Stage 1 Eagle Risk Assessment

Clear Creek Wind Project,
Nodaway County, Missouri

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Sign-off Sheet

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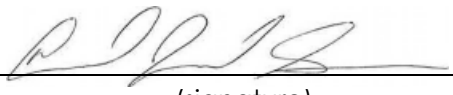
Prepared by 
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Dan Schepis, Wildlife Biologist

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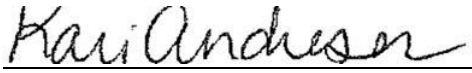
David Bender, Wildlife Biologist/ Project Manager

Reviewed by 
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Kari Andresen, Wildlife Biologist

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Executive Summary

Stantec Consulting Services Inc. (Stantec) has completed this Eagle Risk Assessment (ERA) for Tenaska, Inc. pertaining to the proposed Clear Creek Wind Project (Project), which is located in Nodaway County, Missouri. This ERA evaluated the potential risk to Bald Eagles (*Haliaeetus leucocephalus*) and Golden Eagles (*Aquila chrysaetos*) from construction and operation of the Project as part of the U.S. Fish and Wildlife Service's (USFWS's) Eagle Conservation Plan Guidance (ECPG) Stage 1 Site Assessment. The ECPG was designed to aid wind developers in conserving Bald and Golden Eagles during the siting, construction, and operation of a wind energy facility, and in adhering to the regulations in the Bald and Golden Eagle Protection Act (BGEPA). The purpose of this ERA is to collect information on the potential occurrence and distribution of eagles within the Project boundary and its vicinity, determine whether the Project contains suitable habitat for eagles, and provide a preliminary risk evaluation to eagles from the construction and operation of the Project.

Stantec conducted a literature and database review to obtain information about Bald Eagle resources that may occur within the Project Footprint (boundary), within the Project Area (the area within 10 miles of the Project Footprint), and within the Local Area Population (LAP; the area within 86 miles of the Project Footprint). Given the rarity of Golden Eagles in northwestern Missouri, Golden Eagles were excluded from further evaluation in this ERA. Data sources were reviewed for information on Bald Eagle seasonal abundance, nesting records, migration corridors, communal roosts, and prey availability or potential foraging hotspots.

The Project is located within the Bald Eagle's winter and breeding ranges. Throughout the year, Bald Eagle distribution and abundance is closely tied to the availability and abundance of food. During the winter and migration, Bald Eagles will congregate at reservoirs, lakes, rivers, streams, and wetland complexes where fish, waterbirds, or mammals are abundant. Bald Eagles will also congregate at locations with an abundance of carrion, such as feedlots and cattle ranches. Habitat within the Project Footprint is predominately pasture and hay field and cultivated cropland. The locations of Bald Eagle nests and roosts are also linked to the location of foraging areas and the availability of nest habitat (large trees near food sources).

Based on publicly available information, the Project likely meets the criteria for Category 2 – High or Moderate Risk to Eagles. There are known important eagle-use areas or migration concentration sites within the Project Area (Category 2), specifically the eagle nest within the Project Area (7.9 Miles northeast of the Project Footprint). Within the Project's LAP, Bald Eagles occur along the Missouri River, the Platte River, Loess Bluffs National Wildlife Refuge, and Smithville Lake. In addition, Bald Eagles occur along the One Hundred and Two River, Mozingo Lake, Nodaway Lake, and Nodaway River; all of which occur in the Project Area. Aerial surveys are needed to adequately determine if eagle nests are within the Project Footprint. As per the ECPG, projects in Category 2 may have opportunities to mitigate impacts and reduce risks to

eagles. The preliminary conclusion of a Category 2 does not indicate that an eagle take permit is required as the Project's risk category can potentially change based on additional site-specific surveys for eagles and/or minimization measures proposed by the Project. Stage 2 assessments (eagle use surveys and aerial nest surveys) would provide additional data for the category estimate for the Project.

Abbreviations

ACP	Advanced Conservation Practice
BGEPA	Bald and Golden Eagle Protection Act
CBC	Christmas Bird Count
CFR	Code of Federal Regulations
Clear Creek	Clear Creek Wind Project
ECP	Eagle Conservation Plan
ECPG	Eagle Conservation Plan Guidance, Module 1 – Land-based Wind Energy, Version 2
EMU	Eagle Management Unit
ERA	Eagle Risk Assessment
ESA	Endangered Species Act
ft	feet
GIS	Geographic Information System
km	kilometer
LAP	Local Area Population
m	meter
MBTA	Migratory Bird Treaty Act
MDC	Missouri Department of Conservation
mi	mile
NABCI	North American Bird Conservation Initiative

NWR	National Wildlife Refuge
Project	Clear Creek Wind Project
Stantec	Stantec Consulting Services Inc.
Sutton Center	George Miksch Sutton Avian Research Center
USFWS	U.S. Fish and Wildlife Service

1.0 INTRODUCTION

Stantec Consulting Services Inc. (Stantec) completed an Eagle Risk Assessment (ERA) for Tenaska, Inc. (Tenaska) pertaining to the proposed Clear Creek Wind Project (Project), in Nodaway County, Missouri. The Project is located within the range of the federally protected Bald Eagle (*Haliaeetus leucocephalus*) and the wintering range of Golden Eagles (*Aquila chrysaetos*); though Golden Eagles are a rarity in Missouri. Bald Eagles are protected under the Bald and Golden Eagle Protection Act (BGEPA) as amended (16 U.S.C. §668-668d) as well as the Migratory Bird Treaty Act (MBTA). Due to the Project's location within the range of this species, the Project has the potential to impact eagles. The U.S. Fish and Wildlife Service (USFWS) has published the Eagle Conservation Plan Guidance, Module 1 – Land-based Wind Energy, Version 2 (ECPG) to assist wind developers with eagle conservation during the siting, construction, and operation of a wind energy facility (USFWS 2013).

