Crocker Wind Farm: Bird and Bat Conservation Strategy

CLARK COUNTY, SOUTH DAKOTA

Submitted to:

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1. INTRODUCTION

1.1 Background

The Crocker Wind Farm (the Project) Bird and Bat Conservation Strategy (BBCS) provides strategies for mitigating risks to birds and bats during the construction and operation phases of the Project. As part of this Project's due diligence, this BBCS was created as documentation of reasonable and prudent measures instituted to prevent or minimize avian and bat mortality. Specifically, this document describes a program that identifies monitoring and mitigation protocols for impacts to affected species while considering the content of the following:

- Avian and Bat Protection Plan white paper (USFWS 2010);
- Suggested Practices for Avian Protection On Power Lines (APLIC 2006) and Reducing Avian Collisions with Power Lines: The State of the Art (APLIC 2012);
- Raptor Nest Survey Results for the Crocker Wind Farm (WEST 2016 and WEST 2017);
- Crocker Sharp-tailed Grouse and Greater Prairie Chicken Lek Survey Results (WEST 2016);
- Crocker Site Characterization Study (WEST 2016);
- Crocker Skipper Habitat Assessment (WEST 2016);
- Crocker Year 1 Avian Use Studies (April 2016 – March 2017)
- Crocker General Bat Acoustic Studies (April 2016 – October 2016)
- Crocker Skipper Flight Surveys (July 2017)
- Crocker Northern Long-eared Bat Acoustic Presence/Absence Surveys (July/August 2016);
- US Fish and Wildlife Service (USFWS) Land-Based Wind Energy Guidelines (WEG;USFWS 2012);
- USFWS 2016 Range-Wide Indiana Bat Summer Survey Guidelines (USFWS 2016);
- USFWS Eagle Conservation Plan Guidance: Module 1 – Land-based Wind Energy (Version 2) (ECPG;USFWS 2013)
- Information from publicly available PCM Studies

Several other studies are ongoing at the time of this version of the BBCS, including a second year of avian use studies. Once the studies are complete, the BBCS will be updated to include the results as well as any avoidance, minimization or mitigation measures that are proposed as a result of the information gathered.

1.2 Purpose

This document has been developed for the Crocker Wind Farm to ensure compliance with the regulatory framework outlined in Section 1.3 of this document. It further provides (1) guidance on avoiding, minimizing and mitigating the risks to birds and bats during the construction and operation of the Project, and (2) incorporates a framework for complying with federal and state laws. The processes and procedures set forth are designed to ensure:

- Avian and bat fatalities and secondary effects on wildlife are minimized at the Project site;
- Project-related actions comply with federal and state wildlife regulations;
- If wildlife-related conditions are contained in the South Dakota Public Utilities Commission (SD PUC) site permit, and/or USFWS easement exchange they will be fulfilled;
- Ongoing surveys, monitoring and management efforts are undertaken to avoid and minimize adverse wildlife impacts throughout all phases of the Project;
- Bird and bat injuries and fatalities are effectively documented to provide a basis for ongoing development of avian and bat protection procedures;
- Adequate implementation training is provided to the Construction Contractor and Operations and Maintenance staff;
- Coordination between the Project developers and operators, wildlife agencies including SD GFP, South Dakota Department of Environment and Natural Resources (SD DENR Staff) and the SD PUC is effective and continuous.

1.3 Project Description

Crocker is proposing to construct a wind energy facility located within a boundary of approximately 29,331 acres of privately owned land in Clark County, South Dakota ("Project Area"), approximately 8 miles north of Clark, South Dakota (Figure 1). The proposed Project includes up to 120 wind turbines, up to 4 meteorological towers, associated access roads and temporary crane paths, temporary laydown/staging areas, an operations and maintenance ("O&M facility"), collector and communication systems, and a new Project electrical substation, and associated 345 kilovolt ("kV") transmission line and switchyard in Clark County, South Dakota ("Transmission Facility"). The 5.2 miles of overhead transmission will be wholly located within the Project Area. The Project would generate utility scale electric power for residential, commercial, and industrial consumers. Power from the Project would help meet the growing generation needs of the region for several decades and provide a significant economic benefit to the local community and government.

The proposed Project includes the following components:

- Up to 120 three-bladed, horizontal-axis wind turbines;
- Up to four permanent meteorological towers (height dependent on the final turbine hub height) and Sonic Detection and Ranging ("SoDAR") or Light Range Detection and Ranging ("LiDAR") units;
- Access roads, improvements to existing public and private roads, and temporary crane paths;
- Temporary laydown/staging areas, and temporary batch plant to mix concrete for tower foundations;
- Operations and maintenance (O&M) facility;
- Underground electrical collector and communication systems;
- Project electrical substation; and
- Transmission facility including approximately 5.2 miles of 345 kV transmission line and switchyard

1.3. Environmental Law Compliance

Federal, state and local environmental regulations that govern the Project are described below. The Project's intent is to comply with all of these regulations. This document is a guide by which construction and operations staff will be able to determine whether they are in compliance with these regulations.

In South Dakota, wind developments of 100MW or greater and transmission facilities with a design of more than 115 kV require a permit from the Public Utilities Commission (PUC). The governing law for the PUC (SDCL 48-41B, section 21) states that the commission may prepare an environmental impact statement that complies with the provisions of SDCL 34S-9 and environmental reporting requirements for an applicant. The SD GFP provides comments as part of the Facility Permit application and has developed Siting Guidelines for Wind Power Projects in South Dakota.

1.3.2 Endangered Species Act

The ESA directs the USFWS to identify and protect endangered and threatened species and their critical habitat, and to provide a means to conserve their ecosystems. Among its other provisions, the ESA requires the USFWS to assess civil and criminal penalties for violations of the Act or its regulations. Section 9 of the ESA prohibits take of federally-listed species. Take is defined as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct" 16 U.S.C. 1532. The term "harm" includes significant habitat alteration which kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering, 50 CFR 17.3. Projects involving Federal lands, funding or authorizations will require consultation between the Federal agency and the USFWS, pursuant to section 7 of the ESA. Because some of the Project facilities are proposed to be built on USFWS easements, a federal nexus will occur in connection with the associated easement exchange review process.

1.3.3 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) is the cornerstone of migratory bird conservation and protection in the United States. The MBTA implements four treaties that provide for international protection of migratory birds. It is a strict liability statute, meaning that proof of intent, knowledge, or negligence is not an element of an MBTA violation. The statute's language is clear that actions resulting in a "taking" or possession (permanent or temporary) of a protected species, in the absence of a USFWS permit or regulatory authorization, are a violation. The MBTA states, "Unless and except as permitted by regulations … it shall be unlawful at any time, by any means or in any manner, to pursue, hunt, take, capture, kill … possess, offer for sale, sell … purchase … ship, export, import …transport or cause to be transported… any migratory bird, any part, nest, or eggs of any such bird …" 16 U.S.C. 703. The word "take" is defined by regulation as "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect" 50 CFR 10.12. The USFWS maintains a list of all species protected by the MBTA at 50 CFR 10.13. This list includes over one thousand species of migratory birds, including eagles and other raptors, waterfowl, shorebirds, seabirds, wading birds, and passerines.

1.3.4 Bald and Golden Eagle Protection Act

Under authority of the Eagle Act, 16 U.S.C. 668–668d, bald eagles and golden eagles are afforded additional legal protection. The Eagle Act prohibits the take, sale, purchase, barter, offer of sale, purchase, or barter, transport, export or import, at any time or in any manner of any bald or golden eagle, alive or dead, or any part, nest, or egg thereof, 16 U.S.C. 668. The Eagle Act also defines take to include "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb," 16 U.S.C. 668c, and includes criminal and civil

penalties for violating the statute. See 16 U.S.C. 668. The term "disturb" is defined as agitating or bothering an eagle to a degree that causes, or is likely to cause, injury to an eagle, or either a decrease in productivity or nest abandonment by substantially interfering with normal breeding, feeding, or sheltering behavior, 50 CFR 22.3.Although the bald eagle was removed from the Endangered Species List in June 2007, it is still federally protected under the BGEPA and Migratory Bird Treaty Act. In addition, the National Bald Eagle Management Guidelines were published in conjunction with delisting by the USFWS in May 2007 to provide provisions to continue to protect bald eagles from harmful actions and impacts.

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

In April 2013, the USFWS issued the ECPG. To assist wind project proponents in meeting the requirements of 50 CFR 22.26, the ECPG outlines a five-stage approach to developing successful ECPs. These five stages are:

1. Initial landscape-scale site assessment;

2. Site-specific surveys and assessment;

3. Fatality prediction;

4. Application of advanced conservation practices (ACPs) that avoid and minimize risk, and application of compensatory mitigation for remaining unavoidable take; and

5. Post-construction monitoring.

These five stages build upon one another and in conjunction are used to predict the annual eagle fatalities using a USFWS-developed model that employs a mix of project-specific and existing information regarding eagle behavior. This five-stage approach allows for development of ACPs, which can be used in the USFWS model to display reduction in predicted eagle fatality rate in addition to identifying a predicted number of unavoidable eagle fatalities. The overall goal of this five-stage approach is to use project-specific information and modeling to develop ACPs to minimize the number of predicted annual eagle fatalities to only those unavoidable impacts and provide compensatory mitigation (if and as required under the Eagle Permit Rule, described below) for the fatalities that cannot be avoided.

On December 9, 2013, the USFWS issued a rule extending the maximum term for programmatic eagle permits from five to 30 years if wind farms adopt measures to minimize harm to eagles. This rule went into effect on January 8, 2014 (USFWS 2013b). On August 11, 2015, a Federal Court (Northern district of California) set aside the 30-year Eagle Permit Rule, finding that the USFWS failed to show an adequate basis in the record for deciding not to prepare a National Environmental Policy Act (NEPA) document prior to increasing the maximum eagle take permit duration. Until further NEPA analysis occurs, which is currently

underway as part of the USFWS' Eagle Rule Revisions and Programmatic Environmental Impact Statement, only a renewable 5-year permit duration will be available.

On December 16, 2016, the USFWS issued a rule that includes final revisions to the regulations for eagle take permits and eagle nest take permits. The changes were effective January 17, 2017, and include changes to permit issuance criteria, duration, compensatory mitigation standards, and permit application requirements and codifies and further defines the USFWS-approved protocols for pre-construction eagle use surveys (referencing the ECPG) and post-permit fatality monitoring requirements.

1.3.5 National Environmental Policy Act (NEPA)

The National Environmental Policy Act (NEPA) [42 U.S.C. 4321 et seq.] establishes national environmental policy and goals for the protection, maintenance, and enhancement of the environment and provides a process for implementing these goals within federal agencies. NEPA requires federal agencies to incorporate environmental considerations in their planning and decision-making through a systematic approach. Issuance of an easement exchange to construct facilities on USFWS easements by the USFWS constitutes a federal action, and thus requires an assessment of the potential environmental impacts associated with the action and alternatives under NEPA. Current environmental review suggests that an Environmental Assessment is the likely level of NEPA analysis necessary for evaluating the effects of granting a permit for the Project, tiering to the USFWS/WAPA Upper Great Plains Programmatic Environmental Impact Statement (PEIS); however, if further study suggests that significant impacts are unavoidable, the necessary level of NEPA analysis will be conducted and an Environmental Impact Statement will be prepared.

1.3.6 State Threatened and Endangered Species Laws

South Dakota's Endangered Species Statute (South Dakota Statutes, Title 34A Chapter 8) requires the SD GFP and Department of Agriculture to perform those acts necessary for the conservation, management, protection, restoration, and propagation of endangered, threatened, and nongame species of wildlife. In accordance with this mandate, the SD GFP has drafted a Wildlife Action Plan which includes a list of Species of Greatest Conservation Need (SGCN). In addition to endangered and threatened species, the SGCN list includes species that are regionally or globally imperiled (or secure) and for which South Dakota represents an important portion of their remaining range and species with characteristics that make them vulnerable. The resulting List of Endangered, Threatened, and Special Concern Species (ETSC) is promulgated by the Game, Fish and Parks Commission and reviewed biennially. The Endangered Species Statute also authorizes the Secretary of Agriculture and the Secretary of GFP to enter cooperative agreements with federal or state agencies or private persons for management of nongame, endangered, or threatened species. The South Dakota Endangered Species Statute defines endangered, nongame, threatened, and wildlife species as follows:

- *Endangered (E)* – any species of wildlife or plants which is in danger of extinction throughout all or a significant part of its range other than a species of insects determined by the Game, Fish and Parks Commission or the secretary of the United States Department of Interior to constitute a pest whose protection under this chapter would present an overwhelming and overriding risk to man;

- *Nongame species (NG)* – any wildlife species not legally classified a game species, fur-bearer, threatened species, or as endangered by statute or regulations of this state;

- *Threatened (T)* – any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range;

- *Wildlife (WL)* – any nondomesticated animal, whether reared in captivity or not, and includes any part, product, egg, or offspring thereof, or the dead body or parts thereof.

1.3.7 Wind Development Guidance

Guidance, recommendations and regulations regarding wind project development and wildlife impacts are being developed and constantly changing at federal, state and local levels. On March 23, 2012, the USFWS released final WEG to mitigate impacts to wildlife and their habitats related to land-based wind energy facilities (USFWS 2012). The guidelines outline a tiered research approach that includes searches of existing literature and data to identify potential issues of concern, field studies to provide additional data where necessary, and post-construction mortality studies to identify and quantify impacts. This guidance document recommends that wind developers voluntarily adhere to these guidelines and communicate with the USFWS as part of their due diligence process in order to avoid, minimize and mitigate impacts to species protected under the BGEPA and MBTA. In turn, the USFWS will "regard a developer's or operator's adherence to these Guidelines, including communication with the Service, as appropriate means of identifying and implementing reasonable and effective measures to avoid the take of species protected under the MBTA and BGEPA" (USFWS 2012). Previously, the USFWS had published Interim Voluntary Guidelines (USFWS 2003), which outlined recommendations for site and turbine design and operations, and presented a quantitative method for initial site evaluation. The 2003 guidelines were not widely used, and the 2012 guidelines replaced them.

The USFWS guidelines target "species of concern" and "species of habitat fragmentation concern." The guidelines define a species of concern as "For a particular wind energy project, any species which 1) is either a) listed as an endangered, threatened or candidate species under the Endangered Species Act, subject to the Migratory Bird Treaty Act or Bald and Golden Eagle Protection Act; b) is designated by law, regulation, or other formal process for protection and/ or management by the relevant agency or other authority; or c) has been shown to be significantly adversely affected by wind energy development, and 2) is determined to be possibly affected by the project" (USFWS 2012). It defines species of habitat fragmentation concern as those, "for which a relevant federal, state, tribal, and/or local agency has found that separation of their habitats into smaller blocks reduces connectivity such that the individuals in the remaining habitat segments may suffer from effects such as decreased survival, reproduction, distribution, or use of the area. Habitat fragmentation from a wind energy project may create significant barriers for such species" (USFWS 2012).

