Bird and Bat Conservation Strategy

Sweetland Wind Energy Project

Hand County, South Dakota

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1.0 INTRODUCTION

1.1 Background and Purpose

Although wind energy facilities utilize a renewable-energy resource, potential impacts to birds and bats may result from their construction and operation. Interactions with wind turbines and the associated infrastructure such as energy transmission, distribution, or substations may result in fatalities or indirect effects that may include displacement or habitat loss. To address these concerns, Sweetland Wind Farm, LLC (Sweetland) contracted Western EcoSystems Technology, Inc. (WEST) to develop this site-specific Bird and Bat Conservation Strategy (BBCS) for the Sweetland Wind Farm (Project) in Hand County, South Dakota.

Federal laws and regulations protect the majority of birds found in and around the Project Area, including the Migratory Bird Treaty Act of 1918 (MBTA), the Bald and Golden Eagle Protection Act of 1940 (BGEPA), and the federal Endangered Species Act of 1973 (ESA). This BBCS has been voluntarily prepared as a good faith effort by Sweetland to meet the intent of these regulations by reducing and managing potential impacts to birds and bats that may result from the construction and operation of the Project.

This BBCS outlines various processes that Sweetland has or will employ to: 1) comply with all state and federal avian and bat conservation and protection laws and regulations applicable to the Project; 2) ensure that any effects to avian and bat resources are identified, quantified to the extent possible, and analyzed; and 3) avoid, and minimize potential impacts consistent with the US Fish and Wildlife Service (USFWS) *Land-Based Wind Energy Guidelines* (WEG; USFWS 2012).

1.2 Objectives

Sweetland has developed this BBCS to meet the following objectives:

1) Document and describe the scope of the Project, the biological survey work that was completed during pre-construction, and provide an assessment of risks to avian and bat resources posed by the Project. This objective includes providing a single point of reference for information related to avian and bat studies performed at the Project.
2) Provide a plan that avoids, minimizes, and monitors potential effects to avian and bat species resulting from the construction and operation of the Project consistent with the WEG.
3) Describe post-construction monitoring efforts that will be implemented at the Project to identify impacts to birds and bats, as well as the methods for reporting the results of monitoring.
4) Outline the adaptive management framework that Sweetland is committed to over the life of the Project, and how Sweetland plans to implement adaptive management during operation of the Project.

5) Provide an educational and practical reference for Sweetland's employees and contractors to facilitate the application of measures that avoid and minimize potential negative effects to avian and bat species at the Project.

2.0 SITE HISTORY AND PROJECT DESCRIPTION

Sweetland began initial discussions with the USFWS in 2016 to determine a suitable location for the Project. Based on recommendations from the USFWS, Sweetland identified the 23,642 acre (ac; 9,568 hectares [ha]) Project Area in Hand County, South Dakota. Through consultation with the USFWS and South Dakota Game Fish and Parks (SDGFP), the proposed Project location minimizes impacts to USFWS Wetland and Grassland Easements; avoids the Missouri River, reviewed historic prairie grouse (greater prairie chicken [*Tympanuchus cupido*] and sharp-tailed grouse [*Tympanuchus phasianellus*]) lek locations, and is in an area of compatible land use (i.e., farming and ranching). The current Project Area is 20,979 ac (8,490 ha) and is located on private land approximately 6.4 kilometers (km; 4 miles [mi]) southwest of Wessington, South Dakota (Figure 1, Burns and McDonnell Engineering Company, Inc. 2019).

The Project Area is in the James River Lowland and Southern Missouri Coteau Level IV Ecoregion within the Northern Glaciated Plains and Northwestern Glaciated Plains Level III Ecoregion (EPA 2019). The topography within the Project Area is generally characterized by gently rolling hills ranging from approximately 1,570 to 1,875 feet (ft; 479 to 572 meters [m]) above mean sea level (AMSL). The eastern edge of the Project Area contains some gullies and ravines, which offer some topographic relief compared to the surrounding landscape. Within the Project Area, streams and drainages bisect the terrain. According to the USGS National Land Cover Database (NLCD), herbaceous/grassland (51.9 percent), cultivated crop (24.2 percent), and hay/pasture (19.2 percent) compose the majority of the land cover within the Project Area, with developed land (2.6 percent), open water and wetlands (1.3 percent), deciduous forest (0.7 percent), and shrub/scrub (< 0.1 percent) composing the remaining cover types (USGS NLCD, 2011; Homer et al., 2015).

The Project would include up to 71 wind turbines with an aggregate nameplate capacity of approximately 200 megawatts (MW). The Project would also include electric underground collection lines and communication lines, a transmission line, a Project substation, a switchyard, an Operations and Maintenance (O&M) facility, access roads connecting turbines and associated facilities, up to four permanent meteorological towers, and a temporary laydown yard (Burns and McDonnell Engineering Company, Inc. 2019). Sweetland is considering using the GE 2.82/127 turbine model with a hub height of 290 or 374 ft (89 or 114 m), rotor diameter of 417 ft (127 m), and tip height of 499 or 584 ft (153 or 178 m). The addition of leased lands over time and the corresponding iterations of turbine layouts have led to revised project and survey areas over time (Figure 1), however, the baseline wildlife studies and their corresponding survey efforts were also adjusted to meet the regulatory guidelines (USFWS 2012, SDGFP 2018). Project Area is defined by leased lands whereas Survey Area can be defined by factors such as distance from turbine arrays or Project Area boundaries and are defined in the various baseline wildlife studies.

Table 1. Land cover types, coverage, and composition within the Sweetland Wind Farm, Hand County, South Dakota.

Land cover	Hectares	Acres	% Composition
Herbaceous/Grassland	4407.1	10,890.1	51.9
Cultivated Crops	2053.8	5,075.1	24.2
Hay/Pasture	1628.3	4,023.7	19.2
Developed, Open Space	218.7	540.4	2.6
Open Water	79.6	196.8	0.9
Deciduous Forest	63.4	156.7	0.7
Emergent Herbaceous Wetlands	34.7	85.7	0.4
Developed, Low Intensity	1.5	3.6	<0.1
Shrub/Scrub	1.3	3.1	<0.1
Woody Wetlands	0.9	2.2	<0.1
Developed, Medium Intensity	0.4	0.9	<0.1
Developed, High Intensity	<0.1	0.2	<0.1
Total[a]	**8,489.7**	**20,978.7**	**100**

Data from the US Geological Survey (USGS) National Land Cover Database (NLCD; USGS NLCD 2011, Homer et al. 2015).

[a] Sums of values may not add to total value shown, due to rounding.

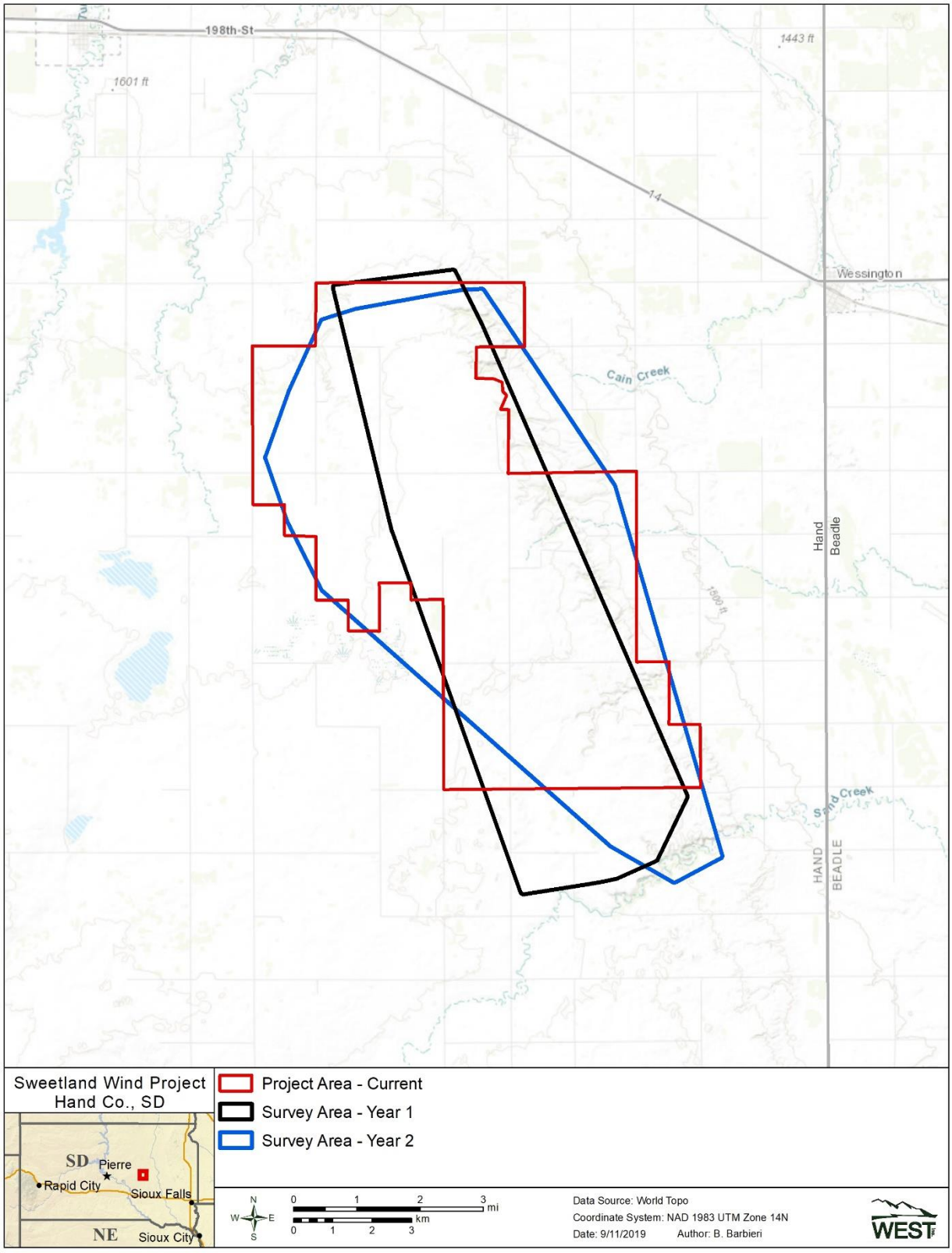

Figure 1. Location of the Sweetland Wind Farm in Hand County, South Dakota.

