	2.15	Johnson et al. 2000
Buffalo Ridge Phase II	MN	1999	2.58	Johnson et al. 2000
Buffalo Ridge Phase II	MN	2001	4.35	Johnson et al. 2004
Buffalo Ridge Phase II	MN	2002	1.64	Johnson et al. 2004
Buffalo Ridge Phase III	MN	1999	2.72	Johnson et al. 2000
Buffalo Ridge Phase III	MN	2001	3.70	Johnson et al. 2004
Buffalo Ridge Phase III	MN	2002	1.82	Johnson et al. 2004
Crystal Lake II	IA	2009	7.4	Derby et al. 2010a[2]
Winnebago	IA	2009-2010	4.50	Derby et al. 2010b[2]
Foot Creek Rim I	WY	1999	3.45	Young et al. 2003
Foot Creek Rim I	WY	2000	0.91	Young et al. 2003
Foot Creek Rim I	WY	2001-2002	1.36	Young et al. 2003
Moraine II	MN	2009	2.5	Derby et al. 2010c[2]
Elm Creek	MN	2009-2010	1.5	Derby et al. 2010d[2]
Wessington Springs	SD	2009	1.5	Derby et al. 2010e[2]
Buffalo Ridge I	SD	2009-2010	0.1	Derby et al. 2010f[2]
Average Bats/MW/Year			3.06	

DRAFT

Minimum Bats/MW/Year	0.1
Maximum Bats/MW/Year	9.82

[1]Relevant, publically available post-construction monitoring studies not available for Missouri, Kansas, or Colorado. Minnesota studies included due to proximity (approx. 300 miles) and environmental similarities between the Buffalo Ridge site and the Project area.
[2]As cited in Strickland et al. (2011)

The Project area lacks forested corridors and other vertical structure, and has a limited amount of suitable foraging and roosting habitat for bats. Based on the pre-construction acoustic survey results, peak bat occurrence in the Project area is expected to occur during fall migration, similar to that observed at other wind energy facilities in Nebraska and surrounding States, between 0.10 and 9.82 bats/MW/year with an average of 3.06 bats/MW/year (Table 5.2.1.2-1). Most mortality is expected to occur during the fall migration season, given the patterns observed at other wind energy facilities located away from maternity habitat and hibernacula and the seasonal bat activity patterns observed during the pre-construction acoustic survey (Section 4.2.2.1). Migratory tree bats (silver-haired bats, hoary bats, eastern red bats) are expected to account for the majority of bat fatalities at the Project, based on the patterns observed nationwide, although all bat species occurring within the Project area may be at risk.

Currently, one species proposed to be listed under the ESA, the northern long-eared bat, is present within the Project area. The only documented northern long-eared bat fatalities at wind farms have been in the Eastern U.S., where they account for only less than 0.2% of all bat fatalities (USFWS 2014).

Based upon the presence of northern long-eared bats during the summer and patterns of mortalities at other wind farms, take of northern long-eared bats at the Project is expected to occur during fall migration and during the summer maternity season. Assuming all potential roost and maternity habitat is carefully surveyed immediately prior to removal (if necessary for construction), take would occur only during operation of the wind farm, and only when the bats are active. Results from mortality monitoring studies at other facilities in Nebraska and the surrounding states have averaged 3.06 bats killed/MW/year. The Project is expected to result in the fatalities of 1,224 bats/year[8] based upon this average. USFWS (2013d) indicated that less than 0.2% of all fatalities in the United States are northern long-eared bats, and that would indicate that an average of approximately 3[9] northern long-eared bats would be killed per year at the Project, which would equate to about 120[10] northern long-eared bats over the 40-year life of the Project. However, by curtailing turbines at 5.0 m/s (see Section 3.9.4), fatalities would be decreased by at least 50% based on results of previous studies of curtailment (Arnett et al. 2010, Good et al. 2011). This results in a take estimate of approximately 2 northern long-eared bats per year[11], or a total of up to 80[12] northern long-eared bats over the life of the Project.

[8] 3.06 bats/MW/year * 400 MW = 1,224 bats/year
[9] 1,224 bats x 0.002 = 2.5 northern long eared bats, which rounds up to 3 northern long-eared bats
[10] 3 northern long-eared bats/year x 40 years = 120 northern long-eared bats total
[11] 3 northern long-eared bats/year prior to minimization, with a 50% reduction results in 1.5 northern long-eared bats/year. Since partial bats cannot be taken, this number was rounded up to 2 northern long-eared bats/year after minimization measures were incorporated into operation.

DRAFT

Impact of take: To determine the impact of the take for the Project, the Service's Draft Region 3 Indiana Bat Resource Equivalency Analysis Model for Wind Energy Projects (REA Model) (USFWS 2014b) was used. Although the REA model uses parameters from studies on Indiana bats (*Myotis sodalis*), it represents the best and most conservative substitute at this time for northern long-eared bat population dynamic parameters as well. The REA model uses reproduction as the unit of measurement for debits and credits, and specifically on the reproductive potential of females from the population. This is based on the principle that when an adult female bat is prematurely taken at a wind energy facility, her and her offspring's reproductive potential is lost. Similarly, when mitigation is applied, females and their future reproductive potential are gained. Therefore, to assess the overall impacts of the estimated take for the Project, an understanding must be developed of the likely demographics of the affected individuals and the subpopulations and metapopulations to which they belong.

Research into the sex ratios and the risk of mortality to male and female northern long-eared bats has been limited. However, there is no evidence to suggest that a 1:1 sex ratio is improbable. There are no data that suggest that male *Myotis* bats may be more vulnerable to wind turbine mortality than female *Myotis* (USFWS 2011). Gruver et al. (2009) recorded an equal number of male and female *Myotis* fatalities at a wind energy facility in Wisconsin and BHE Environmental (2011) recorded more female *Myotis* fatalities than male *Myotis* fatalities at another wind energy facility in Wisconsin. Therefore, it is currently most reasonable to assume equal risk for male and female bats within the action area. As described above, the Project is estimated to take 2 northern long-eared bats/year or 80 northern long-eared bats over the 40-year life of the Project. Northern long-eared bats taken by Grande Prairie may include non-reproductive juveniles as well as adult female and male bats. Consequently, of the 80 northern long-eared bats estimated to be taken at Grande Prairie over the life of the project, 50% (40 bats) are expected to be female, for an estimated take of 1 female bat/year over the 40-year Project life. The loss of a male bat represents the loss of an individual; however, the loss of female bats also represents lost reproductive potential from the lost females.

The reproductive potential which may be lost from the population due to the estimated take of 40 northern long-eared female bats at Grande Prairie was calculated based on the following assumptions:

- Summer habitat of lost bat remains functional on landscape;
- Colony persists with additional loss from wind energy take;
- Taken bat is reproductively active adult female;
- Taken bat is from stable colony with saturated summer habitat; and
- Available non-reproductive females will occupy vacant summer habitat within two years.

The number of young that each taken female bat would have produced over two breeding seasons was calculated using the REA Model[13]. The REA Model, based on a "stationary

[12] 2 northern long-eared bats/year x 40 years = 80 northern long-eared bats total

[13] Several assumptions for the model (USFWS 2014b):

1. The median values calculated from a subset of parameters derived from Thogmartin et al. represent reasonable estimates of annual survival and reproductive rates.
2. The calculated median reproductive lifetime represents a reasonable estimate of the breeding lifespan of an average female.

DRAFT

condition" (i.e., the population trend of northern long-eared bats is not increasing or decreasing), gives an average fecundity of 0.60 and an average adult survival rate of 0.87 (based on studies of Indiana bats due to a lack of such information for northern long-eared bats) (USFWS 2014b). These parameters are the same for both years, as they represent average annual rates. The model returns an average of 1.9 lost young that would have been produced by each taken female over two breeding seasons. Therefore, over the life of the Project, it is estimated that the lost reproductive potential of 40 female northern long-eared bats taken by the Project will equal 76 juvenile bats.

The northern long-eared bat debits accrued over the 40-year life of the Project include the female take estimate (40) as well as the lost reproductive contribution of the taken female northern long-eared bats (76), resulting in approximately 116 total northern long-eared bats. The northern long-eared bat population in Nebraska has not yet seen the declines from white nose syndrome, which has occurred in the eastern United States. Due to this and the low level of estimated take, it is likely that overall impacts to the local population from take at Grande Prairie would be minimal. Range-wide or even local population estimates of northern long-eared bats are not known at this time; however they are commonly caught at mist-netting sites throughout large portions of their range.

Although the results of the pre-construction acoustic survey provide good site-specific baseline information regarding bat activity within the Project area, they cannot be used to accurately predict the level of bat mortality that may occur as a result of Project operation (Strickland et al. 2011). Post-construction monitoring for the Project will provide an accurate means of determining potential impacts to bats and assessing the effectiveness of the Project's impact

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3. Adult females are killed after their second year of breeding. Females gained from mitigation projects are afforded their entire (median) reproductive life span.
4. The benefits afforded to female bats will sufficiently account for male bat losses.
5. Females gained tomorrow are valued the same as females gained today, and females lost tomorrow are valued the same as females lost today (i.e., no discounting applied).

Additionally, all of these parameters were developed for Indiana bats, but represent the best available science for the similar northern long-eared bat. When an adult female bat is prematurely killed, she and her future reproductive potential are lost. In terms of the REA model, lost females plus their lost future reproduction are the debits. Lost future reproductive potential is calculated as: $\boldsymbol{FG} = \frac{1}{2}\boldsymbol{b_a}\frac{1-s_A^{T+1}}{1-s_A}$

Where FG is the number of daughters a female would have produced over her adult reproductive life span (T=1…,4), S_A is the adult survival probability, and b_A is the adult breeding rate. The expression is multiplied by 0.5 to account for the 50:50 sex ratio. The median reproductive lifespan of a female Indiana bat is 6.78 years, but it is assumed that a female is killed after her second year of breeding, and that the reproductive lifespan of female northern long-eared bats is the same. Thus, the lost reproduction time is 5 years. Furthermore, the potential offspring of her pups (i.e., second generation pups, SG) are also lost. $\boldsymbol{SG} = \frac{1}{2}\boldsymbol{s_p}\left(\boldsymbol{b_J} + \boldsymbol{s_J}\boldsymbol{b_A}\left[\frac{1-s_A^{T+1}}{1-s_A}\right]\right)$

This equation follows the same reasoning, with the addition of potential early death as a pup (S_P) or juvenile (S_J) and lower birth rates in the first breeding year (b_J). The expression within the brackets represents the reproductive potential of the injured female's offspring while the outside term reflects the probability that the offspring would have survived. The reproductive life of the offspring is the full breeding lifespan (7 years). Again, the expression is multiplied by 0.5 to account for a 50:50 sex ratio. While these parameters were developed for northern long-eared bats, the model parameters (other than T) are identical for the debit and credit modules, such that the choice of parameter values has little effect on the outcome of the REA model (i.e., the REA model is fairly robust to the uncertainty surrounding the parameter values).

minimization strategies, as well as a plan for implementation of additional measures if impacts are determined to be significant (see Section 8.2).

5.2.1.2.2 Indirect Impacts

Resident bats in Nebraska are usually associated with trees or wooded areas and wetlands (NWWWG 2013). See Section 6.2.11 for Grande Prairie's conservation measures for turbines located within 1,000 feet of northern long-eared bat suitable habitat. Although bats are known to forage over grasslands and agricultural fields in Nebraska (NWWWG 2013), nighttime Project construction activities in these areas will be minimal and there are no data to suggest bats will avoid foraging in these habitats once the turbines have been constructed. Based on the number and frequency of documented deaths of bat species observed at wind energy facilities throughout North America, there appears to be no active avoidance of wind facilities by bat species (USFWS 2011).