Additional federal involvement in wind energy projects may be triggered through the Clean Water Act (1972), National Historic Preservation Act (1966) and NEPA. The U.S. Army Corps of Engineers (USACE) has permitting authority over proposed impacts to federally protected Waters of the United States, including many wetlands. Cultural resources are protected at the state level by the State Historic Preservation Office (SHPO) in collaboration with the federal Advisory Council on Historic Preservation. Federal permitting through the USACE, USFWS or SHPO may trigger NEPA review of a proposed wind project.

At the state level, the Siting Guidelines for Wind Power Projects in South Dakota address activities and concerns associated with siting and permitting wind turbines in South Dakota. The guidelines highlight the Coteau des Prairies in eastern South Dakota and the Missouri River in central South Dakota as areas identified as potential sites for wind development which are unique to South Dakota. These guidelines also

contain contact information for state agencies, wildlife experts and universities, interest groups, and local resource management agencies (SD GFP 2009).

1.4 Agency Consultation

Natural Heritage Information System (NHIS) review and records of rare species have been requested during the development of this Project, and the results have been incorporated into this document.

Additional communications with the SDGFP and the USFWS have included a project coordination meeting held on May 2, 2016, where the Project was introduced and the results of the aerial raptor nest survey and lek survey were discussed. Additional coordination occurred via phone conversations and emails between WEST staff SD GFP and the USFWS regarding the approach to Dakota skipper/Poweshiek skipperling habitat assessments, lek surveys, and northern long-eared bat presence/absence surveys. A conference call was held on November 9, 2016, to discuss the interim results of the avian use studies, the results of the butterfly habitat assessment study, and the results of the northern long-eared bat acoustic presence/absence study, and an in-person meeting was held on December 13, 2016 to discuss the preliminary layout, discuss further studies and reports that would occur in 2017, as well as the approach to NEPA review.

In 2017, agency communication included a conference call on April 6 to discuss the study plan for Tier 3 studies in 2017, and a follow up call on May 23 to discuss the approach to skipper surveys during the flight season. On August 29 and September 28, conference calls were held to discuss the NEPA process as well as results of several surveys (breeding bird survey and skipper survey) that had occurred over the summer. The USFWS provided a letter in November of 2016 and email in September 2017 with suggested turbine siting revisions, which were discussed on September 28 and were further discussed on November 27, 2017. A conference call on December 7, 2017 discussed the EA, BBCS and revised turbine layout. In January and February 2018 conference calls were held to discuss the EA draft and schedule.

.A complete history of project correspondence and guidance from the FWS and SD GFP is provided in the facility permit for this Project.

2. SITE CHARACTERIZATION

As part of this Project, WEST followed USFWS land-based wind energy guidelines and conducted Tier 1 and Tier 2 site characterization studies, which included analyzing available data in the literature and soliciting information from expert sources. These analyses were used to identify broader environmental and site-development issues. Detailed information from site characterization studies is found in the WEST Site Characterization Survey (2016). Findings and concerns from these studies are summarized briefly below.

2.1 Wildlife and Habitat near the Crocker Project Site

The Crocker Wind Farm is located in the Northern Glaciated Plains level III ecoregion the Prairie Coteau (46k) Level IV ecoregion (USEPA 2015). The Northern Glaciated Plains ecoregion is flat to gently rolling landscape of glacial drift. The region is transitional between tallgrass and shortgrass prairie and high concentrations of temporary and seasonal wetlands offer suitable habitat for waterfowl nesting and migration. The Prairie Coteau is a higher elevation plateau with poorly defined drainage. Many lakes and a mix of row crops and pasture are present in this region. Historically, the area contained an abundance of transitional tallgrass and shortgrass prairie.

Today, approximately 55% of the former natural lands within the Project support agriculture, either as hay and pasture (37%) or as cultivated crops (18%). Herbaceous areas account for roughly a third (33%) of the the Project, but site visits and aerial imagery show that a significant portion of this area is actually grazed pasture that have been impacted by grazing activities - invasive species such as smooth brome are present, and the natural plant community has been degraded to some extent. Grazed grasslands still provide grassland habitat for wildlife, but they are less likely to still contain native plant communities, especially if they are heavily grazed or affected by herbicide treatments. Additional natural lands are generally associated with the region's water features. The National Wetland Inventory (NWI) shows 2,533 total acres of wetlands within the Project (8.1% of the Project area). Within the herbaceous, hay, and pasture areas, particularly in the northeastern half of the Project, depressions which become saturated or ponded during the wet periods may provide suitable stopover habitat for migrating shorebirds during spring migration. Within the cropland complex, small natural patches include grasslands along drainage ditches, fence rows, and woodlots and wind breaks associated with farmsteads.

Natural and restored areas are protected by ownership or through the use of USFWS, NRCS, or state conservation easements. The USFWS manages multiple conservation easements located throughout the Project. There are two 80-acre game production areas managed by the state located. Additionally, there is one State Trust School and Public parcel on the eastern portion of the Project Area. Two State-managed units adjoin the Project boundary on the eastern and southeastern side, with Sherwood Wildlife Management Area (WMA) at Round Lake, and Bailey's Lake Public Shooting Area at Bailey's Lake. These units provide some suitable habitat for sensitive species near Project boundaries that might use lands within the Project boundaries. There is one Walk-In-Area hunter access parcel within the Project in the northern part of the Project Area.

The Project area contains minimal development. Clark, located about 8 miles south of the site, is the largest nearby community and the county seat of Clark County. Most development within the site is found at individual farmsteads.

In general, the wildlife encountered near the Project site is adapted to agriculture and development. Commonly encountered wildlife species include White-tailed Deer (*Odocoileus virginianus*), Raccoon (*Procyon lotor*), Striped Skunk (*Mephitis mephitis*), Mallard (*Anas platyrhynchos*), Canada Goose (*Branta canadensis*), Red-winged Blackbird (*Agelaius phoeniceus*), Common Grackle (*Quiscalus quiscula*), Common Crow (*Corvus brachyrhynchos*), American Robin (*Turdus migratorius*),the introduced House Sparrow (*Passer domesticus*), House Finch (*Carpodacus mexicanus*), Rock Pigeon (*Columa livia*), Ring-necked Pheasant (*Phasianus colchicus*), and European Starling (*Sturnus vulgaris*). However, as described further in Section 3, numerous other species use the area's wetlands and adjacent grasslands as well. for a habitat-by-habitat assessment of collision and habitat displacement risk. A habitat cover map was created to define and visualize the locations where different bird and bat habitats were present. Habitat cover types are summarized in Table 2.

2.2 Endangered, Threatened, other Sensitive Species

The USFWS county distribution list and SD GFP county distribution list identified the potential for several federally listed and state listed species to occur within Clark County. These include: Topeka Shiner (*Notropis topeka*, Federal endangered), Poweshiek skipperling (*Oarisma poweshiek*, Federal endangered), Dakota skipper (*Hesperia dacotae*, Federal threatened), rufa red knot (*Calidris canutus rufa,* Federal threatened*)*, whooping crane

(*Grus americana,* Federal endangered), and the northern long-eared bat (*Myotis septentrionalis,* Federal threatened).

WEST identified the presence of habitat for protected or sensitive species, including wetlands, grasslands, prairie, depressions, and other habitats utilized by ETSC, SGCN, or concentration areas used by species covered by the federal MBTA. Based on the results of the Tier 2 evaluations, WEST and Crocker coordinated (and are continuing to coordinate) with wildlife agencies, have conducted multiple surveys (some of which are currently ongoing) within and around the site (described further in Field Studies).

2.3 Tier 1 and Tier 2 Questions; Stage 1 Questions

As described in the Final Land-based Wind Energy Guidelines (USFWS 2012), Tier 1 studies help to identify potential issues that may need to be addressed before further actions can be taken with the development or operations of a Project. The objective of the Tier 1 & 2 study is to assist the developer in further identifying a potential wind site by providing a preliminary evaluation or screening of public data from federal, state, and tribal entities and offering early guidance about the sensitivity of the site in regards to flora and fauna. The following discussion provides answers to the Tier 1 and 2 questions for the Crocker Project. The Stage 1 Eagle Conservation Plan Questions are also included.

1. *Are there species of concern, or habitat for that species (including eagles), present in the proposed Project area?*

Yes. There are substantial grassland areas in the Project which may provide suitable habitat for listed prairie-dependent species such as the Dakota skipper and Poweshiek skipperling, although grazing on many of the parcels has degraded the habitat. The prairie potholes in the Project provide potential suitable stopover habitat for whooping cranes; this species has been documented in Clark County and the Project is in the state-specific whooping crane migration corridor, although it is outside of the normalized national migration corridor. There is very limited forested habitat that could provide suitable summer foraging or roosting habitat for the NLEB. Bald eagles may occur in the Project, as well as SGCN and Birds of Conservation Concern (BCC) species from the region associated with grassland and prairie potholes such as chestnut-collared longspur (*Calcarius ornatus*), grasshopper sparrow (*Ammodramus savannarum*), dickcissel (*Spiza americana*), Swainson's hawk (*Buteo swainsoni*), willet (*Tringa semipalmata*), and marbled godwit (*Limosa fedoa*), but habitat for these species does not appear to be higher density within the Project than in the surrounding landscape. Central tallgrass prairie habitat is present in the Project Area; tallgrass prairie is dominated by big blue-stem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), Indiangrass (*Sorhastrum nutans*), and switchgrass (*Panicum virgatum*). Tallgrass prairie is considered rare comprising less than 1 percent of its historic range.

2. *Does the landscape contain areas where development is precluded by law or designated as sensitive according to scientifically credible information? Are there areas of habitat known to be or potentially valuable to eagles that would be destroyed or degraded due to the project?*

Yes. There is one state-managed game production area within the Project and several state-owned and managed lands adjacent to the Project. There are many federal easements within the Project (Map Exhibit 3) but no federally owned parcels within the Project. Further coordination with the USFWS Wetland Management District is recommended to determine if there are any restrictions on wind development within these parcels. There are no designated Critical Habitat Units for Dakota skippers or Poweshiek's skipperling, or any other federally listed species, within the Project.

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

Yes. Cultivated cropland, grazed pasture, and water compose the majority of the Project area; there are no federally listed plant species known to occur in Clark County. Native prairie grasses (species such as big bluestem, switchgrass and Indiangrass) and forbs (such as purple coneflower) are of potential concern due to the associated wildlife habitat they provide. It should be noted that much of the Project area is believed to retain unbroken sod, but many of those areas are currently in pasture and have been degraded to varying degrees. Some isolated areas within these lands and any ungrazed grasslands retain some of the prairie forbs associated with unbroken prairies.

4. *Are there known critical areas of wildlife congregation in the proposed Project area? Are there important eagle use areas or migration concentration sites documented or thought to occur in the project area? Does existing or historical information indicate that habitat supporting abundant prey for eagles may be present within the geographic region under development consideration?*

Yes. Wildlife congregates within the Project area based on publicly available data, specifically around lakes and other open waterbodies during peaks in waterfowl migration through the area. These resources do not appear to be in higher density in the Project area than the surrounding landscape. Although the Project area may provide some prey sources for eagles (fish and ducks associated with larger open water wetlands), it does not appear to have higher density of prey or forage habitat than the surrounding areas. Additionally, data provided by the SD GFP indicates the potential for prairie grouse leks in the vicinity of the Project, although there are no records within the Project boundary.

5. *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?*

Yes. A mosaic of grassland, pasture and wetlands comprise the majority of the Project area. Aerial imagery and the site visit indicate that there are some relatively large areas of intact mixed herbaceous grasslands and pasture/hay within the Project. The relatively large areas of contiguous grasslands and pastures may be suitable for some species such as grasshopper sparrow, northern harrier, sedge wren, marbled godwit, and upland sandpiper.

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?*

Additional data from field studies are necessary to adequately address potential presence of species of concern. The Project occurs within the known range of the NLEB, and occurrence is possible within the limited forested areas of the Project likely during the summer months as well as more generally during early fall migration throughout the area. Bald and golden eagles may also occur within the Project. Bald eagles may use the area year-round, although use is expected to be lower during winter and summer due to the lack of suitable nesting substrate and winter roost sites. Golden eagles are much less common in this area and are expected to occur as uncommon migrants passing through in a broad-front fashion. The area is likely to be used by relatively high numbers of waterfowl, although risk to this avian group from wind projects appears to be relatively low, as described further in Sections 3.4 and 5.1 (Gue et al..,2013). Additionally, species such as bobolink (Dolichonyx oryzivorus), chestnut-collared longspur, clay-colored sparrow (*Spizella pallida*), grasshopper sparrow, (*Ammodramus savannarum*), Savannah sparrow (*Passerculus sandwichensis*), upland sandpiper (*Bartramia longicauda*), and western meadowlark (*Sturnella neglecta*) that utilize prairie and grassland areas use suitable habitat in the relatively larger blocks of herbaceous grassland and pasture that are present

within the Project. Because the Tier 2 assessment documented potential risk to bird and bat species, Tier 3 studies were conducted, as described in more detail in Section 3.

7. *Is there a potential for significant adverse impacts to species of concern (including eagles) based on the answers to the questions above?*

Based on available information, there is potential for localized indirect impacts to breeding populations of grassland birds as well as direct impacts to several species of concern. However, Tier 2 data indicated that the potential for significant adverse impacts to the regional populations of species of concern from development of the project would likely be low. Because species of concern and associated habitat were identified in the Project, as well as concerns expressed by agencies regarding the potential of the Project to impact listed species and other species of concern, further Tier 3 studies were initiated to further address this question, as described further in the next Section.

3. FIELD STUDIES – TIER 3

WEST began conducting USFWS Tier 3 field studies in the spring of 2016 to obtain additional data on birds, bats, native prairies, and protected species' habitats. Tier 3 field studies completed to date include: Year 1 of avian use surveys, general acoustic bat surveys, northern long-eared bat presence/absence surveys, lek surveys, skipper habitat and flight surveys, and grassland breeding bird surveys. A second year of avian use surveys will continue through the first quarter of 2018 and a Year 2 report will analyze data from this second year of surveys. Survey results to date have informed Project infrastructure siting.

Avian ETSC, BBC, or SGCN observed to date (through July, 2017) during Tier 3 surveys include:

- American bittern (BCC)
- American white pelican (SC, SGCN)
- Bald eagle (BGEPA, ST, BCC)
- Black tern (SGCN, SC, BCC)
- Black-crowned night heron (SC)
- Bufflehead (SC)
- California gull (SC)
- Chestnut-collared longspur (SGCN, BCC)
- Cooper's hawk (SC)
- Dickcissel (BCC)
- Grasshopper Sparrow (BCC)
- Great blue heron (SC)
- Great egret (SC)
- Hooded merganser (SC)
- Marbled godwit (SGCN, BCC)

- Prairie falcon (SC)
- Snowy egret (SC)
- Swainson's hawk (SC, BCC)
- Upland Sandpiper (BCC)
- White-faced ibis (SC)
- Willet (SGCN)
- Wilson's phalarope (SGCN)

WEST designed the Tier 3 surveys to describe the distribution and abundance of species in and near the proposed Project site, to understand the relative risk of collision and habitat displacement among habitat types, and to enable decisions to use or avoid different areas in the site, or abandon the site. Overall, more than 240 hours of avian surveys were surveyed during the first year of avian use surveys, and 176 grassland breeding bird surveys were conducted I 2017, with additional avian use surveys ongoing during Year 2. The following sections summarize the results of the surveys completed to date.