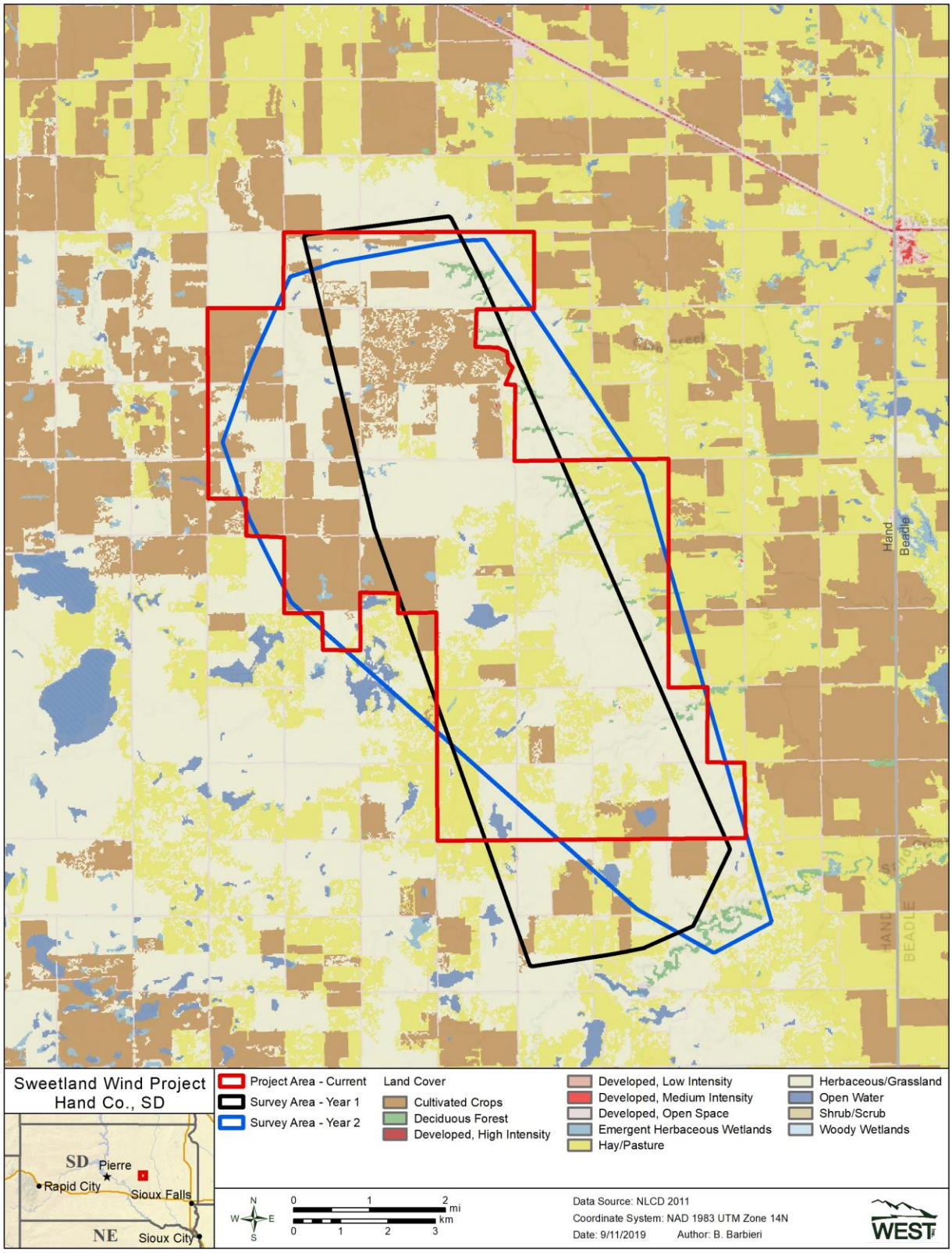

Figure 2. Land cover in the Sweetland Wind Farm (US Geological Survey National Land Cover Database 2011, Homer et al. 2015) in Hand County, South Dakota.

3.0 REGULATORY SETTING

3.1 Federal Endangered Species Act

Species at risk of extinction, including birds and bats, are protected under the federal ESA of 1973, as amended. The purpose of the ESA is to protect threatened and endangered species and to provide a means to conserve their habitats. Take under the ESA is defined as "…to harass, harm, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct." Harm is an act that injures or kills a wildlife species, including significant habitat modification or degradation; whereas harass is defined as an intentional or negligent act or omission that creates the likelihood of injury by annoying the animal to the extent it significantly disrupts normal behavior patterns such as breeding, feeding, or sheltering. The ESA authorizes the USFWS to issue permits for "incidental take" of wildlife species, which is take resulting from an otherwise lawful activity.

3.2 Migratory Bird Treaty Act

The MBTA integrates and implements four international treaties that provide for the protection of migratory birds. The MBTA prohibits the taking, killing, possession, transportation, import and export of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Department of the Interior." (16 United States Code [USC] 703 [1918]). 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 Code of Federal Regulations [CFR] 10.12 [1973]). The USFWS maintains a list of all species protected by the MBTA at 50 CFR 10.13 (1973). This list includes over one thousand species of migratory birds, including eagles and other raptors, waterfowl, shorebirds, seabirds, wading birds, and passerines.

On December 22, 2017, the US Department of Interior (USDOI) issued a Solicitor's Opinion (USDOI 2017) followed by the USFWS Guidance Memorandum on April 11, 2018 (USFWS 2018b), both of which clarified the following with regards to enforcement of the MBTA: 1) the MBTA's take prohibitions only apply when the purpose of an action is take of migratory birds, their eggs, or their nests; 2) the project's impacts on migratory birds should still be considered during the National Environmental Policy Act of 1969 (NEPA) review process; 3) future settlement agreements for take of listed species or eagles should not include restrictions, minimization measures, or mitigation for purposes of MBTA compliance; 4) future permits under the ESA or Bald and Golden Eagle Protection Act (BGEPA), or inter-agency consultations under Section 7 of the ESA, should not include restrictions, minimization measures, or mitigation for purposes of MBTA compliance; and 5) the MBTA does not affect protections provided under the ESA or the BGEPA (Locke Lord 2018).

3.3 Bald and Golden Eagle Protection Act

The BGEPA, 16 USC 668-668d (1940), affords bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) additional legal protection. The BGEPA prohibits the take, sale, purchase, barter, offer of sale, 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. The BGEPA also defines

take to include "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb," (16 USC 668c [1940]), and includes criminal and civil penalties for violating the statute (see 16 USC 668 [1940]). The USFWS further defined the term "disturb" as agitating or bothering an eagle to a degree that causes, or is likely to cause, injury, or either a decrease in productivity or nest abandonment by substantially interfering with normal breeding, feeding, or sheltering behavior.

In September of 2009, the USFWS promulgated a final rule on two new permit regulations that specifically authorize under the BGEPA the non-purposeful (i.e., incidental) take of eagles and eagle nests in certain situations (see 50 CFR 22.26 [2009] and 22.27 [2009]). Revisions to the final rule were issued in December of 2016. The permits authorize limited take of bald and golden eagles; authorizing individuals, companies, government agencies and other organizations to disturb or otherwise take eagles in the course of conducting lawful activities. To facilitate issuance of Eagle Take Permits (ETPs) for wind energy facilities the USFWS finalized the Eagle Conservation Plan Guidance (ECPG) - Module 1 - Land-based Wind Energy Version 2 (USFWS 2013). If eagles are identified as a potential risk at a project site, developers are encouraged to follow the ECPG. The ECPG describes specific actions that are recommended to achieve compliance with the regulatory requirements in the BGEPA for an ETP, as described in 50 CFR 22.26 (2009) and 22.27 (2009). The ECPG provides a national framework for assessing and mitigating risk specific to eagles through development of Eagle Conservation Plans (ECPs) and issuance of programmatic ETPs for eagles at wind facilities.

3.4 South Dakota State Threatened and Endangered Species

South Dakota's Endangered Species Statute (South Dakota Statutes, Title 34A Chapter 8) requires the SDGFP 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 SDGFP has drafted a Wildlife Action Plan, which includes a list of Species of Greatest Conservation Need (SGCN; SDGFP 2014). 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.

4.0 AGENCY CONSULTATION

The WEG strongly encourages energy developers to coordinate with agencies to obtain information on bird, bat or other wildlife issues within a project area and vicinity. Agencies can help developers identify potential biological resource issues early in the development process. Throughout Project planning and development, Sweetland coordinated with various federal, state, and local agencies and governmental authorities to identify a preferred location for the Project and to address potential concerns. Sweetland convened multiple meetings with the USFWS, SDGFP, and Western Area Power Administration (WAPA) between October 12, 2016 and August 16, 2019 (Table 2). Additionally, after WAPA's public scoping meeting in August 7,2018 Sweetland has had weekly scheduled calls with WAPA and USFWS to discuss the EA and address any agency concerns. Bird and bat baseline studies were designed based on both the recommendations of SDGFP and USFWS, and in accordance with the USFWS WEG.

Table 2. Summary of USFWS and SDGFP Agency Coordination Activities

Date	Participants[a]	Event/Topic[b]	Discussion/Main Points
10/12/2016 and 10/14/2016	USFWS, Applicant	Project planning	In-person meeting at USFWS Huron Wetland Management District and subsequent email exchange regarding Project siting and avoidance of USFWS Easements
6/9/2017	USFWS, SDGFP, Applicant, WEST	Meeting	Email correspondence sent to USFWS and SDGFP to set up in-person meeting
8/14/2017	USFWS, SDGFP, Applicant, WEST	Grassland and Wetland Easements	USFWS Huron Wetland Management District provided known grassland and wetland easements within the proposed project boundary
8/15/2017	USFWS, SDGFP, Applicant, WEST	Meeting	Representatives from USFWS, SDGFP, Applicant, and WEST met in-person at the SDGFP Office in Pierre to discuss the Project and Tier 3 surveys planned for the Project

Table 2. Summary of USFWS and SDGFP Agency Coordination Activities

Date	Participants[a]	Event/Topic[b]	Discussion/Main Points
8/15/2017	USFWS, SDGFP, Applicant, WEST	Data received	SDGFP provided links to species monitored by the South Dakota Natural Heritage Program, South Dakota T&E Species, South Dakota Species of Greatest Conservation Need; quantifying undisturbed lands in eastern South Dakota (Bauman et al. 2016); and breeding bird atlas and species list from the two breeding bird blocks closest to the Project. SDGFP personnel also sent shapefiles of known prairie grouse locations with 2 miles of the Project
9/11/2017	USFWS, SDGFP, Applicant, WEST	Study Plan, 2017 Raptor Nest Report and Meeting notes	At the request of Applicant, WEST submitted draft copies of the Sweetland Wind Farm Baseline Wildlife Study Plan, 2017 Raptor Nest Report, and meeting notes from the August 2017 in-person meeting
9/18/2017	USFWS, SDGFP, Applicant, WEST	Study Plan, 2017 Raptor Nest Report and Meeting notes	USFWS South Dakota Ecological Services Field Office provided comments on the Baseline Wildlife Study Plan, 2017 Raptor Nest Report, and meeting notes
3/7/2018	USFWS, SDGFP, Applicant, WEST	Study Plan, 2017 Raptor Nest Report and Meeting notes	At the request of Applicant, WEST finalized versions of the Baseline Wildlife Study Plan, 2017 Raptor Nest Report, and meeting notes
5/22/2018	USFWS, SDGFP, Applicant, WEST, WAPA, Burns & McDonnell	Sweetland Environmental Assessment	Kick off call to discuss the Sweetland Environmental Assessment and WAPA interconnection
6/15/2018	USFWS, Applicant, WEST	NLEB surveys	At the request of Applicant, WEST contacted USFWS South Dakota Ecological Field Office personnel to discuss current plans for conducting NLEB bat surveys at the Project