Project turbines, access roads, and other facilities have been sited on lands used for agricultural production and livestock grazing. If removal of trees or man-made structures must occur between 1 April and 30 September, a biologist will be consulted to ensure that no northern long-eared bats are roosting in that area, and tree clearing will occur during daytime hours to avoid impacts to foraging bats. Clearing of trees would be restricted to winter clearing when possible, and to the extent possible, no trees or man-made structures would be removed during Project construction during the northern long-eared bat breeding season (1 April to 30 September; USFWS 2014). Consequently, minimal maternity, roosting, or native foraging habitat for bats would be lost due to Project construction, as this will also protect other species of breeding bats. Additionally, Project construction would not impact fall swarming habitat for bats or hibernacula for cave-dwelling species. Due to their preference for forested, forest edge, and wetland (e.g., farm ponds, emergent wetlands, streams) habitat, most bat species that may occur within the Project area are unlikely to be affected by the loss of disturbed, agricultural habitat. In addition, disturbed, agricultural habitat and pasture is abundant in the area and available for bat species, such as the big brown bat, that may occasionally forage over croplands and pasture.

Grande Prairie will minimize the use of pesticides (e.g., rodenticides, sticky traps) in and around structures with roosting bats. The use of herbicides and pesticides would be minimized and spot treatments implemented where possible to avoid and/or minimize potential impacts to clean drinking water and foraging areas.

5.3 AMERICAN BURYING BEETLE

The pre-construction site characterization (Section 4.1.2.3.1.1) and the trapping surveys described above (Section 4.2.3) were conducted to assess the potential for ABB presence in the Project area to determine if the species may experience negative impacts of concerning magnitude from the project.

DRAFT

5.3.1 Project Risk Assessment

To reduce the risk of these potential impacts, the Project has been sited within previously altered habitat that is dominated by tilled agriculture (corn, soybeans, wheat, sorghum) and pasture used for livestock production.

5.3.1.1 Project Construction and Decommissioning

5.3.1.1.1 Direct Impacts

ABB may be affected by soil disturbance, use of vehicles and heavy machinery, artificial lighting, habitat fragmentation, vegetation removal, and the use of herbicides/pesticides/hazardous chemicals. During construction of the Project, ground disturbance would occur during the installation and construction of the underground collection system, overhead transmission line, access roads, upgrading existing roads, turbines, O&M building, lay down areas, and collector substations. This disturbance could result in direct injury or mortality to the ABB. Final turbine positions have not been chosen, so conservative construction footprints for all 317 turbine positions were assumed to calculate acreage of temporary and permanent impacts (Table 5-3).

Table 5-3. Temporary and permanent impacts used for calculation of impacts[1] to American burying beetle habitat at the Grande Prairie Wind Farm, Holt County, Nebraska.

Project Component	Quantity	Temporary Impact Corridor	Temporary Impacts (acres)	Permanent Impact Corridor	Permanent Impacts (acres)
Turbine	138	250 ft	621.7	30 ft	2.18
Turbine (end circuit)	179	400 ft	2063	30 ft	2.82
Collection Line	170.9 miles	150 ft	2631	*None*	0.0
Access Road	95.8 miles	150 ft	1801	20 ft	235
Substations and Switchyard	3	10 acres	30.0	10 acres	30.0
O&M Facility[2]	1	*None*	0	*None*	0.0
Laydown Yard	1	10.85 acres	10.85	*None*	0.0
Staging Areas	2	10.85 acres	21.7	*None*	0.0
Batch Plant[3]	1	5 acres	0	*None*	0.0
Permanent MET Tower	8	50 ft	0.001	10 ft	0.001
Temporary Meteorological Monitoring Station	2	*None*	0.0	*None*	0.0

DRAFT

Project Component	Quantity	Temporary Impact Corridor	Temporary Impacts (acres)	Permanent Impact Corridor	Permanent Impacts (acres)
Gen-tie Line	14 miles	100 ft	167.0	175 ft²/mile	0.06
Crane Path	19.3 miles	100 ft	248.8	*None*	0.0
Total			7595.05		270.061
Subtract Acres of Overlap[4]			(1180.051)		N/A
Total			**6415**		**270.061**

[1] Temporary and permanent impact corridors were placed around Project components in GIS to calculate acreages of temporary and permanent impacts.

2The location of the O&M facility is not yet determined. The O&M facility will not be located in ABB designated "good" or "fair" habitat.

3It is anticipated that the batch plant(s) will be located at the laydown yard or staging areas.

4Individual component corridors have significant overlap, for example within the 'Turbine' corridor which will also contain crane, access road, and collector system corridor. Further, since the project has been designed to minimize disturbance to farmland and potential wildlife habitats there are many areas in the project where the crane path and collection system corridors coincide. These areas of overlap must be subtracted to calculate actual acreage of impact (6,415 acres).

Table 5-4. Temporary and permanent impacts from the Grande Prairie Wind Project, Holt County. Nebraska on American burying beetle habitat, as determined by a 2014 habitat survey.

Type of ABB Habitat	Temporary Impacts		Permanent Impacts	
	Acres	Percent	Acres	Percent
Prime	0	0%	0	0%
Good	629.46	9.8%	21.07	7.8%
Fair	632.43	9.9%	33.15	12.2%
Marginal	2,658.65	41.4%	127.18	46.9%
Poor	2,494.00	38.9%	89.49	33.0%
Total	6,414.54	100%	270.89	100%

Using the 317 potential turbine locations and associated facilities, the Project would result in approximately 6,415 acres of temporary disturbance during construction and 271 acres of permanent disturbance (Table 5-4). This is an overestimate of impacts since a maximum of 266 turbines would ultimately be constructed. Actual impact acreage will be less due to the final turbine layout and conservative disturbance corridors used by Grande Prairie to calculate impacts. Take estimates were developed for the proposed 2015 construction schedule under

DRAFT

several scenarios (good, moderate or poor weather/moisture conditions for ABB), and also for a 2016 construction schedule, should construction be delayed.

The weighted modifiers were based on the methodology used to estimate the mortality of ABB from the Keystone pipeline in the USFWS' Biological Opinion (USFWS 2013). The weighted modifiers are used to account for the fact that ABB are more likely to be found in Good and Prime habitat rather than Marginal and Poor habitat, and are as follows: Prime = 4, Good = 3, Fair = 2, Marginal = 1, and Poor = 0. These are conservative estimates because they assume that mowing does not occur prior to the disturbance, and also overestimated the amount of acres impacted since it reflects all 317 potential turbines being constructed, when a maximum of 266 will actually be built.

Table 5-5. Estimated take of American burying beetles during construction of the Grande Prairie Wind Farm (Holt County, NE) based on the 2014 habitat assessment.

		Density				Total take		
Habitat Quality	**Acres Impacted**	**Good conditions**	**Moderate Conditions**	**Poor Conditions**	**Quality Modifier**	**Good Conditions**	**Moderate Conditions**	**Poor Conditions**
Prime	0	0.00100	0.000223	0	4	0.00	0.00	0.00
Good	629.46	0.00100	0.000223	0	3	1.89	0.42	0.00
Fair	632.43	0.00100	0.000223	0	2	1.27	0.28	0.00
Marginal	2,658.65	0.00100	0.000223	0	1	2.66	0.59	0.00
Poor	2,494.00	0.00100	0.000223	0	0	0.00	0.00	0.00
Total	**6,414.54**					**5.82**	**1.29**	**0.00**

Good conditions: The potential mortality of ABB assuming that conditions are good for the ABB in 2015 was calculated by assuming that the relatively good moisture conditions that were documented in the Project site in 2014 by Dr. Hoback continue in 2015, and allow for an increase in the ABB population. To arrive at an estimated ABB density in this good year scenario, it is assumed that the 2 ABB that were documented in the trapping efforts in 2014 mate and have a brood, with an average size of 15. The mean 60% overwintering survival rate that was documented by Schnell et al. (2007) is used to arrive at 9 ABB having the potential to be trapped in the 10,052-acre survey area in the spring of 2015[14]. The 2014 ABB density of 0.000223 ABB/acre[15] was modified with a 4.5x multiplier[16] to arrive at an assumed density of 0.00100 ABB/acre[17] if the conditions are good in 2015. The 0.0010 density was then multiplied by the acreage of construction disturbance per habitat type, and then using a modifier associated with the quality of habitat affected (Table 5-5).

If construction takes place during the breeding season in mid-summer, eggs or larvae could also be taken. Assuming that half of the ABB taken during construction are female (assumes a 50:50

[14] 15 ABB in the brood x 0.60 overwinter survival = 9 ABB
[15] This density was calculated by dividing the total number of ABB found (2) by the area surveyed (10,052 acres due to 20 traps each having a 0.5 –mile trap radius), and then adjusting for an assumed capture rate of 89.4% (Butler 2011)
[16] 9 ABB in 2015:2 ABB in 2014 = 4.5x
[17] 0.000223/acre in 2014 x 4.5 = 0.001 ABB/acre

sex ratio in the population), three broods would be assumed to be taken as well. Average broods consist of 15 larvae; therefore the worst case total number of ABB taken by construction during the summer breeding season would be 51 (6 adults plus 3 broods of 15 ABB each). However, by implementing conservation measures (Section 6.0) such as mowing and carrion removal prior to the breeding season (i.e., by April or May) it is anticipated that ABB will avoid the proposed construction areas for the rest of the active season. Therefore, it is anticipated that the use of the mowing and carrion removal would result in construction activities injuring or killing a maximum of six adult ABB. Because of the potential for similar disturbance, it is anticipated that decommissioning activities would also injure or kill a maximum of six adult ABB. During operation, intermittent mowing associated with access roads or for post-construction mortality monitoring plots is expected to be too insignificant to rise to the level of take.

Moderate Conditions: The potential mortality of ABB for the scenario where weather/moisture conditions are moderate for the ABB in 2015, assuming worst case (i.e., no mowing or other avoidance measures) was calculated by multiplying the Project's 2014 ABB abundance (0.000223/acre) by the acreage of construction disturbance, and then using the modifier associated with the quality of habitat affected as described above. This scenario assumes that conditions in 2015 are less favorable than they were in 2014 in the Project area, and thus that the ABB density does not increase. Given the amount of construction disturbance and type of habitat that would be disturbed, approximately 1.3 ABB would be injured or killed by construction of the Project (Table 5-5), assuming 2015 has moderate conditions for the ABB. Again, this is a conservative estimate because it assumes that mowing does not occur prior to the disturbance, and also overestimated the amount of acres impacted since it reflects all 317 potential turbines being constructed, when a maximum of 266 will actually be built.

If construction takes place during the breeding season in mid-summer, eggs or larvae could also be taken. Assuming that one of the 1.3 ABB that is taken during construction is female, one brood would be assumed to be taken as well. Average broods consist of 15 larvae; therefore the worst case total number of ABB taken by construction during the summer breeding season would be 17 (rounding 1.3 to two adults, and 15 larvae). However, by implementing conservation measures (Section 6.0) such as mowing and carrion removal prior to the breeding season (i.e., by April or May) it is anticipated that ABB will avoid the proposed construction areas for the rest of the active season. Therefore, it is anticipated that the use of the mowing and carrion removal would result in construction activities injuring or killing a maximum of two adult ABB. Because of the potential for similar disturbance, it is anticipated that decommissioning activities would also injure or kill a maximum of two adult ABB. During operation, intermittent mowing associated with access roads or for post-construction mortality monitoring plots is expected to be too insignificant to rise to the level of take.

Poor Conditions: If the weather/moisture conditions are poor for the ABB in 2015, it is possible that the abundance in the Project area would decline. For this scenario, it was assumed that the ABB population would be zero, similar to what was found during the trapping survey in the Project in 2012. In this scenario, 2015 construction would not take any ABB.