This ERA was prepared in accordance with the ECPG and USFWS updates and revisions to date. Specifically, methods used in this ERA are in accordance with Appendix B (Stage 1 – Site Assessment) of the ECPG (USFWS 2013). The purpose of this ERA is to determine whether the Project is within the vicinity of areas known or likely to be used by eagles, and to determine the relative spatiotemporal extent and type of eagle use. Stantec has prepared this ERA to address the following objectives:

1. Collect information on the potential occurrence and distribution of eagles within the Project and its vicinity.

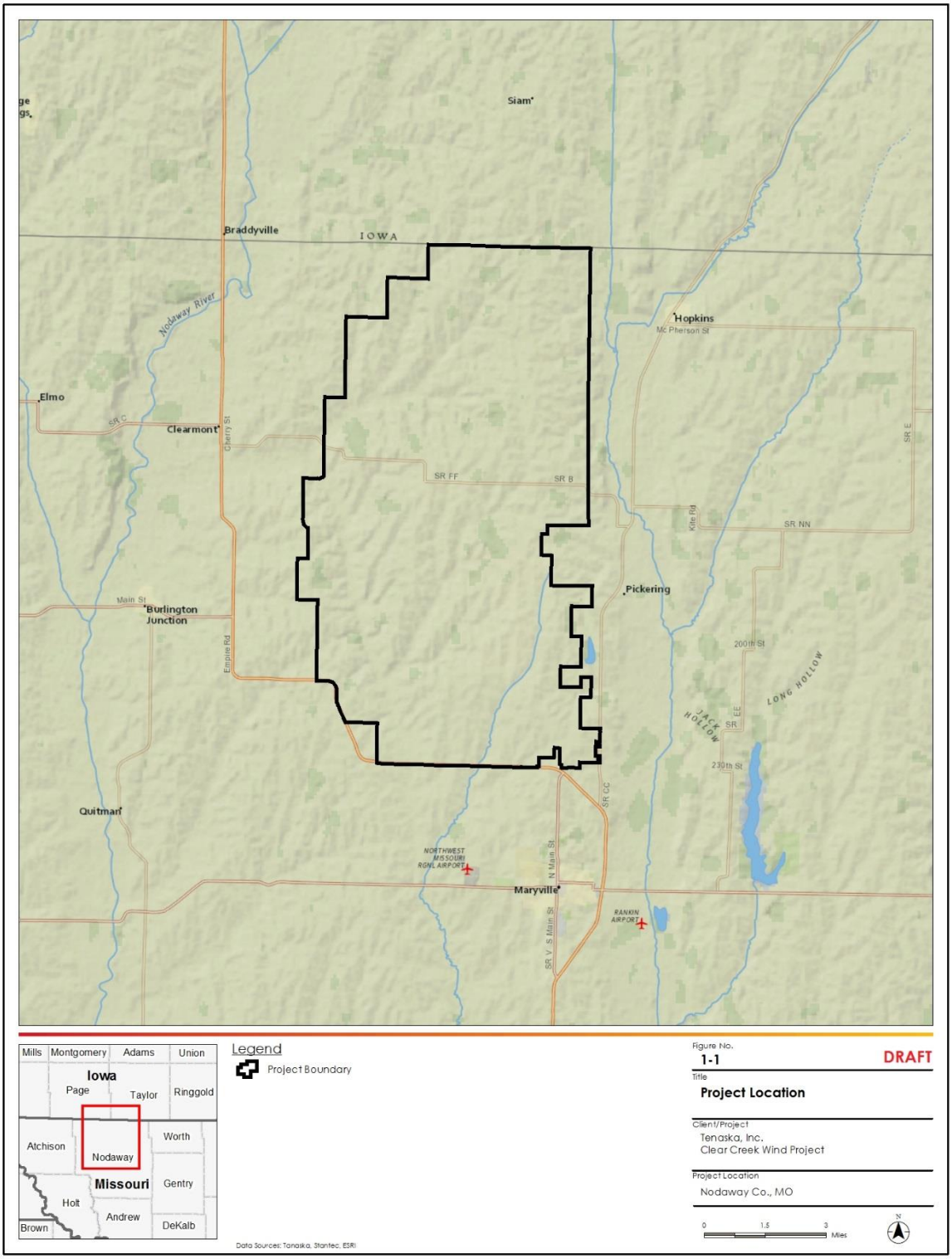
2. Determine whether the Project contains suitable habitat for eagles.

3. Provide a preliminary evaluation of the potential risk to eagles from the construction and operation of the Project.

The findings in this ERA are based on information obtained from publicly available data sources, geographic information system (GIS) desktop analyses, and by comparing Project features and geography with eagle distributions and life-history characteristics. Stantec used this information to assess the potential risk to eagles from wind energy development at the preliminary Project location.

1.1 PROJECT DESCRIPTION

The Project is located in Nodaway County, Missouri, and incorporates 29,023 acres (4,535 square miles). The Project is located approximately 3 miles north of Maryville, Missouri, with a northern boundary coincident with the Missouri-Iowa state line. The eastern boundary runs parallel to State Route-148 and the One Hundred and Two River. The western boundary runs parallel to the Nodaway River, less than 2 miles at its closes distance. The Project's location is shown in Figure 1-1.


Siam
Braddyville
IOWA
Nodaway River
Hopkins
Mc Pherson St
Elmo
SR C
Clearmont
Cherry St
SR FF
SR B
SR E
Kite Rd
SR NN
Pickering
Main St
Burlington Junction
Empire Rd
200th St
LONG HOLLOW
JACK HOLLOW
SR EE
230th St
SR CC
Quitman
NORTHWEST MISSOURI RGNL AIRPORT
N Main St
Maryville
RANKIN AIRPORT
SR V S Main St
Mills
Montgomery
Adams
Union
Iowa
Page
Taylor
Ringgold
Atchison
Nodaway
Worth
Missouri
Gentry
Holt
Andrew
DeKalb
Brown
Legend
Project Boundary
Figure No.
1-1
DRAFT
Title
Project Location
Client/Project
Tenaska, Inc.
Clear Creek Wind Project
Project Location
Nodaway Co., MO
0
1.5
3
Miles
N
Data Sources: Tenaska, Stantec, ESRI

The size, number, placement, and proposed megawatt production of the Project turbines and associated infrastructure have not been finalized.

1.1.1 Project Habitat

According to the U.S. Geological Survey's National Land Cover Dataset, the habitat within the Project is primarily pasture/hay (46% of the total land use) and cultivated cropland (36%). The remaining habitat within the Project Footprint is deciduous, mixed, and evergreen forest (10%), roads and houses (4%), scrub/shrub (2%), grassland/herbaceous (1%), and less than 1% each of open water and wetlands (Homer et al. 2015). The land cover within the Project boundary is shown in Figure 1-2.