Table 2. Summary of USFWS and SDGFP Agency Coordination Activities

Date	Participants[a]	Event/Topic[b]	Discussion/Main Points
6/29/2018	USFWS, Applicant, WEST	NLEB surveys	USFWS South Dakota Ecological Services Field Office indicated the current plans for NLEB surveys the Project were reasonable
7/31/2018	USFWS, Applicant, WEST	NLEB surveys	At the request of Applicant, WEST notified USFWS South Dakota Ecological Field Office personnel that no NLEB calls were detected during the 2018 surveys
8/7/2018	USFWS, Applicant, WEST, WAPA, Burns & McDonnell, Hand County Board of Commissioners	Site visit	Representatives from USFWS, Applicant, WEST, WAPA, Burns & McDonnell and Hand County Board of Commissioners Office participated in a tour of the Project Area.
8/7/2018	Applicant, WEST, WAPA, Burns & McDonnell	Public scoping meeting	Representatives from Applicant, WEST, WAPA, Hand County Board of Commissioners Office, and Burns & McDonnell participated in the public scoping meeting held in Miller, South Dakota.
12/14/18	USFWS and Applicant	Grassland Easements	Applicant received digitized Grassland Easements from USFWS.
1/11/19	SDGFP, Applicant, WEST	Prairie grouse surveys	The intent of the meeting was to provide SDGFP with a project introduction/update, discuss methods and results from the first year of prairie grouse surveys conducted at the Project, discuss recommended setbacks and seasonal timing stipulations, and obtain SDGFP feedback
1/25/2019	USFWS, Applicant, WEST	Northern Long-Eared Bat Report	At the request of Applicant, WEST submitted the Northern Long-Eared Bat report along with the USFWS Northern Long-Eared Bat reporting spreadsheets
2/25/2019	SDGFP, Applicant, WEST	Prairie Grouse surveys	At the request of Applicant, WEST submitted draft meeting notes from the January 11, 2019 conference call

Table 2. Summary of USFWS and SDGFP Agency Coordination Activities

Date	Participants[a]	Event/Topic[b]	Discussion/Main Points
2/25/2019	USFWS, SDGFP, Applicant, WEST	First Year Baseline Avian Studies Report, Whooping Crane Stop-Over Habitat Assessment, 2018 Raptor Nest Report, Sweetland Grassland Assessment, 2017 Acoustic Bat Activity Report, 2018 Acoustic Bat Activity Report	At the request of Applicant, WEST submitted the First Year Baseline Avian Studies Report, Whooping Crane Stop-Over Habitat Assessment, 2018 Raptor Nest Report, Sweetland Grassland Assessment, 2017 Acoustic Bat Activity Report, 2018 Acoustic Bat Activity Report
5/28/2019	USFWS, Applicant, WEST	Whooping Crane Monitoring Plan and Shut-Down Protocol	At the request of Applicant, WEST submitted a draft copy of the Sweetland Wind Farm Whooping Crane Monitoring Plan and Shut-Down Protocol
6/19/19	USFWS, Applicant, WEST	Whooping Crane Monitoring Plan and Shut-Down Protocol	USFWS South Dakota Ecological Services Field Office provided comments on the Sweetland Wind Farm Whooping Crane Monitoring Plan and Shut-Down Protocol
6/28/19	WAPA, Applicant, WEST	Whooping Crane Monitoring Plan and Shut-Down Protocol	At the request of Applicant, WEST finalized the Sweetland Wind Farm Whooping Crane Monitoring Plan and Shut-Down Protocol
7/24/19	SDGFP, Applicant, WEST	Prairie Grouse surveys	The Applicant received email notification about a potential post- construction lek monitoring partnering opportunity with SDGFP
8/1/19	SDGFP, Applicant, WEST	Prairie Grouse surveys	Conference call to discuss the potential post-construction lek monitoring partnering opportunity

Table 2. Summary of USFWS and SDGFP Agency Coordination Activities

Date	Participants[a]	Event/Topic[b]	Discussion/Main Points
8/16/19	SDGFP, Applicant, WEST	Prairie Grouse surveys	The Applicant received further information (via email) from SDGFP regarding the potential post-construction lek monitoring partnering opportunity.

(a) Applicant = Sweetland Wind Farm, LLC, WEST = WEST, Inc., USFWS = U.S. Fish and Wildlife Service, SDGFP = South Dakota Game, Fish and Parks, WAPA = Western Area Power Administration

(b) NLEB = northern long-eared bat

5.0 WILDLIFE AND HABITAT RESOURCES: TIERS 1-3

The WEG outlines a tiered approach that assesses the habitat suitability and risks to wildlife at a potential wind resource area. The "tiered" approach ensures that sufficient data are collected to enable project proponents to make informed decisions about continued development of a proposed project (USFWS 2012) while ensuring that Sweetland is complying with its corporate environmental policy. At each tier, potential issues associated with the development or operations of the project are identified and questions are formulated to guide the decision process. This process starts at a broad scale and provides more site-specific detail at each tier as more data are gathered and the potential for avian and bat issues are better understood.

5.1 Tiers 1 and 2 – Preliminary Site Evaluation and Characterization

As described in the WEG, the objective of a Tier 1 study is to assist the developer in further identifying a potential wind energy site through an evaluation of public data from federal, state, and tribal entities on species of concern. The objective of a Tier 2 study is to conduct a more detailed assessment on species of concern and to determine if Tier 3 studies are needed.

Sweetland began initial discussions with representatives from the USFWS and SDGFP in 2016 to determine a suitable location for the Project and selected a location based on input and recommendations from the agencies (Table 2). The meetings with the regulatory agencies and the subsequent selection of the site considering the potential species of concern at the Project met the intent of a Tier 1 study.

Sweetland continued to meet with USFWS and SDGFP to solicit comments and/or concerns on wildlife resources with potential to occur within the Project Area (Table 2). Additionally, a review of available desktop information was completed to assess species of concern and their habitats. Data sources included the USFWS Information for Planning and Conservation (IPaC) website, South Dakota Natural Heritage Database, USGS Breeding Bird Survey, and aerial imagery. Additional input was received from USFWS and SDGFP representatives on August 15, 2017, in relation to federally protected species, state-listed species, species of greatest conservation need, and significant important habitats associated with those species. Based on these initial data reviews and comments received from the USFWS and SDGFP, additional Tier 3 surveys were needed to further evaluate wildlife resources at the Project (Table 2). The meetings with the

regulatory agencies and the identification of Tier 3 studies needed for the Project, met the objective of a Tier 2 study.

Table 3. Federal and state protected birds and migratory birds of conservation concern with the potential to occur at the Sweetland Wind Farm, Hand County, South Dakota.

Common Name	Scientific Name	Status
American bittern	*Botaurus lentiginosus*	BCC
bald eagle	*Haliaeetus leucocephalus*	BGEPA, BCC
black tern	*Chlidonias niger*	BCC
bobolink	*Dolichonyx oryzivorus*	BCC
burrowing owl	*Athene cunicularia*	BCC
chestnut-collared longspur	*Calcarius ornatus*	BCC
ferruginous hawk	*Buteo regalis*	BCC
franklin's gull	*Leucophaeus pipixcan*	BCC
golden eagle	*Aquila chrysaetos*	BGEPA
Hudsonian godwit	*Limosa haemastica*	BCC
lark bunting	*Calamospiza melanocorys*	BCC
lesser yellowlegs	*Tringa flavipes*	BCC
long-billed curlew	*Numenius americanus*	BCC
marbled godwit	*Limosa fedoa*	BCC
Nelson's sparrow	*Ammodramus nelson*	BCC
peregrine falcon	*Falco peregrinus*	SE, BCC
red-headed woodpecker	*Melanerpes erythrocephalus*	BCC
Rufa red knot	*Calidris canutus rufa*	FT
semipalmated sandpiper	*Calidris pusilla*	BCC
Whooping crane	*Grus americana*	FE, SE
willet	*Tringa semipalmata*	BCC

BGEPA = Bald and Golden Eagle Protection Act (1940), FE = Federally Endangered (USFWS 2018c), FT = Federally Threatened (USFWS 2015), SE = State Endangered (South Dakota Game, Fish, and Parks [SDGFP] 2018), BCC = Birds of Conservation Concern (IPaC)

Table 4. Bat species with potential to occur at the Sweetland Wind Farm, Hand County, South Dakota.

Common Name	Scientific Name	Habitat	Presence in Project Area
Big brown bat	*Eptesicus fuscus*	Common in most habitat, abundant in deciduous forests and suburban areas with agriculture; maternity colonies beneath bark, tree cavities, buildings, barns, and bridges.	Likely
Eastern red bat	*Lasiurus borealis*	Roosts in trees; solitary.	Likely
Hoary bat	*Lasiurus cinereus*	Usually not found in man-made structures; roosts in trees; very wide-spread	Likely
Silver-haired bat	*Lasionycteris noctivagans*	Common bat in forested areas, particularly old growth; maternity colonies in tree cavities or hollows; hibernates in forests or cliff faces.	Likely
Northern long-eared bat	*Myotis septentrionalis*	Associated with forests; chooses maternity roosts in buildings, under loose bark, and in the cavities of trees; caves and underground mines are	The Project Area lacks suitable summer habitat and probable summer absence was confirmed

Table 4. Bat species with potential to occur at the Sweetland Wind Farm, Hand County, South Dakota.

Common Name	Scientific Name	Habitat	Presence in Project Area
		their choice sites for hibernating. On western edge of range.	with surveys; potential seasonal migrant
Little brown bat	*Myotis lucifugus*	Commonly forages over water; roosts in attics, barns, bridges, snags, and loose bark; hibernacula in caves and mines.	Likely
Western small-footed bat	*Myotis ciliolabrum*	Found in mesic conifer forest, also riparian woodland; roosts in rock outcrops, clay banks, loose bark, buildings, bridges, caves, and mines	The Project Area lacks suitable habitat, potential seasonal migrant.

Source: South Dakota Bat Management Plan (South Dakota Bat Working Group, 2004)

5.2 Tier 3 – Baseline Wildlife Studies

The baseline wildlife studies and their corresponding survey efforts were designed to meet the regulatory guidelines in all years (USFWS 2012). This BBCS discusses all study results completed over the two year pre-construction period. Baseline desktop and wildlife studies include the following: 1) Avian Use Surveys; 2) Aerial Raptor Nest Surveys; 3) Prairie Grouse Surveys; 4) Whooping Crane Stopover Habitat Assessment; 5) Bat Acoustic Surveys; 6) Northern Long-eared Bat Presence/Absence Surveys; and 7) Grassland Habitat Assessment.

5.2.1 2017-2019 Avian Use Surveys

Avian/eagle use point-count surveys were completed for the Project to evaluate species composition, relative abundance, and spatial characteristics of avian use in accordance with agency recommendations (Appendix A and B). The avian use survey was completed following the study plan, as discussed with the USFWS and SDGFP on August 15, 2017. Fixed-point avian use surveys were completed approximately once monthly at 13 points during the first year (May 2017 to April 2018). Six additional points were added for the second year of surveys (May 2018 to April 2019) when the Project Area expanded (Figure 3). The previous and ongoing surveys contained points representative of the habitat within the Project Area, and survey coverage encompassed approximately 30 percent of the Project Area consistent with the WEG and ECPG.

Large bird surveys were completed for 60 minutes during each visit within an 800-meter survey radius. Small bird surveys were completed for 10 minutes before the 60-minute large bird surveys at the same survey points. The surveys provide standardized data for small and large bird species, eagles, and species of concern (i.e., federal- or state-listed threatened and endangered species [ESA 1973], USFWS Birds of Conservation Concern [BCC; USFWS 2008], and South Dakota Species of Greatest Conservation Need [SGCN; SDGFP 2014]).

Forty-three unique large bird species were identified during the 153 hours of surveys that occurred during the first year of large bird surveys. No federally listed species were observed and only one observation of a state endangered species (peregrine falcon [*Falco peregrinus*]) was observed during the surveys. The most common species groups observed included waterfowl, gulls/terns,

and waterbirds. Six golden eagles, four bald eagles, and two unidentified eagles were observed within the Survey Area. Golden eagles were observed during the summer and winter seasons while bald eagles were observed during the spring and winter seasons. These eagles were observed in the southern and central portion of the Project Area. Forty-two unique small bird species were observed during the first year of small bird surveys. The most common small bird species included the barn swallow (*Hirundo rustica*), red-winged blackbird (*Agelaius phoeniceus*), and house sparrow (*Passer domesticus*).