2016 Construction: In order to examine the potential range of mortality that could occur if construction starts in 2016 instead of 2015, it was conservatively assumed that the relatively good moisture conditions that were documented in the action area in 2014 continue in both 2015 and 2016. The 4.5x multiplier arrived at above for the level of increased density to expect in a good moisture/weather year was then applied to the projected 2015 ABB density to arrive at an

DRAFT

assumed density of 0.00451 ABB/acre (0.00100/acre 2015 density x 4.5) if the conditions are good in 2016. The 0.00451 density was then multiplied by the acreage of construction disturbance per habitat type (Table 5-4), then using a modifier associated with the quality of habitat affected as described above. Given the amount of construction disturbance and type of habitat that would be disturbed, approximately 26.2 ABB would be injured or killed by construction of the Project, assuming both 2015 and 2016 have good conditions for the ABB (Table 5-6). This is a conservative estimate because it assumes that mowing does not occur prior to the disturbance, and also overestimates the amount of acres impacted since it reflects all 317 potential turbines being constructed, when a maximum of 266 will actually be built.

Table 5-6. Estimated take of American burying beetles during construction of the Grande Prairie Wind Farm (Holt County, NE) based on the 2014 habitat assessment and assuming construction occurs in 2016 rather than 2015.

Habitat Quality	Acres Impacted	Density	Quality Modifier	Total take
Prime	0	0.00451	4	0.000
Good	629.46	0.00451	3	8.510
Fair	632.43	0.00451	2	5.700
Marginal	2,658.65	0.00451	1	11.982
Poor	2,494.00	0.00451	0	0.000
Total	**6,414.54**			**26.193**

As discussed for the 2015 scenarios, if construction takes place during the breeding season in mid-summer, eggs or larvae could also be taken. Assuming half of the ABB taken during construction are female (assumes a 50:50 sex ratio in the population), 17 broods would be assumed to be taken as well (26.193/2 = 13.1, rounded up to 14). Average broods consist of 15 larvae; therefore the worst case total number of ABB taken by construction during the summer breeding season would be 237 (rounding 26.193 to 27 adults, plus 210 larvae [14 broods x 15 per brood]). However, it is anticipated that the temporary construction footprint would be mowed prior to the breeding season (i.e., by April or May); this vegetation removal is anticipated to result in ABB avoiding the proposed construction areas for the rest of the active season. Additionally, construction crews would remove any observed carrion from the construction site. Therefore, it is anticipated that the use of the mowing and carrion removal would result in construction activities injuring or killing a maximum of 27 adult ABB if construction starts in 2016. This number is conservative because it assumes good moisture/weather conditions at the Project site in both 2015 and 2016; if poor conditions occur in both years, it is possible that 0 ABB would be taken during 2016 construction.

5.3.1.1.2 Indirect Impacts

Construction of the Project will result in up to 400 acres of suitable habitat being affected during construction and/or operation. Prior to topsoil replacement, any impacted area will be ripped to reduce soil compaction and avoid degrading the habitat quality.

5.3.1.1.3 Decommissioning

Decommissioning of the Project would minimize, but not preclude, the long-term impacts to ABB (when compared with re-commissioning or re-powering the Project) by removing turbines from

DRAFT

the Project area and restoring the area to the pre-existing land use and vegetation communities. Impacts on ABB from decommissioning activities would be similar in character as those for construction activities, but they would occur intermittently and in shorter periods of time. Avoidance and minimization measures implemented for decommissioning would be similar to those prescribed for construction activities. Estimated take would be the same as that for construction (Section 5.3.1.1.1), up to 27 adult ABB.

5.3.1.2 Project Operation

5.3.1.2.1 Direct Impacts

After construction of the Project, limited vegetation clearing or other soil disturbing activities would be anticipated as part of operation, and traffic levels would be low volume and confined to defined access roads. Limited mowing may have to occur to maintain post-construction mortality monitoring plots. The habitat in the Project area is already fragmented by center pivot and other agricultural practices, and the small permanent footprint of the turbine pads and access roads in ABB habitat would not be expected to affect the ABB population in the area.

5.3.1.2.2 Indirect Impacts

The effects of wind turbine operation on the ABB have not been widely studied. It has been hypothesized that wind turbines may provide a novel and rich source of carrion for the ABB. However, a single laboratory study has shown that the ABB may have sensory challenges due to the seismic vibrations from the spinning of the rotors, increasing the carcass burial time needed, though there was no effect found on fecundity (Moore et al. 2012). The majority of the data from this study are not published, and therefore information is not available on the characteristics of vibration (frequency, amplitude, and distance from turbines) that produced effects on carcass burial rates.

The habitat in the Project area has already been fragmented by center pivot irrigation and other agricultural practices, and the small permanent footprint for access roads and turbine pads located in "fair" or "good" habitat would not be expected to affect the ABB population in the area. Permanent lighting in the Project (associated with the Project facilities) could disrupt ABB.

5.4 RISK ASSESSMENT DECISIONS

5.4.1 Decision Criteria to either Abandon Site or Advance Project

Based upon the results from the breeding bird survey, lek survey, and raptor nest survey, the significance of impacts to local avian populations is relatively low. The results of the bat surveys and ABB surveys indicate that the Project will result in take of two listed species, the northern long-eared bat and the ABB. Grande Prairie is committed to implementing conservation measures (Section 6.0) as well as mitigation to minimize and offset any take of these species. The

DRAFT

decision was made to advance the Project, utilizing proven minimization measures, post-construction monitoring and adaptive management to determine actual impacts and minimize where possible.

5.4.2 Decision of Need for Other Conservation Plans

The only federally-listed species found in the Project area were the ABB and the northern long-eared bat. Grande Prairie is currently undergoing formal consultation/conferencing with USFWS for these two species. Additionally, a federally-protected bald eagle nest was found. Bald eagle use surveys are currently underway, and the results will be used in consultation with USFWS and NGPC to determine the need for an Eagle Conservation Plan (ECP). Based on this information, there are no plans for additional conservation plans at this time.

6.0 Conservation Measures to Avoid and Minimize Adverse Impacts

6.1 SUMMARY OF MEASURES INCORPORATED INTO THE PROJECT SITING PROCESS

In assessing potential Project locations, Grande Prairie used NGPC's Nebraska Wind and Wildlife Map (Figure 3) to identify areas considered relatively less sensitive to wind energy development in Nebraska and located the Project area in a landscape of low sensitivity to wind energy development. As part of the siting process, Grande Prairie considered the results of a number of pre-construction (Tiers 1-3) studies and recommendations from NGPC and USFWS regarding the Project layout. Additionally, Grande Prairie made a good faith effort to incorporate agency guidance when possible, including the WEG (March 2012) and the NWWWG Guidelines for Wind Energy and Wildlife Resource Management in Nebraska (November 2013).

6.2 SUMMARY OF MEASURES INCORPORATED INTO THE PROJECT DESIGN

Based on site-specific scientific data collected through the pre-construction surveys (Tiers 1-3) and the recommendations obtained from NGPC and USFWS, Grande Prairie has designed the Project to minimize impacts to wildlife while maximizing Project output. Grande Prairie has also committed to implementing specific conservation measures for the northern long-eared bat, whooping crane, bald eagle and ABB. Additionally, the Project design and development stages will incorporate and implement industry best management practices based on the USFWS wind energy guidelines (USFWS 2012) and other measures based on the best available scientific data to reduce risk to birds and bats. These conservation and mitigation practices, which are a part of the Project design, are summarized below.

6.2.1 General

- All federal, state, and local environmental laws, orders, and regulations will be complied with.

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- Prior to construction, all supervisory construction personnel will be instructed on the protection of wildlife resources including: (1) federal and state laws regarding plants and wildlife, including collection and removal and (2) the importance of these resources and the purpose and necessity of protecting them. This information will be disseminated through the contractor hierarchy to ensure that all appropriate staff members are aware of the correct procedures and responsibility to report wildlife incidences.
- Site personnel will be required to receive training on the wildlife incident reporting system in the event that injured or deceased wildlife are discovered during construction, operations, or decommissioning.
- Grande Prairie has consulted and coordinated with USFWS and NGPC for avoidance and minimization measures related to bats, eagles, other raptors, and other migratory birds (see Section 1.2). The Project has been sited such that potential impacts to these taxa are reduced.
- Prior to construction activities on bridges, including the removal of any bridge structures, the underside of each bridge will be carefully examined for the presence of bats within the summer maternity season (April 1 through September 30). If any bats are found roosting at the bridge, the USFWS will be contacted.

6.2.2 Surveys

- The effects of pre-construction, construction, and operational activities were taken into account during the pre-development stage of this Project and were assessed by conducting Tier 1 - 3 surveys.
- Tier 4 studies, including post-construction monitoring (see Section 7.0) and continued monitoring (see Section 8.1) will help in determining whether the impacts of operation are at or below the levels predicted. Design of the Tier 4 protocol and evaluation of the need for subsequent surveys will be determined using the WEG's guidance on tier IV surveys and in coordination with USFWS and NGPC.

6.2.3 Surface Water, Soils, and Vegetation

- Appropriate storm water management practices that do not create attractions for birds will be implemented. A storm water pollution prevention plan will be prepared to ensure that erosion is minimized during storm events and will be kept on-site at all construction sites, as well as in the construction contractors' offices. Grande Prairie and its contractors will implement the storm water pollution prevention plan.
- All federal regulations concerning the crossing of waters of the U.S., as listed in Title 33 C.F.R. Part 323, will be complied with.
- Wind turbines and non-linear facilities will be built on uplands, which avoid the surface water features and designated floodplains. During Project construction, Grande Prairie will avoid filling, channelizing or degrading streams, wetlands and other watering areas.

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Wetland impacts from linear features (e.g. access roads) will be minimized to the extent possible. Any unavoidable wetland impacts will be permitted through U.S. Army Corps of Engineers.

- Wetland delineations were completed in 2012 (Olsson Associates 2012), and additional surveys were conducted in 2014 prior to construction due to layout changes. At this stage in Project development, impacts to jurisdictional wetlands and waterways are anticipated to be within nationwide permit thresholds. Once the field surveys have been completed, a summary of impacts will be submitted to the U.S. Army Corps of Engineers, and the required authorizations/permits will be obtained.
- Where practicable and not a safety hazard, dead or dying trees will be left standing and forest patches or forest connections (hedgerows, riparian corridors) will be maintained or improved to maintain summer maternity habitat for bats.
- Grande Prairie will avoid or minimize fragmentation of large forested areas or tree lined corridors in order to improve the integrity of forest patches with known or suspected northern long-eared bat use.
- Trees will be clearly demarcated to identify which trees should be protected or removed to help ensure Grande Prairie contractors do not accidentally remove more trees than anticipated.
- Roads, portions of roads, crane paths, and staging areas not required for operation and maintenance will be restored to the original contour and made impassable to vehicular traffic. Areas to be reclaimed will be contoured, graded, and seeded as needed to promote successful revegetation, provide for proper drainage, and prevent erosion. Seed mixtures will be developed based on best management practices for the region, requirements or recommendations by the County, or specific requests by the landowner or easement requirements, and in consultation with NGPC.
- During Project construction, riparian areas will be avoided, where feasible. If avoidance is not feasible, activities within riparian areas will be conducted in conformance with storm water pollution prevention plan requirements.
- During construction and operation of the Project, industry-standard best management practices will be implemented to protect topsoil and adjacent resources and to minimize soil erosion. Grande Prairie will work with the construction contractor to ensure effective BMPs are implemented that are suitable for construction work in the sandhills as a part of the Stormwater Pollution Prevention Plan that will be developed and implemented for the Construction Storm Water – General Permit. This will ensure adequate stabilization is reached following completion of construction. Grande Prairie will also consult with the NGPC botanist to determine the appropriate seed mix for restoration in the sandhills in order to avoid use of grass cultivars that become invasive. Other BMPs that are effective in the sandhills and could be incorporated as part of the stormwater permit may include the following:
    - Increase watering frequency in the sandy soils during construction
    - Using a soil amendment (i.e. manure) in sandy areas during stabilization

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  - Utilizing a permanent irrigation system to help with restoration
  - Utilizing weed control practices following construction and during restoration

  Prior to being issued a Notice of Termination as part of the Construction Storm Water – General Permit, restoration and stabilization would have to be achieved (see Appendix A for a list of BMPs and SWPPP BMPs).