Project topography consists of generally flat fields in the south, rolling hills north and east, and floodplains associated with streams. Water features within the Project Footprint consist mainly of intermittent streams, and small impoundments used for livestock watering. Water features within the Project are shown in Figure 1-3.

There are no large bodies of water in the Project Footprint; however, directly adjacent to the Project boundary's east border is Nodaway County Community Lake. The lake is managed by the Missouri Department of Conservation (MDC) for public recreation and hunting and fishing opportunities (MDC 2016a). Habitat within the area is about one-third grassland and contains old fields, forest, and the 73-acre lake. Clear Creek, a tributary of the Nodaway River, parallels the Project's western boundary. Approximately 1 mile (mi) of Clear Creek lies within the Project's northwest corner. The two largest rivers in proximity to the Project are the One Hundred and Two River (approximately 0.5 mi east of the Project at its closest point), and the Nodaway River (approximately 2 mi west of the Project) (see Figure 1-1). Located approximately 2.75 miles east of the Project is Mozingo Lake, a 1,000-acre lake with 26 miles of shoreline and a 3,000-acre park. Owned by the City of Maryville, Mozingo Lake was constructed in 1992 for water supply, flood control, and a recreational reservoir (see Figure 1-3).

1.2 SPECIES DESCRIPTION

1.2.1 Bald Eagles

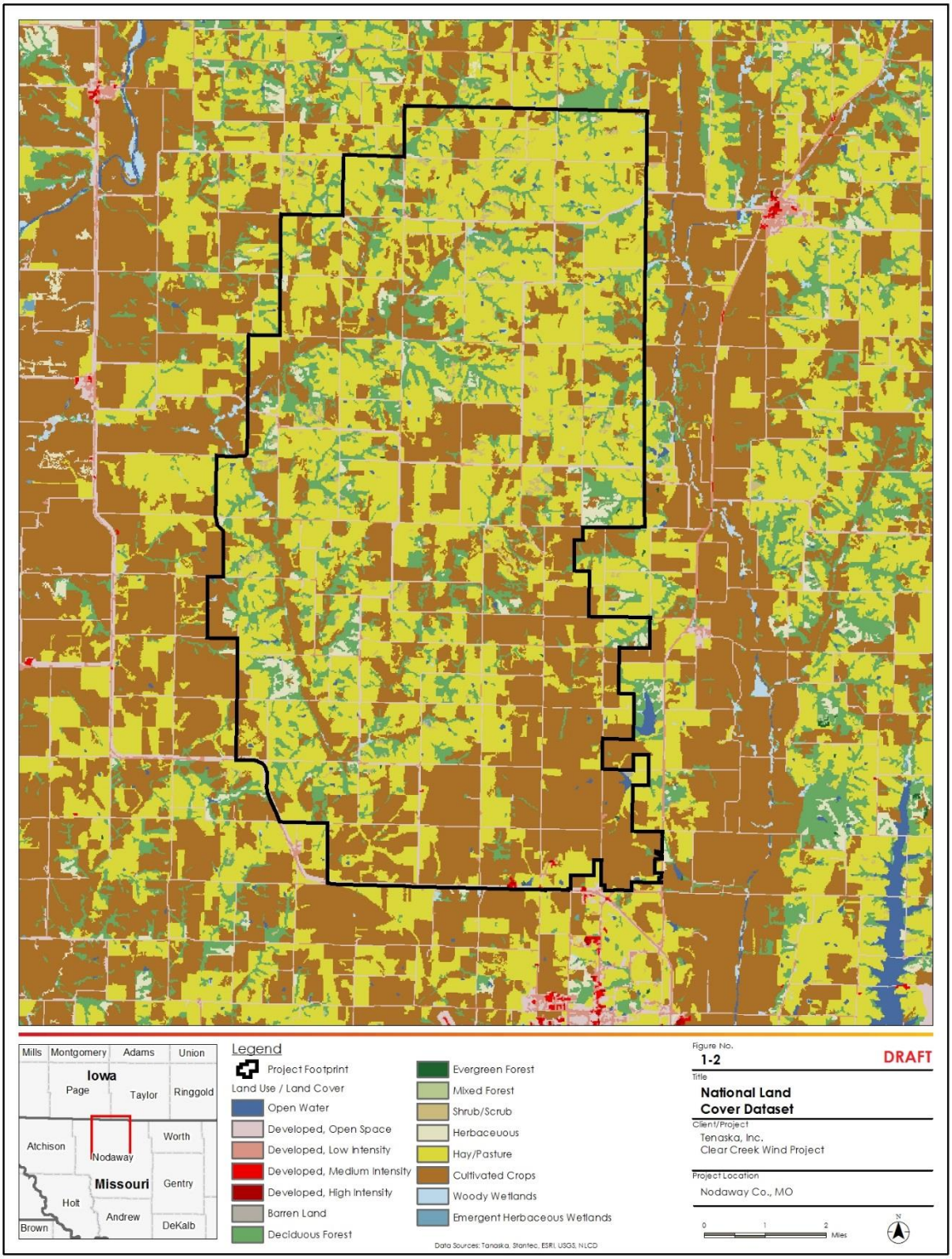
The second largest bird of prey in North America, the adult Bald Eagle has a brown body with a distinctive white head and tail and a yellow bill and feet. Juvenile Bald Eagles are covered in dark brown feathers mixed with white feathers (Buehler 2000). The Bald Eagle was listed as endangered under the Endangered Species Act (ESA) in 1978, but in 1999 the species had recovered sufficiently for USFWS to propose removing it from the ESA (Department of the Interior 2007). It was officially delisted in 2007, though the Bald Eagle is still protected under the BGEPA and MBTA. Both breeding and wintering Bald Eagle populations occur in Missouri.