Forty-seven unique large bird species were identified during the 209 hours of surveys that occurred during the second year of large bird surveys. No federally listed species were observed. Additionally no state listed species were observed during survey either. The most common species groups observed included waterfowl, shorebirds and gulls. A single bald eagle was observed during the winter in the central portion of the Project Area. No golden or unidentified eagles were observed during the second year of large bird surveys. Forty-two unique small bird species were observed during the second year of small bird surveys. The most common small bird species included horned lark (*Eremophila alpestris*), red-winged blackbird and brown-headed cowbird (*Molothrus ater*).

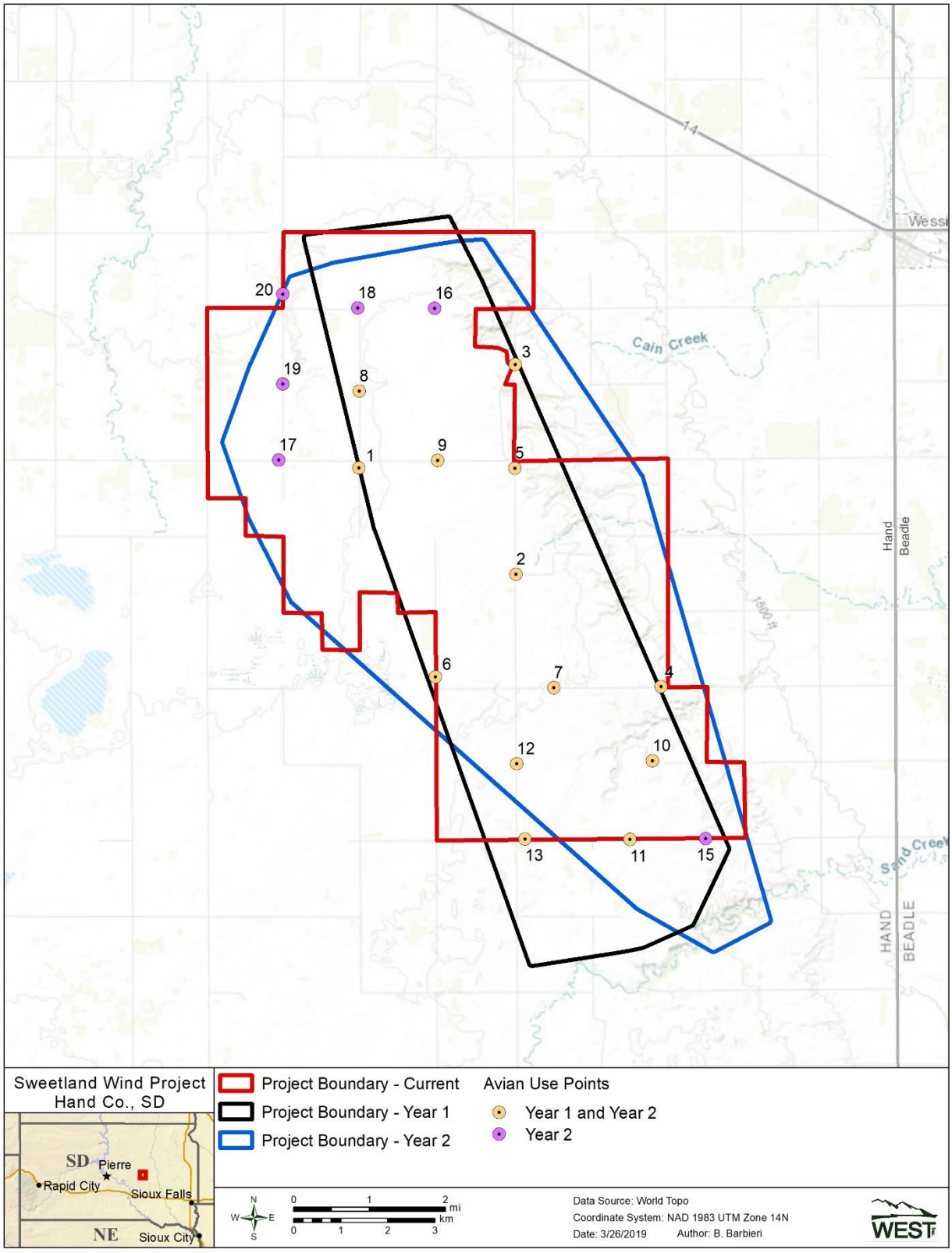

Figure 3. Location of fixed-point eagle and large bird use surveys at the Sweetland Wind Farm, Hand County, South Dakota.

5.2.2 2017/2018 Aerial Raptor Nest Surveys

Aerial raptor nest surveys were completed in spring of 2017 and 2018 (Appendix C and D) to characterize the raptor nesting community and locate raptor stick nests, including eagle nests. All nests located in 2017 were re-surveyed again in 2018, to the extent possible. Aerial surveys were completed prior to leaf-out and during the breeding season when raptors would be actively tending nests, incubating eggs, or brood-rearing. Raptor nest surveys focused on locating stick nest structures in suitable raptor nesting substrate (trees, transmission lines, shelter belts, etc.). The details of the 2017 and 2018 survey methods and results are found in Appendices C and D. The most recent survey (2018) is summarized for non-eagle nests and both years (2017 and 2018) are summarized for eagle nests in the following paragraphs.

5.2.2.1 Non-Eagle Raptor Nests

The raptor-nest survey area was defined as the wind turbine locations (at that time), along with the hazardous area around all the proposed turbine locations, and surrounding 1-mile buffer, although some raptor stick nests documented beyond the 1-mi (1.6-km) buffer were opportunistically recorded. During May 2018, occupied active nests documented during the survey included red-tailed hawk (*Buteo jamaicensis*; n=32) and great horned owl (*Bubo virginianus*; n= 15). The remaining documented raptor stick nests were of unidentified species, with the majority appearing to be unoccupied nests. Within the survey area of the March 2018 turbine layout, 5 active nests (4 red-tailed hawk nests and 1 great horned owl nest) and 13 unoccupied nests were recorded.

5.2.2.2 Eagle Nests

The 10-mile eagle nest survey area was defined as the MCP that encompassed the wind turbine locations (at that time), along with the hazardous area around all the proposed turbine locations, plus a surrounding 10-mile buffer. During 2017, no occupied bald eagle nests were observed. During 2018, one occupied active bald eagle nest (nest ID #69) was located within the 10-mile buffer. The bald eagle nest was over 5.5 miles north of the Project Area. One eagle chick was observed within the nest.

5.2.2.3 Incidental Observations of Eagles

During the 2017 surveys, 10 observations of bald eagles were recorded within the 10-mile buffer of the eagle nest survey area. These observations included 53 bald eagles but may have included multiple observations of the same individuals. Three observations were within 1.4 miles of each other and included 28, 12, and 3 bald eagles. The observations were located near a complex of small lakes approximately 8.2 miles south of the MCP. The remaining observations consisted of one to three bald eagles and were spread throughout the 10-mile survey area. No golden eagles were observed incidentally.

During the 2018 surveys, 38 observations of eagles were recorded within the 10-mile buffer of the eagle nest survey area. These observations included 45 bald eagles and 12 golden eagles but may have included multiple observations of the same individuals. Ten bald eagle observations

occurred within 5 miles of the Project Area, with two of these observations within the MCP. Eight golden eagle observations occurred within 5 miles of the MCP, with five of those observations within the MCP. The remaining observations occurred at least 5 miles from the MCP. Group sizes ranged from 1 to 5 individuals.

5.2.3 2018/2019 Prairie Grouse Surveys

Prairie grouse lek surveys were completed from mid-April to mid-May in 2018 and 2019 in accordance with the study plan that was discussed with USFWS and SDGFP on August 15, 2017, and consistent with the SDGFP Wildlife Survey Manual (SDGFP, 2009; Appendix A). SDGFP provided four historic lek locations within and near the Project Area on August 15, 2017. The Project Area and associated 1-mi buffer were surveyed twice (April 6–7 and16 –17, 2018) via helicopter. All historic lek locations and additional sites identified as having displaying grouse during the aerial survey were also surveyed from the ground three times (April 29, May 5, and May 12, 2018). During the 2019 surveys, the Project Area and associated 1-mi buffer were surveyed twice (April 3–7 and 14–15, 2019) via helicopter. All historic lek locations and additional sites identified as having displaying grouse during the aerial survey were also surveyed from the ground three times (April 23–24, April 30–May 1, and May 9–10, 2019).

No prairie grouse were observed at the four historic lek locations in 2018 or 2019. During the 2018 aerial and ground surveys, 1–12 male sharp-tailed grouse were observed dancing/displaying at four locations (Appendix A) but could not be confirmed as leks according the SDGFP's definition, which is the traditional display area where two or more male grouse have attended in two or more of the previous five years.

During the 2019 aerial and ground surveys 2–8 male sharp-tailed grouse were observed dancing/displaying at three locations identified in 2018, making them official lek locations. In addition, two male sharp-tailed grouse (one location) and 2–3 male greater prairie chickens (two locations) were observed dancing/displaying at new locations but these are not considered leks because only one year of data has been collected in the last five years at those locations.

5.2.4 Whooping Crane Stopover Habitat Assessment

The Applicant completed a site-specific whooping crane (*Grus Americana)* stopover habitat assessment (Appendix E) of the Project Area and surrounding 10-mi buffer. This assessment was done via desktop using a model developed by The Watershed Institute, Inc. (TWI). This model is recommended by the USFWS and was discussed with the USFWS South Dakota Ecological Services Field Office personnel during an in-person meeting on August 15, 2017. All wetlands within the Project Area and 10-mi buffer were assessed using the TWI model and scored based on the quality of the stopover habitat. The TWI model identified water features that could serve as potential stopover habitat for whooping cranes within the Project Area and the surrounding 10-mi buffer.

Suitable habitat for whooping cranes is scattered throughout the Project Area and is generally of lower quality than in surrounding areas. The highest concentration of higher quality suitable stop-

over habitat (primarily pothole wetlands) occurs along the southwestern edge of the Project Area, but these areas are relatively less dense than the higher quality stopover habitat in surrounding landscapes. There is the potential for whooping cranes to use or fly through the area during the life of the Project, but this is not expected to be frequent event given the low number of cranes in the population that migrates across the relatively wide (200+ miles) migration corridor, as well as the low number observed historically in the vicinity of the Project. Additionally, no whooping cranes have been observed, to date, during Tier 3 surveys occurring in the Project Area.

5.2.5 Bat Acoustic Surveys

The Applicant conducted general acoustic bat surveys for two years, 2017 and 2018, with three detectors. Two detectors were paired with one installed approximately 164 ft (50 m) aboveground on a meteorological tower and the other on the ground elevated about 1.5 meters. Another detector rotated between two locations, elevated about 5.0 ft (1.5 m). During 2017, surveys lasted from June 1 to October 15, and during 2018, surveys lasted from May 7 to October 15. Based on data collected at a single meteorological tower and temporary locations, both years showed similar results, with an average of 2.93 bat passes per detector night during 2017, and 3.63 bat passes per detector night during 2018 (Appendix F and G). AnaBat units at temporary stations recorded an average of 6.50 bat passes per detector night. Temporary stations were located near forested drainages, which may have attracted bats for roosting or foraging opportunities. Peak activity during both years occurred during the late summer/early fall timeframe. Based on data collected at the meteorological tower location, bat passes per detector night were also calculated during the bat fall migration period (FMP), defined as July 30 to October 14 for the Project Area. During the 2017 FMP, an average of 1.34 bat passes per detector night was estimated. The estimated average for the 2018 FMP was 1.37 bat passes per detector night. These estimates to other projects can been seen in Appendix A of both the 2017 and 2018 bat reports, included in this application as Appendix F and G.