- Existing roads and previously disturbed lands will be used where feasible, to reduce vegetation impacts within the Project area. Surface disturbance will be limited to that which is necessary for safe and efficient construction.
- All surface-disturbed areas will be restored to the approximate original contour and reclaimed in accordance with easement agreements.
- Removal or disturbance of vegetation will be minimized through site management (e.g., by utilizing previously disturbed areas, designating limited equipment/materials storage yards and staging areas, scalping) and reclaiming all disturbed areas not required for operations.
- Site equipment servicing and maintenance areas will be at least 300 feet away from water bodies (e.g., wetlands, streams). Available standards will be followed regarding spill prevention, containment and control.
- Construction activities in areas of moderate to steep slopes (15-20%) will be avoided, where possible.
- Following construction, vehicle travel will be restricted to designated roads; no off-road travel will be allowed except in emergencies.
- Using the guidelines established by the NWWWG, Grande Prairie will develop a compensatory mitigation package for direct Project impacts to high value and/or sensitive habitat as identified by Grande Prairie in coordination with NGPC and USFWS.

6.2.4 Site Management

- Grande Prairie will contact local land owners to discuss removing carrion, afterbirth, and carcasses to avoid attracting eagles and other raptors into the Project area.
- As part of regular maintenance activities, if O&M personnel discover carrion under wind turbines or on Project access roads, they will remove the carrion to avoid attracting eagles and other raptors.
- Hunting, fishing, dogs, or possession of firearms by Grande Prairie personnel and designated contractor(s) in the Project area will be prohibited during construction, operation, and maintenance.
- If bats (of any species) are using structures (e.g. barns or other out-buildings) as roosts, and these structures are proposed for removal, removal will be performed outside of the summer maternity season (April 1 through September 30) unless there are human health or safety concerns associated with the structure. In addition, if northern long-eared bats

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are discovered in structures slated for removal, Grande Prairie will coordinate with the USFWS prior to conducting humane exclusion of this species.

- Project personnel and construction subcontractors will be advised regarding speed limits on roads (25 mph) to minimize wildlife mortality due to vehicle collisions.
- Potential increases in poaching will be minimized through personnel and contractor education regarding wildlife laws. If violations are discovered, the offense will be reported to the NGPC and offending personnel or contractor will be disciplined and may be dismissed by Grande Prairie.
- Travel will be restricted to designated roads; no off-road travel will be allowed except in emergencies.
- Non-cropland areas that are temporarily disturbed will be reseeded. Seed mixtures will be developed in coordination with NGPC botanists based on best management practices for the region, requirements or recommendations by the County, or specific requests by the landowner or easement requirements.
- Grande Prairie will minimize the use of pesticides (e.g., rodenticides, sticky traps) in and around structures with roosting bats.
- The use of herbicides and pesticides would be minimized and spot treatments implemented where possible to avoid and/or minimize potential impacts to clean drinking water and foraging areas for bats.

6.2.5 Collision Risk

- Turbines and permanent met towers will employ unguyed, tubular towers and slow-rotating, upwind rotors. Lighting on permanent met towers will be minimized, and temporary meteorological towers' guy wires are marked with marker balls to prevent avian strikes.
- Bird flight diverters will be installed on all new overhead transmission lines to be built by Grande Prairie in order to minimize risks to Whooping Cranes and other birds. The fiber optic and shield wire will be marked with bird diverters at intervals of 20 feet. Where two shield wires are required the bird diverters will be placed at alternating intervals of 40 feet such that the over-all interval between bird diverters on both wires is 20 feet. The conductor wires will be attached to the poles via davit arms, brace post or post mount insulators and arms as needed to meet local utility practice and rural utility specifications. All conductor wire spacing and other features will follow the guidelines developed by the Avian Power Line Interaction Committee (APLIC) working group guidelines as they are written at the time of installation.
- Collection and communication lines will be buried. The Project's electrical collection and transmission system will be designed, constructed, and operated pursuant to APLIC guidelines.

DRAFT

- Lighting will be minimized to that which is required by the Federal Aviation Administration. The Federal Aviation Administration typically requires every structure taller than 200 ft (61 m) above ground level to be lighted, but in the case of wind power developments, it allows a strategic lighting plan that provides complete conspicuity to aviators but does not require lighting every turbine. Grande Prairie will develop a lighting plan for the Project to be submitted for Federal Aviation Administration approval. An estimated 40% to 60% of the Project's turbines will be designated for lighting with medium intensity dual red synchronously flashing lights for night-time use and daytime use, if needed. The turbines will be lighted only as required by Federal Aviation Administration regulations, plus a low voltage, shielded light on a motion sensor at the entrance door to each turbine. To avoid disorienting or attracting birds or bats, lighting on turbines will employ strobed, minimum-intensity lights as recommended by the USFWS (2012).

  Grande Prairie will test the effectiveness of these collision risk minimization measures through fatality monitoring during the first year of operation (see Section 7.1).

- To avoid attracting or disorienting birds flying near or within the Project area, both Project substations would be outfitted with downward facing shields on all lights. The lights would be equipped with light sensors set to come on at night for security purposes. All operators and technicians on-site would be required to turn off internal lights in turbines at night when lights are not required for safety or compliance purposes. Additionally, operations and maintenance staff would be trained in avian mortality reporting procedures so that any mass mortality events observed by Project staff would be reported and addressed
- For operation, lighting will be designed so exterior light fixtures are hooded, with lights directed downward or toward the area to be illuminated, and so that backscatter to the nighttime sky is minimized. The design of the lighting will be such that luminescence or light sources are shielded to prevent light trespass.
- For operation, high illumination areas not occupied on a continuous basis will have switches of motion detectors to light the area only when occupied.
- Construction safety is the first priority and GPW will minimize construction requiring artificial lighting to the extent allowable.
- Because night-time construction is not completely avoidable, temporary safety lighting associated with night-time construction or maintenance activities during whooping crane spring and fall migration will implement the following.

  - In situations where night construction work is necessary and as safety conditions allow, direct light will be shielded to the work area and light will be prevented from projecting upwards to minimize attracting insects, including burying beetles.

- Plans for any temporary safety lighting associated with night-time construction or maintenance activities during spring and fall migration will be developed in consultation with NGPC and USFWS to ensure that the lighting will not disrupt whooping crane migration (see Section 6.2.12).

DRAFT

6.2.6 Fencing

- The substation and O&M building will be fenced as required for public safety, but no other fencing is proposed at this time. The public will continue to have access to portions of the Project area via public roads and private roads that are regularly open to the public.

6.2.7 Hazardous and Solid Wastes

- All applicable hazardous material laws and regulations existing or hereafter enacted or promulgated regarding these chemicals will be complied with and a Spill Prevention, Control, and Countermeasure Plan will be implemented. The only hazardous chemicals anticipated to be on-site are the chemicals contained in diesel fuel, gasoline, coolant (ethylene glycol), and lubricants in machinery. Hazardous chemicals contained in diesel fuel, gasoline, coolant (ethylene glycol), and lubricants will not be stored in or near any stream, nor will any vehicle refueling or routine maintenance occur in or near streams. When work is conducted in and adjacent to streams, fuels and coolants will be contained in the fuel tanks and radiators of vehicles or other equipment.
- Construction activities will be performed using standard construction best management practices so as to minimize the potential for accidental spills of solid material, contaminants, debris, and other pollutants. Excavated material or other construction materials will not be stockpiled or deposited near or on stream banks.
- No burning or burying of waste materials will occur at the Project site. The contractor will be responsible for the removal of all waste materials from the construction area. All contaminated soil and construction debris will be disposed of in approved landfills in accordance with appropriate environmental regulations.
- Grande Prairie will use tanks to store waste fluids to ensure no loss of bats by entrapment in waste pits.

6.2.8 Fire Protection

- A fire protection system will be implemented, using industrial best practices, and in accordance with all applicable fire safety codes. Grande Prairie will coordinate with fire, safety, and emergency personnel during all stages of the Project to promote efficient and timely emergency preparedness and response.
- A representative will be designated to be in charge of fire control during construction. The fire representative will ensure that each construction crew has appropriate types and amounts of fire-fighting tools and equipment, such as extinguishers, shovels, and axes available at all times.
- At all times during construction and operation, satisfactory spark arresters will be maintained on internal combustion engines.

DRAFT

- During prescribed burns, where the proposed perimeter fire line is constructed by hand, the perimeter will be constructed at least two tree-lengths away from known northern long-eared bat habitat or any potential roost trees that have been identified. If such trees are adjacent to a fixed part of the fire line such as a road, trail or a river, the fire line will be constructed around the bases so long as their remaining in place does not jeopardize firefighter safety.

- Whenever practicable, conduct prescribed burns outside of the summer maternity season. Burns conducted during the summer maternity season should be low/moderate intensity to minimize direct impacts to the northern long-eared bat.

- Fire-effects monitoring should be used before, during and after the burns to ensure that burning conditions and effects are within the desired ranges.

6.2.9 Weeds

- During construction in areas where soils are disturbed, Grande Prairie would use standard BMPs to control the introduction and establishment of invasive weeds and manage existing weed populations.
- It may also be necessary to employ mechanical and/or chemical control methods to eradicate established populations..

6.2.10 Noise

- Effective exhaust mufflers will be installed and properly maintained on all construction equipment. Grande Prairie will require construction contractors to comply with federal limits on truck noise.

- Construction activities will take place mostly during daylight hours. Construction contractors will be required to ensure that their personnel and delivery vehicles are driven responsibly.

- Grande Prairie and its contractors will adhere to a Project-wide speed limit of 25 mph or lower depending on the requirements of the specific equipment utilizing the roads.

- Nighttime construction work will be minimized, and when it does occur, it generally will be limited to relatively quiet activities.

6.2.11 Northern Long-Eared Bat

- If structures owned or leased by Grande Prairie are identified as having roosting bats, Grande Prairie will minimize use of pesticides in and around those structures by applying pesticides in accordance with label instructions having to do with federally listed species.