3.1 Birds

3.1.1 Passerines

Avian Surveys. WEST began avian use surveys in April 2016 (Map Exhibit 1), using point count methodology outlined within the WEG (2012). In September, an additional four points were added in the northern area of the Project to cover the boundary expansion that occurred. The objective of the fixed-point avian use surveys is to provide information regarding levels of use by birds, including small birds and large birds (e.g., bald eagles and other large bird species). The fixed-point avian use surveys consist of counts of bird use within circular plots around fixed observation points following methods similar to Reynolds et al. (1980). During the first year of surveys conducted at the Project, the first 20 minutes of each count, all birds (small and large) are identified and counted. After the first 20 minutes, the survey shifted to focus on large birds only (described in section 3.1.2 Raptors). The first year of surveys was completed in March 2017. A second year of avian use surveys started in April 2017. At that time, survey methodology was changed, so that a 10-min small-bird only survey was conducted at the points, followed by a 60-min survey in which all large birds were recorded during the first 20 minutes, followed by 40 minutes of eagle use only surveys. Surveys will continue through March 2018 at the Project point count locations.

Passerine use in Year 1 surveys was higher during the spring, summer, and fall (14.82, 13.90, and 10.18 birds/100-m plot/20-min survey, respectively) than during the winter (5.25 birds/100-m plot/20-min survey; (Pickle et al., 2017). During fall, 79.0% of passerine use was attributable to four species: red-winged blackbird (5.87 birds/100-m plot/20-min survey), common grackle (2.92 birds/100-m plot/20-min survey), brown-headed cowbird (1.64 birds/100-m plot/20-min survey), and western meadowlark (*Sturnella neglecta;* 1.28 birds/100-m plot/20-min survey) (Pickle et al., 2017).

3.1.2 Raptors

Avian Surveys. Raptor and large bird migration point count surveys began in April 2016 using the avian use survey methodology described in Section 3.1.1. As described above, during the first year of avian use surveys, after the first 20 minutes of small and large bird surveys, the surveys shifted to focus on large birds only.

Estimated distance to each large bird observed is recorded to the nearest five meters, and flight or movement paths are mapped for all eagles and for other large birds as time permits.

Diurnal raptor use in Year 1 surveys was highest during the summer (0.48 birds/800-m plot/20-min survey) followed by fall and spring (0.37 and 0.34 birds/plot/20-min survey, respectively); diurnal raptor use in winter was low (0.03) (Pickle et al., 2017). Red-tailed hawk accounted for most diurnal raptor use in each season. Red-tailed hawk, American kestrel (*Falco sparverius*) and bald eagle were the only diurnal raptors with use in the winter, and each of these were only seen once or twice during that season. Diurnal raptors accounted for less than 6% of large bird use each season. Diurnal raptors were observed more frequently in spring, summer and fall (26.0%, 36.7%, and 30.3% of surveys, respectively) than in winter (3.3%). Diurnal raptor flight paths in spring appeared to be concentrated at Points 1, 9, 12, 14, 16, which form a general east-west line through the middle of the Project, as well as at Point 7 in the southwest, just outside of the revised project boundary. In summer, diurnal raptor use was distributed across the Project, with no discernable spatial patterns. Diurnal raptor flight paths in fall and winter were also distributed across the Project with no discernable areas of concentrated activity. The relatively few documented bald eagle flight paths recorded during surveys did not show a spatial pattern.

Raptor Nest Survey. WEST conducted an aerial raptor nest survey on April 4 – April 5, 2016. The principal objectives of the survey were to document the presence of Bald Eagle nests within the Project boundary and 10-mile buffer area in compliance with the ECPG, and document the presence of other raptor stick nests within the Project boundary and 1-mile buffer area (Pickle et al. 2016). WEST detected a total of 54 raptor nests representing three raptor species. Two occupied Bald Eagle nests, twelve occupied Red-tailed Hawk (*Buteo jamaicensis*) nests, six occupied Great-horned Owl (*Bubo virginianus*) nests, and 34 unoccupied, inactive unknown raptor nests were identified. No occupied or potential Bald Eagle nests were located within five miles of the Project.

In 2017, WEST conducted an aerial nest survey, the principal objectives of which were to document the presence of Bald Eagle nests within a 10-mile buffer. A total of five bald eagle nests were detected during the aerial survey on April 13-14 and April 18, 2017. Four occupied and active bald eagle nests and one unoccupied and inactive nest which appeared consistent in size and shape with a bald eagle nest were documented, between 3.2 and 9.3 miles outside of the Project boundary. The mean inter-nest distance for active bald eagle nests observed during the 2017 aerial survey was approximately 16.6 mi (26.7 km), with a half-mean inter-nest distance of 8.3 mi (13.4 km).

Reid Lake Fall Migration

Crocker conducted surveys at two sites at Reid Lake to determine bald eagle use of the lake during fall migration in 2017. Zero to 13 bald eagles were documented per site during each survey visit between October 27 and November 28, 2017. The majority of bald eagles observed were perched in trees on the east and northern portions of the lakeshore.

3.1.3 Lek Survey

Aerial Lek Survey. WEST conducted aerial and ground-based surveys for leks from April 25 – May 11, 2016. The principle objective of the surveys was to document the presence of greater prairie-chicken (*Tympanuchus cupido* pinnatus) and sharp-tailed grouse (*Tympanuchus* phasianellus) leks within the Project boundary. South Dakota Game, Fish and Parks developed a Prairie Grouse Management Plan with the goal

of maintaining greater prairie-chicken and sharp-tailed grouse populations and habitat consistent with the ecological, social, and aesthetic values of South Dakota (SD GFP 2011). WEST biologists detected no greater prairie-chicken or sharp-tailed grouse leks within the Project after two rounds of surveys. While conducting aerial surveys, WEST biologists observed two sharp-tailed grouse flying approximately 0.75 mile west of the Project boundary and one sharp-tailed grouse flying approximately 0.5 mile west of the Project boundary.

SD GFP records contained ten leks located one to five miles to the south and southwest of the Project boundary, in relatively flat terrain to the west of the Prairie Couteau. WEST biologists did not survey historic SD GFP lek locations since they were more than a mile from the Project boundary and their status is unknown for 2016.

3.1.4 Waterfowl/Waterbirds

Waterfowl accounted for 36% of observations during the first year of surveys at the Project. (second most commonly observed group after passerines), with waterbirds accounting for the third-most commonly observed group. Waterfowl had the highest use during the spring (21.95 birds/800-m plot/20-min survey), followed by winter, (13.37 birds/800-m plot/20-min survey), fall (7.94 birds/800-m plot/20-min survey), and summer (1.86 birds/plot/20-min survey). Six species accounted for 91% of waterfowl use in spring: greater scaup (5.00 birds/800-m plot/20-min survey), snow goose (*Chen caerulescens;* 4.12), Canada goose (3.66), mallard (*Anas platyrhynchos*; 3.52), lesser scaup (*Aythya affinis*; 2.09), and blue-winged teal (*Anas discors*; 1.65). During winter, unidentified ducks accounted for 88.6% of waterfowl use. Canada goose had the highest use among waterfowl species in fall (4.34 birds/800-m plot/20-min survey), and mallard had highest use in summer (0.51 birds/800-m plot/20-min survey). Waterfowl accounted for nearly all large bird use in winter (97.4%), 68.7% of large bird use in spring, 41.9% of large bird use in fall, and 20.5% of large bird use in summer. Waterfowl were observed frequently during the spring (72.1% of surveys), than during, summer, fall, and winter (33.2%, 36.5%, and 10.0% of surveys, respectively).

Waterbirds were observed in spring, summer, and fall, and use was higher during spring and fall (4.32 and 3.32 birds/800-m plot/20-min survey) than in summer (1.97 birds/800-m plot/20-min survey. Most waterbird use in spring (77.8%) was attributable to American white pelican (*Pelecanus erythrorhynchos*). American white pelican and great egret (*Ardea alba*) accounted for most use in summer, and double-crested cormorant accounted for most waterbird use in fall. Waterbirds accounted for 21.7% of all large bird use in summer, 17.5% of large bird use in fall, and 13.5% of use in spring. Waterbirds were observed during 35% of summer surveys, 28.6% of surveys during spring, and 16.8% of fall surveys.

Waterbird and waterfowl flight paths in spring appeared to be generally distributed throughout the portion of the Project with a full year of data; the lack of flightpaths in the northern portion of the Project in Points 17 – 20 is likely the fact that surveys only occurred during one spring session in March 2017. In summer, waterbird and waterfowl activity was lower than spring, with some points that had relatively high density of flightpaths in spring showing little to know flightpaths in the summer (Point 1, Point 5); again the lack of flightpaths in the northern four points is due to the fact that no summer surveys were conducted in 2016 at these locations. During fall, the number of waterbird and waterfowl flight paths was relatively higher at Points 10, 13, and 6 in the general center of the Project. Few waterfowl and waterbird flight paths were recorded in winter. Overall, no obvious waterbird/waterfowl flyways were observed beyond a general relatively high use in multiple directions across the Project, particularly during spring.

3.1.5 Grassland Breeding Birds

WEST conducted breeding bird surveys at paired transects at 30 randomly selected proposed turbine locations, with two transects survey each of three visits between June 7 and July 4, 2017. Forty-eight bird species were identified during the 176 transect surveys, during which 2,843 individual bird observations and 1,892 separate groups were recorded. Cumulatively, eight species comprised 74% of the individual observations: grasshopper sparrow, western meadowlark, bobolink, dickcissel, brown-headed cowbird, clay-colored sparrow, red-winged blackbird, and chestnut-collared longspur.

3.1.6 Sensitive Bird Species

Sensitive species are most likely to experience impacts from wind energy development because other existing factors unrelated to wind energy development are already present. In monitoring and analyses, WEST biologists use native species as a broad indicator of wind project impacts and sensitive species as a specific indictor of potential effects to already at-risk species. Sensitive species vary from ecological region to ecological region, based on the abundance and population trends of species.

Sensitive species are similar to the species of concern as defined in the USFWS recommendations (2012a); however, the WEST-defined sensitive species emphasize the conservation significance of a species. For example, mourning dove is protected by the MBTA and some state game laws, but its population is large and at low risk from wind energy development. Consequently, it is a "species of concern" to the USFWS, but not a "sensitive species" in the WEST analysis.

No whooping crane, rufa red knots or any other federally listed species have been documented at the site during surveys to date. The breeding bird surveys and avian surveys documented four species of Special Concern (SC): Swainson's hawk, (*Buteo swainsoni*), great blue heron (*Ardea Herodias),* great egret (*Ardea alba*) and snowy egret (*Egretta thula*) and five SGCN avian species: bald eagle, marbled godwit (L*imosa fedoa)*, willet (*Tringa semipalmata),* American white pelican (*Pelecanus erythrorhynchos*)and chestnut-collared longspur (*Calcarius ornatus).* These species were all documented during breeding bird surveys or during the summer in avian use surveys, indicating they likely are nesting in the Project area. Two additional SGCN species, black tern (*Chlidonias niger)* and Wilson's phalarope (*Phalaropus tricolor*) and five additional SC species, bufflehead (*Bucephala albeola*), California gull (*Larus californicus*), hooded merganser (*Lophodytes cucullatus*), prairie falcon (*Falco mexicanus*), and white-faced ibis (*Plegadis chihi*) were identified during the first year of avian use surveys outside of the breeding season, indicating they likely are migrants through the area. Additionally, several bald eagles have been documented during the large bird use surveys at the site; eight were documented within the first year of surveys, with the no spatial pattern evident from the relatively few documented bald eagle flight paths recorded.

3.1.7 Habitat Displacement Risk

In its report "Wind Turbine Interactions with Wildlife and Their Habitats - A Summary of Research Results and Priority Questions" (June 2017), the AWWI summarizes information that is publicly available regarding impacts on wildlife from land-based wind facilities, focusing on research from peer-reviewed journals and publicly available reports that have received technical review from experts. In their 2017 report, the AWWI concluded that indirect impacts on birds from operating wind turbines due to displacement have been documented in a subset of the species studied, but these impacts have not been found consistently across studies. Additional research is needed to determine if grassland species will habituate to the turbines over time (AWWI, 2017). The USFWS Draft Midwest Wind Energy Multi-Species Habitat Conservation Plan (April

2016) concluded that wind facilities may displace some species of grassland birds locally (USFWS, 2016e). Indirect impacts due to displacement from wind turbines have also been studied in waterfowl. Loesch et al. (2013) studied changes in densities of five species of breeding waterfowl at two wind facilities in the Missouri Coteau of North Dakota and South Dakota. Impacts to breeding ducks were evident in about 50 percent of the site-year combinations, actual decreases in density were limited.

3.2 Bats

3.2.1 Acoustic Monitoring Survey

WEST conducted acoustic surveys within the Project site to help understand general bat activity levels by season. Bat activity was surveyed within the Project from April 14 through October 27, 2016. Ground-based (1.5 meter [m]) and raised detectors (45 m) were paired at two meteorological towers within the Project for a total of four detectors (Map Exhibit 2).

Bat activity data was collected using full spectrum acoustic monitoring and data logging platforms (Song Meter SM3, Wildlife Acoustics, Inc., Concord, MA, USA). The paired ground and raised met tower stations recorded a combined mean (± standard error) of 1.84 ± 0.22 bat passes per detector-night. Detectors at fixed ground stations recorded 448 bat passes on 265 detector-nights for a mean (± standard error) of 1.84 ± 0.23 bat passes per detector-night. Raised stations recorded a similar number (455) of bat passes on 265 detector nights for a mean of 1.83 ± 0.24 per detector-night. Bat activity was highest in the fall, peaking in early August. Activity during the standardized Fall Migration Period (FMP) was 2.80 ± 0.42 bat passes per detector-night at ground met tower stations, which is lower than rates established at other upper Midwest wind projects using AnaBat units (which generally record fewer bat passes than full spectrum units). Anabat-derived bat activity rate estimates include the national median (7.68) and the majority of studies available from the Midwest (6.97) and Rocky Mountains (2.2). Although it is expected that bat activity data collected using SM3 detectors is not directly comparable with activity data from the Anabat-derived studies, it is assumed that SM3 detectors would detect more bat calls due to a greater detection distance and the fact that noise from insects or other sources does not inhibit detection of bats for full-spectrum detectors. Therefore, the activity data collected by SM3 detectors in the Crocker study provides a conservative risk assessment, and the fact that even with the SM3 units the bat passes were low indicates a relatively low use site.