5.2.6 Northern Long-eared Bat Presence Absence

The Applicant conducted site-specific acoustic presence/absence surveys for northern long-eared bat (NLEB; *Myotis septentrionalis*) during the summer of 2018 (Appendix H. All surveys followed the USFWS *Range-Wide Indiana Bat summer Survey Guidelines* (Guidelines; USFWS 2018a), which also applies to NLEB. A desktop assessment of the Project Area was done to determine potential suitable summer habitat and to identify appropriate habitat for three acoustic sites to sample. Three acoustic sites were sampled using two detectors deployed at each site for four nights, for 24 detector nights. Bats were surveyed using Song Meter full-spectrum ultrasonic detectors (SM4; Wildlife Acoustics, Inc., http://www.wildlifeacoustics.com).

Acoustic presence/probable absence surveys were conducted from July 5 to 10, 2018. Acoustic monitoring began before sunset and continued for the entire night. If weather conditions, such as persistent rain (30 or more minutes), strong sustained winds (greater than 9 miles per hour [mph; 14.5 kilometers per hour {kph}] for 30 or more minutes), or cold temperature (below 10 degrees Celsius [50 degrees Fahrenheit] for 30 or more minutes) occurred, then the acoustic site subject to those conditions was survey for an additional night. Omnidirectional detector microphones were positioned at least 9.8 ft (3.0 m) off the ground and oriented horizontally. For each acoustic

detector, the date, site description, site coordinates, tree species composition, stand age, vegetation community type, and weather data were recorded. Representative photographs of each acoustic site were taken.

No potential NLEB calls were identified by the automated bat call identification feature in the software program Kaleidoscope (set to the versions approved by the USFWS for acoustic analysis of sensitive species); therefore, no qualitative review was necessary and no follow-up mist-net or telemetry surveys were performed. The acoustic survey results show probable absence of NLEB within the Project Area during the summer, but the species may pass through the Project Area as a seasonal migrant. There are no Natural Heritage Information System records of NLEB hibernacula within the vicinity of the Project; the nearest publicly available NLEB hibernaculum is in eastern Stearns County, Minnesota, more than 200 miles east (Minnesota DNR/USFWS, 2018).

5.2.7 Grassland Habitat Assessment

A site-specific grassland habitat assessment of the Project Area was conducted between July 17 and September 14, 2018, to provide an assessment of the quality of all potential Project grasslands, both disturbed and previously undisturbed (Appendix I) and to therefore provide information to the Applicant to avoid and minimize impacts to higher quality undisturbed grasslands. Potentially undisturbed grassland (i.e., grasslands that have not previously been tilled) were initially identified based on publicly available data in the Quantifying Undisturbed (Native) Land in Eastern South Dakota: 2013 digital data layer (Bauman et al. 2016) and recent aerial photography. All grassland tracts were field checked, either by traversing on foot, or making observations from adjacent public roads. This assessment defined “undisturbed native grasslands” as those grassland that (1) showed no evidence of previous tilling and (2) were dominated entirely by native tallgrass species; any grassland parcel with these characteristics in the Project Area would be given a Rank of 1, or Excellent (Appendix I). Parcels found to have introduced grasslands such as smooth brome (*Bromus inermis*) prevalent but still had common occurrences of native grasses were given a Rank of 2, or Above Average. Parcels dominated by introduced grasses with infrequent native grasses or no native grasses present were given ranks of 3 (Average) and 4 (Fair), respectively, Grassland classified as Rank 5 (Poor) included all those classified as hayfield as well as any grassland severely overgrazed by livestock (Appendix I).

This assessment determined that grassland tracts in the Project Area are dominated by a mix of non-native grasses such as smooth brome, Kentucky bluegrass (*Poa pratensis*), and fescue (*Festuca* spp.). Additional species documented in some of the grassland tracts included prairie coneflower (*Ratibida columnifera*) and thistle (*Cirsium* spp.). It was also determined during the field visit that some of the herbaceous/grassland tracts were planted with alfalfa (*Medicago sativa*).

Overall, the review of the grassland tracts in the Project Area reveals localized fragmentation impacts due to land conversion and vegetation loss primarily associated with agriculture, but also due to invasive and noxious species, pesticides; and urbanization through road construction, distribution and transmission lines, pipelines, fiber optic lines, gravel pits, and residential

development. No undisturbed native grasslands (parcels ranked as Excellent) were documented in the Project Area, and only limited, isolated patches of Above Average grasslands were found, generally limited to the edges of ravines (Appendix I). Thirteen of the parcels evaluated appeared to be previously tilled but were planted in grasses dominated by smooth brome at the time of the evaluation; these disturbed grasslands were all ranked as 4 (Fair).

The limited numbers of trees within the Project Area are primarily found around residences and shelterbelts. Trees identified during the grassland habitat assessment include eastern red cedar (*Juniperus virginiana*) and Russian olive (*Eleagnus angustifolia*), which are invading some of the grassland tracts in the Project Area.

6.0 ASSESSMENT OF RISKS TO BIRDS AND BATS

Direct impacts to wildlife resources can occur at different temporal scales (e.g., during the construction, operation, and decommissioning phases of the Project) and spatial scales (e.g., within or outside the Project Area). Direct impacts include wildlife fatalities resulting from interactions with facility development or infrastructure. Some potential direct impacts from wind-energy development include:

- Collisions: turbines, overhead lines, vehicle and equipment collisions
- Avian power line interactions
- Habitat loss, fragmentation, and/or alteration during construction, operation, and decommissioning

Indirect impacts to wildlife resources can also occur at different temporal scales (e.g., during and after construction and operation) and spatial scales (e.g., within or outside the Project Area). Indirect impacts are often unintended, may produce unforeseen consequences to wildlife, and are difficult to predict. In this document, indirect impacts will focus on what could occur at the Project, particularly habitat loss and/or alteration.

The data from Tier 3 avian and bat surveys, publicly available information on post-construction mortality monitoring from other wind energy projects, and relevant literature were used to provide an assessment of risk to birds and bats at the Project.

6.1 BIRDS

Impacts to avian species from the construction and operation of the Wind Farm can be direct or indirect and can occur at different temporal scales (e.g., during and after construction and operation) and spatial scales (e.g., within or outside the Project Area).

6.1.1 Direct Impacts

6.1.1.1 Collisions

Potential direct impacts to birds as a result of collisions with wind turbines or associated project infrastructure is possible based on the studies to date. One of the closest operational wind energy

facilities with publicly available data is the Wessington Springs facility in Jerauld County, South Dakota, approximately 24 mi (38.0 km) to the southeast. At the Wessington Springs facility, overall bird fatality estimates ranged from 0.89 to 8.25 fatalities/MW/year and averaged 4.57 fatalities/MW/year. In the Midwest, 38 comparable fatality rate estimates for all bird species combined are publicly available from studies of wind energy facilities. Overall bird fatality rates in the Midwest have ranged from 0.27 to 8.25 bird fatalities/MW/year and averaged 2.76 all bird fatalities/MW/year. The range of bird fatalities observed in the Midwest would be expected to encompass the impacts anticipated at the Project.

Most documented avian fatalities in North America are of passerines (e.g., songbirds) which composed about 62.5 percent of wind turbine fatalities in 116 studies included in a recent analysis (Erickson et al. 2014). A total of 3,110 fatalities represented by 156 species of passerines were found during the studies. From this research it was estimated that approximately 134,000 to 230,000 fatalities of small passerines occurred each year in the United States and Canada combined, equaling a rate of 2.10 to 3.35 small birds/MW of installed capacity.

Although passerines make up the majority of fatalities at wind projects, the fatalities are spread out among multiple species, with each species experiencing relatively low direct impacts, ranging from 0.008–0.043% of respective continental populations experiencing mortality each year from collisions with wind turbines. Similar effects (i.e., direct impacts spread across multiple species of small birds with negligible effects on overall populations of any one species) would be anticipated for this Project. In comparison, researchers estimated that 6.8 million birds were killed annually from collisions with communication towers (passerines composed 97 percent of all fatalities), and annual mortality for individual species ranged from 1.2 to 9.0% of their estimated total populations for the 20 species most affected (Longcore et al. 2012, 2013).

Several wind projects located in complexes of prairie pothole wetlands had relatively high use by waterfowl, but waterfowl-specific fatality estimates from these studies is limited. Publicly available data from the Prairie Wind Project in North Dakota estimated between 0.38 and 0.44 waterfowl fatalities/MW/year. The Prairie Wind Project in South Dakota is 27 mi (48 km) south of the Project and estimated between 0.45 to 0.78 large bird fatalities/MW/year, including waterfowl. Additional data from other projects in the Central Flyway with relatively high use by migratory birds and waterfowl (Rugby Wind Project in North Dakota, Tatanka Wind Project in North and South Dakota, Wessington Springs in South Dakota, and Top of Iowa in Iowa) show fatality estimates for all birds and large birds ranging from 0.38 to 8.25 bird fatalities/MW/year. Although wind projects located in proximity to waterfowl habitat can result in waterfowl fatalities, others do not (Top of Iowa) and the fatality rates do not appear to approach levels that would affect waterfowl populations. In 2016, there were 48.4 million breeding ducks and 11.8 million migrating mallards, as documented in USFWS Waterfowl Population Status report [USFWS 2016]).

Publicly available diurnal raptor use estimates coupled with publicly available diurnal raptor fatality estimates are only available for the Wessington Springs facility in South Dakota. At the Wessington Springs facility, the mean annual diurnal raptor use estimate was 0.24 diurnal raptor/800-m plot/20-minute survey similar to the 0.22 raptor/800-m plot/20-minute survey

estimate at the Project and raptor fatality rates at the Wessington Spring facility averaged between 0.07 and 0.08 diurnal raptor fatalities/MW/year. Raptor fatality rates ranged from 0 to 0.20 raptor fatalities/MW/year in North and South Dakota and ranged from 0 to 0.47 raptor fatalities/MW/year in the Midwestand similar levels of raptor mortality might be expected for this Project. Population level effects have not been detected yet or reported in the studies/reviews that have evaluated the issue for raptors (Bay et al 2017), nor would they be anticipated for the Project. PCM would occur to confirm the pre-construction risk analysis for all birds, and adaptive management measures as documented in the BBCS would be implemented if needed (see Section 9).

6.1.1.2 Avian Power Line Interactions

Potential impacts to birds from power line operation include electrocution and collision and depend on voltage, configurations, and location relative to area habitats and bird presence/use. For this Project, the 34.5kV collector lines from the turbines to the Project substation will be buried, eliminating the electrocution or collision risk from these undergrounded lines.

Electrocution risk to birds on the 230kV transmission line would not apply, given line size and clearances required by the National Electrical Safety Code for 230kV transmission lines exceed the necessary clearances for the largest birds in this region (e.g., golden eagle). The necessary clearances to prevent avian electrocutions for 230kV transmission voltages would equal 94 inches (in; 237 centimeter [cm]) horizontal and 74 in (187 cm) vertical for phase-to-phase (i.e., energized-to-energized) contacts and 75 in (189 cm) horizontal and 55 in (139 cm) vertical for phase-to-ground contact points (APLIC 2006; Nielsen and Ehmke pers. comm., WEST). Although the design of the 230kV transmission line is pending, it can be assumed no electrocution risk to perching birds from power line operation would apply (APLIC 2006).