DRAFT

- If removal of trees or man-made structures must occur between 1 April and 30 September, a biologist will be consulted to ensure that no northern long-eared bats are roosting in that area, and tree clearing will occur during daylight hours to avoid impacts to foraging bats. Tree clearing will be restricted to winter clearing whenever practicable.
- Lighting on permanent MET towers will be minimized to that which is required by the Federal Aviation Administration.
- Both project substations will be outfitted with downward facing shields on all lights. The lights would be equipped with light sensors to come on at night for security purposes. All operators and technicians on site would be required to turn off internal lights when lights are not required for safety or compliance purposes.
- Lighting on turbines will be minimized to that which is required by the Federal Aviation Administration.
- Grande Prairie will avoid conducting construction activities after sunset in areas within 1,000 feet of suitable small roost/foraging and medium-large roost/foraging summer habitat, as field verified by WEST, Inc.
- Grande Prairie will leave dead or dying trees standing wherever practicable. Grande Prairie will work with the contractor to clearly demarcate trees to be protected versus cut to ensure that no unnecessary trees are removed by mistake.
- Grande Prairie will retain the integrity of forest patches with known northern long-eared bat use by avoiding and minimizing such areas for project components.
- Grande Prairie will maintain existing forested corridors whenever practicable.
- Should prescribed burns be necessary during construction or operation, the fire line will be at least two tree-lengths away from any known northern long-eared bat habitat.
- Grande Prairie will work with the contractor to clearly demarcate trees to be protected vs. cut to ensure no unnecessary trees are removed by mistake.
- If northern long-eared bat are discovered in structures slated for removal, Grande Prairie will conduct humane exclusion of northern long-eared bats and will consult with USFWS prior to doing so.
- Cut-in speed will be raised to 5 m/s at turbines located within 1,000 feet of suitable northern long-eared bat habitat during the summer period (1 April to 14 August).
- Cut-in speed will be raised to 5 m/s at all turbines within the Project during the fall migration period (15 August to 15 November).
- Grande Prairie will compensate for direct take of northern long-eared bat through implementation of a mitigation plan described in the Project's Biological Assessment (BA) and Environmental Impact Statement (EIS).

6.2.12 Whooping Crane

- To ensure that Grande Prairie personnel and subcontractors are all able to identify whooping cranes and understand the contingencies, all will receive training on the contingency plan prior to the start of each migration season.

DRAFT

- Photographs of whooping cranes will be posted year-round in a common area (e.g., the kitchen) of the Operations and Maintenance building to aid in the education and identification of the species.
- Training will include:
    - History and behavior of the whooping crane;
    - How to identify the whooping crane (including distinguishing a whooping crane from similar species that may be present at Grande Prairie);
    - Reporting procedures should a whooping crane be sighted;
    - Definition of wildlife harassment, and measures to avoid harassing whooping cranes; and
    - How to properly use binoculars.
- A pair of binoculars will be kept in all Project vehicles to aid in the identification of whooping cranes.
- During construction, in the morning prior to equipment start-up, daily visual surveys for whooping cranes will be conducted within a 0.5-mile buffer around the area designated for construction on that day. The daily surveys will occur during spring (March 23 – May 10) and fall (mid-September through mid-November) migration. If cranes are observed by the qualified personnel, he/she can monitor their behavior and determine if construction activities need to be halted within two miles of where the cranes are observed.
- If whooping cranes are observed within or near the Project area, a report containing information about the sighting (including behavior(s) observed with relation to wind turbines, length of stay, and direction/timing of departure) shall be maintained in the Operations and Maintenance building for the life of the Project; this report will be sent to USFWS and NGPC.
- The USFWS and NGPC may require mitigation if the Project were to impact wetlands considered to be suitable whooping crane habitat (wetlands occurring within 0.5 mile of turbines). This may include, but may not be limited to, protection of alternative, similar wetland habitat more than 5 miles from the Project area on a 1:1 or greater ratio (USFWS 2009). Micro-siting of turbines more than 0.5 mile from suitable wetlands during the development phase of the Project could further reduce impacts to whooping cranes that may stopover in the Project.
- If stopover habitat is affected, Grande Prairie would, using the guidelines established by the Nebraska Wind and Wildlife Working Group, and in consultation with USFWS and NGPC, develop a compensatory mitigation package for direct Project impacts to whooping crane stopover habitat.
- No non-permitted ground disturbing activities in wetland or riparian habitat. The need for an Individual 404 permit is not anticipated for the Project.
- The Whooping Crane Contingency Plan (Section 8.3) will be followed during construction, operation and decommissioning.

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6.2.13 Bald Eagle

- A non-disturbance buffer of 0.25 miles for ground disturbing activities during construction will be established around the known occupied nest during incubation and fledging periods to avoid disturbance of nesting eagles. Nests will be monitored for activity. If construction occurs beyond August and the nest is active and contains chicks, a protocol will be developed and monitors will be established near the nest to evaluate for changes in behavior to determine when and where construction can occur without disturbing the eagles.

- Accumulation of outdoor storage or waste will be addressed immediately so as not to attract birds or rodents, which could serve as prey for eagles.

- Site personnel will be required to receive training on the wildlife incident reporting system in the event that an injured eagle or eagle carcass is discovered during construction, operations, or decommissioning.

- Rock and brush piles that could create prey habitat located adjacent to wind turbines will be removed to reduce prey sources for eagles in risk areas.

- Road kill or other carcasses around the Project site will be cleared on a regular basis to avoid attracting bald eagles as bald eagles scavenge road-killed animals. Site personnel will be trained so that only carcasses of non-federally protected animals are moved. The owner of Grande Prairie, LLC will secure a special purpose permit from USFWS for removing road kill (MBTA-protected bird species) and a game/salvage permit from NGPC for removing road kill (such as deer).

- Bald eagles are known to scavenge carcasses at livestock operations. Thus, written training materials will be provided to landowners that have livestock operations within the project, if any. Materials will describe carcass disposal methods that minimize scavenging opportunities for bald eagles and other raptors. The goal of this measure is to reduce such scavenging opportunities in the area through increased landowner awareness of the issue.

- If a bald eagle nest is built within one mile of the Project when the Project is operational, it is assumed that the operation of the Project does not negatively affect bald eagle breeding behavior. If maintenance requires use of heavy equipment during the breeding period, eagle behavior will be monitored. This measure would only apply to nests built after the Project is operational.

6.2.14 American Burying Beetle

- Some pesticide applications negatively impact ABB, leading to reductions, isolation, and extirpations of populations from direct exposure, reduced availability of live insects as a

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food source, or secondary exposure from feeding on dead insects exposed to chemicals. Grande Prairie will time use of pesticide applications outside of ABB activity times—May 15-October 15.

- Prior to the topsoil replacement, any impacted area will be ripped (i.e., mechanically turned with a plow or ripping device) so as to reduce soil compaction. This will be done at a time when the soil is dry enough for normal tillage operations to occur on undisturbed farmlands adjacent to the areas being ripped.
- When construction commences, Grande Prairie will keep construction activities above the frost line in areas of "good" ABB habitat until the construction corridors are mowed and the grass has dried out (approximately 3 days).
- Minimize construction requiring artificial lighting to the extent practicable. In situations where night construction work is necessary and as safety conditions allow, direct light will be shielded to the work area and light will be prevented from projecting upwards to minimize attracting insects, including ABB.
- For night construction work in June and August, and as safety conditions allow, Grande Prairie will use sodium-vapor lights that emit a yellowish light.
- If construction in "good" ABB habitat is not completed during the June activity period, Grande Prairie will maintain vegetation height and remove carrion in the construction corridors to keep ABB out of these areas should construction activities carry into the August activity period and/or through October 15.
- Nighttime construction will be avoided in "good" ABB habitat within 2-miles of the two positive ABB capture locations.
- Site personnel operating in the Project area will be educated about ABB habitat, biology, reasons for decline, and the responsibility of all personnel to protect the ABB. Training will ensure that all site personnel can identify ABB and know the appropriate conservation measures to be implemented.
- All personnel will be required to report any ABB sightings to the Project manager or environmental inspector. Each worker will be provided with a full color Endangered Species Card with a photo of the ABB and a summary of information on the card before they are allowed to conduct soil disturbing activities.
- All food waste will be removed from the construction site each day, and pets will be prohibited.
- Road kill or other carcasses around the Project will be cleared on a regular basis to avoid attracting scavengers. Site personnel will be trained so that only carcasses of non-federally protected animals are moved. The owner of Grande Prairie, LLC will secure a special purpose permit from USFWS for removing road kill (MBTA-protected bird species) and a game/salvage permit from NGPC for removing road kill (such as deer).
- Grande Prairie will compensate for direct and indirect impacts to ABB and "good" ABB habitat through implementation of a mitigation plan described in the Project's Biological Assessment (BA) and Environmental Impact Statement (EIS).

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7.0 Post-construction Studies to Estimate Impacts (WEG Tier 4)

To enable Grande Prairie to monitor mortality rates of birds and bats at the Project, post-construction avian and bat mortality monitoring will be conducted in accordance with standardized monitoring protocol. Monitoring will also help determine the effectiveness of avoidance and minimization measures at the facility. The monitoring protocol presented below was developed, in part, using the USFWS Land-Based Wind Energy Guidelines (USFWS 2012). It attempts to answer the following questions from Tier 4 of the WEG (USFWS 2012):

1. *What are the bird and bat fatality rates for the project?*
2. *What are the fatality rates of species of concern?*
3. *How do the estimated fatality rates compare to the predicted fatality rates?*
4. *Do bird and bat fatalities vary within the project site in relation to site characteristics?*
5. *How do the fatality rates compare to the fatality rates from existing projects in similar landscapes with similar species composition and use?*
6. *What is the composition of fatalities in relation to migrating and resident birds and bats at the site?*
7. *Do fatality data suggest the need for measures to reduce impacts?*

7.1 MONITORING

7.1.1 Monitoring Goals

The goals of the post-construction monitoring are to determine the overall bird and bat fatality rates from the Project, species composition, and to evaluate the circumstances under which fatalities occur. Post-construction monitoring results will also provide triggers for adaptive management, as described in Section 8.2.

7.1.2 Species to be Monitored

The post-construction monitoring will address all bird and bat fatalities observed within the Project area. The monitoring plan is designed to enable comparison with other operating wind energy projects. Within the overall bat and bird fatality estimates, estimates by species will be made, if possible, based on the number of carcasses detected.

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7.1.3 Study Design

The results of post-construction monitoring efforts intended to provide an estimate of overall fatality at a facility can be influenced by several sources of bias during field sampling. To provide corrected estimates of overall fatality rates, the methodology of mortality monitoring efforts must account for important sources of field-sampling bias including 1) fatalities that occur on a highly periodic basis, 2) carcass removal by scavengers, 3) searcher efficiency, 4) influence of site conditions (e.g., vegetation) in relation to carcass removal and searcher efficiency rates, and 5) fatalities or injured birds and bats that may land or move to areas not included in the search plots (Kunz et al. 2007a). Searcher efficiency and carcass removal, specifically, are known to be two sources of field bias which are highly variable and site- and research-specific; mortality estimators are highly sensitive to these parameters (Huso 2010). It has been recommended that all mortality studies conduct searcher efficiency and carcass removal trials that follow accepted methods and address the effects of differing vegetation types (Kunz et al. 2007a, USFWS 2012). Grande Prairie's post-construction mortality monitoring methodology is designed to account for all of these sources of bias and adapt to preliminary results such that effectiveness, efficiency, and accuracy of the study is maximized.

Post-construction mortality monitoring at the Project will involve standardized carcass searches in spring (March 1 – May 31), summer (June 1 – August 15) and fall (August 16 – November 21) during the first full year of operation, accompanied by searcher efficiency trials and carcass removal trials in each season. Standardized carcass searches will allow statistical analysis of the search results, calculation of overall fatality estimates, and assessment of correlations between fatality rates and potentially-influential variables (e.g., weather, location).

Additional carcass searches will be conducted by Grande Prairie operational staff following major storm events and are intended to document potential mass mortality events.

7.1.3.1 Sample Size

Carcass searches will be conducted at 30% of the Project turbines; search turbines will be selected using a systematic sampling method stratified across different habitat types within the Project area to account for differences in fatality rates among habitat types and geographic locations within the Project area (USFWS 2012). The final choice of study turbines will be subject to landowner agreement and cooperation. The approach will meet the study goal of detecting and analyzing overall bird and bat fatalities at the Project by providing sufficient sample size to support reliable data analysis and related interpretations and conclusions.