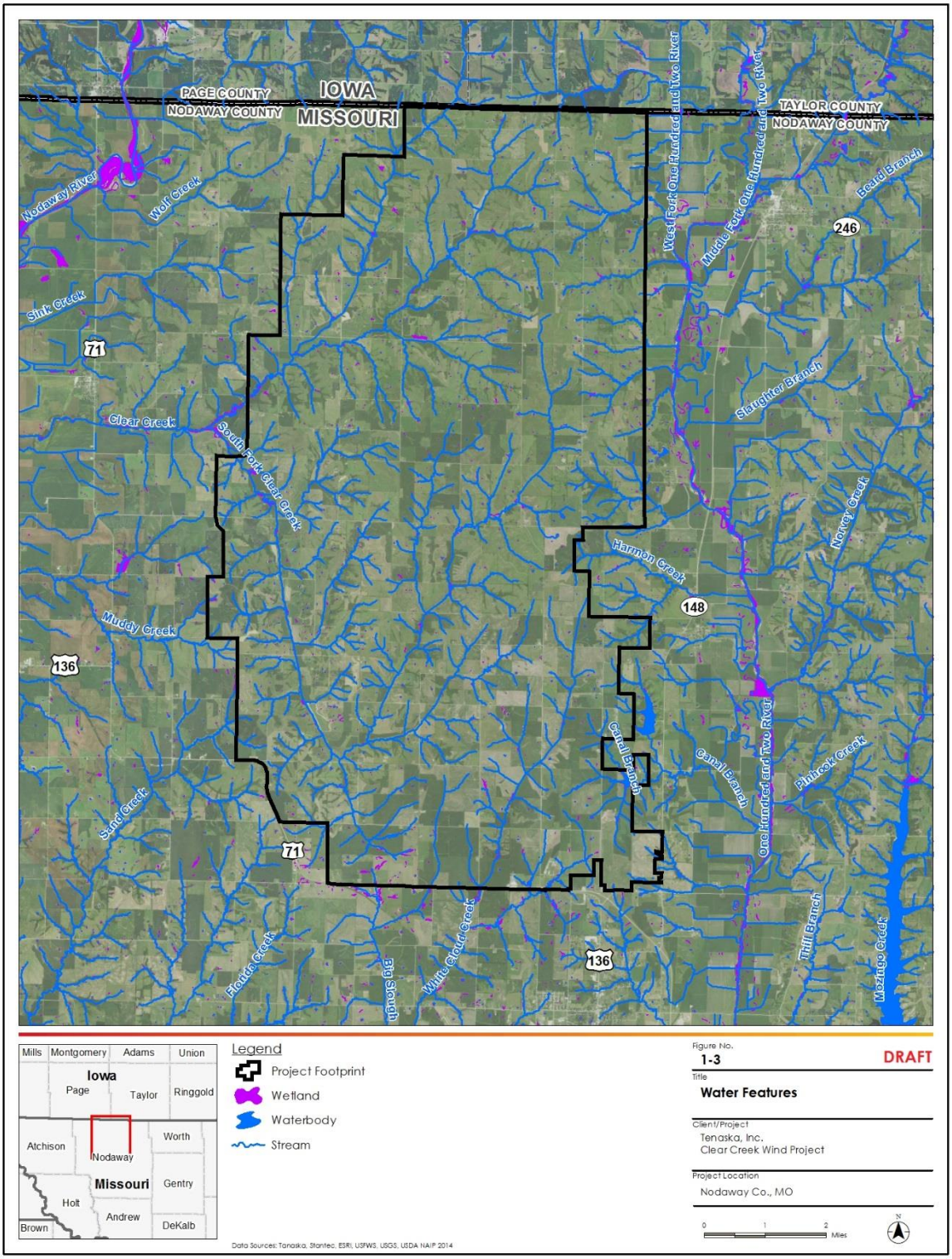
Bald Eagles breed throughout most of subarctic Alaska and Canada, with breeding populations associated with aquatic habitats (coastal areas, rivers, lakes, and reservoirs) throughout much of

the Lower 48 States. Breeding Bald Eagles are very territorial. Bald Eagles typically nest in large, mature trees with an open branch structure in an area near a reservoir or large river, and rarely near smaller ponds, lakes, or creeks (Buehler 2000; Thompson et al. 2011). Nests are usually less than 1.2 kilometer [km] (1.2 mi) from a water source with suitable foraging opportunities and generally away from human disturbance (greater than 500 m [1,640 feet (ft.)] (Buehler 2000). Bald Eagle nests are large (4-6 ft. in diameter or more, and 3 ft. deep), made of large sticks, and lined with grasses and other soft vegetation (USFWS 2007a).

The migration patterns of Bald Eagles are complex and are dependent on the age of the individual (immature or adult), the location of the breeding site (north vs. south, interior vs. coastal), the climate of the breeding site, and the availability of food. Bald Eagles migrate alone, although they will congregate with other eagles at feeding and roost sites, which are generally associated with aquatic foraging areas (within 10 km [6 mi] of the foraging area) (Buehler 2000). Migrating Bald Eagles will pass over unsuitable, human-developed habitat, but they will also follow traditional migration pathways. Stopover sites during migration have abundant food resources such as fish and waterfowl concentrations or the presence of large mammals as carrion. Most stopover sites also have traditional communal roost sites, which are often stands of mature deciduous trees in riparian areas that are protected from human disturbance (Buehler 2000).

Bald Eagles spend the winter in the Lower 48 States and coastal Alaska and Canada near aquatic habitats. During the winter, Bald Eagle communal roosts are generally located in large deciduous or coniferous trees that are open and accessible (Buehler 2000). Communal roost trees are between 15 to 60 m (49 to 197 ft.) in height, are associated with aquatic foraging areas, and are located away from houses and roads. Communal roost locations are also selected because of their ability to protect eagles from prevailing winter winds (Buehler 2000). During migration and winter, the distribution of Bald Eagles across the landscape is most related to the availability of food. Nest locations are also tied to the location of foraging areas. The Bald Eagle's primary prey is fish, but they are opportunistic feeders. Bald Eagles will feed on fish, carrion, aquatic and terrestrial mammals, turtles, and waterfowl. During the winter, they are frequently found near large bodies of water and large rivers where the water is more likely to stay at least partially free of ice throughout the winter (Buehler 2000; USFWS 2007a). Bald Eagles will also feed on wild and domestic carrion along roads, in landfills, and at feedlots (USFWS 2007a).