The potential risk of bird collisions with the overhead transmission line for this Project would be based on a number of site-specific factors. These factors would include line design, line orientation and placement, at-risk bird species present, topography, habitats, weather and seasonality, bird morphology, flight characteristics, land uses, and human influences (APLIC 2012). Based on the committed conservation measure listed in Section 7, avian flight diverters would be installed along the entire transmission line's overhead ground wire(s) to increase line visibility and reduce avian collision risk during transmission line operation. Marking overhead power lines has been shown to reduce bird collision risk anywhere from 29% to 89% (Beaulaurier 1981, Morkill and Anderson 1991, Crowder 2000, Yee 2008, Murphy et al. 2009, Ventana Wildlife Society 2009, APLIC 2012, Sporer et al. 2013).

6.1.1.3 Habitat Loss or Alteration

Construction of the Project will result in habitat impacts that could lead to direct impacts of local avian species such as in injury or mortality resulting from collisions with construction equipment in the Project Area. These impacts are unlikely, however, based on the current plan of development and the wildlife conservation and mitigation measures intended to offset these impacts (see Section 7).

6.1.2 Indirect Impacts

Indirect impacts are often unintended, may produce unforeseen consequences to wildlife, and are difficult to predict. Indirect impacts will focus on what could occur for the Project, particularly habitat loss and/or alteration and the potential temporary or permanent displacement of avian species. Construction and operation of the Project may result in grassland impacts that could lead to displacement of local avian species in the Project Area. The small amount of Above Average grasslands temporarily (12.1 ac [4.9 ha]) or permanently (1.3 ac [0.5 ha]) impacted by the Project minimized the potential impact to grassland birds using this habitat. The current plan of development will manage vegetation and weeds in an effort to minimize impacts and allow native vegetation to revegetate areas altered by construction.

Studies in the Great Plains on the effects of wind energy development on grassland breeding birds found immediate displacement effects (first year) for three species, attraction for two species, and no effect on four species (Shaffer and Buhl 2016). Over time, however, delayed effects (2 to 5 years post-construction) were observed for seven species that showed some displacement up to 300 meters from wind turbines, whereas no effects were observed for two species (killdeer, vesper sparrow; Shaffer and Buhl 2016). Of the seven grassland-breeding birds showing displacement in the Shaffer and Buhl (2016) study, grasshopper sparrow and upland sandpiper (Birds of Conservation Concern [BCC] but not Species of Greatest Conservation Need [SGCN]) were species of concern detected in the Project Area. The remaining five of the seven displaced species were either not detected at the Project (chestnut collared longspur), not displaced (bobolink) or not studied (clay-colored sparrow, savannah sparrow) at the South Dakota study site, or not listed as BCC or SGCN (western meadowlark). Displacement effects would not be anticipated at the population level in part because it is unknown if displaced birds have reduced reproductive fitness in their new locations.

Studies in the Great Plains on the effects of wind energy development on breeding density of waterfowl at two wind facilities in the Missouri Coteau of North Dakota and South Dakota found results consistent with displacement (Loesch et al. 2013). Five species of waterfowl showed a median displacement rate of 21 percent, with approximately half of the study sites showing a reduction in breeding pairs (Loesch et al., 2013). Identifying the ultimate cause of the reduced breeding density, however, was challenging because of the limited temporal duration of the study (three years), and confounding effects between land use and duration of development. This prevented the authors from assessing the potential for cumulative impacts of wind energy development on breeding waterfowl. (Loesch et al. 2013).

6.2 BATS

Impacts to bats from the construction and operation of the Project could include both direct and indirect impacts. Direct impacts to bats as a result of collisions with moving turbine blades is the main source of mortality at wind projects (Grodsky et al. 2011, Rollins et al. 2012), but the underlying reasons for why bats come near turbines are still largely unknown (Cryan and Barclay 2009).

Most bat fatality studies at wind energy facilities in the US have shown a peak in fatality during August and September and generally lower mortality earlier in the summer and very low mortality during the spring (Johnson 2005, Arnett et al. 2008, Derby et al. 2013c). Three species of migratory tree bats comprised the majority of all bat turbine fatalities in the U.S. and Canada between 2000 and 2011 including hoary bat (*Lasiurus cinereus*; 38% of fatalities), eastern red bat (*Lasiurus borealis*; 22%), and silver-haired bat (*Lasionycteris noctivagans*; 18.4%; Arnett and Baerwald 2013).

The Wessington Springs Project, located approximately 38 km (24 mi) southeast of the Project, and the Prairie Winds Wind Project, located 27 mi (48 km) south of the Project, both contain similar habitat types to the Project, with relatively scattered patches of deciduous trees and open waterbodies. Due to the geographic proximity and habitat similarity of the Project Area to Wessington Springs and Prairie Winds, it is assumed that bat mortality at the Project would be relatively low and follow similar patterns as those observed at these facilities (i.e., 0.41 to 1.48 bat fatalities/MW/year) and within the Midwest region (0.16 to 30.61 bat fatalities/MW/year, an average of 5.89 fatalities/MW/year).

Direct impacts would be minimized by feathering below the manufacturer's cut-in speed from July 15 to September 30, between sunset and sunrise when the temperature is above 50 degrees Fahrenheit, to reduce bat mortality. Indirect impacts (e.g., habitat loss or alteration) would be minimized by siting the Project in an area that has minimal wooded habitat. PCM would occur to confirm the pre-construction risk analysis for bats, and adaptive management measures as documented in the BBCS would be implemented if needed (see Section 9).

6.3 Potential Risk to Federal or State-listed Species and Species of Interest

6.3.1 Bald Eagle

The bald eagle is protected by the Bald and Golden Eagle Protection Act of 1940 (BGEPA) and is a resident species throughout South Dakota in suitable habitats. Bald eagles were observed within the Project Area infrequently during avian use surveys during spring (3 observations) and winter (1) of 2017–2018; and during winter (1) of 2018–2019 with none observed during summer and fall. Additionally, two unidentified eagle observations were observed during spring. There were no occupied nests identified in 2017 and the closest known occupied nest in 2018 was approximately 5.5 mi (8.9 km) north of the Project Area.

Bald eagles were also observed incidentally during the course of raptor nest surveys in 2017 and 2018, and these sightings may have multiple observations of the same individuals. In 2017, 53 bald eagles were observed: three observations totaling 43 bald eagles were clustered at small lakes within 1.5 miles of each other approximately 8.2 miles south of the Project Area, and seven instances totaling 10 bald eagles were observed throughout the Survey Area. In 2018, 45 bald eagles were observed: 10 bald eagle observations occurred within five miles of the Project Area, with the remaining 35 observations occurring at least five miles from the Project Area.

Preferred nesting, foraging, and roosting bald eagle habitats include large, mature trees near water with abundant fish and waterfowl prey, especially in areas with little disturbance. The small patches of isolated wooded habitat in the Project Area are not anticipated to be high quality or preferred nesting habitat for bald eagles; however, with increasing bald eagle populations, nesting eagles are also being found in areas away from major waterbodies. The larger wetlands in the Project Area provide potential foraging habitat for bald eagles. Bald eagles may also be found during migration and winter periods in areas away from major rivers if sufficient forage or prey (i.e. waterfowl) is available. Wintering bald eagles are often associated with lakes, rivers, and reservoirs where they feed primarily on fish or waterfowl and the nearest major river is the Missouri River, located approximately 35 mi west of the Project Area.

Potential direct impacts to breeding bald eagles as a result of construction and operation activities could include injury or mortality due to vehicle collisions, but is unlikely because of their low anticipated use of the Project Area. No electrocution or collision risk to bald eagles would apply to the buried 34.5kV collector lines, and no electrocution risk to eagles from operation of the 230kV transmission line would apply given line size. The potential for collision risk with the overhead 230kV transmission line would be low given the low probability of eagle use of the Project Area, the low incidence of power line collision for raptors, and because line collision risk for eagles has primarily been associated with crossing lines daily in concentrated movement corridors (Olendorff and Lehman 1986, Bevanger 1994, Mojica et al. 2009, APLIC 2012) a situation that does not occur at the Project. Additionally, avian flight diverters will be installed along the entire length of the transmission line (see Section 7) and marking overhead power lines has been shown to reduce bird collision risk anywhere from 29% to 89% (Beaulaurier 1981, Morkill and Anderson 1991, Crowder 2000, Yee 2008, Murphy et al. 2009, Ventana Wildlife Society 2009, APLIC 2012, Sporer et al. 2013).

Indirect impacts from the loss of foraging habitat are also unlikely because of the limited use of the Project Area and the prevalence of foraging habitat in the region. Overall impacts to bald eagles in the Project Area are expected to be minimal based on the following: low mean use, lack of eagle concentration areas, limited roost sites, and low nesting density outside the Project Area. Potential direct and indirect impacts to bald eagles would be reduced through implementation of conservation measures (see Section 7).

6.3.2 Golden Eagle

The golden eagle is also protected by the BGEPA and is also a resident species in South Dakota in suitable habitat such as prairie, but is more common in hilly or mountainous regions of western South Dakota. Golden eagles were observed within the Project Area infrequently during avian use surveys during summer (1 observation), winter (5) 2017–2018, and none during spring and fall. Additionally, two unidentified eagle observations were observed during spring. No golden eagles were observed during the second year of surveys (2018–2019). No nests were found within a 10 mi radius of the Project Area in 2017 or 2018.

Golden eagles were observed during the course of raptor nest surveys in 2018 (not in 2017), and these sightings may have multiple observations of the same individuals. In 2018, eight golden

eagle observations occurred within five miles of the Project Area, while the remaining four observations occurred at least five miles from the Project Area.

Preferred nesting habitat includes rock outcrops, cliff ledges, and trees, while foraging habitat includes prairies, sagebrush, and open woodlands. While the Project Area does contain some small patches of isolated wooded habitat that may be suitable for nesting eagles, these areas are not anticipated to be high quality or preferred nesting habitat for golden eagles, and there are no cliffs or rocky outcrops. The grasslands within the Project Area could provide potential foraging habitat for golden eagles. Golden eagles may also pass through Project Area during migration and could also be found during winter in areas where sufficient prey (e.g., waterfowl) is available. The nearest location concentrating waterfowl during winter is the Missouri River, located approximately 35 mi west of the Project Area.

Potential direct impacts to breeding golden eagles as a result of construction and operation activities could include injury or mortality due to vehicle collisions, but is unlikely because of their low anticipated use of the Project Area. No electrocution or collision risk to golden eagles would apply to the buried 34.5kV collector lines, and no electrocution risk to eagles from operation of the 230kV transmission line would apply. The potential for collision risk with the overhead 230kV transmission line would be low given the low probability of eagle use of the Project Area, the low incidence of power line collision for raptors, and because line collision risk for eagles has primarily been associated with crossing lines daily in concentrated movement corridors (Olendorff and Lehman 1986, Bevanger 1994, Mojica et al. 2009, Avian Power Line Interaction Committee [APLIC] 2012) a situation that does not occur at the Project. Additionally, avian flight diverters will be installed along the entire length of the transmission line (see Section 7) and marking overhead power lines has been shown to reduce bird collision risk anywhere from 29% to 89% (Beaulaurier 1981, Morkill and Anderson 1991, Crowder 2000, Yee 2008, Murphy et al. 2009, Ventana Wildlife Society 2009, APLIC 2012, Sporer et al. 2013).