7.1.3.2 Search Interval

The search interval will be once weekly at all of the search turbines. The turbine search schedule and order will be randomized so that each turbine's search plot will be sampled at differing periods in the day. A weekly search interval has been deemed adequate (Kunz et al. 2007a), and studies have shown that a weekly search interval provides effective mortality monitoring

DRAFT

and adequately estimates impacts from wind energy facilities (Gruver et al. 2009, Young et al. 2009), such that the added effort associated with more frequent intervals is not warranted. If more or less intensive monitoring is deemed necessary following initial data collection (carcass searchers and carcass removal trials) at the site, the search intervals will be modified accordingly.

7.1.4 Field Methods

7.1.4.1 Plot Size and Visibility Classes

During post-construction monitoring, at 80% of the study turbines, only the turbine pads and access roads out to 658 feet (200 m) from the turbine will be searched. The search plot size is dependent upon the type of turbine selected for the Project. This method targets the areas shown to support the highest searcher efficiency while greatly reducing the financial and logistical constraints associated with the clearing and searching of large study plots, enabling much broader sampling coverage of the facility. At the remaining 20% of the study turbines, 658 foot x 658 foot (200 m x 200 m) plots will be cleared and searched using a full-coverage transect methodology. This size sample plot is consistent with USFWS recommendations (USFWS 2012), which recommends that plots be twice the width of the turbine height for bird searches. Within these plots, thirty-one 20-foot (6-m) transects will be established for complete survey coverage. Vegetation will be maintained prior to the beginning of each study period.

Several studies have indicated that the majority of bird and bat carcasses typically fall within 100 feet (30 m) of the turbine, or within 50% of the maximum height of the turbine (Kerns and Kerlinger 2004, Arnett et al. 2005, Young et al. 2009, Jain et al. 2007, Piorkowski and O'Connell 2010). The 200 m wide plots will be over three times this size, minimizing the number of fatalities or injuries which land or move outside of the search plots, and thereby reducing the number of carcasses that would be undetected, causing underestimation of overall fatality. Turbines will remain assigned to either the roads-and-pads search group or the cleared plot search group throughout the entire search year. The subset of full-coverage turbines (200 m wide plots) will provide a reference for estimating the number of fatalities that may fall outside the searched area at the other turbines (roads and pads). This mixed sampling methodology is consistent with other post-construction monitoring studies being conducted (e.g., Good et al. 2011) and will enable comparison of study results.

7.1.4.2 Standardized Carcass Searches

Carcass searches will be conducted by searchers trained in conducting fatality search methods, including proper handling and reporting of carcasses. Searchers will be familiar with and able to accurately identify bird and bat species likely to be found in the Project area. Any unknown or suspected ESA-listed species discovered during fatality searches will be sent to a qualified expert for positive identification. During searches, searchers will walk at a rate of approximately 2 mph (45 to 60 m per minute) while searching 10 feet (3 m) on either side of each transect.

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For all carcasses found, data recorded will include:

- Date and time;
- Initial species identification;
- Sex, age, and reproductive condition (when possible);
- GPS location;
- Distance and bearing to turbine;
- Substrate/ground cover conditions;
- Condition (intact, scavenged);
- Any notes on presumed cause of death; and
- Wind speeds and direction and general weather conditions for nights preceding search.

A digital picture of each detected carcass will be taken before the carcass is handled and removed. As previously mentioned, all carcasses will be labeled with a unique number, bagged, and stored frozen (with a copy of the original data sheet) at the Project Operations and Maintenance building.

Bird or bat carcasses found in non-search areas will be coded as "incidental finds" and documented as much as possible in a similar fashion to those found during standard searches. Maintenance personnel will be informed of the timing and location of standardized searches and, in the event that maintenance personnel find a carcass or injured animal, these personnel will be trained on the collision event reporting protocol. Any carcasses found by maintenance personnel will also be considered incidental finds. Incidental finds will be included in survey summary totals, but will not be included in the mortality estimates.

7.1.4.3 Searcher Efficiency and Carcass Removal Trials

Searcher efficiency trials will be used to estimate the percentage of all bird and bat fatalities that are detected during the carcass searches. Similarly, carcass removal trials will be used to estimate the percentage of carcasses that are removed by scavengers prior to being located by searchers. When considered together, the results of these trials will represent the likelihood that a fatality that falls within the searched area will be recorded and considered in the final fatality estimate. Due to the presumed differences, searcher efficiency and carcass removal will be calculated separately for both birds and bats.

Trials will be conducted during each study period by placing "trial" carcasses in the searched areas to account for changes in personnel, searcher experience, weather, and scavenger

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densities. The carcasses used will either be non-listed carcasses available following the initial carcass searches in the Project area or commercially-available substitute carcasses (e.g., brown mice for bats, and quail for birds). Searcher efficiency and carcass removal trials will be limited to one trial per season to avoid attracting scavengers to the Project area with carcasses and potentially artificially inflating the carcass removal rate.

Each trial carcass will be discretely marked and labeled with a unique number so that it can be identified as a trial carcass. Prior to placement, the date of placement, species, turbine number, and distance and direction from the turbine will be recorded. Carcasses will be randomly assigned to turbines, directions from turbine, and distance from turbine within the searched areas. No more than two trial carcasses will be placed simultaneously at a single turbine.

Searcher efficiency trials will be conducted blindly; the searcher(s) will not know when trials are occurring, at which search turbines trial carcasses are placed, or where trial carcasses are located within the subplots. The number and location of trial carcasses found by the searchers will be recorded and compared to the total number placed in the subplots. Searchers will be instructed prior to the initial search effort to leave carcasses, once discovered to be trial carcasses, in place. The number of trial carcasses available for detection (non-scavenged) will be determined immediately after the conclusion of the searcher efficiency trial.

Carcass removal trials will be conducted immediately following the searcher efficiency trials using the same trial carcasses. Trial carcasses will be left in place by searchers and monitored for a period of up to 30 days. Carcasses will be checked on days 1, 2, 3, 4, 5, 6, 7, 10, 14, 20, and 30. The status of each trial carcass will be recorded throughout the trial.

7.2 PERMITS AND WILDLIFE HANDLING PROCEDURES

7.2.1 Permits

All necessary wildlife salvage/collection permits will be obtained from NGPC and the UWSFWS to facilitate legal transport of injured animals and/or carcasses prior to initiating monitoring activities.

7.2.2 Wildlife Handling Procedures

All carcasses found will be labeled with a unique number, individually bagged, and retained in a freezer at the Project Operation and Maintenance building. A copy of the original data sheet for each carcass will be placed in the bag with each frozen carcass. Non-listed carcasses may be used in searcher efficiency and carcass removal trials. In the event that an eagle carcass or a carcass of an ESA- or state-listed species in found, Grande Prairie will notify the agencies within one business day and arrange to submit the carcass to the appropriate authorities. If an injured bird or bat is found, the animal will be handled by a biologist and transferred to a local certified and licensed wildlife rehabilitator, whenever possible and necessary.

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7.3 DATA ANALYSIS AND REPORTING

7.3.1 Data Analysis

Analysis of data collected during the post-construction mortality monitoring will include spring, summer and fall season fatality estimates, as well as an annual fatality estimate for all birds and bats to the taxonomic level where fatality estimates can be calculated (i.e., it is difficult to calculate representative fatality rates from small numbers of carcasses, so species- and genus-level fatality calculation may not be possible for some species/genera). Data analysis will be performed to assess patterns in fatalities across turbine locations. Data will also be analyzed to determine the influence of factors such as date and location on bird and bat fatality rates.

7.3.2 Statistical Methods for Estimating Fatality Rates

The methodology for estimating overall bird and bat fatality rates will make sure of contemporary, peer-reviewed equations, such as the estimator proposed by Erickson et al. (2003) as modified by Young et al. (2009), the empirical estimator presented in Good et al. (2011), or the estimator proposed by Huso (2010). The use of a contemporary fatality estimator will be necessary for developing fatality estimates that can be compared to other sites and used to accurately determine if any of the adaptive management triggers have been met.

7.3.3 Reporting

Grande Prairie will provide an annual mortality monitoring report to USFWS following the completion of the post-construction monitoring. The report will include fatality estimates and data summaries. Fatalities will be expressed both in terms of fatalities/turbine/season and in terms of fatalities/MW/season, as recommended to facilitate comparison with other studies (USFWS 2012). The report will include all data analyses, including overall fatality estimates and a discussion of monitoring results and their implications. In addition to the mortality monitoring report, Grande Prairie will report the discovery of any ESA-listed species or eagles to USFWS and the discovery of any state-listed species to NGPC within one business day of their discovery. Grande Prairie will also fulfill the reporting requirements of all salvage/collection permits held throughout the post-construction monitoring effort.

8.0 Other Post-construction Studies and Adaptive Management (WEG Tier 5)

8.1 CONTINUED MONITORING AND COORDINATION PROCESSES

Upon commissioning, the Project will employ a site-specific Wildlife Incident Reporting System (WIRS). The WIRS will be designed to provide a means of recording avian and bat fatalities found at the Project site to increase the understanding of wind turbine and wildlife interactions. The WIRS will provide a set of standardized instructions for the Projects' personnel to follow in the

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event of a wildlife incident in the Project area. Each incident will be documented on a data sheet and reported to the USFWS and NGPC on an annual basis. The data will be logged into and maintained within a tracking spreadsheet by the Site Manager or a designee. All site personnel will be required to receive training on WIRS procedures as well as how to complete and submit the WIRS report.

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

- Each fatality/injury will have a WIRS form completed, and a photo documentation;
- A qualified individual will be contacted to remove carcass or injured wildlife;
- Species identification will be completed and confirmed by a qualified individual;
- Carcass will be removed and/or disposed of according to any site permits;
- If injured, a rehabilitation center will be contacted to remove and care for injured wildlife; and
- If species is listed (ESA, state-listed or an eagle), incident will be reported to USFWS and NGPC as soon as possible, not to exceed one business day.

8.2 ADAPTIVE MANAGEMENT

This WCS represents a process through which Grande Prairie plans to reduce impacts to birds and bats at the Project while still maintaining optimal Project operation and generating electricity from renewable, emissions-free wind. Grande Prairie has sited the Project and incorporated measures to avoid and minimize impacts to birds and bats, including sensitive and listed species (based on Tier 1-3 studies). The effectiveness of these measures will be informed by post-construction monitoring (Tier 4 studies) of fatality rates. Adaptive management is a process that will allow Grande Prairie to adjust the minimization measures outlined in this WCS to reflect new information or changing conditions in order to reach a goal – in this case, minimization of impacts to all bird and bat species, while minimizing effects on the operation of the Project. Changes to the Project's avoidance and minimization plan may be triggered by certain events; Grande Prairie will coordinate with both USFWS and NGPC prior to implementing such changes. The adaptive management plan will apply throughout the life of the Project; on-going evaluation and adaptation of the Project will provide effective measures for avoiding and reducing impacts to birds and bats.

Examples of specific events which will trigger adaptive management measures, in coordination with USFWS and NGPC, include:

- Documented fatalities are higher than predicted;
- Discovery of a mass avian or bat mortality event (> 50 individuals in one day);
- Take of an eagle;
- Take of an ESA-listed species not previously authorized by USFWS;
- Take of an ESA-listed species beyond the authorized level;
- Take of a state-listed species; and
- ESA listing of a new bird or bat species known to occur or which has the potential to occur in the Project area.

Additionally, Grande Prairie will conduct annual audits of its WCS practices and compile an annual report for internal and external use. This report will include any wildlife incidents from the previous year (see Section 7.3.3 for reporting guidelines). The annual report will summarize study methods, protocols, and results from the previous year. Any deficiencies or recommended changes will be noted in the report, along with a schedule for implementing the corrective or modified actions. Grande Prairie will provide a copy of the annual report to NGPC and USFWS, if requested, no later than March 15th of each year.