Mills
Montgomery
Adams
Union
Iowa
Page
Taylor
Ringgold
Atchison
Nodaway
Worth
Missouri
Gentry
Holt
Andrew
DeKalb
Brown
Legend
Project Footprint
Land Use / Land Cover
Open Water
Developed, Open Space
Developed, Low Intensity
Developed, Medium Intensity
Developed, High Intensity
Barren Land
Deciduous Forest
Evergreen Forest
Mixed Forest
Shrub/Scrub
Herbaceuous
Hay/Pasture
Cultivated Crops
Woody Wetlands
Emergent Herbaceous Wetlands
Data Sources: Tenaska, Stantec, ESRI, USGS, NLCD
Figure No.
1-2
DRAFT
Title
National Land Cover Dataset
Client/Project
Tenaska, Inc.
Clear Creek Wind Project
Project Location
Nodaway Co., MO
0
1
2
Miles
N


PAGE COUNTY
NODAWAY COUNTY
IOWA
MISSOURI
TAYLOR COUNTY
NODAWAY COUNTY
Nodaway River
Wolf Creek
West Fork One Hundred and Two River
Middle Fork One Hundred and Two River
Beard Branch
246
Sink Creek
71
Clear Creek
South Fork Clear Creek
Slaughter Branch
Norvey Creek
Harmon Creek
148
Muddy Creek
136
Canal Branch
One Hundred and Two River
Pinhook Creek
Sand Creek
71
Fiegle Creek
Big Slough
White Cloud Creek
136
Thill Branch
Mozingo Creek
Mills
Montgomery
Adams
Union
Iowa
Page
Taylor
Ringgold
Atchison
Nodaway
Worth
Missouri
Gentry
Holt
Andrew
DeKalb
Brown
Legend
Project Footprint
Wetland
Waterbody
Stream
Data Sources: Tenaska, Stantec, ESRI, USFWS, USGS, USDA NAIP 2014
Figure No.
1-3
DRAFT
Title
Water Features
Client/Project
Tenaska, Inc.
Clear Creek Wind Project
Project Location
Nodaway Co., MO
0
1
2
Miles
N

2.0 APPLICABLE REGULATIONS AND GUIDELINES

2.1 MIGRATORY BIRD TREATY ACT

The MBTA is a joint agreement between the United States, Canada, Mexico, Japan, and Russia to ensure the protection of a shared migratory bird resource. All migratory birds and raptors, including eagles, in North America are protected under the MBTA (16 United States Code [U.S.C.] §703 et seq.). The MBTA prohibits the take, kill, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Department of the Interior (16 U.S.C. §703). The word "take" is defined by the MBTA as any act that pursues hunting, wounding, killing, or capturing migratory birds (50 Code of Federal Regulations [CFR] §10.12).

2.2 BALD AND GOLDEN EAGLE PROTECTION ACT

The BGEPA was first passed in 1940 and provides protection to the Bald Eagle and Golden Eagle (as amended in 1962). The BGEPA prohibits the take, possession, sale, purchase, barter, offer to sell, transport, export, or import of any bald or golden eagle (dead or alive) including any part, nest, or egg, unless allowed by permit" (16 Untied States Code §668a; 50 CFR §22). In the BGEPA, "take" means to "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb" (50 CFR §22.3). "Disturb" means "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior" (50 CFR §22.3). The BGEPA provides civil and criminal penalties for persons who violate these regulations without a permit from the USFWS.

In September 2009, the USFWS established rules (50 CFR §22.26 and §22.27) authorizing limited take of Bald or Golden Eagles and their nests through take permits. As part of the 2009 Eagle Permit Rule (USFWS 2009), the USFWS established thresholds of take under which a regional population of eagles would maintain stable or increasing eagle populations. In 2016 the threshold criteria were revised during updates to Eagle Management Unit framework. Take limits for permits issued by the USFWS under the BGEPA must not exceed established thresholds. A take permit can be issued "when the take is associated with, but not the purpose of, an otherwise legal activity" and where the take is unavoidable even though Advanced Conservation Practices (ACPs) are being implemented. The Eagle Permit Rule distinguishes take that might result from short-term or one-time actions from take that might result from ongoing, long term actions (i.e., programmatic take). The USFWS may issue a programmatic take permit when the take is recurring, is not caused solely by indirect effects, and occurs over the long term.

2.3 EAGLE CONSERVATION PLAN GUIDELINES

The USFWS issued the ECPG in 2013 to assist wind developers in their efforts to adhere to the BGEPA. The ECPG details the USFWS's approach to the issuance of programmatic eagle take permits for wind facilities under the Eagle Permit Rule and provides guidance on the development of Eagle Conservation Plans (ECP). Adherence to the ECPG is voluntary, but the USFWS has developed the ECPG to assist wind-facility developers with regulatory compliance regarding eagle take, avoidance and minimization of unintentional eagle take, and provide the information to support an eagle take permit application, if necessary (USFWS 2013). The ECPG describes a five-stage approach for siting new wind facilities[1]:

1. **Stage 1** is the preliminary site evaluation, which includes the landscape-level screening of one or more potential project sites.

2. **Stage 2** includes site-specific surveys to assess the potential risk of the proposed project to eagles.

3. In **Stage 3**, the USFWS and the project developer or operator use the data from Stage 2 to predict the project's risk to eagles.

4. In **Stage 4**, the USFWS and wind developers use the information gathered in previous stages to determine eagle risk at a project and write an ECP. The ECP discusses conservation measures and ACPs to be used to avoid or minimize potential risks to eagles to the extent practical. The final eagle risk assessment for a project is completed at the end of Stage 4.

5. In **Stage 5**, if the USFWS issues a take permit, the project operator conducts post-construction monitoring to evaluate the effectiveness compensatory mitigation.

This ERA is a Stage 1 evaluation for the Project.

2.3.1 Determination for an Eagle Take Permit

Adherence to the ECPG is voluntary, and the methods and approaches outlined in the ECPG are not mandatory to obtain an eagle take permit. However, take permit applications that do not follow the ECPG may take longer for the USFWS to process. An ECP is not required to obtain an eagle take permit, so long as the permit application includes all necessary information for the USFWS to adequately evaluate the application.