Indirect impacts from the loss of foraging habitat are also unlikely because of their limited use of the Project Area and the limited amount of suitable foraging habitat impacted in the Project Area (see 6.1.2) and the prevalence of foraging habitat in the region. Overall impacts to golden eagles in the Project Area are expected to be minimal based on the following: low mean use, lack of eagle concentration areas, limited roost sites, and no nests within a 10 mi radius of the Project Area. Potential impacts to golden eagles would be reduced through implementation of conservation measures (see Section 7).

6.3.3 Whooping Crane

The whooping crane is listed as endangered under the ESA, and endangered within the state according to the SDGFP. Whooping cranes migrate in a corridor between the Texas gulf coast and Canada's Northwest Territories and the Project Area is located in bands where 75 percent (Pearse et al. 2018) or 90 to 95 percent of migratory whooping crane observations have occurred (WAPA and USFWS, 2015b). or A desktop stopover habitat assessment of the Project Area and surrounding 10-mile buffer determined the highest quality suitable habitat for whooping cranes occurs in the southwestern edge of the Project Area; whereas, the remaining suitable habitat is

scattered throughout the Project Area and is generally of lower quality than in surrounding areas (TWI 2012). A similar result was obtained using the predictive map of relative probability of occurrence by whooping cranes (Niemuth et al. 2018). Suitable stopover habitat for whooping cranes occurs in limited amounts within the Project and with low probability of occurrence when compared to the surrounding landscape.

There is potential for whooping cranes to use or fly through the area during the life of the Project, but this is not expected to be a frequent event given the low number of cranes in the population that migrate across the relatively wide (200+ miles) migration corridor, as well as the low number observed historically in the vicinity of the Project. According to the Cooperative Whooping Crane Tracking Project (CWCTP), no observations of whooping cranes have occurred within the Project Area and the nearest historical sighting occurred approximately 4 miles east of the Project Area (CWCTP 2016). Additionally, no whooping cranes were observed during Tier 3 surveys occurring in the Project Area and no crane fatalities have been documented at wind energy facilities (Derby et al. 2018).

Overall impacts to whooping cranes in the Project Area are expected to be minimal, based on the following: no observations of whooping cranes during the study period, limited high-quality suitable stopover habitat in the Project Area, the Project Area is outside of the species' breeding and wintering range, limiting potential occurrence to migration periods, and the 230kV transmission line will be marked with avian flight diverters to reduce avian collision risks, and no documented fatalities at wind energy facilities. Potential impacts to whooping cranes would be reduced through implementation of conservation measures (see Section 7).

6.3.4 Rufa Red Knot

The red knot (*Calidris canutus*) is listed as threatened under the ESA. The primary reason the red knot is listed as threatened is because of climate change and coastal development, in addition to overharvesting of the horseshoe crab. The red knot migration path can vary greatly, but they travel extreme distances, at times over 9,000 miles, from South America to North America. This species makes frequent stops to feed and rest during migration and prefers a habitat with their prey of choice, invertebrates, particularly small snails, crustaceans, and bivalves. This species is unlikely to occur in the Project Area, as it is primarily a coastal species and the Project Area lacks suitable stopover habitat in the form of intertidal, marine habitats. No red knots were observed during the avian use surveys. The nearest potential stopover habitat likely occurs along the Missouri River, which is approximately 35 mi (56 km) west of the Project Area.

Overall impacts to red knot in the Project Area are expected to be minimal based on the following: limited suitable habitat in the Project Area, and the Project Area is outside of the breeding and wintering range, limiting occurrence to migration periods. Potential impacts to red knot would be reduced through implementation of conservation measures (see Section 7).

6.3.5 Peregrine Falcon

Only one peregrine falcon was observed during migration during the avian use surveys. Overall impacts to peregrine falcon in the Project Area are expected to be minimal based on the following:

no breeding habitat, low mean use, and occurrence limited to migration periods. Potential impacts to peregrine falcon would be reduced through implementation of conservation measures (see Section 7).

6.3.6 Prairie Grouse

Prairie grouse lek surveys were completed in the Project Area and a 1-mile buffer in 2018 and 2019. Four historic lek locations provided by SDGFP were inactive in both years. Three sharp-tailed grouse locations met the definition of a lek according the SDGFP's definition, which is a traditional display area where two or more male grouse have attended in two or more of the previous five years. Two leks are within one mile of project infrastructure and one lek is greater than one mile from infrastructure (Appendix A). Additionally, there were four new locations of displaying/dancing birds in 2019: one sharp-tailed grouse and one greater prairie chicken location within one mile of project infrastructure; one greater prairie chicken location greater than one mile of infrastructure; and one sharp-tailed grouse location considered a satellite of a nearby lek site established in 2019 (Appendix A).

The indirect effects of wind energy development have been studied on three species of grouse in the U.S.: greater sage-grouse (*Centrocercus urophasianus*), greater prairie-chicken (*Tympanuchus cupido*), and Columbia sharp-tailed grouse (*Tympanuchus phasianellus columbianus*), but no studies have been conducted on plains sharp-tailed grouse (*Tympanuchus phasianellus*). Studies on greater sage-grouse and greater prairie-chicken concluded there were displacement effects from wind facilities, although they had no negative effect on population fitness. Greater sage-grouse brood and summer use decreased as density of turbines increased within 1,200 m of turbines (LeBeau et al. 2017a), and the probability of space use for greater prairie-chicken decreased within 2,170 m of turbines during the breeding season (Winder et al. 2014a). Greater sage-grouse nest site selection and nest survival were not affected by the presence of turbines (LeBeau et al. 2017a) nor were there significant differences in the number of males attending leks pre and post development between control and treatment sites (LeBeau et al. 2017b). Similarly, Columbia sharp-tailed grouse nest site selection and nest survival were not affected by the presence of turbines (Proett 2019).

Overall impacts to prairie grouse in the Project Area are expected to be minimal based on the following: two leks and two displaying/dancing locations within one mile of proposed infrastructure, one lek and one displaying/dancing location greater than one mile from proposed infrastructure, lek attendance not influenced by turbines for other species of grouse (greater sage-grouse), nest site selection and nest survival not affected by the presence of turbines, and suitable habitat for nesting, foraging, and brood rearing outside the Project. Potential impacts to prairie grouse would be reduced through implementation of conservation measures (see Section 7) and potential impacts to leks would be monitored for two years post-construction (see Section 8).

Further, the project sited wind turbines to the extent practicable to minimize impacts to leks. This was done by situating the strings of wind turbines to maximize wind turbine distance from displaying/dancing locations while avoiding placement of wind turbines (including turbine access roads and underground collection) that could impact sensitive cultural resource areas, delineated

wetlands, USFWS Wetland and Grassland Easements while locating wind turbines on acreage under wind lease.

6.3.7 Northern Long-Eared Bat

The northern long-eared bat (*Myotis septentrionalis*; NLEB) is listed as threatened under the ESA; however, incidental take of the species due to operation of wind projects is exempt under a 4(d) rule (81 Federal Register 9: 1900-1922, 2016). The NLEB was listed as threatened under the ESA in 2015, and the USFWS issued the final 4(d) rule for the NLEB on April 2, 2015.
The NLEB is a forest bat species that roosts alone or in colonies under bark, cavities, or crevices in living or dead trees. The NLEB bat generally flies under a canopy, feeding on moths, fleas, leafhoppers, caddisflies, and beetles. The Project Area contains small amounts of generally isolated wooded land cover and therefore contains little suitable summer habitat for the NLEB.

The Applicant conducted site-specific acoustic presence/absence surveys for NLEB during the summer of 2018 and no potential NLEB calls were identified showing probable absence of NLEB within the Project Area during the summer. The species may pass through the Project Area as a seasonal migrant and the nearest NLEB hibernaculum is more than 200 miles east in Minnesota (Minnesota DNR/USFWS 2018). Overall impacts to NLEB in the Project Area are expected to be minimal based on the following: probably absence in the Project Area, limited foraging and roost sites, and nearest hibernacula more than 200 mi from Project. Potential impacts to NLEB would be reduced through implementation of conservation measures (see Section 7).

7.0 AVOIDANCE AND MINIMIZATION MEASURES

Information gathered during Tier 1, 2, and 3 studies will be used during the Project design and turbine and infrastructure siting process to reduce potential impacts to birds and bats and their habitats. As part of the NEPA process for approval of the WAPA interconnection, the Project will implement the applicable best management practices (BMPs) and mitigation measures specified in the UGP PEIS. The Applicant is committed to avoiding and/or minimizing impacts to wildlife through Project design, construction, and operation by implementing the following Conservation Measures.

7.1 Conservation Measures Implemented During Site Selection and Project Design

Sweetland will make efforts during initial site selection and during project design to locate and select wind turbines, met towers, and other infrastructure such that bird and bat collisions are minimized. Project design and siting measures to avoid or minimize risk to avian and bat species will include the following:

- To the extent commercially reasonable, maximize power generation per turbine to reduce the number of turbines needed to achieve maximum energy production.
- Locate the up to 7.0-mi (11.3-km) transmission line in areas where Sweetland has site control and to the extent possible in areas where previous disturbance has occurred, thereby minimizing impacts to trees and associated wildlife.

- Where applicable, the Project's aboveground power lines shall be designed and constructed to minimize avian electrocution and collision risks, referencing guidelines outlined in the Avian Power Line Interaction Committee's (APLIC) *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* and *Reducing Avian Collisions with Power Lines: The State of the Art in 2012*.

- To the extent commercially reasonable, use un-guyed met towers for permanent monitoring. Schedule the installation of meteorological towers and other characterization activities (i.e., field surveys and to avoid disruption of wildlife reproductive activities or other important behaviors (e.g., do not install towers during periods of prairie-grouse nesting).

- Use the existing road network to reduce the need for road construction.
- Avoid siting project components in wetlands and waterbodies.
- Site turbines and access roads to avoid USFWS Grassland or Wetland Easements.
- Minimize disturbance to Above Average grasslands.
- Minimize siting turbines in wooded patches.
- Locate the Project in an area with minimal bat habitat (limited wooded areas in isolated small patches).
- Site turbines and other above-ground wind facility infrastructure away from prairie grouse leks to the extent possible; conduct 2 years of post-construction lek/grouse monitoring. To the extent practicable, limit construction and disruptive activities from three hours after sunrise to one hour before sunset
- Turn off unnecessary lighting at night to limit attraction of migratory birds. Follow lighting guidelines, where applicable, from the Wind Energy Guidelines Handbook (*U.S. Fish and Wildlife* Service *Land Based Wind Energy Guidelines* (WEG). This includes using lights with timed shutoff, downward-directed lighting to minimize horizontal or skyward illumination, and avoidance of steady-burning, high-intensity lights. Extinguish all internal turbine nacelle and tower lighting when unoccupied.
- Light the wind turbines and met towers in accordance with the Federal Aviation Administration requirements.

7.2 Conservation Measures to be Implemented during Construction

Construction of the Project is expected to begin in Q4 2019 and occur over a period of approximately 12 months (excluding times when the weather prevents construction activities). The following Conservation Measures will be implemented to avoid or minimize risk to avian and bat species during construction:

- Prepare a BBCS in accordance with the USFWS WEG that will be implemented to minimize impacts to avian and bat species during construction and operation of the Project.