Based on the results of their annual audit, Grande Prairie will, in consultation with USFWS and NGPC, consider the need for adaptive management measures commensurate with the impact. Adaptive management measures will be designed to resolve identifiable, unanticipated effects from the operation of the wind farm.

Additional adaptive management measures will be designed to resolve any issues that arise on a case-by-case basis. Some examples of adaptive management include:

- Procuring habitat conservation easements;
- Improving wildlife habitat;
- Installing nest boxes;
- Installing more avian flight diverters along transmission lines;
- Modification of wind turbine operations;
- Additional training of wind farm staff; and
- Regular clearing of road kill around Project site to remove scavenger food sources.

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8.3 WHOOPING CRANE CONTINGENCY PLAN

To ensure that Grande Prairie personnel and subcontractors are all able to identify whooping cranes and understand the contingencies, all will receive training on this contingency plan prior to the start of each migration season. Photographs of whooping cranes will be posted year-round in a common area (e.g., the kitchen) of the Operations and Maintenance building to aid in the education and identification of the species. Training will include:

- History and behavior of the whooping crane;
- How to identify the whooping crane (including distinguishing a whooping crane from similar species that may be present at Grande Prairie);
- Reporting procedures should a whooping crane be sighted;
- Definition of wildlife harassment, and measures to avoid harassing whooping cranes; and
- How to properly use binoculars.

A pair of binoculars will be kept in all Project vehicles to aid in the identification of whooping cranes.

8.3.1 Construction

In the morning prior to equipment start-up, daily visual surveys for whooping cranes will be conducted within a 0.5-mile buffer around the area designated for construction on that day. The daily surveys will occur during spring (March 23 – May 10) and fall (mid-September through mid-November) migration. If cranes are observed by the qualified personnel, he/she can monitor their behavior and determine if construction activities need to be halted within 0.5 miles of where the cranes are observed.

8.3.2 Operation

Although it is unlikely that a whooping crane will stopover in the Project area, the site is within the migration corridor (see Section 4.1.2.1.1.1). Because whooping cranes may migrate over the Project area or stopover in or near the Project area, this contingency plan has been developed.

Should personnel identify a whooping crane in flight, the following steps will be taken immediately:

1. Contact Site Manager or designee by cell phone or radio. Provide location, turbine(s), number of cranes observed, and approximate altitude of flight (i.e., above or below rotor swept zone).

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2. If observation is greater than or equal to twice the length of the blade above the hub, the observer will continue to monitor the whooping crane(s) until they have traveled 2 miles beyond the Project boundary in the direction of migration.

3. If observation is within two blade lengths, at, or below the rotor swept zone, the Site Manager shall immediately begin a controlled shut down of turbines within 2 miles of the location and anticipated flight zone.

4. Once the whooping crane(s) have left the Project area and a 2-mile buffer, the Site Manager or a designee shall complete a report on the observation (location, behavior, etc.) and send notification to USFWS and NGPC as soon as possible, not to exceed 24 hours.

5. Turbines can become operational once there is visual confirmation that the whooping crane(s) have left the Project area and 2-mile buffer for at least 15-minutes.

6. The report containing information about the sighting shall be maintained in the Operations and Maintenance building for the life of the Project.

Should personnel identify a whooping crane on the ground (or should a whooping crane in flight land within the Project area or a 2-mile buffer), the following steps will be taken immediately:

1. Contact Site Manager or designee by cell phone or radio. Provide location, turbine(s), and number of cranes observed. The observer shall remain at the location during daylight hours at a distance as far as possible from the cranes while still being able to observe them until after coordination with USFWS and NGPC has occurred.

2. Personnel will monitor the crane(s) until they leave the area.

3. The Site Manager shall begin a controlled shut down of all turbines within 2 miles of the observation (or all turbines at the site if visibility is less than one quarter mile AND the crane is located within 2 miles of the Project area).

4. The Site Manager shall contact USFWS and NGPC as soon as possible (not to exceed 24 hours) to coordinate an appropriate course of action and monitoring of the whooping crane(s).

5. Turbines can become operational once there is visual confirmation that the whooping crane(s) have left the Project area and 2-mile buffer for at least 15-minutes.

6. A report containing information about the sighting (including behavior(s) observed with relation to wind turbines, length of stay, and direction/timing of departure) shall be maintained in the Operations and Maintenance building for the life of the Project; this report will be sent to USFWS and NGPC.

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9.0 Contacts/Key Resources

9.1 LIST OF CONTACTS AND KEY RESOURCES

- NGPC
  - Contact #1
  - Contact #1
- USFWS
  - Contact #1
  - Contact #2
  - Law Enforcement Contact
- Grande Prairie Wind, LLC
  - Contact #1
  - Operation and Maintenance Contact

9.2 LIST OF PREPARERS

The following companies and key individuals contributed to the preparation of this document:

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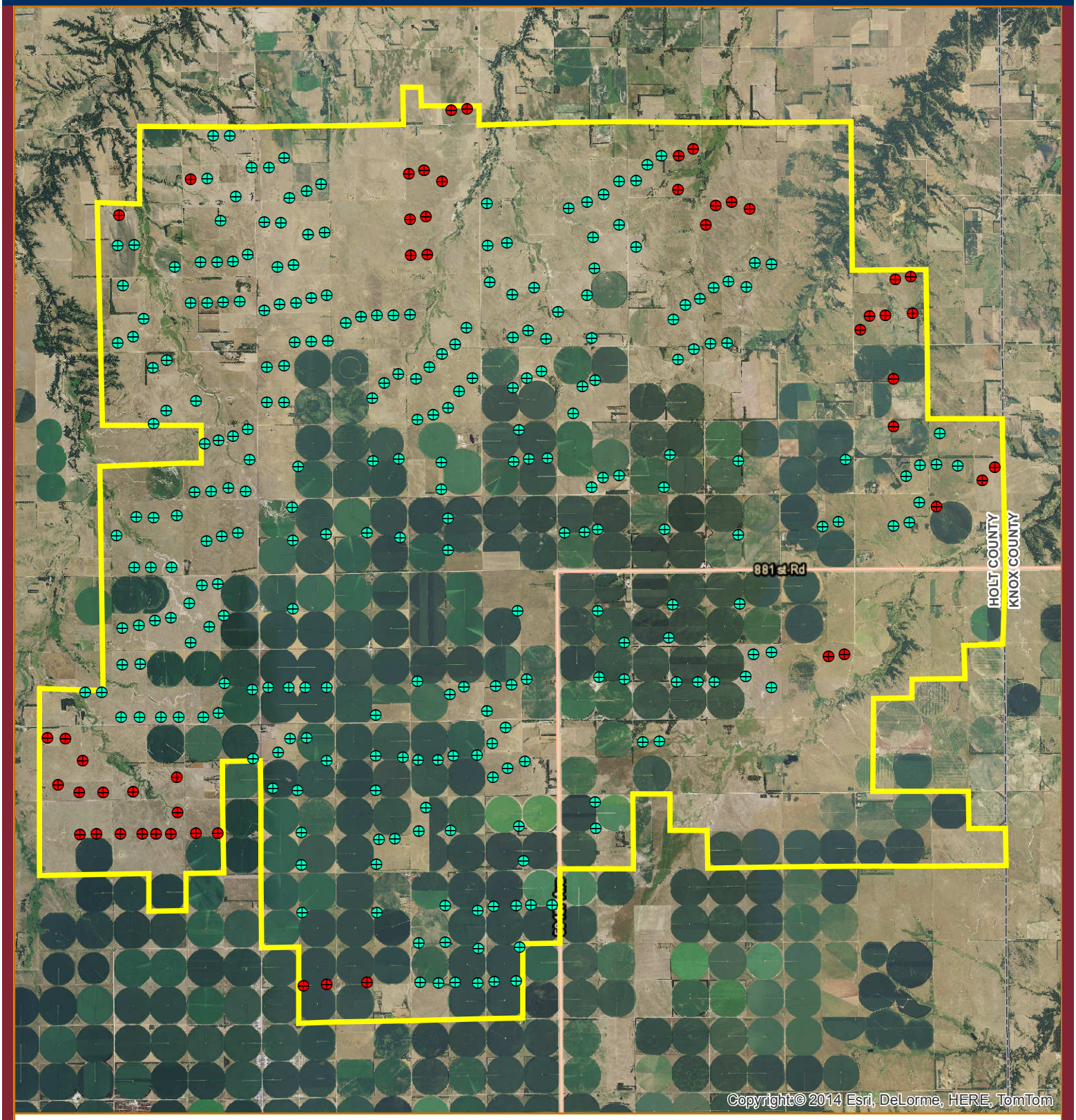
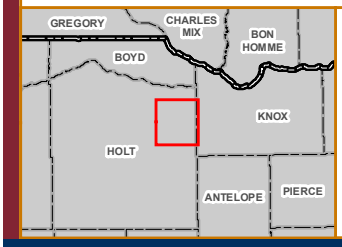


Figure 1 Project Layout
Grande Prairie Wind Farm



Location

Holt County, NE

Project Information

Project Number: 193701626
Last Modified: October 31, 2014

0 1 2
Miles

Legend

Project Area
Proposed Turbine Location (20140922)
Primary
Alternate

Data Sources include: Geronimo, Stantec, USGS, 2012 NAIP

Stantec

	Initials	Date
Prepared by	SF	20140827
Peer Review by	CP	20140124
Final Review by	MG	20140827

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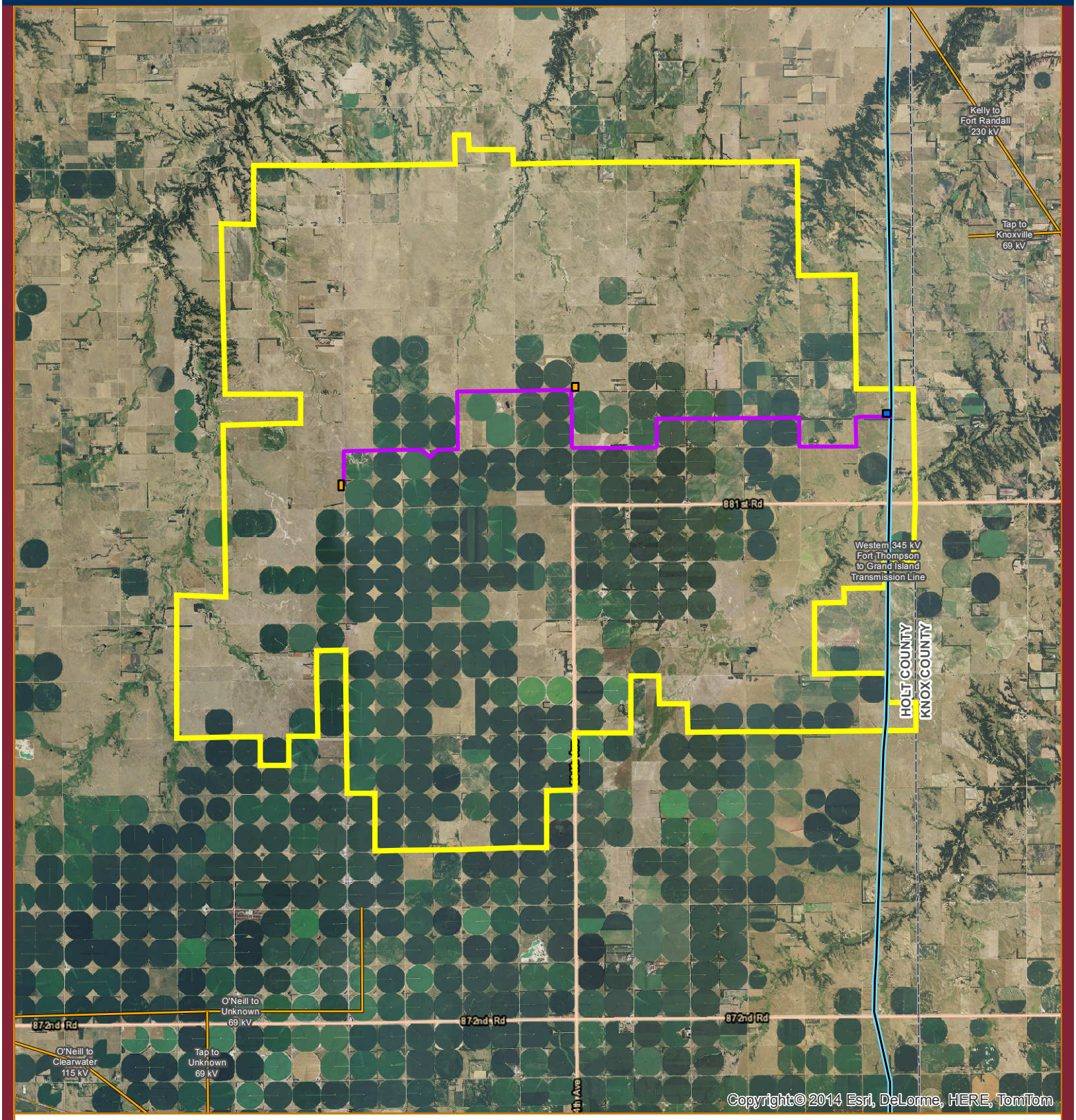
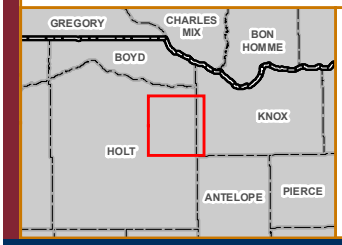