3.2.2 Northern Long-eared Bat Presence/Absence Surveys

WEST evaluated the potential presence of the federally threatened NLEB at the Project site following the U.S. Fish and Wildlife Service *Northern Long-Eared Bat Interim Conference and Planning Guidance* (USFWS 2014a) and the *2015 Range-Wide Indiana Bat Summer Survey Guidelines* (USFWS 2015b). This evaluation included a review of potential NLEB habitat and acoustic surveys to assess the potential presence of the NLEB within the Project area. WEST conducted a Phase I habitat analysis by reviewing aerial imagery of the Project from 2015 (NAIP 2015) and delineating potential roosting and foraging habitat within 2.5 miles of the Project using ArcGIS software. Desktop analysis showed approximately 389.39 acres of wooded habitat within the project boundary which is scattered in small patches throughout the Project. Of the total wooded habitat area, about 33 acres of the habitat is considered suitable as summer foraging habitat (wooded areas within 1,000 ft of forested patches of 15 acres or more). Wooded areas greater than 1,000 ft from forest patches at least 15 acres in size are unlikely to be suitable habitat for NLEB given their relative isolation and NLEB summer foraging and roosting habitat requirements.

Acoustic surveys were conducted between July 22 and July 27, 2016 consistent with USFWS Guidelines. Bat calls were surveyed using SM3 detectors and identified using the USFWS-approved Automated Acoustic Bat ID Software Program, Kaleidoscope Pro (version 3.1.7; www.wildlifeacoustics.com), with NLEB calls examined and verified by a qualified biologist. The presence/absence survey focused on areas within and near forested habitat that are expected to be disturbed by Project development. Following the USFWS guidelines, WEST conducted presence/probable absence surveys at two sites (four survey stations) within the Project.. A total of 722 calls were identified to the species level, with an average number of bat calls per detector night of 72.2. Qualitative analysis did not verify any potential NLEB calls; NLEB is therefore considered absent from the Project during the summer.

3.2.2 Bat Collision Risk

Based on information gathered at the site, it is likely that similar to other wind energy projects in Minnesota and South Dakota (see Table 2 in Section 5.1), impacts are likely to be greatest during the peak migration (July 15–September 15), and at low wind speeds, or associated with the passage of weather fronts.

3.3 Summary of Concerns Identified During Research and Analysis

Issues discussed in this report are ranked below with the assumption of no avoidance, minimization or mitigation. The level of concern would decrease if avoidance, minimization and mitigation were employed. Rankings are described below.

- High – Without avoidance, minimization or mitigation, the Project is likely to pose a significant risk to the topic of concern.
- Moderate – Without avoidance, minimization or mitigation, the Project is likely to pose a moderate risk to the topic of concern.
- Low – Without avoidance, minimization or mitigation, the Project is likely to pose a low risk to the topic of concern.
- Minor – Without avoidance, minimization or mitigation, the Project is likely to pose minimal risk to the topic of concern.

These conclusions and recommendations will be reevaluated upon completion of Tier 3 assessments at the Project site, as well as upon completion of the Section 7 ESA review by the USFWS.

High Level of Concern

There are no identified issues of high concern.

Moderate Level of Concern

Subject: Breeding Bird Collision

Regulatory Framework: MBTA

Breeding bird collision is an issue of moderate concern due to the high percentage of turbines proposed to be placed in grassland habitat. Given the relative diversity of passerine species documented at the Project, it is anticipated that the Project would result in direct impacts to passerines, likely spread out in relatively low numbers across multiple passerine species. The results of the first year of avian use surveys further indicate

that risk to passerines may be higher in the spring and summer, and fatalities would likely include species common to both agricultural and grassland landscapes.

Subject: Waterfowl and Waterbird Collision

Regulatory Framework: MBTA

Northeastern South Dakota is known for significant activity during the waterfowl migration, and waterfowl and waterbird activity was documented at the site during avian use surveys conducted during the spring 2016 migratory period. Multiple waterfowl and waterbird species have been observed during surveys conducted to date. Collision risk is generally low for waterfowl and waterbird species because studies and observations indicate that waterfowl and waterbirds can see and avoid turbines during flight. Given the data collected during the survey and the Project's location in the Prairie Pothole region, it appears that the Project will have higher use by waterfowl in spring, followed by summer; risk to these species may be higher during these seasons. As described in more detail in Section 5.1, various studies show differing risk of direct impacts to waterfowl species, and it is possible that post-construction studies at the Project may show that waterfowl comprise a higher percentage of mortalities than at other locations in the Midwest in more agricultural settings. However, Gue et al. (2013) concluded that mortality for female mallards and blue-winged teal due to collision with wind turbines was likely a limited threat. In addition, in the Graff 2016 study which documented waterfowl as the primary avian fatality in spring migration, the rates (0.79 waterfowl per megawatt [MW] per spring) did not appear to approach levels that would affect populations (overall 48.4 million breeding ducks, 13.5 million migrating mallards in 2016, as documented in the USFWS' Waterfowl Population Status report).

Low Level of Concern

Subject: Grassland Bird and Waterfowl Habitat Displacement, including BCC, SGCN, and state SC bird species

Regulatory Framework: MBTA

As described in Section 3.1.5, there is some evidence that some grassland specialist bird species may be susceptible to displacement effects from wind turbines; some studies have also indicated some displacement effects of breeding duck pairs in the vicinity of wetlands (although other studies have not shown a significant effect).

Waterfowl may use agricultural fields in and near the site during migration. Overall, the Project has the potential to affect the movements and breeding densities of waterfowl in the immediate vicinity of the wind turbines. Waterfowl would still be expected to utilize the prairie potholes in the Project boundaries and adjacent areas during spring and fall migration, and direct collision impacts would not be anticipated to significantly affect their numbers in the area. It is possible that breeding duck densities would be lower in the Project area around turbines compared to adjacent areas, although it is unknown if this breeding displacement would be long term or if the effect would decrease after the first few years of operation as waterfowl acclimate to the presence of the turbines; apparent habituation to the presence of wind turbines has also been observed (Jones et al 2010)

Subject: Migratory Bats

Regulatory Framework: State Endangered Species Act.

Migratory tree bats that have experienced mortality at other wind sites are present at the site during spring and fall migration. As described in Section 3.2.1, the general acoustic survey indicates that general bat use at the site is relatively low when compared to other projects in the Midwest. It is likely that some mortality will occur at the Project site, and that mortality will be similar to other wind energy projects in agricultural regions of the Midwest with low- bat activity, as described further in Section 5.1. Hoary bats and silver-haired bats may experience the greatest mortality, based on the species composition of the general acoustic study. A recent study has indicated that wind development does have the potential to effect bats at a population level, particularly hoary bats (Frick et al. 2017). Post-construction fatality studies would be useful to confirm that the low level of use documented in the pre-construction surveys corresponds to a relative low level of bat fatalities.

Risk of mortality at the Project site is likely to be greatest on nights in the FMP, when bat passage rates are the highest (at the Project beginning in late July and peaking in early August). During the FMP, weather conditions that are most conducive to higher mortality rates occur with warm temperatures (>50F) and low wind speeds (<6.5m/s) (Baerwald et al. 2009, Arnett et al. 2010, Good et al. 2011, Cryan and Brown 2007). In addition, risk is higher on the first night following the passage of a low-pressure system when the prevailing wind shifts from a southerly to a northerly direction (Cryan and Brown 2007, Good et al. 2011).

Subject: Bald Eagle

Regulatory Framework: BGEPA, MBTA, State Endangered Species Act

There is a low level of concern for potential Bald Eagle mortality at the site. The Bald Eagle is protected under the BGEPA, and is a state listed threatened species. The Project occurs within the nesting, migration, and winter range of the Bald Eagle. There are four occupied Bald Eagle nests within 10 miles of the site as documented in the April 2017 eagle nest survey, although no Bald Eagle nests are located within three miles of the Project boundary. Eleven bald eagle observations were recorded during the 244 hours of surveys conducted during the first year of avian use surveys (8 during surveys and 3 incidentally), with most observations in the spring, followed by single observations in winter and fall, and none during the summer. Use to date therefore appears to be relatively low.

WEST will continue general eagle use surveys per the ECPG at the Project through March 2018. Once the data is analyzed, an update to the Bald Eagle risk assessment will be provided.

Subject: Raptor Collision Risk

Regulatory Framework: MBTA

There are no known raptor migration routes near the site. Due to the general low raptor use documented in the first year of avian use surveys and typical raptor mortality rates, it is unlikely that significant numbers of raptors would be killed at the Project site.

Subject: Northern Long-eared Bat
Regulatory Framework: Federal Endangered Species Act

NLEB is a federal threatened species under the ESA. The NLEB is experiencing steep population declines due to White Nose Syndrome. This species is known to occur throughout South Dakota, although it prefers forested habitat. The presence/absence survey results indicate that the NLEB is not expected to breed or forage at the Project during the summer, although it could be present during migration.

Subject: Migratory Passerine Birds
Regulatory Framework: MBTA

Passerine bird mortality during spring and fall migration is typically the greatest source of bird mortality at wind energy developments. Migratory passerine use of the site appears typical of Midwestern agricultural habitats based on avian use surveys conducted to date, and mortality for these species is anticipated to be similar to that at other Midwestern wind energy developments, as described further in Section 5.1.

Subject: Rufa red knot and whooping crane
Regulatory Framework: Federal Endangered Species Act and MBTA

There are no records of the Rufa red knot in the vicinity of the Project according to NHIS data. If the species were to occur within the Project, it would likely be an isolated few individuals in spring or fall as migrants, stopping at ephemeral and permanent wetlands and ponds. Knot response to wind turbines is not well documented but it is expected to be similar to many waterbirds and shorebirds (in general, this avian group does not appear to be significantly affected by wind turbines).

The Project falls within the corridor for South Dakota where 95 percent of the whooping cranes have been documented . Whooping have been documented in Clark County. It is possible that whooping cranes would stop during migration within the Project, although this would not be expected to be a frequent or regular occurrence.

Minor Level of Concern

Subject: Topeka shiner
Regulatory Framework: Federal Endangered Species Act

Small streams on the western portion of the Project draining to the James River are of some potential concern, which feed into streams where Topeka shiner observations have been recorded downstream. However, there are no records of this species in the vicinity of the Project according to NHIS data, and use of proper erosion control techniques during construction should result in avoidance of potential impacts to this species.

Subject: Federal Listed Plant Species

Regulatory Framework: Federal Endangered Species Act

No records of federally listed plants have occurred in the vicinity of the Project, according to NHIS records, and coordination with USFWS and SD GFP have not indicated that the Project would present a risk to listed plant species.

4. AVOIDANCE AND MINIMIZATION MEASURES

4.1 Preconstruction Siting and Design

4.1.1 Turbine Siting

Wind turbines and associated facilities for the Project will be sited with consideration for the topographic and environmental characteristics of the site, efficiency of selected turbine models, and minimal impacts to area residents. Siting also considers the setback requirements established in the Zoning Ordinance for Clark County. The Clark County Board of Adjustment may allow setback/separation distances to be less than the established distances identified above, if the adjoining landowners agree to a lesser setback or separation distance. Table 1 enumerates setbacks that will be adhered to in siting the Project.

Table 1. Project Setback Requirements

Turbine Setback Requirement	Requirements	Proposed Setbacks
Clark County		
4.21.03 (2)(a) Off-site residences, businesses, churches, and buildings owned and/or maintained by governmental entity	3,960 feet	3,960 feet
4.21.03 (2)(a) Buildings on-site or lessor's residences	500 feet	1,000 feet plus any distance needed to meet noise requirement and shadow flicker commitment
4.21.03 (2)(b) Centerline of public roads	500 feet or 110% the height of the wind turbine	550 feet minimum and 110% of turbine height should the turbine be taller
4.21.03 (2)(c) Any property line	500 feet or 110% the height of the wind turbine, whichever is greater	County requirement for non-participants, setback has been waived for participants
Setback from cemeteries (condition of CUP)	1 mile	1 mile
Noise requirement	Distance from receptors must meet the noise standard of 50 dB(A)	Crocker will site turbines at the distance required to meet the 50 dB(A) standard
South Dakota		
SDCL 43-13-24 Property lines	500 feet or 1.1 times the height of the tower, whichever is greater	Turbines are sited to meet this standard
Voluntary		
Shadow Flicker	Not regulated by state, federal or local law	Distance required to meet voluntary commitment of 30 hours per year or less at any residence

The layout and design of the Project will maximize energy generation while minimizing impacts to the land and surrounding community. The Project will adhere to a voluntary setback of a minimum of 1,000 feet from nonparticipating occupied structures, unless other arrangements have been made with specific residents. A 500-foot setback has been incorporated from all public and private rights-of-way.

The Project will be designed in an environmentally conscientious manner, with input from wildlife agencies and relevant site-specific information gathered during avian surveys. As currently planned the Project will either meet or exceed state and local siting requirements Additionally, once the NEPA process associated with the USFWS easement right-of-way permit is concluded, this BBCS will be updated to reflect all avoidance, minimization and mitigation measures that are included as part of that federal review and permit process.

Access roads, wind turbine locations, and the underground collector system will not require significant cut and/or fill.

4.1.2 Collection and Transmission Lines

The Project design for electrical facilities will be based upon the Avian Power Line Interaction Committee's (APLIC) suggested practices for minimizing risk of electrocution of birds from power lines. Electrocution is commonly a concern with electrical facilities, and the electrocution of large birds, such as raptors, is more commonly associated with distribution lines. Electrocution occurs when birds with large wingspans come in contact with two conductors or a conductor and a grounding device. Adequate spacing of the transmission line design diminishes the risk of raptor electrocution, and the Project will incorporate such a design so as to eliminate the risk of electrocution. To the extent practicable, the collector system will be placed underground, thereby eliminating the risk of electrocution, as well as minimizing impact on existing farm operations. Any disruption to drainage tile will be avoided to the extent possible during construction; further, any damage to tile as a result of construction activities will be repaired.

Historically, utilities have had success in reducing collisions on transmission lines by marking the shield wires with flight diverters (FDs). FDs are preformed, spiral-shaped devices made of polyvinyl chloride that are wrapped around the shield wire and are designed to increase its visibility. Other devices will be considered if they are proven to be effective.

4.2 Construction

4.2.1 Minimizing Temporary Disturbance

Areas of construction and temporary ground-disturbance activities will be minimized to the extent practicable. Temporary disturbances during construction of the Project include crane pads at each turbine location, temporary crane paths, temporary laydown areas at the base of each turbine, trenching-in the underground electrical collection system, and storage or stockpile areas. In areas where temporary ground-disturbance activities occur, such as temporary crane paths or the installation of underground infrastructure, preconstruction vegetation will be restored. Furthermore, in USFWS grassland easements, further minimization measures will be taken, including as co-locating crane paths along other disturbance corridors (access roads and/or collection lines).

Additionally, while impacts to avian nesting cover are not anticipated due to construction timing, clearing of perennial vegetation and any potential avian nesting cover will be avoided to the extent practicable. While efforts have been made to avoid all areas of native prairie, in the event that change in project design causes the relocation of facilities into areas of nesting cover, the construction sequence will be re-examined so as to not disturb nesting cover that contains hatched or unhatched clutches.