USFWS uses the approach outlined below to assess the likelihood that a wind project will take eagles. The following definitions are part of the process for evaluating a project's potential risk to eagles:

[1] All stages of the ECPG may not be applicable to all projects

Project Footprint – the boundary that encompasses the wind project inclusive of the hazardous area around all turbines and any associated infrastructure, including utility lines, out-buildings, roads, etc. (USFWS 2013, pg. 12)

Project Area – the area that includes the Project Footprint plus a 10-mile buffer around the Project Footprint, which is a conservative approximation of the largest recorded Golden Eagle breeding territory size (USFWS 2013, pg. 12).

Local Area Population (LAP) –refers to the eagle population within the area of human activity or project bounded by the natal dispersal distance for the respective species (86 miles for Bald Eagles). (USFWS 2016).

Projects are placed into one of three risk categories based on proximity of the Project Footprint to important eagle-use areas or migration concentrations sites and the project's annual eagle fatality estimate in relation to the population size of the LAP. An important eagle-use area is defined as "an eagle nest, foraging area, or communal roost site eagles rely on for breeding, sheltering, or feeding, and the landscape features surrounding such nest, foraging area, or roost site that are essential for the continued viability of the site for breeding, feeding, or sheltering eagles" (USFWS 2009; 50 CFR §22.3). The three risk categories in the ECPG are defined as follows (USFWS 2013, pg. 25-26):

Category 1 – High risk to eagles, potential to avoid or mitigate impacts is low

A project is in this category if it:

1) has an important eagle-use area or migration concentration site within the project footprint; or

2) has an annual eagle fatality estimate (average number of eagles predicted to be taken annually) > 5% of the estimated local-area population size; or

3) causes the cumulative annual take for the local-area population to exceed 5% of the estimated local-area population size.

Category 2 – High or moderate risk to eagles, opportunity to mitigate impacts

A project is in this category if it:

1) has an important eagle-use area or migration concentration site within the project area but not in the project footprint; or

2) has an annual eagle fatality estimate between 0.03 eagles per year and 5% of the estimated local-area population size; or

3) causes cumulative annual take of the local-area population of less than 5% of the estimated local-area population size

Category 3 – Minimal risk to eagles
A project is in this category if it:

1) has no important eagle-use areas or migration concentration sites within the project area; and

2) has an annual eagle fatality rate estimate of less than 0.03; and

3) causes cumulative annual take of the local-area population of less than 5% of the estimated local-area population size

Should a project be considered to be in Category 1, the USFWS recommends that the project not be constructed or should be substantially redesigned to meet criteria in Category 2. An eagle take permit is recommended for projects in Category 2. Projects in Category 3 pose little risk to eagles and may not require or warrant an eagle take permit; however, the decision to pursue an eagle take permit should be made in coordination with the USFWS (USFWS 2013). The risk category of a project can potentially change as a developer moves through the 5 stages in the ECPG as a result of site-specific evaluations or changes in the project's design or layout.

2.3.2 Eagle Management Units and Take Thresholds

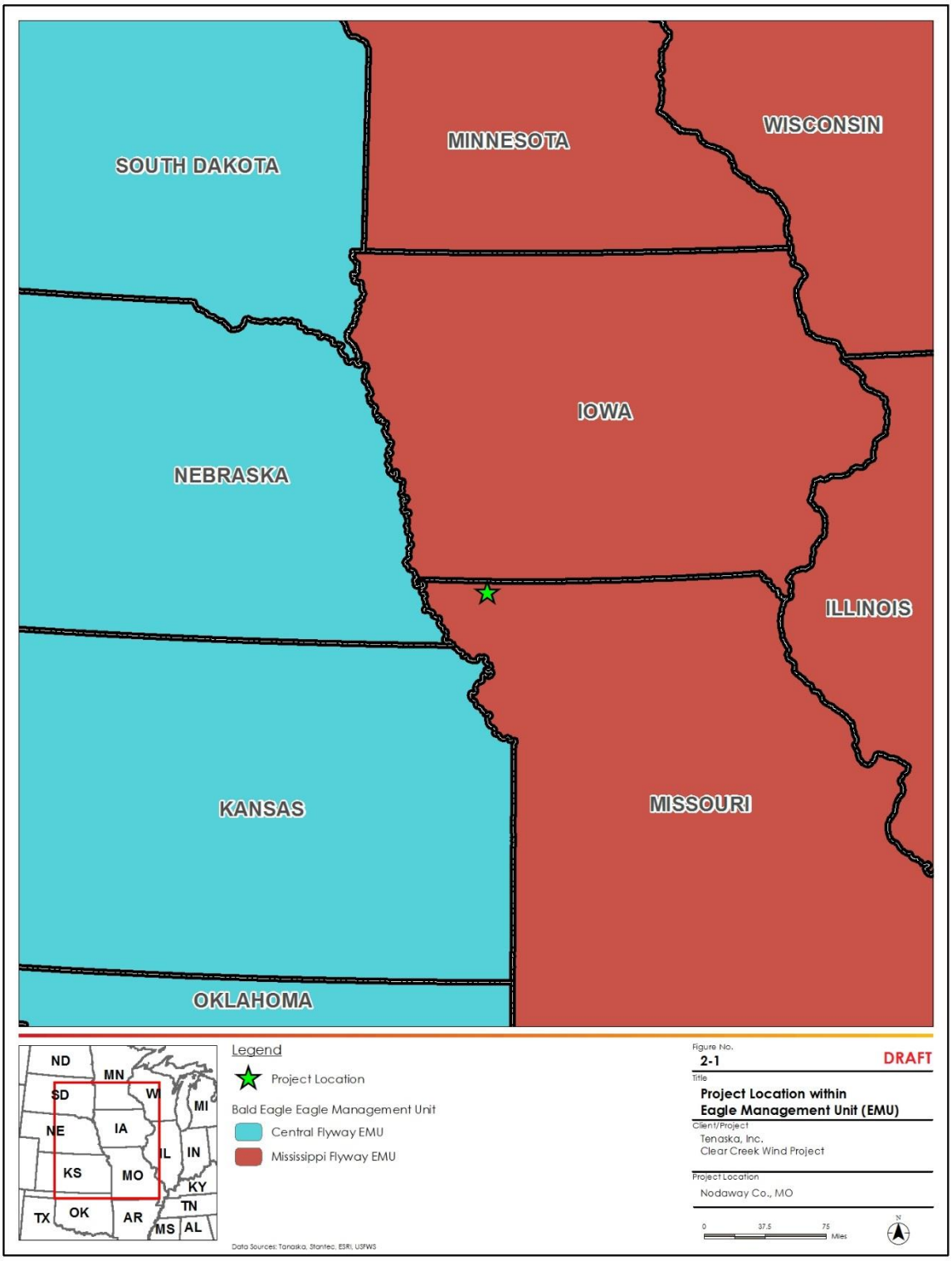
In 2009 the USFWS used available data for Bald Eagles to identify appropriate regional population boundaries for management purposes, with the goal of ensuring the USFWS's permit program does not cause declines in eagle populations at a regional or national scale. These defined regional management boundaries are called Eagle Management Units (EMU) (USFWS 2009). In 2016 the USFWS revised the EMU's to follow the four administrative migratory bird flyways, thereby reducing the number of EMU's from 14 to 4 (USFWS 2016). The current EMU configuration includes the Pacific, Central, Mississippi, and Atlantic EMU's.