Figure 2 Transmission and Interconnect

Grande Prairie Wind Farm



Location

Holt County, NE

Project Information

Project Number: 193701626

Last Modified: September 03, 2014

0 1 2 Miles

Legend

- Project Area
- Western 345 kV Fort Thompson to Grand Island Transmission Line
- Other Existing Transmission Lines
- Proposed Collector Substation
- Proposed Interconnection Switchyard
- Gen-Tie Line (13.76 Miles)

Data Sources include: Geronimo, Stantec
USGS, BING imagery

Stantec

	Initials	Date
Prepared by	SF	20140828
Peer Review by	CP	20140107
Final Review by	MG	20140828

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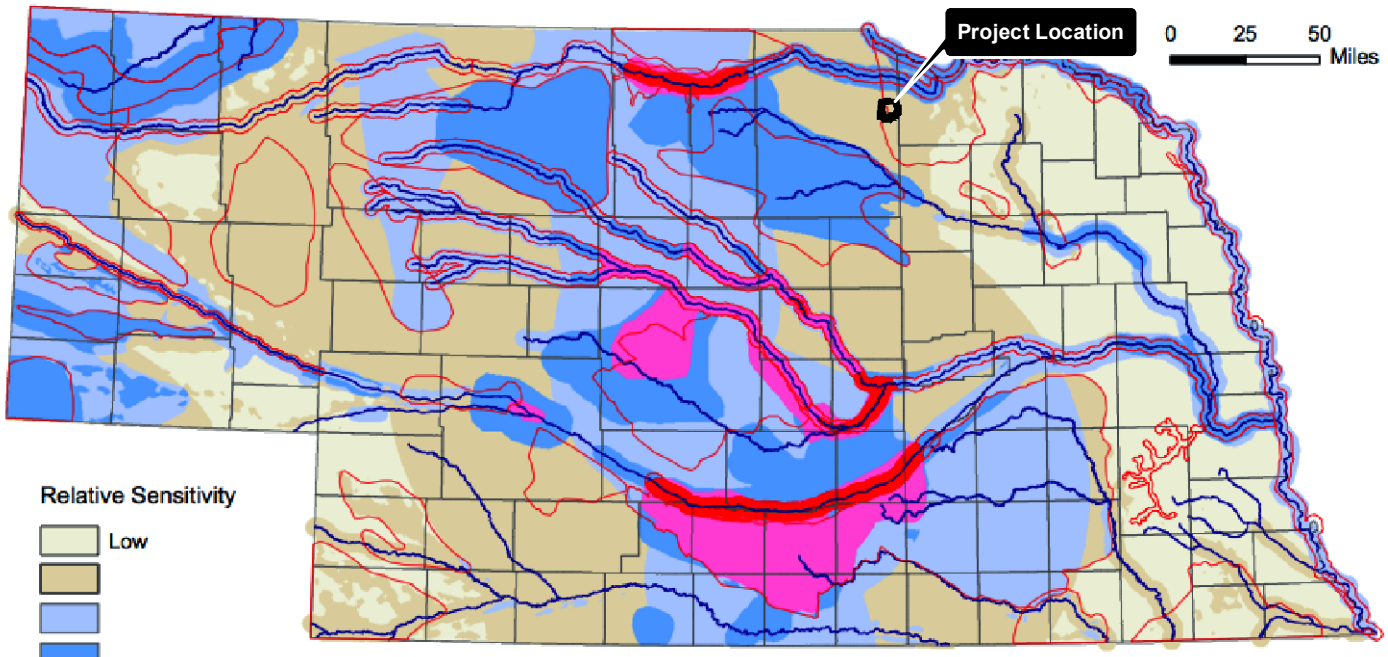
Wind Energy and Nebraska's Wildlife:
An index of the sensitivity of wildlife habitats to wind energy development, based on selected at-risk species



Relative Sensitivity

- Low
- High

Biologically Unique Landscapes

This map was designed to aid in planning for wind energy development by identifying areas that are considered relatively more sensitive or less sensitive to such development, with respect to species of concern. This map is not designed to evaluate wind farm siting at specific locations. Even in "low sensitivity" areas shown, there will be specific locations where siting of wind power infrastructure can negatively impact significant biological resources (e.g. remnant tallgrass prairie, listed plant species, etc.). Contact the Nebraska Game and Parks Commission and the U.S. Fish and Wildlife Service for potential site-specific impacts and potential conservation measures to avoid "take" under the state Nongame and Endangered Species Conservation Act and the federal Endangered Species Act.

See attached document for a description of the information used to develop this map.

Map version date: October 1, 2011

NEBRASKA GAME PARKS

Figure 3 Index of the Sensitivity of Wildlife Habitats in Nebraska to Wind Energy Development

Grande Prairie Wind Farm

Location

Holt County, NE

Project Information

Project Number: 193701626

Last Modified: May 09, 2014

Legend

Project Area

Data Sources include: Geronimo, Stantec, Nebraska Game and Parks

	Initials	Date
Prepared by	ACS	20140106
Peer Review by	CP	20140106
Final Review by	MG	20140106

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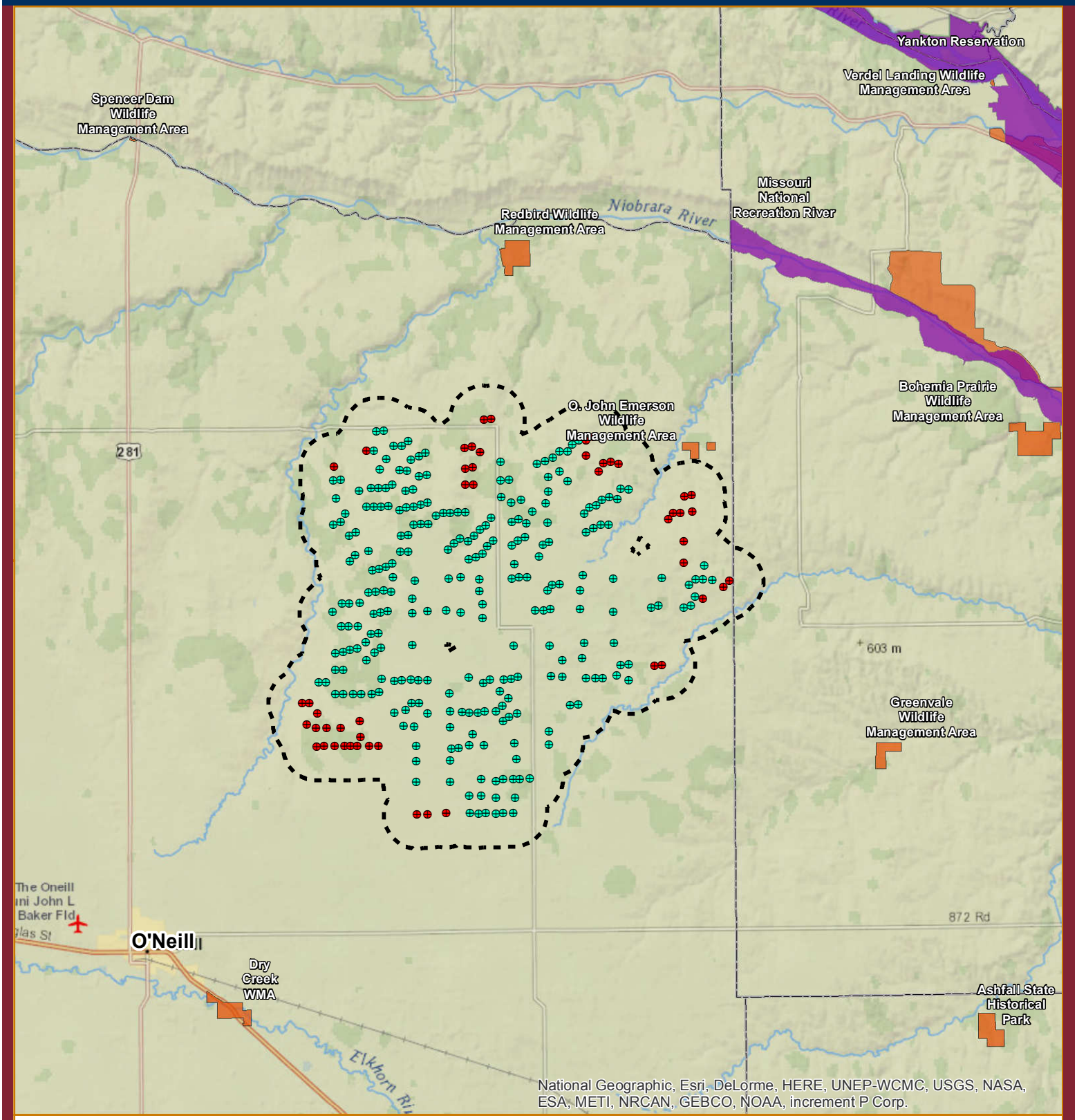
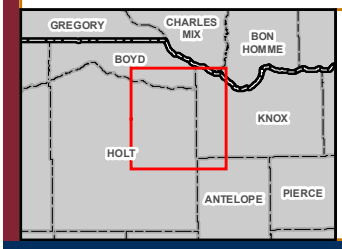


Figure 4. Conservation Areas

Grande Prairie Wind Farm



Location

Holt County, NE

Project Information

Project Number: 193701626
Last Modified: October 31, 2014

0 1.5 3
Miles

Legend

1 Mile Turbine Buffer

Proposed Turbine Location (20140922)

- Primary
- Alternate

Conservation Areas

- Federal Land
- State Land

Data Sources include: Geronimo Energy, Stantec PADUS, USGS NatGeo

Stantec

	Initials	Date
Prepared by	SF	20140827
Peer Review by	CP	20140106
Final Review by	MG	20140827

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