Management measures will be implemented to restore areas that are impacted due to temporary construction activities. After all practicable avoidance measures are taken to reduce temporary impacts to vegetated areas, any temporarily disturbed areas will be re-vegetated to blend with existing vegetation. Further measures will be taken to minimize disturbance from construction activities. Construction teams will be made aware of, and attempt to prevent spreading of, invasive species via the movement of people, materials and equipment into and out of the site to prevent the spread and colonization of any new populations of invasive species. Control measures include washing off any soil, dirt and debris on equipment, such as wheels and turbine components, as well as footwear if necessary, prior to moving equipment over native prairie land, as soil may be embedded with roots or seeds of invasive plant species.

A plan for control of noxious weeds and invasive plants that could occur because of new surface disturbance activities at the site will be developed. The plan will address monitoring, weed identification, weed spread, and methods for treating infestations. Certified weed-free mulching will be used. A controlled inspection and cleaning area for trucks and construction equipment arriving from locations with known invasive vegetation problems will be established. Visual inspections of construction equipment arriving at the Project area will occur and seeds that may be adhering to tires and other equipment surfaces will be removed and contained. Access roads and newly established utility and transmission line corridors will be regulatory monitored for the establishment of invasive species. Weed control measures will be initiated immediately upon evidence of the introduction or establishment of invasive species. Areas of disturbed soil will be restored using weed-free native grasses, forbs, and shrubs, in consultation with land managers and appropriate agencies.

The Project's Storm Water Pollution Prevention Plan (SWPPP) will be utilized as a resource to ensure control measures are taken to prevent erosion and runoff during construction of the Project. Of particular concern is runoff into sensitive habitats as well as into streams and roadside ditches. The measures within the SWPPP will comply with the requirements of the South Dakota Department of Environment and Natural Resources (SD DENR) General Permit for construction discharges under the National Pollutant Discharge Elimination System (NPDES) / State Disposal System Permit Program. These rules are reflected in the construction erosion and sediment control BMPs described below.

- Disturbed areas will be minimized and silt fence will be installed at the down gradient edge of disturbed area, prior to disturbance, to limit sediment flow and pollution to natural areas outside the construction zone.

- If streams are within the area of construction additional silt fence must be placed along the edge of the stream 3 m (10 ft) from edge of channel, if possible, as a primary sediment break. If natural vegetation along the edge of stream is to be disturbed, silt curtain must be placed at the edge of said stream, in a fashion proper with rate of flow, as a secondary precaution. If natural vegetation is not to be disturbed then it should provide necessary filtration to preclude the need of silt curtain in the stream.

- If soil is disturbed outside of the agricultural till area, the soil must be stabilized within fourteen (14) days after continuous disturbance ceases. If said area is along special or impaired water (PWI waters) the area must be stabilized within seven (7) days of disturbance. Ditch bottoms 60 m (200 ft) from edge of surface water or property must be stabilized within 24 hours. If soil is disturbed around a culvert or other water discharge location, the area must be stabilized within 24 hours of disturbance.

- Erosion and sediment control devices require weekly inspections to ensure that they are staying effective. In the event of a half inch (½") or greater rainfall, inspection must occur within 24 hours.

- If failures are found, any discharge associated with said failure must be cleaned up as soon as possible and no later than seven (7) days from time of discovery.

- Any track out from vehicles traveling through the site onto roadways must be cleaned up within 24 hours.

- Upon construction completion, disturbed areas must be stabilized within 14 days.

- Material stockpiling will be kept to specified areas and will be surrounded with silt fence at least 2.4 m (8 ft) from the edge of the stock pile to provide a barrier for potential erosion and sediment run off from the stockpile yard. Hazardous material will be handled per the individual material guidelines as well as on-site spill kits.

4.2.2 Site Maintenance

Proper caution and safety measures will be exercised to minimize risks to avian and bat populations near and at the site. To minimize the risk of wildfire that could destroy bird and bat habitat, or that could be injurious to construction personnel, the contractor will be responsible for maintaining a clean and orderly site. Flammable chemicals, petroleum and other materials with the potential for combustion will be handled and stored in a safe manner. Accumulation of outdoor storage or waste will be addressed immediately so as not to attract birds and bats. The site manager will be responsible for enforcement of BMPs that focus on reducing impacts to birds and bats, as well as the implementation of this document.

4.2.3 Nest Management

This BBCS includes procedures for nest management for the life of the Project on operational grounds and on Project structures. These procedures will be explained to Project employees during training to ensure uniform treatment of avian nest issues among personnel. Many bird species build nests on transmission and generation facilities as well as on the adjacent maintenance pads, roads and other ground cover. Species such as barn swallows, cliff swallows, kingbirds, crows, robins and several raptor species are known to use generation and transmission facilities as nesting substrate. Additionally, turbine pads can provide substrate for ground nesting species such as common nighthawks, killdeer, and horned larks among others. Depending on where nests are located, they may pose fire, safety, power outage, bird electrocution, and bird collision risks. Nest management may include trimming nest material, removing nests, or relocating nests to areas of less risk. In some instances, nesting platforms can be constructed in locations that reduce the risk to birds using the area and to equipment.

In the absence of other suitable nest sites, other species such as some songbirds and raptors will use artificial structures for nesting. State and federal laws and regulations prohibit these nests from removal at certain times of the year without first obtaining authorization from state and federal wildlife agencies. It is unlawful to destroy nests when eggs or young birds are in them. Project employees will be trained to understand that no impacts to occupied nests can occur unless there is an immediate safety threat, in which case, coordination with the USFWS and SD GFP will need to occur. While some nests are benign and need no management, others may need to be managed to reduce the risk of equipment failure, bird and bat collisions, and electrocution.

4.2.4 Training

The contractor will be the lead entity for construction management and will be responsible for providing training to all construction staff working on the Project. Training, both formal and informal, will be provided for all construction staff depending on the work responsibilities of personnel. A variety of formats will be employed to present information to those receiving training, such as department or group meetings and discussions, one-on-one training, presentations, posters, and handouts. Copies of any training materials distributed will also be kept at the construction trailer/field office, and the hours and attendees of training sessions will be documented by the appropriate designee. Training will include but is not limited to:

- environmental compliance,
- threatened & endangered species, and species of concern,
- avian and bat issues,
- sediment and erosion control BMPs,
- vegetation management and noxious weeds,
- wetland and water resources,
- hazardous materials,
- water crossings, and
- cultural and historic resources.

Expected formal training opportunities include:

- preconstruction meeting with contractor and construction managers,
- preconstruction meeting with relevant agencies,
- regular status meetings as determined by contractor, and
- regular field meetings with construction personnel.

4.2.5 Wildlife Concerns

The contractor and subcontractors will work to implement BMPs to construct the Project in a way that minimizes impacts to avian and bat species on site. This includes maintaining flexibility in the construction of components where feasible, as well as encouraging the education of construction teams on site-specific environmental and faunal concerns. Education may also include training in the identification of different types of birds and bats, which may be accomplished by utilizing posters that identify sensitive species, and which are posted at the construction trailer facility. Site personnel will be required to receive training on the Wildlife Incident Reporting System.

The contractor will be required to have a proper safety program in place and to ensure that construction and operations crews have been adequately trained to that effect. To minimize the risk of wildfire that could destroy bird and bat habitat, or that could be injurious to construction personnel, construction crews will exercise proper caution and safety measures while handling and storing flammable chemicals, petroleum, and other materials with the potential for combustion. Operations and Maintenance (O&M) staff will be trained on this document, and training on avian protection planning and practices external to this document is highly encouraged.

In the event of permit noncompliance issues, the contractor will take the measures necessary to correct the situation and maintain compliance. A stop work order may be issued if an emergency occurs, or if a violation is not corrected in a reasonable time. The contractor will designate a project representative responsible for notifying and documenting issues of noncompliance with the permit.

During the Project's construction phase, occupied bat maternity roosts may be damaged or destroyed (e.g., large trees, old buildings). Between June 1 and July 31, if construction will remove large trees, old buildings, or directly impact potential roosting or breeding habitat, construction personnel will be directed to halt activities and a trained biologist will search the area to ensure no bats are present. This searching can consist of visual inspection of trees, old buildings, and cavities where bats may exist, or of watching for bats departing these areas at dusk or returning at dawn. Construction personnel will be trained to identify potential habitat and required to contact the Site Manager prior to disturbance. The Site Manager will coordinate the searches with the environmental inspector and will notify the construction personnel when construction can continue. If areas are disturbed before June 1 or after July 31, these measures are not necessary.

Whooping Crane:

Species-specific conservation measures for the whooping crane are outlined below by category; these conservation measures are congruent with the conservation measures outlined for the species in the PEIS:

- Wetland impacts
  - 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. Crocker and its contractors will implement the storm water pollution prevention plan.
  - Wind turbines and non-linear facilities will be built on uplands, which avoid wetlands and designated floodplains. Wetland impacts from linear features (e.g. access roads) will be minimized to the extent possible.
- Habitat loss and disturbance
  - 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.
  - 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 or specific requests by the landowner or easement requirements.

  - Following construction, vehicle travel will be restricted to designated roads; no off-road travel will be allowed except in emergencies.
- Lighting
  - Turbine lighting will be minimized to that which is required by the FAA. The FAA typically requires every structure taller than 200 feet 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. An estimated 40% to 60% of the Project's turbines will be designated for lighting with minimum intensity dual red synchronously flashing strobe lights for night-time and daytime use, if needed, as recommended by the USFWS (2012). The turbines will be lighted only as required by FAA regulations, plus a low voltage, shielded light on a motion sensor at the entrance door to each turbine.
  - To reduce the probability of attracting or disorienting birds flying near or within the Project area, both Project collector 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 a first priority; Crocker 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 be in accordance with 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.
- Collision mortality
  - Permanent meteorological towers will be free of guy wires and lighting will be minimized. Guy wires on temporary meteorological towers will be marked with marker balls to reduce the potential for avian strikes.
  - Bird flight diverters will be installed on all new overhead transmission lines to be built by Crocker 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 overall 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 APLIC guidelines, as they are written at the time of installation (APLIC, 2012).
  - 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, as they are written at the time of installation (APLIC, 2012).
- Other sources of potential mortality

  - Hunting, fishing, dogs, or possession of firearms by Crocker personnel and designated contractor(s) in the Project area will be prohibited during construction, operation, and maintenance.
  - 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 SDGFP and offending personnel or contractor will be disciplined and may be dismissed by Crocker.
- Post-construction monitoring
  - An avian and bat post-construction mortality study will be conducted for a minimum of one year following Project commissioning using protocol developed according to industry standards and the USFWS WEG (USFWS, 2012). Design of the protocol and evaluation of the need for subsequent surveys will be determined using the USFWS WEG (USFWS, 2012) on Tier 4 surveys. Crocker will conduct a second year of monitoring if the first year's results indicate the need.
- Personnel Training
  - 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 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 and to implement measures to minimize impacts on listed species.
  - 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.
  - Crocker personnel and subcontractors who will be in the Project Area will receive training on the identification of whooping cranes prior to the start of each migration season. Training will include:
    - Natural history and behavior of the whooping crane;
    - Identification of whooping crane including distinguishing features between whooping crane and similar species that may be present at Crocker;
    - Reporting procedures if a whooping crane is sighted;
    - Definition of wildlife harassment, and measures to avoid harassing whooping cranes; and
    - Proper use of binoculars.
  - A pair of binoculars will be kept in all Project vehicles to aid in the identification of whooping cranes.
  - 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.
- Contingency plan-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 (September 15 – November 15) migration.
  - If cranes are observed, personnel will monitor their behavior and determine if construction activities need to be halted within two miles of where the cranes are observed.
- Contingency plan-operations
  - If 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).
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. After the whooping crane(s) have left the Project area and surrounding 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 SDGFP as soon as possible within 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 15 minutes or more.
6. The report containing information about the sighting shall be maintained in the Operations and Maintenance building for the life of the Project; this report should also be sent to USFWS and SDGFP.

- If personnel identify a whooping crane on the ground or if a whooping crane in flight lands within the Project area or a surrounding 2-mile buffer, the following steps will be taken immediately:
    1. The Site Manager or designee will be contacted by cell phone or radio and provided with the location, nearest 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 coordination with USFWS and SDGFP 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 SDGFP as soon as possible (not to exceed 24 hours) to coordinate an appropriate course of action and to monitor the whooping crane(s).
    5. Turbines can begin operating after 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 should also be sent to USFWS and SDGFP.

General Wildlife Resources. Construction personnel will be trained to identify and avoid impacts to wildlife in general. During construction, personnel will visually inspect each open trench or pit daily to determine if any animal has become trapped in the trench or pit. If an animal has become trapped, the Site Manager will be notified and appropriate action taken to safely remove and release the animal. Training in general wildlife awareness will be required of all construction personnel.

4.2.6 Construction Monitoring Plan

The Project is sited in an area dominated by herbaceous areas, pasture/hay, and cultivated agriculture, thereby offering a low to moderate risk for potential environmental impacts. While proper siting could avoid and minimize many potential impacts to birds, bats, and other wildlife, the following training and action will be implemented during the construction phase to further reduce impacts. Different phases of construction will

utilize different construction personnel at different times of the year. Therefore, the construction monitoring plan is designed to be implemented during these appropriate times, such that the construction personnel receive the necessary training and are implementing the plan accordingly. Construction personnel will be trained in the following areas when appropriate:

- awareness and general identification of BCC and SGCN species;
- awareness of potential bird nesting areas;
- awareness of potential bat roosting/breeding habitat;
- awareness of butterfly habitat; and
- awareness of general wildlife issues.

Awareness training makes construction personnel responsible for observing and then reporting potential issues to the site representative or construction manager. The site representative will also be trained in procedures to follow and actions to take at different times of year and for different situations.

4.2.7 Road Minimization and Traffic Plan

During the construction period, heavy trucks, light trucks, and other construction equipment will access construction sites via existing county and gravel roads. New access roads will be built only as necessary to reach the turbines. Road widening will be limited to the extent feasible during the construction phase of the Project. Erosion and sediment control requirements apply to any road construction activities.

Construction vehicle travel will be reduced by requiring all construction workers to park their personal vehicles at a central location on the Project site. All construction and construction-related activities will be confined to the minimum area necessary to safely construct generation, transportation, transmission and maintenance facilities as depicted in the final site design and engineering plans. Approved work space limits will be marked and maintained throughout the construction period. All construction-related traffic within the wind farm areas will be limited to a maximum speed limit of 25 mph unless a lower speed limit is posted. Any carrion resulting from collisions with vehicles will be removed from roads constructed to maintain or access Project facilities.

Upon completion of construction, any expanded road widths will be narrowed to approximately 20 feet, and vegetation alongside the roads will be restored. During the operational phase of the Project, traffic volume will be minimal, consisting mainly of local traffic and routine trips by technicians to check and maintain wind generation and transportation equipment.

4.2.8 Collection and Transmission Lines

There is potential for temporary displacement of wildlife during the construction of both the wind farm and the transmission line. However, this displacement is anticipated only for a short distance and it is temporary. Fallow farm fields, fencerows and woodlots in cultivated areas may provide cover for displaced birds during construction of the transmission line.