- Avoid tree removal from June 1 through July 31 to reduce potential impacts to roosts and other tree roosting habitats for NLEBs and other bat species.
- Minimize tree removal as much as feasible to reduce impacts to bat roosting habitat.
- Establish wind turbine buffer zones around known raptor nests (0.25-mile) and bat roosts if site evaluations show that proposed construction activities would pose a significant risk to avian or bat species of concern.
- Conduct construction monitoring during whooping crane migration seasons, and stop construction activities within 2.0 mi (1.6 km) of observed whooping cranes until the crane leaves (see Appendix K);
- Install avian flight diverters along the entire length of the transmission line using appropriate marking devices and device spacing to minimize potential collision impacts to whooping cranes and other avian species. Devices will be installed on the overhead ground wire/optical ground wire (as appropriate) to increase wire visibility (APLIC 2012).
- To the extent feasible, the area required for Project construction and operation will be minimized. Sweetland will develop a restoration plan for restoring all areas of temporary disturbance to their previous condition, including the use of native species when seeding or planting during restoration. The restoration plan will ensure:
    - All areas disturbed temporarily by Project construction will be restored including temporary disturbance areas around structure construction sites, laydown/ staging areas, and temporary access roads,
    - Topsoil salvage will be included in all grading activities.
    - Conduct restoration activities in accordance with the wind leases and in consultation with the NRCS.
- Use natural fiber erosion control methods during construction to eliminate or minimize runoff and avoid impacts to hydrology.
- Following Project construction, roads not needed for site operations will be restored to native vegetation.
- Vehicle speeds will be limited to 25 mph (40 kph) to avoid wildlife collisions and construction vehicles will be restricted to pre-designated access routes.
- Gravel will be placed at least 5.0 ft (1.5 m) around each turbine foundation to discourage small mammals and reptiles from burrowing under or near turbine bases.
- All trash will be covered in containers and work sites will be cleared regularly of any garbage and debris related to food.
- Pets shall not be allowed in the Project Area.

7.3 Conservation Measures to be Implemented during Operations

- Vehicle speeds will be limited to 25 mph to avoid wildlife collisions.
- Fire hazards from vehicles and human activities will be reduced (e.g., use of spark arrestors on power equipment, avoiding driving vehicles off roads, allowing smoking in designated areas only).
- Sweetland will develop and implement a noxious weed control plan in accordance with the wind lease agreements.
- Pest and weed control measures will be implemented as specified by county, state, and federal requirements.
- Other than maintenance vehicles, which will park at the entrance of turbines for maintenance purposes, parts and equipment which may be used as cover for prey will not be stored at the base of wind turbines while a turbine is operational.
- A carcass removal program will be implemented to minimize potential attractants for carrion-feeding raptors.
- Feather blades to manufacturer's cut in speed from sunset to sunrise, when the temperature is above 50 degrees Fahrenheit from July 15 to September 30.
- Conduct operational monitoring during whooping crane migration seasons; operations staff will be trained to identify whooping cranes, and if any are noted in the Project Area, turbines will be shut down within two miles of the crane until it leaves (see Appendix K).
- Conduct post-construction fatality monitoring for two years to assess impacts.
- All of Sweetland's employees and contractors working on site will receive worker awareness training for identifying and responding to encounters with sensitive biological resources, including avian and bat species. The training:
    - Will be conducted by Sweetland or their designee.
    - Instruct employees, contractors, and site visitors to avoid harassment and disturbance of wildlife, especially during reproductive (e.g., courtship and nesting) seasons.
    - Will include instruction on identification and values of plant and wildlife species and significant natural plant community habitats, the issue of microtrash and its effects, fire protection measures and measures to minimize the spread of weeds during construction as well as hazardous material spill and containment measures.
    - Will include a flyer in the O&M building and/or construction trailer(s) detailing information on potential state and federal special-status animal and plant species that might be discovered on the Project site.
    - Will include an overview of the distribution, general behavior, and ecology of golden and bald eagles. Employees will be informed that they are not authorized to approach, handle, or otherwise move any eagles that might be encountered

during construction or operation, whether alive, injured, or deceased. Operations personnel will be instructed to report any finding of an injured or deceased eagle to USFWS within 24 hours of positive identification by a qualified biologist.

8.0 POST-CONSTRUCTION MONITORING: TIER 4

8.1 Tier 4a – Avian and Bat Fatality Monitoring

Post-construction fatality monitoring is a critical component of this BBCS. The primary objective of fatality monitoring is to estimate avian and bat mortality at the Project and to determine whether the estimated mortality is lower, similar to, or higher than the average mortality observed at other regional projects, and consistent with the levels of mortality predicted during the pre-construction risk assessments (see Section 6.0).

8.1.1 Baseline Monitoring

Baseline monitoring consists of short-term intensive surveys involving standardized carcass searches, bias trials for searcher efficiency, and carcass removal trials conducted by trained biologists. Baseline fatality monitoring will be conducted during the first two years of commercial operations of the Project. The monitoring study design will be consistent with the recommendations for operations monitoring included in the WEG. Additionally, the scope and duration of the fatality monitoring study will be developed to be consistent with, and within the range of, monitoring programs that have been conducted at other wind projects in the Great Plains.

8.1.1.1 Monitoring Activities

Baseline fatality monitoring will be conducted during all seasons of the first two years of commercial operations of the Project. Baseline avian and bat monitoring will consist of the following components:

1) Standardized carcass searches of selected turbines in a plot centered on the turbine;
2) Searcher efficiency trials to estimate the percentage of carcasses found by searchers;
3) Carcass persistence trials to estimate the length of time that a carcass remains in the field for possible detection;
4) Data analysis and calculation of fatality rates.

Following the first year of monitoring, Sweetland will coordinate with the USFWS and the SDGFP to discuss results.

8.1.1.2 Reporting

Annual reports will be completed following each year of fatality monitoring and submitted to the USFWS and the SDGFP within three months of completion of surveys. The report will detail the results of mortality surveys, as well as the results of searcher efficiency and carcass removal trials. Fatality rates will be estimated following the most recent and acceptable methods.

8.1.2 Long Term Monitoring

O&M staff will be specifically trained to monitor for dead or injured golden eagles, bald eagles, and other sensitive wildlife species during their work activities. A data sheet that describes how Project personnel can recognize an injured or dead eagle or sensitive species will be posted in the maintenance facility. The data sheet will include instructions and the procedures that personnel shall take in the event an injured or dead golden eagle, bald eagle, or other protected species is discovered onsite, including whom to notify and what actions shall be taken. Any incident involving a state or federally listed threatened or endangered species or a golden or bald eagle will be reported to the USFWS and the SDGFP within 24 hours of identification.

8.2 Tier 5 – Prairie Grouse Lek Monitoring

Sweetland is involved with ongoing discussions with SDGFP to conduct a collaborative study on prairie grouse during post-construction lek monitoring at the Project.

9.0 ADAPTIVE MANAGEMENT

Within the WEG, the USFWS 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 if they are sited in accordance with the tiered approach. Nevertheless, Sweetland recognizes the value of applying this approach to its Project activities that include some uncertainty. As such, Sweetland will incorporate an adaptive approach for the conservation of wildlife potentially impacted by the Project.

Section 5.0 of this BBCS describes the tiered approach used to study pre-construction wildlife conditions and section 6.0 predicts potential Project impacts. Based on Project siting, the results of pre-construction wildlife studies, and an assessment of risks to birds and bats, no significant adverse impacts are anticipated from the Project and mortality is expected to be within the range of other projects discussed in Section 6.0. Tier 4 post-construction fatality monitoring will be conducted to estimate the actual level of avian and bat mortality at the Project. If impacts are determined to be minimal, no further action may be needed. Should the results of the Tier 4 studies indicate higher than anticipated impacts, however, adaptive management measures could be considered to further avoid, minimize, or compensate for unanticipated and significant project impacts to wildlife. Thresholds for considering an adaptive response may include:

- Mortality of an eagle or a species listed as state or federal endangered/threatened; or

- Significant levels of mortality of unlisted species of birds or bats. Significance will be determined by qualified biologists and will be based on species' population sizes and trends. For example, even relatively high levels of mortality of the most common species may not be significant. Conversely, lower levels of mortalities of less common species may be of more concern, particularly if these species appear to be at risk (e.g., USFWS Birds of Conservation Concern).

If effects are determined to be higher than anticipated, an assessment of why effects are occurring will be conducted to aid in developing appropriate mitigation actions. If causation of effects is unknown, further monitoring efforts may be implemented to help understand effects. Some of the adaptive management options that could be considered depending on the results of the post-construction mortality monitoring and taking into account economic feasibility[1] include:

- Additional on-site studies (e.g., more intensive use studies, prey base studies);
- Addition or modification of anti-perching, anti-nesting, collision, or electrocution protection devices on "problem" project facilities;
- Experimentation with visual and/or auditory bird flight diverters;
- Prey-base management through habitat alteration; and
- Operational curtailment

Once the mitigation measures are put into place, additional monitoring to determine the effectiveness of the mitigation measures may be conducted, and, depending on the results, further remedial measures may or may not be warranted.

10.0 CONCLUSIONS

This BBCS was written to provide guidance for avoiding, minimizing, and monitoring potential effects to avian and bat species at the Sweetland Wind Farm. The measures described in this document are intended to help protect and reduce effects to avian and bat species during the construction phase of the Project, as well as to monitor potential effects to avian and bat species following implementation of the Project. Further, it is anticipated that this BBCS will facilitate adaptive management at the Project based on information gathered following construction of the Project.

[1] Once a project is operational there is a fixed amount of capital expenditure and the only available source of funding is from operational budgets, which must be within the economic parameters of the Project.

11.0 KEY RESOURCES

Key wildlife resource personnel involved with the Project include the following:

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Appendix A. Baseline Avian Studies for the Sweetland Wind Energy Project, Hand County, South Dakota: Final Report May 2017 – April 2018:

All Appendices are part of the Sweetland Wind Farm Project Draft Environmental Assessment (see Appendix G)

Appendix B. Baseline Avian Studies for the Sweetland Wind Energy Project, Hand County, South Dakota: Final Report May 2018 – April 2019

All Appendices are part of the Sweetland Wind Farm Project Draft Environmental Assessment (see Appendix G)

Appendix C. Sweetland Wind Energy Project Eagle and Raptor Nest Survey Memorandum: Year One Final Report February 2018

All Appendices are part of the Sweetland Wind Farm Project Draft Environmental Assessment (see Appendix F)

Appendix D. Sweetland Wind Energy Project Eagle and Raptor Nest Survey Memorandum: Year Two Final Report September 2018

All Appendices are part of the Sweetland Wind Farm Project Draft Environmental Assessment (see Appendix F)

Appendix E. Sweetland Wind Energy Project Whooping Crane Stopover Habitat Assessment: Final Report December 2018

All Appendices are part of the Sweetland Wind Farm Project Draft Environmental Assessment (see Appendix K)

Appendix F. Bat Activity Studies for the Sweetland Wind Energy Project, Hand County, South Dakota: Year One Final Report June – October 2017

All Appendices are part of the Sweetland Wind Farm Project Draft Environmental Assessment (see Appendix H)

Appendix G. Bat Activity Studies for the Sweetland Wind Energy Project, Hand County, South Dakota: Year Two Final Report May – October 2018

All Appendices are part of the Sweetland Wind Farm Project Draft Environmental Assessment (see Appendix H)

Appendix H. Bat Summer Presence/Absence Surveys Sweetland Wind Energy Project, Hand County, South Dakota: Final Report July 2018

All Appendices are part of the Sweetland Wind Farm Project Draft Environmental Assessment (see Appendix J)

Appendix I. Sweetland Wind Energy Project 2018 Grassland Habitat Assessment: Final Report February 2019

All Appendices are part of the Sweetland Wind Farm Project Draft Environmental Assessment (see Appendix E)

Appendix K. Whooping Crane Monitoring Plan and Shut-Down Protocol Sweetland Wind Energy Project: Final Plan June 2019

All Appendices are part of the Sweetland Wind Farm Project Draft Environmental Assessment (see Appendix M)