2.3.2.1 Bald Eagle Management Unit

There are 4 EMU's for Bald Eagles in the United States. The Project is located in the Mississippi EMU and within USFWS Region 3 as shown in Figure 2-1. In 2016, as part of revisions to the Eagle Permit Rule, the USFWS estimated the Bald Eagle population size for the Mississippi EMU to be 27,334 Bald Eagles, and the USFWS set the annual individual take threshold for this EMU at 1,640 (6%)Bald Eagles/year. In 2009, the USFWS also estimated 2,973 occupied nests within the Mississippi EMU, which represents 20% of the total number of mapped nests across all EMUs (USFWS 2016).

The locations of known nests are not publicly available. The Bald Eagle population and nest data for the EMU in the Eagle Permit Rule are the most recent available population estimates for

the EMU, and given that Bald Eagle populations are increasing in the United States, the current population is likely larger than the 2009 estimates compiled in USFWS 2016.


SOUTH DAKOTA
MINNESOTA
WISCONSIN
IOWA
NEBRASKA
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MISSOURI
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IA
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IN
KS
MO
KY
TN
TX
OK
AR
MS
AL
Legend
Project Location
Bald Eagle Eagle Management Unit
Central Flyway EMU
Mississippi Flyway EMU
Data Sources: Tenaska, Stantec, ESRI, USFWS
Figure No.
2-1
DRAFT
Title
Project Location within
Eagle Management Unit (EMU)
Client/Project
Tenaska, Inc.
Clear Creek Wind Project
Project Location
Nodaway Co., MO
0
37.5
75
Miles
N

3.0 SCOPE AND METHODS OF ASSESSMENT

3.1 SCOPE

As recommended by the ECPG, publicly available information on eagle occurrence data and potential habitat (breeding and non-breeding) was searched for the Project and surrounding area. The geographic scope of this assessment included the Project Footprint, Project Area, and LAP. The geographic scope of this assessment is shown in Figure 3-1. Within the scope of this ERA, all data sources were searched for Bald Eagle data within the Project Footprint, Project Area, and LAP. These defined search areas are significant because the USFWS uses eagle information in each of these areas to determine relative eagle risk at wind projects (see Section 2.2.2).