Raptors, waterfowl and other bird species may be affected by the construction and placement of the transmission lines. Avian collisions with transmission structures are a possibility in areas where there are agricultural fields that serve as feeding areas, wetlands, and open water. As such, transmission structures will not be located within these wetland areas to the extent feasible and transmission lines will be marked between areas of suitable wetland habitat.

5. OPERATION AND MAINTENANCE

5.1 Avian and Bat Mortality

A combination of several factors contributes to avian and bat susceptibility to wind turbine collisions. These factors may include the abundance and composition of avifauna in the area, the way in which avifauna are dispersed across a geographic area, the presence of suitable nesting and foraging habitat, the presence and abundance of prey, the time of the day or night, season of the year, and the siting or layout of wind turbines. Predicting the fatality rates for the Project is best understood by utilizing the data and information learned from a number of key studies, including Jain (2005), Young et al. (2003), Erickson et al. (2004), Johnson et al. (2000), Poulton (2010), and the National Research Council (2007).

Based on Project data gathered to date, no significant adverse direct impacts are anticipated from the Project. The anticipated fatality rate for birds and raptors is expected to be within the overall range for other projects in Minnesota and South Dakota (Table 2). Publicly available studies from Minnesota and South Dakota (for studies conducted after 2005) suggest the range of estimated fatality rates is 0.44 to 5.59 birds/MW/year and 0 to 0.37 raptors/MW/year. Based on publicly available studies in Minnesota and South Dakota for studies conducted after 2005 (Table 2), the anticipated fatality rate for bats ranges from 0.16 to 20.19 bats/MW/year.

Table 2. Avian and Bat Fatality Rates at Minnesota and South Dakota Wind Farms (from publicly available data)

Location	Project Name	Adjusted* Bird Fatalities per MW per study period	Adjusted *Raptor Fatalities per MW per study period	Adjusted* Bat Fatalities per MW per study period	Reference
Minnesota	Big Blue	NA	NA	6.33	Chodacheck et al. 2014
Minnesota	Elm Creek	1.55	0	1.49	Derby et al. 2010
Minnesota	Elm Creek II	3.64	0	2.81	Derby et al. 2012
Minnesota	Grand Meadow	NA	NA	3.11	Chodacheck et al. 2014
Minnesota	Lakefield	1.07	NA	20.19	Westwood Professional Services 2015
Minnesota	Moraine II	5.59	0.37	2.42	Derby et al. 2010
Minnesota	Oak Glen	NA	NA	3.09	Chodachek et al. 2014
Minnesota	Prairie Rose	0.44	0.08	0.41	Chodacheck et al. 2015
South Dakota	Buffalo Ridge I	5.06	0.2	0.16	Derby et al. 2010
South Dakota	Buffalo Ridge II	1.99	0	2.81	Derby et al. 2012c

Location	Project Name	Adjusted* Bird Fatalities per MW per study period	Adjusted *Raptor Fatalities per MW per study period	Adjusted* Bat Fatalities per MW per study period	Reference
South Dakota	Prairie Winds	1.41	0 – 0.03	1.05 – 1.23	Derby et al. 2012b and 2013
South Dakota	Wessington Springs	0.89	0.06 – 0.07	0.41 – 1.48	Derby et al. 2010 and 2011
Range		***0.44 -5.59***	***0 - 0.37***	***0.16 – 20.19***	

* An estimate of overall fatality rates during the study period for each survey, statistically extrapolated from documented fatalities found at the project and adjusted to take into account results of searcher efficiency and carcass removal rates

This Project is located within the Central Flyway, and wetlands/potholes within the boundary will be used by migratory birds during migration. Concern regarding the risk to waterfowl/waterbirds that may use wetlands and prairie potholes for stopover habitat is generally higher for projects in these areas. WEST examined publicly available fatality data from post-construction studies at several wind projects located in complexes of prairie pothole wetlands and areas with relatively high use by waterfowl (Table 3). Publicly available data from the Prairie Winds project in North Dakota show a range of fatality rates for waterfowl between 0.38 and 0.44 waterfowl fatalities/MW/year. Additional data from other projects in the Central Flyway with relatively high usage by migratory birds and waterfowl in North Dakota, South Dakota, and Iowa show fatality rates for all-birds and large-birds ranging from 0.38-8.25 birds/MW/year; however, no fatality estimates specific to waterfowl were calculated for these projects, and waterfowl-specific fatality estimates are expected to be substantially lower (see notes in Table 3).

Table 3. Avian Fatality Rates at Wind Farms in high waterfowl use areas (from publicly available data)

Location	Project Name (year)	Fatalities per MW per year	Notes	Reference
North Dakota	Prairie Winds (2010)	0.38 (waterfowl)	Fatality estimate is for waterfowl birds only. Study period mid-March to October 30.	Derby et al. 2011a
North Dakota	Prairie Winds (2011)	0.44 (waterfowl)	Fatality estimate is for waterfowl birds only.	Derby et al. 2012a
North Dakota	Rugby (2010-2011)	2.77 (large birds)	No specific waterfowl fatality estimates were calculated. Approximately seven large birds were documented during scheduled searches. Of these, three were waterfowl/waterbirds. Therefore, waterfowl fatality rates are expected to be lower than 2.77 large birds/MW/yr.	Derby et al. 2011b
North and South Dakota	Tatanka (2013 and 2014)	0.79 (waterfowl, spring only)	This study was a survey of only spring mortality, so waterfowl mortality for a full year would be expected to be higher.	Graff 2015

Location	Project Name (year)	Fatalities per MW per year	Notes	Reference
South Dakota	Prairie Winds (2011-2012)	0.45 (large birds)	No specific waterfowl fatality estimates were calculated. Approximately 22 large birds were documented in the scheduled searches. Of these, five were waterfowl/waterbirds. Therefore, waterfowl rates are expected to be lower than 0.45 large birds/MW/yr.	Derby et al. 2012b
South Dakota	Prairie Winds (2012-2013)	0.78 (large birds)	No specific waterfowl fatality estimates were calculated. Approximately 26 large birds were documented in the scheduled searches – of these, 17 were waterfowl/waterbirds. Therefore, waterfowl fatality rates are expected to be lower than 0.78 large birds/MW.	Derby et al. 2013
South Dakota	Prairie Winds (2013-2014)	0.45 (large birds)	No specific waterfowl fatality estimates calculated. Approximately 26 large birds were documented. Of these, three were waterfowl/waterbirds. Therefore, waterfowl fatality rates are expected to be lower than 0.45 large birds/MW.	Derby et al. 2014
South Dakota	Wessington Springs (2009)	8.25 (all birds)	Waterfowl accounted for 6.8% of documented fatalities and totaled 2 waterfowl individuals (one mallard and one pintail). Therefore, waterfowl fatality rates are expected to be much lower than 8.25 birds/MW/yr. Relatively low searcher efficiency and relatively high carcass removal rates likely inflated the overall bird fatality estimate.	Derby et al. 2010
South Dakota	Wessington Springs (2010)	0.89 (all birds)	Waterfowl accounted for approximately 10% of fatalities and included one individual (gadwall). Therefore, waterfowl fatality rates are expected to be lower than 0.89 birds/MW/yr.	Derby et al. 2011c
Iowa	Top of Iowa (2003)	0.38 (all birds)	Turbines located in cropland between three Wildlife Management Areas with wetlands/lakes and high bird use that includes migrants and resident waterfowl. No waterfowl or waterbirds were documented as fatalities, although multiple geese and other waterfowl were documented flying in and around turbines.	Jain 2005
Iowa	Top of Iowa (2004)	0.76 (all birds)		Jain 2005

The data available from the studies in Table 3 indicate that while wind projects located in proximity to waterfowl/waterbird migration stopover and breeding habitat do result in some mortality, the rates do not appear to approach levels that would affect populations (overall 48.4 million breeding ducks, 13.5 million migrating mallards in 2016, as documented in the USFWS' Waterfowl Population Status report) – and some studies have shown no mortality at all even in areas with high waterfowl use during operations (Top of Iowa).

Avian use surveys were initiated in spring 2016 to identify species and species-group use within the Project area and to aid in estimating avian mortality risk. The WEST study uses the hierarchical data collection and decision-making process in the USFWS Land Based Wind Energy Guidelines (USFWS 2012).

5.2 Operational Procedures

During operations and maintenance, the following measures will be implemented:

1. *Minimize Lighting.* All unnecessary lighting, except those required for safety by the FAA and other lights needed for safety and security purposes, will be turned off. USFWS's draft Wind Turbine Guidelines recommend that wind turbine lighting be designed such that the blinking lights illuminate simultaneously to prevent disorientation of birds and bats. This measure is less likely to attract insects to a constant light source, and thus the birds and bats that feed on them. Further, the USFWS recommends the use of minimum intensity, maximum off-phased strobe lights where necessary; constantly lighted sources, such as L-810 obstruction lights, are not recommended. The FAA recommends synchronized flashing or blinking red lights (L864), and generally recommends lighting only the perimeter of the wind farm project with lighting gaps of no more than 0.5 mile between lights, and no more than one mile across turbine clusters, as well as lighting turbines that are isolated from strings or clusters of other turbines. Minimizing the duration of the flash and maximizing the time between flashes is also beneficial. Turbines within the Project site will be lighted in compliance with FAA minimum standards. In keeping with the Draft Guidelines, the use of motion- or infrared-activated lights on building facilities will be investigated as a method to reduce attraction of insects, birds and bats. The use of high-intensity lights such as spotlights, steadily-burning bright lights, and sodium vapor lights will be minimized.
2. *Limit Foraging Opportunities.* Foraging opportunities for raptors and other scavengers will be limited by
    - regular clearing of road kill or other carcasses around the Project site to remove scavenger food sources.
    - removing rock and brush piles that could create prey habitat.
    - prohibiting food waste littering by employees.

    In addition to these measures, general farming practices such as tilling, harvesting and mowing will provide another measure that will limit the accumulation of surface water and thereby deter avifauna.
3. *Minimize Risk of Vehicular Collisions.* Project access roads will be posted with a 25-mph speed limit.
4. *Overhead Utilities Maintenance.* APLIC (2006) guidelines for overhead utilities maintenance will be followed where possible. Any new transmission line for the Project will be marked with bird diverters, if acceptable to the power off-taker or owner.
5. *Meteorological Towers.* Temporary met towers be removed, and replaced with an un-guyed permanent lattice tower for meteorological monitoring.
6. *Minimize Fire Risk.* Fire risk will be minimized by utilizing spark arrestors on all electrical equipment, and by restricting smoking to designated site areas.
7. *Proper Hazmat Handling.* Hazardous materials will be handled in accordance with federal and state regulations.

8. *Minimize establishment of invasive species.* Access roads, utility and transmission line corridors, and tower site areas should be monitored regularly for the establishment of invasive species, and weed control measures should be initiated immediately upon evidence of the introduction of invasive species.

5.3 Tier 4 – Post-construction Avian and Bat Monitoring

To assess actual direct collision impacts to bird and bat species from the Project, post-construction mortality monitoring will be conducted at the site for a minimum of one year. The survey will include searcher efficiency and carcass removal trials, and the overall mortality rate will be adjusted based on the trial results. This protocol is based on guidelines from the USFWS Land Based Wind Energy Guidelines (USFWS 2012) and the National Wind Coordinating Collaborative Comprehensive Guide to Studying Wind Energy/Wildlife Interactions (Strickland et al. 2011). Estimates of mortality will follow either the Schoenfeld or Huso method as appropriate per Strickland et al. (2011).

Post-construction mortality data will be compiled at the end of the year of surveys and reported to the USFWS and SD GFP. Results of the post-construction mortality monitoring will be evaluated based on comparison with other mortality figures for similar wind energy projects, and other pertinent factors such as weather events and factors related to wind facility operations, such as lighting. Should a reasonable level of mortality be exceeded, a process of adaptive management will be used to reduce the Project impacts below a reasonable level, and success or failure of these measures will be documented through post-construction mortality surveys. As described further in Table 5 in Section 6, adaptive management thresholds have been identified for all stages of development. During operation of the Project, either during the systematic third-party monitoring or during routine operations of the Project, if thresholds such as mass casualties of birds or bats are documented, a dialogue with the USFWS and SDGFP will occur to determine whether the data are indicative of a particular risk at the Project, and whether and what kind of adaptive management response is warranted. Furthermore, the results of the year of post-construction fatality monitoring will be analyzed, and the results shared with the agencies. Part of the analysis will include a comparison of the fatality rates (per turbine and per MW) to other wind facilities in the region (particularly South Dakota and North Dakota) to determine if the rates are relatively higher or lower than other wind projects with known fatality rates. Additionally, data from the first year of surveys will be examined to see if the Project appears to pose a risk to a particular species of bird or bat. Because each species has a different population and risk profile, no specific thresholds are proposed at this time, but the dialogue that will occur with the agencies after the first year of monitoring is complete will include a discussion of whether any additional adaptive management measures, which could include additional post-construction monitoring studies to further understand risk, are warranted."

These mortality surveys will require the collection of bird and bat carcasses. A Special Purpose-Migratory Bird Mortality Monitoring permit is required from the USFWS (http://www.fws.gov/forms/3-200-81.pdf) to handle bird carcasses. All handling of bird carcasses will be carried out under the appropriate state and federal permits.

5.3.1 Mortality Surveys

For compliance with the MBTA, post-construction mortality monitoring methods will be developed in cooperation with the USFWS and SD GFP and follow guidelines set forth in the following documents:

- Bat Sampling and Collection Protocol Guidelines and Requirements (SD GFP 2001)

- US Fish and Wildlife Service Land-Based Wind Energy Guidelines (USFWS 2012)

Compliance with the BGEPA and MBTA, allowing the 'possession' of the bird/carcass requires the possession of a Salvage, Rehabilitation, Special Purpose, Scientific Collecting, or related permits. The issuance and use of Federal Migratory Bird permits also requires annual reporting to USFWS. Contacts at the USFWS and SD GFP are:

USFWS

Office of Migratory Bird Permits
US Fish and Wildlife Service
P.O. Box 25486
Denver, CO 80225
Telephone Number (303) 236-8171

South Dakota Game, Fish and Parks

Eileen Dowd Stukel
Wildlife Diversity Coordinator
South Dakota Game, Fish and Parks
523 E. Capitol Avenue
Pierre, SD 57501
Telephone Number (605) 773-4229
Eileen.dowdstukel@state.sd.us

Weekly Mortality Surveys. The greatest mortality risks occur during the spring and fall migratory periods for birds and the fall migratory period for bats. Risks are lower during the breeding season and at a minimum during the winter season when passage rates and abundances of birds and bats are at seasonal lows. Weekly mortality surveys are optimally conducted from April 15 to October 15, to encompass bird and bat activity during the spring migration, breeding season and fall migration. Standard methods for searching for carcasses will be employed (e.g., Strickland et al. 2011).

Bald Eagle and Large Bird Mortality Surveys. The mortality of a Bald Eagle is likely to be a rare event that is best detected by monitoring all turbine locations over an entire year. Searches will employ standard methods. Searcher efficiency is likely to be high from November 1 through May 31 when vegetation is absent or low. Efficiency is likely to be lower from June 1 through October 31 when vegetation will obscure most of the area, and carcasses not caught on vegetation will be hidden.

5.3.2 Searcher Efficiency Trials

Searcher efficiency rates are highly variable and can range from 25% to 63% detection for small carcasses (Arnett et. al. 2005), and be as high as 100% detection for large carcasses (Stantec Consulting Services 2012). Trials will be conducted for each searcher to address differences between searchers, and will be conducted intermittently throughout the survey season.

Separate searcher efficiency rates will be determined following standard methods (Strickland et al. 2011), with specified numbers of carcasses distributed across turbines and seasons.

Bird and bat carcasses used in searcher efficiency trials will be inconspicuously marked. Carcass locations will be randomly located, but no more than a few carcasses will be placed at any one turbine during any one trial (Strickland et al. 2011). All locations will be GPS located. Carcasses will be placed by a biologist not participating in the mortality searches, and the timing of the searches will not be known to the searchers. Carcasses will be dropped from waist level to give them a more realistic position and location.

5.3.3 Carcass Removal Trials

Carcass removal trials will be utilized to estimate the scavenger rate at the site. Trials will be conducted throughout the survey season to account for seasonal variability, using standard methods (Strickland et al. 2011).

Carcasses will be obtained and placed as for the searcher efficiency trials, except that they will be placed by the biologist carrying out the mortality searches. GPS locations for each carcass will be recorded. Carcasses will be checked on predetermined days after placement or until all evidence of the carcass is removed. Each time a carcass is checked, its condition will be noted as present (intact or partially scavenged) or absent.

5.3.4 Reporting

Mortality results will be compiled and reported at the end of the year of post-construction mortality surveys. Estimated mortality rates for birds and bats per turbine will be calculated based on the methods described above. These calculated mortality rates will be compared to mortality data from other wind facilities for similar projects. These results and analysis will be compiled in a report and provided to the USFWS and SD GFP. If a reasonable level of mortality is exceeded, adaptive management strategies will be identified and implemented. These reports will include copies of all data forms associated with mortality monitoring

5.3.5 Post-construction Permitting Efforts

Required wildlife permits will be obtained for the Project from the USFWS and SD GFP for handling dead or injured birds protected by programs such as the MBTA, BGEPA, and state nest relocation permits. Temporary possession, depredation, and salvage permits issued by the USFWS under the BGEPA and MBTA and state salvage permits will be part of the post-construction monitoring efforts and each of these permits will be acquired before monitoring begins.

Results compiled from preconstruction studies and ongoing fall/winter surveys determined that impacts to birds and bats are likely but will not be significant enough to affect area populations. These data are also being used to inform compliance with the BGEPA take permit, MBTA temporary possession, depredation, and salvage permits, and state salvage permitting requirements to monitor avian and bat mortality for up to three years post-construction.

The BGEPA and the ECPG (USFWS 2013) for wind development sites provides steps for voluntary compliance. Eagle use data will be collected over the course of an entire year at the Project. The results of these studies will be provided and discussed with the USFWS, as well as whether development of an Eagle Conservation Plan is appropriate for the Project. It is anticipated that the studies will satisfy the data requirements of the ECPG (USFWS 2013).

5.4 Quality Control and Adaptive Management

This BBCS includes mechanisms to review existing practices and ensure quality control. For instance, independent assessments of the avian reporting system may be conducted to ensure effectiveness, or there may be research on the effectiveness of different techniques and technologies used to prevent collisions, seasonal mortality, problem sites, areas where electrocutions occur on frequent or periodic basis, and problem nests.

With time, new methods to reduce and avoid negative impacts to avian and bat species may surface, and this plan may be amended to address issues and concerns utilizing those new methods. Further, data collected during operational monitoring may help to further inform wind farm environmental staff and wildlife agencies about the interplay of wind farms with avian species. Therefore, this plan will be reviewed and updated annually as needed to assist environmental staff in implementing the directives of the plan. This document will be maintained and made available at the operations facility for the Project.

The Project owners will consider adaptive management measures based on the results from formal monitoring. If results indicate that reevaluation is necessary, the effort will first focus on adherence to the operations, maintenance, and monitoring protocols described in this document. All human activities occurring on site will be reexamined to identify opportunities for improvement of study protocols and mitigation approaches.

If avian and bat mortalities exceed an acceptable level of mortality, additional avoidance and minimization measures will be implemented to reduce the number of fatalities. Measures will be implemented in consultation with the USFWS and SD GFP. These measures might include

- improving wildlife habitat;
- installing off-site nest boxes;
- additional training of wind farm staff;
- modifications to lighting, if lighting is contributing to mortality events;
- feathering of turbines, or other modifications to operations, to reduce mortality of birds or bats; the protocol will be based on scientifically based studies documenting effectiveness in reducing bird and/or bat mortality, and will allow for the continued economic viability of the project. It will be limited to the periods of higher risk based on factors including season, time of day/night, weather conditions, and individual turbines associated with higher mortality. The level of feathering will be commensurate with the level of mortality observed.
- installing more avian flight diverters along transmission line;
- implementing technology proven to decrease bird/bat mortality without affecting the financial viability of the project.

If adaptive management measures are put in place after the first year of post-construction monitoring, the second year of post-construction monitoring will document the success of the avoidance and minimization measures. If adaptive management measures are put in place after the second year of post-construction monitoring, additional research will be conducted to document the success of the implemented avoidance and minimization measures. If the implemented measures successfully decrease mortality, they will be continued throughout the operational life of the project, unless alternative effective measures are identified and implemented.

If the implemented measures are not successful in reducing mortality below an reasonable level, additional avoidance and minimization measures will be discussed with the USFWS and SD GFP, and research will continue to document the success of these additional measures. If avoidance and minimization measures do not reduce mortality below reasonable levels, mitigation options will be considered. Possibilities for mitigation through funding various actions include the following:

- initiatives to protect, enhance or restore habitat for the impacted species;
- research on site or off site to improve wind facility design, and understanding of factors contributing to mortality;
- research that would increase biological understanding of impacted species;
- retrofitting of communication towers with bird flight diverters on guy lines, or improve the lighting so that it is less likely to attract birds; and/or
- offsite measures to increase nesting success, such as nesting platforms or nest boxes.

This list of mitigation measures is not exhaustive; these and additional mitigation measures appropriate to the impacted species will be discussed with the USFWS and SD GFP.

5.5 Key Resources

This BBCS identifies key resources to address avian protection issues including area USFWS and SD GFP biologists, engineers, planners, and operation personnel who have been trained on avian interaction problems. External organizations such as the National Wind Coordination Committee (NWCC) and APLIC can also serve as helpful resources by providing guidance, workshops, materials, and contacts. An understanding of bald eagle, grassland bird, waterfowl, and bat behavior can influence how and when avian and bat protection should be utilized. The Project personnel will attempt to connect regulators and wildlife experts with Project decision-makers to reduce avian and bat injury or mortality and maintain Project reliability. The site manager will be responsible for enforcement of BMPs that focus on reducing impacts to birds and bats, as well as the implementation of this document. Operations and maintenance staff will be trained on this document and training on avian protection planning. Practices external to this document are highly encouraged by the Project personnel.

In the event of permit noncompliance issues during construction, the construction contractor will take the measures necessary to correct the situation and maintain compliance. A stop work order may be issued if an emergency occurs, or if a violation is not corrected in a reasonable timeframe. The contractor will designate a Project representative responsible for notifying and documenting issues of noncompliance with the permit.

Table 4 lists contacts that will serve as key resources during the construction and operations phases of both Projects. These include contacts for the Crocker Wind Project, area biologists, etc.

Table 4. List of Key Resources

Organization Type	Name	Address	Phone
Government Agency	South Dakota Department of Game, Fish and Parks	20641 SD Highway 1806 Pierre, SD 57532	605.223.7660
Government Agency	U.S. Fish & Wildlife Service South Dakota Field Office	420 S. Garfield Ave. Pierre, SD 57501	605.224.8693
Government Agency	South Dakota Public Utilities Commission	500 E. Capitol Ave. Pierre, SD 57501	800.332.1782
Developer	Crocker Wind Farm, LLC.	Address TBD – Operations & Maintenance Facility Building	TBD

6. AVOIDANCE, MINIMIZATION AND ADAPTIVE MANAGEMENT

As discussed above, the Project has incorporated Tier 1 through 3 information in the siting process to avoid and minimize potential impacts to wildlife. Siting decisions will also incorporate comments from agencies, and mitigation measures as required by the USFWS easement exchange process (anticipated to be in the form of funds to purchase in-kind replacement of grassland habitat) will also occur. Avoidance and minimization measures that have already occurred or are being considered are described further in Table 5 below; any updates that occur as part of the NEPA review will be included in a revision to Table 5 in the updated BBCS document.

Within the WEG, the Department of the Interior defines adaptive management as "an iterative decision process that promotes flexible decision-making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood. Comprehensively applying the tiered approach embodies the adaptive management process" (USFWS 2012). The WEG further notes that adaptive management at most wind facilities is unlikely to be needed during operation if they are sited in accordance with the tiered approach. Nevertheless, Crocker recognizes the value of applying this approach to its Project activities that include some uncertainty. As such, Crocker has incorporated an adaptive approach for the conservation of wildlife potentially impacted by the Project. Table 5 below summarizes the adaptive management measures currently under consideration.

Table 5. Summary of Avoidance, Minimization and Adaptive Management Measures

Project Planning/Design Phase	Construction Phase	Operations Phase	Adaptive Management	
Level 1 – Avoidance and Minimization Measures			**Level 2**	**Level 3**
Birds				
1. All electrical collection lines and communications lines will be buried underground. This measure minimizes habitat loss, perch sites,	1. Disturbance to habitat will be minimized during construction. Equipment and vehicle travel will be limited to existing roads or specific construction pathways during	1. Nighttime lighting will be minimized at the Project by: a) installing motion activated timed lighting on tower entrances and	1.Trigger: Mass casualty event (five or more carcasses of one species of bird documented at the facility at one time, or five or	

Project Planning/Design Phase	Construction Phase	Operations Phase	Adaptive Management	
Level 1 – Avoidance and Minimization Measures			Level 2	Level 3
collision risk, and electrocution risk for birds.	construction. Construction traffic, parking, and laydown areas will occur within previously disturbed lands to the extent feasible. Disturbed soil, if not replanted in agriculture, will be reclaimed with weed-free native grass, forbs, and shrubs. This measure minimizes habitat loss for birds.	other facilities b) installing downward projecting lights to minimize visibility of the lights beyond the building, c) turbine lighting in accordance with FAA minimum requirements, and d) extinguishing work lights in turbine nacelles at night Minimizing the night time lighting at this site will minimize mortality of nocturnal migrant birds by reducing attractants.	more bird carcasses of any species found at one turbine at one time). In coordination with SD GFP and USFWS, evaluate monitoring data to determine whether the data are indicative of a pattern of fatalities at the Project that should be addressed through additional measures. This measure is intended to identify unanticipated impacts and focus responses appropriately.	
2. Turbine lighting will utilize current FAA recommendations for turbine lighting of red strobes at night with long off intervals. This measure minimizes attractants to nocturnal birds	2. All trash and food-related waste will be placed in self-closing containers and removed daily from the site. This measure reduces the attractiveness of the Project to avian scavengers.	2. Staff will be trained to identify anthropomorphic sources of avian attractants including rock piles, compost sites and potential roost sources and will work with the landowners to remove or reduce attractants within 500 feet of wind turbines, project substation, and meteorological towers.	2. Trigger: Mass casualty event (five or more carcasses of one species of bird documented at the facility at one time, or five or more bird carcasses of any species found at one turbine at one time). In coordination with SD GFP and USFWS, identify practicable measures to address the impact and minimize fatalities. This measure is intended to focus the response appropriately to address the impact.	2. Trigger: Continued documentation of mass casualty after Level 2 evaluation has occurred. Conduct studies to test additional ways to reduce avian fatalities from wind turbines and implement tested measures that prove to be effective. This measure would help determine effective strategies to minimize further impacts.
3. Location of collection lines in forested habitats will be avoided to the greatest extent possible	3. Vehicular speed will be limited to 25 miles per hour (40 km per hour) on Project roads. This measure minimizes the risk of wildlife collisions	3. "Good housekeeping" procedures will be developed to keep the site clean of debris, garbage, carrion, fugitive trash or waste, and	3. Trigger: Mass casualty event (five or more carcasses of one species of bird documented at the facility at one	3.Trigger: continued casualty events after evaluation and corrective actions in Level 2 have been implemented.

Project Planning/Design Phase	Construction Phase	Operations Phase	Adaptive Management	
Level 1 – Avoidance and Minimization Measures			Level 2	Level 3
	with vehicles and reduces the occurrence of carcasses that may attract avian scavengers to the Project.	graffiti; to prohibit scrap heaps and dumps; and to minimize storage yards. This will prevent trash from being exposed or blown around the Project area. This will minimize the attraction of raptors or avian scavengers to the Project. This will also minimize the attraction of mammalian scavengers that may interfere with monitoring.	time, or five or more bird carcasses of any species found at one turbine at one time). Initiate an investigation of and report any mass casualty event. Coordinate with SD GFP and USFWS to determine corrective actions, to the extent possible, to ensure long term solutions are implemented for the life of the Project. For example, if there are unanticipated waterfowl fatalities, assess whether radar-controlled informed curtailment can be practicably implemented during daytime when waterfowl are active. This measure is intended to focus the response appropriately to address the impact.	Expand removal of roadside carcasses to a buffer around the Project that does not overlap with similar buffers for other nearby projects, by surveying for carcasses and notifying local officials of carcass presence. This will minimize attraction of raptors and other avian scavengers to the vicinity of the Project.
4. A separation distance between individual wind turbines of approximately 1,000 feet will be maintained to minimize turbulence effects. This will allow ample space for birds to fly between the turbines and avoid hazardous areas. This measure reduces collision risk for birds.	4. The number of storm water control features (sediment retention ponds) near turbines will be minimized by eliminating any such features that are unnecessary. This measure minimizes on-site attractants to birds.	4. Road-killed animals or other carcasses (excluding bald eagles and other migratory birds) detected by personnel on or near roads within the Final Project area will be removed. This measure minimizes the attraction of raptors and other avian scavengers to the Project.	4. Trigger: fatality rates of birds are higher than anticipated and a potential risk to populations is identified from the project. Coordination with the GFP will occur, to discuss whether additional conservation measures may be necessary. .	
5. Utility lines will be designed following APLIC (2006, 2012)	5. A site-specific worker environmental training program will be	5. Vehicular speed will be limited to 25 miles per hour (40 km per		

Project Planning/Design Phase	Construction Phase	Operations Phase	Adaptive Management	
Level 1 – Avoidance and Minimization Measures			Level 2	Level 3
guidelines to prevent electrocution and collision. This measure reduces the risks of collision and electrocution for birds.	developed and implemented throughout the construction of the Project. All employees and contractors working in the field will be required to attend the environmental training session prior to working on-site. This training will include information regarding the sensitive biological resources, restrictions, protection measures (including minimizing light pollution), individual responsibilities associated with the Project, and the consequences of non-compliance. Written material will be provided to employees at orientation and participants will sign an attendance sheet documenting their participation. This measure minimizes disturbance of wildlife by the Project and increases the effectiveness of all construction measures for birds by ensuring that workers are aware of these measures and the means to implement them.	hour) on Project roads. This measure minimizes the risk of collision with vehicles and reduces the occurrence of carcasses that may attract avian scavengers to the Project.		
6. Turbines will use monopole instead of lattice tower design, to minimize opportunities for perching and nesting. This measure minimizes risks of electrocution and collision for raptors and other birds.	6. Potential roost trees and nesting sites will be protected by retaining mature trees wherever possible. This measure minimizes disturbance and habitat loss by protecting nesting and roosting sites for birds.	6. APLIC guidelines will be followed for marking of any above-ground transmission lines under the Project owner's control. This measure minimizes the risk of avian collisions.		
7. Any new transmission line for the Project will be marked with bird	7. Best Management Practices (BMPs) for fire prevention during	7. Maintenance during operations will prioritize tree trimming over tree		

Project Planning/Design Phase	Construction Phase	Operations Phase	Adaptive Management	
Level 1 – Avoidance and Minimization Measures			Level 2	Level 3
diverters, if acceptable to the power off-taker or owner. This measure will minimize the potential for bird collisions with the lines.	construction will be implemented to minimize wildfire potential. This measure minimizes loss of habitat for nesting, roosting and foraging by birds	removal.		
8. Permanent met towers will be free-standing to avoid the collision risk associated with guy wires. Met towers will not be located in sensitive habitats or in areas where ecological resources known to be sensitive to human activities are present. Installation of towers will be scheduled to avoid disruption of wildlife reproductive activities or other important behaviors. This measure minimizes collision risk and disturbance of breeding areas and loss of habitat for nesting by birds.	.	8. A site-specific worker environmental training plan will be developed and implemented throughout the Project operating life and will include the importance of minimizing light pollution. All employees and contractors working in the field will be required to attend the environmental training session prior to working on site. This training will include information regarding the sensitive biological resources, restrictions, protection measures (including minimizing light pollution), individual responsibilities associated with the Project, and the consequences of non-compliance. Written material will be provided to employees at orientation and participants will sign an attendance sheet documenting their participation. This measure minimizes collision risks and disturbance of birds ensuring that workers are aware of these measures and the means to implement them.		
9. Construction footprints and surface disturbance areas will be minimized. An	9. Any use of pesticides, herbicides, fertilizers, and other chemicals will be in accordance with	9. Avian and bat fatalities will be evaluated during standardized post-		

Project Planning/Design Phase	Construction Phase	Operations Phase	Adaptive Management	
Level 1 – Avoidance and Minimization Measures			**Level 2**	**Level 3**
erosion control protocol will be developed to treat disturbed and exposed soil surfaces and prevent contamination of natural water resources. This measure minimizes loss of habitat that may provide nesting or roosting opportunities for birds.	federal and state laws. An integrated pest management plan will be developed to ensure that applications will use only Environmental Protection Agency registered pesticides. Pesticide use will be limited to non-persistent, immobile pesticides and will only be applied in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications. This measure reduces the risk of poisoning fatalities of wildlife, thereby reducing the potential occurrence of carcasses that attract avian scavengers.	construction fatality monitoring for one year following construction. Following post-construction monitoring, there will be ongoing operational monitoring by staff for remaining life of project.		
		10. The Project will use the minimum number of aviation hazard lights acceptable to the FAA. Although it has not been demonstrated to reduce avian impacts, this measure may potentially reduce avian collisions by reducing attractants.		
		11. BMPs for fire prevention during operation will be implemented to minimize wildfire potential. This measure minimizes habitat loss for nesting birds.		
		12. Firearms and pets will be prohibited from the Project and workers will be instructed to avoid disturbing or harassing wildlife. This measure minimizes the risk of disturbance of birds at the Project.		
Bats				

Project Planning/Design Phase	Construction Phase	Operations Phase	Adaptive Management	
Level 1 – Avoidance and Minimization Measures			Level 2	Level 3
1. All electrical collection lines and communication lines will be buried underground to the extent practicable. This measure minimizes habitat loss, collision risk, and electrocution risk for bats.	1. Disturbance to habitat will be minimized during construction. Equipment and vehicle travel will be limited to existing roads or specific construction pathways during construction. Construction traffic, parking, and laydown areas will occur within previously disturbed lands to the extent feasible. Disturbed soil, if not replanted in agriculture, will be reclaimed with weed-free native grass, forbs, and shrubs. This measure minimizes habitat loss for bats.	1. Nighttime lighting will be minimized at the Project by: a) installing motion activated timed lighting on tower entrances and other facilities b) installing downward projecting lights to minimize visibility of the lights beyond the building, and c) extinguishing work lights in turbine nacelles at night Minimizing the night time lighting at this site will minimize mortality of bats by reducing attractiveness to insects and foraging bats.	1. Trigger: fatality rates of bats are higher than anticipated and a potential risk to populations is identified from the project. Coordination with the GFP will occur, to discuss whether additional conservation measures may be necessary..	1.Trigger: Continued higher than anticipated fatality rates after Level 2 is implemented. In coordination with SD GFP and USFWS, evaluate data to assess whether any additional practicable changes in curtailment strategy can be implemented to reduce collisions. This measure would attempt to reduce future fatalities at the Project.
2. Location of collection lines in forested habitats will be avoided to the greatest extent possible, but if any lines need to be placed in these habitats, surface disturbance will be avoided by directional boring under them from adjacent areas. This measure minimizes loss of forested areas that may provide roosting habitat for bats.	2. A site-specific worker environmental training program will be developed and implemented throughout the construction of the Project. All employees and contractors working in the field will be required to attend the environmental training session prior to working on-site. This training will include information regarding the sensitive biological resources, restrictions, protection measures (including minimizing light pollution), individual responsibilities associated with the Project, and the consequences of non-compliance. Written material will be provided to employees at orientation and participants will sign an attendance sheet documenting their participation. This	2. Feathering of wind turbine blades below the manufacturer's normal operational wind cut-in speed during the fall migration season, whenever the temperature is above 50 degrees Fahrenheit or higher. Feathering, which occurs when wind turbine blades are pitched parallel to the wind so that rotor tip speed is 50 mph or less (rotation of the rotor is less than 1-3 rotations per minute, depending on blade length) is a method usually shown to significantly reduce the level of bat fatalities.	2. Trigger: Mass casualty event (five or more carcasses of one species of bat documented at the facility at one time, or five or more bat carcasses of any species found at one turbine at one time). In coordination with SD GFP and USFWS evaluate data to determine whether the data are indicative of a pattern of fatalities at the Project that should be addressed through additional measures. This measure is intended to identify unanticipated impacts and focus responses appropriately.	2. Trigger: continued casualty events after evaluation and corrective actions in Level 2 have been implemented. Implement an additional measure to reduce fatalities that was identified during Tier 2 evaluation process (Measure 2) to reduce fatalities at the Project.

Project Planning/Design Phase	Construction Phase	Operations Phase	Adaptive Management	
Level 1 – Avoidance and Minimization Measures			Level 2	Level 3
	measure minimizes disturbance of wildlife by the Project and increases the effectiveness of all construction measures for bats by ensuring that workers are aware of these measures and the means to implement them.			
	3. Potential roost trees and nesting sites will be protected by retaining mature trees wherever possible. This measure minimizes disturbance and habitat loss by protecting roosting sites for bats.	3. Firearms and pets will be prohibited from the Project and workers will be instructed to avoid disturbing or harassing wildlife. This measure minimizes the risk of disturbance of bats at the Project.	3. Trigger: a bat species listed under the ESA is detected as a fatality at the Project. Seek an Incidental Take Permit if the take is not covered by a 4(d) rule.	3. Trigger: continued take of listed species beyond the rate anticipated or covered by the Incidental Take Permit. If the additional on-site measures do not appear to be effective at reducing fatalities, make voluntary donations to organizations that promote the conservation of affected bat species. This measure supports the long-term conservation of the affected species.
	4. BMPs for fire prevention during construction will be implemented to minimize wildfire potential. This measure minimizes loss of habitat for roosting and foraging by bats.	4. The number of storm water control features (sediment retention ponds) near turbines will be minimized by eliminating any such features that are unnecessary. This measure minimizes on-site attractants to foraging bats.	4. Trigger: new bat species is listed under the ESA. Meet and confer with USFWS if new bat species are listed under ESA to determine if changes to the turbine operation plan are warranted based on results of monitoring at the Project.	

7. SUMMARY

Table 6 below summarizes the main steps that have been or will be taken to avoid, minimize and mitigate Project impacts on wildlife species. This table will be updated during the construction and operations phase of the Project.

Table 6. Summary of BBCS Components

BBCS Component	Phase	Project Action	Status and Notes
Risk Assessment	Preconstruction	Assess available data addressing areas of high avian/bat use, avian/bat mortality, nesting problems, established flyways, adjacent wetlands, prey populations, perch availability, evidence of perching on utility structures by large birds, effectiveness of existing procedures, institute remedial actions and other factors that can reduce avian and bat contacts with Project facilities.	Evaluation largely completed; Tier 1 and 2 studies.
Permit Compliance	Preconstruction	Ensure compliance with siting and preconstruction regulations such as WTGAC, ESA, BGEPA, MBTA and state requirements. Obtain salvage, monitoring, recovery, and transportation permits for post construction operations	Tier 3 studies underway. Will identify contacts and salvage permit requirements for post-construction monitoring.
Design Standards	Preconstruction	Minimize the areas of construction and temporary ground-disturbance activities, incorporate avian and bat-safe structures and protocols.	Institute siting designs that avoid high use flight paths between areas of suitable wetland habitat on the site to the maximum extent practicable.
Training	Construction and Operation	Train appropriate personnel, including managers, supervisors, engineers, wildlife biologists, dispatchers, and operations and maintenance personnel in avian and bat issues related to wind farm operation.	
Nest Management	Construction and Operation	Train appropriate personnel to ensure uniform treatment of avian nest issues and procedures.	
Wildlife Incident Reporting	Construction and Operation	Institute Wildlife Incident Reporting procedures and maintain database for quarterly reporting to regulating agencies.	Developed Wildlife Incident Reporting forms and procedures to monitor wildlife interaction.
Quality Control	Construction and Operation	Review existing practices and ensure quality control. Update this plan annually	

BBCS Component	Phase	Project Action	Status and Notes
Key Resources	Construction and Operation	Identify area USFWS and SDGFP biologists, engineers, planners, and operation personnel who are trained in avian interaction problems.	Identified agency personnel
Mortality Reduction Measures	Operation	Identify rectification efforts, and where new construction warrants, pay special attention to bald eagles, bats, and other wildlife issues where mortality or injuries are being documented.	

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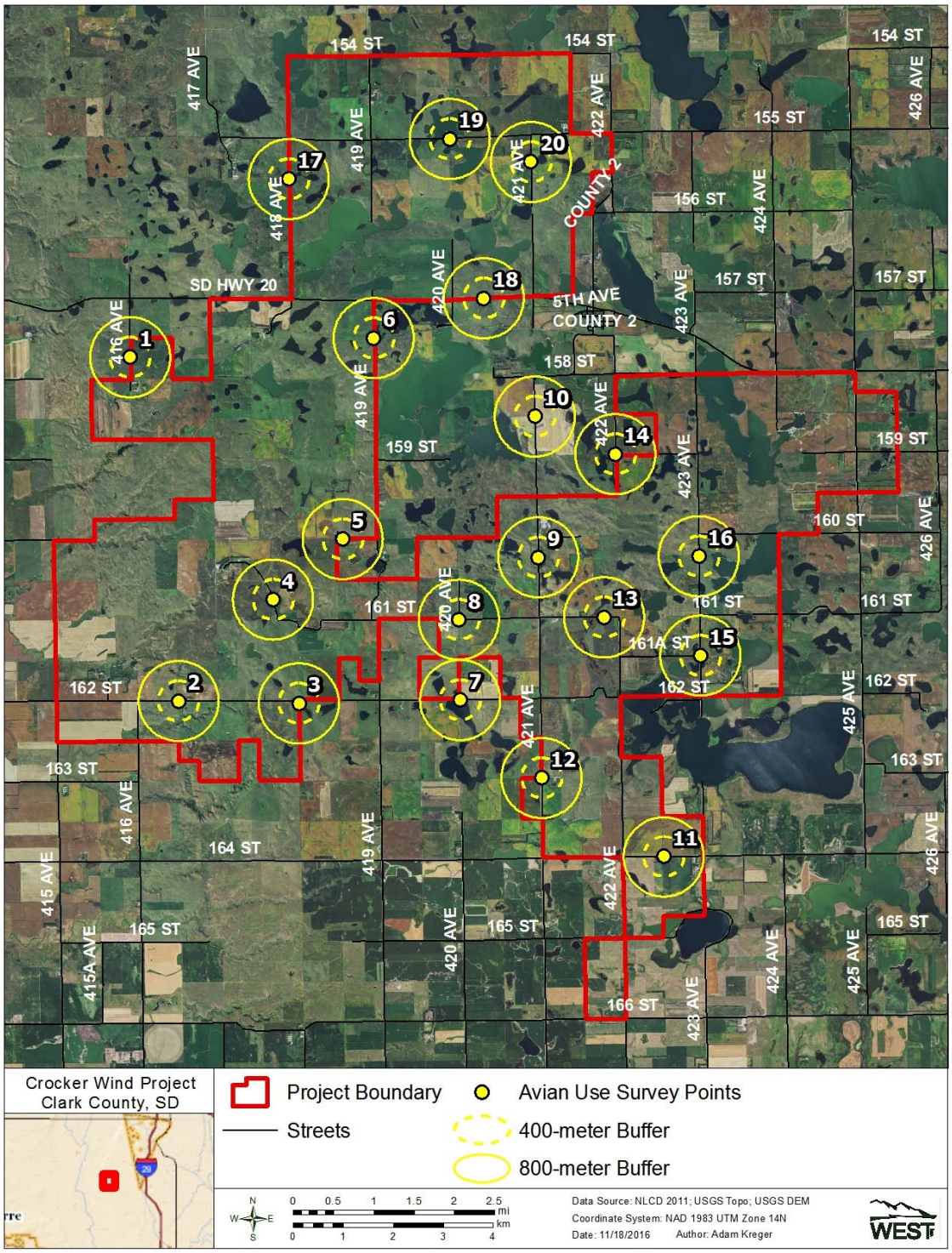
Map Exhibit 1. Crocker Wind Farm with Avian Use Survey Locations



Map Exhibit 2. Crocker Wind Farm with Bat Acoustic Survey Locations