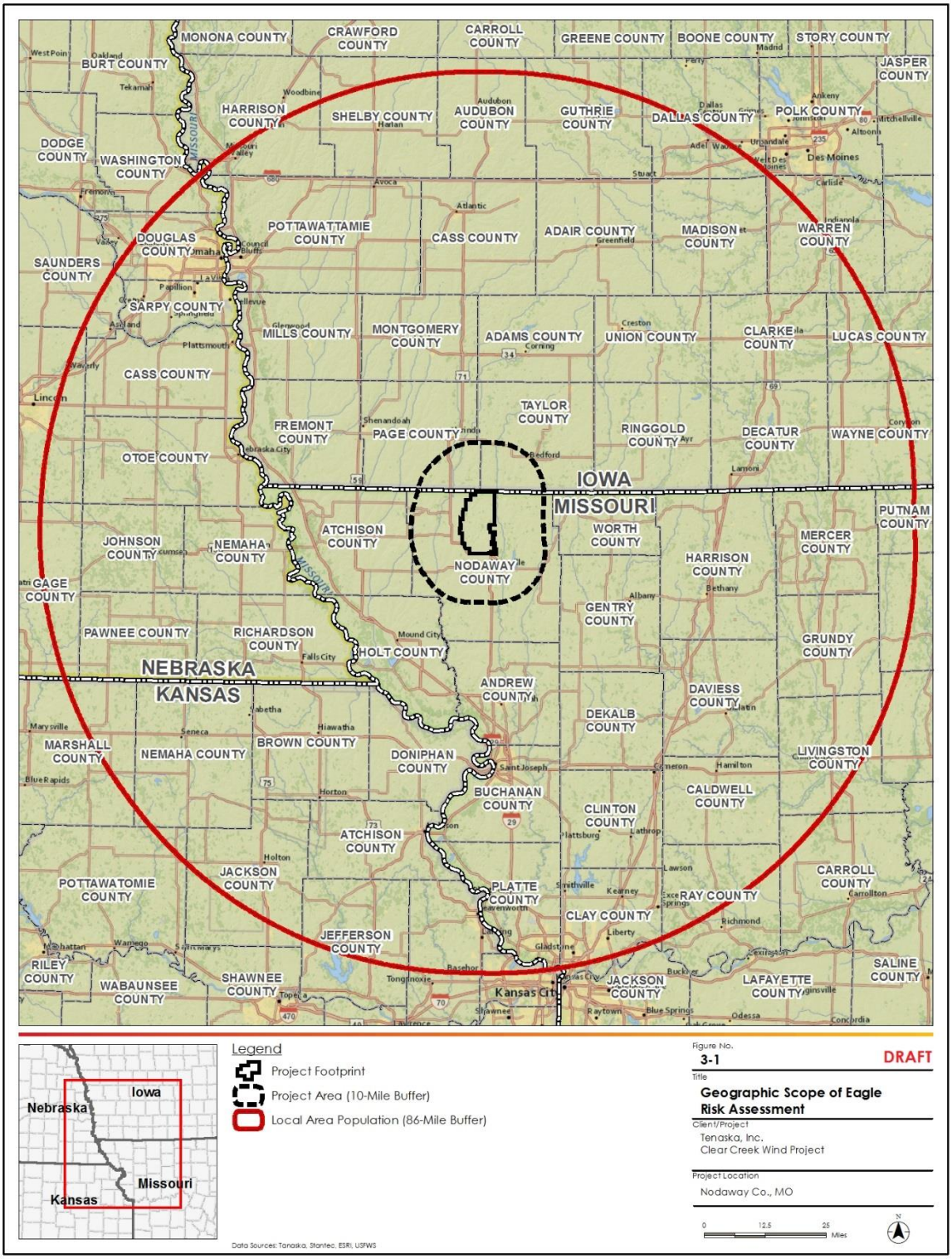
3.1.1 Bald Eagles

The Project is located within the Bald Eagle's winter (Steenhoff et al. 2008; Thompson et al. 2011) and breeding range (Suckling and Hodges 2007; MDC 2012). Bald Eagle populations have been increasing rapidly since 1991, including in Missouri (Jacobs 2003; Suckling and Hodges 2007; USFWS 2007b) where they have expanded into sections of the state where nesting has not been previously documented. Based on the occurrence of Bald Eagles in northwest Missouri, and the availability of suitable habitat and preferred prey within, or near the Project, Bald Eagles are further assessed in this ERA.

3.1.2 Golden Eagles

Golden Eagles are occasionally observed in Missouri in winter months (MDC 2012). Unlike Bald Eagles, which frequent lakes and rivers, these rare winter inhabitants forage in open grasslands for small mammals (Davit 2009; MDC 2012). Due to their rarity in the state, data on Golden Eagle range and population size in Missouri are limited.

The Project is within the winter range of the Golden Eagle (MDC 2012); however, they occur infrequently in north-west Missouri and there is little suitable habitat for this species in the Project (i.e., open grasslands). Golden Eagles are most frequently found near colonies of black-tailed prairie dogs (*Cynomys ludovicianus*) or areas with high concentrations of waterbirds during the winter (Kochert et al. 2002). Prairie dogs are not known to be present within the Project or its vicinity. The rarity of Golden Eagles within the Project's vicinity is demonstrated as no more than 6 individuals were observed, per year, during Christmas Bird Counts (CBC) within the LAP in the last 20 years (Audubon 2017). Based on the rarity of occurrence, limited availability of suitable habitat, and the lack of preferred prey (prairie dogs) within, or near the Project, risk to Golden Eagles is low. Based on this information Golden Eagles are excluded from further analysis in this ERA.


MONONA COUNTY
CRAWFORD COUNTY
CARROLL COUNTY
GREENE COUNTY
BOONE COUNTY
STORY COUNTY
JASPER COUNTY
BURT COUNTY
HARRISON COUNTY
SHELBY COUNTY
AUDUBON COUNTY
GUTHRIE COUNTY
DALLAS COUNTY
POLK COUNTY
DODGE COUNTY
WASHINGTON COUNTY
POTTAWATTAMIE COUNTY
CASS COUNTY
ADAIR COUNTY
MADISON COUNTY
WARREN COUNTY
DOUGLAS COUNTY
SAUNDERS COUNTY
SARPY COUNTY
MILLS COUNTY
MONTGOMERY COUNTY
ADAMS COUNTY
UNION COUNTY
CLARKE COUNTY
LUCAS COUNTY
CASS COUNTY
TAYLOR COUNTY
FREMONT COUNTY
PAGE COUNTY
RINGGOLD COUNTY
DECATUR COUNTY
WAYNE COUNTY
OTOE COUNTY
IOWA
MISSOURI
PUTNAM COUNTY
ATCHISON COUNTY
WORTH COUNTY
MERCER COUNTY
JOHNSON COUNTY
NEMAHA COUNTY
NODAWAY COUNTY
HARRISON COUNTY
GAGE COUNTY
GENTRY COUNTY
PAWNEE COUNTY
RICHARDSON COUNTY
HOLT COUNTY
GRUNDY COUNTY
NEBRASKA
KANSAS
ANDREW COUNTY
DAVIESS COUNTY
DEKALB COUNTY
MARSHALL COUNTY
NEMAHA COUNTY
BROWN COUNTY
DONIPHAN COUNTY
LIVINGSTON COUNTY
BUCHANAN COUNTY
CALDWELL COUNTY
CLINTON COUNTY
ATCHISON COUNTY
POTTAWATOMIE COUNTY
JACKSON COUNTY
PLATTE COUNTY
CARROLL COUNTY
RAY COUNTY
CLAY COUNTY
JEFFERSON COUNTY
RILEY COUNTY
SHAWNEE COUNTY
WABAUNSEE COUNTY
JACKSON COUNTY
LAFAYETTE COUNTY
SALINE COUNTY
Kansas City
Iowa
Nebraska
Missouri
Kansas
Legend
Project Footprint
Project Area (10-Mile Buffer)
Local Area Population (86-Mile Buffer)
Figure No.
3-1
DRAFT
Title
Geographic Scope of Eagle Risk Assessment
Client/Project
Tenaska, Inc.
Clear Creek Wind Project
Project Location
Nodaway Co., MO
0
12.5
25
Miles
N
Data Sources: Tenaska, Stantec, ESRI, USFWS

3.2 METHODS

Stantec conducted a literature and database review to obtain information about Bald Eagle resources that may occur in the Project's vicinity. These data sources provided information on the potential distribution and abundance of Bald Eagles within the scope of this assessment (Section 3.1). Stantec reviewed the following sources for Bald Eagle-related information:

- State and Federal data, publications, and correspondence
- Birds in Missouri (Jacobs 2003)
- National Audubon Society's CBC
- National Audubon Society and the Cornell Lab of Ornithology's eBird program
- Scientific publications
- Publicly available GIS data
- Publicly available survey data

These data sources were reviewed for information on Bald Eagle seasonal abundance, nesting records, migration corridors, communal roosts, and prey availability or potential foraging hotspots. While most publicly available data sources are recorded and maintained by state and federal governments, eBird data is a collection of observations maintained by the National Audubon Society and the Cornell Lab of Ornithology. The eBird program accumulates information on bird abundance and distribution from observations by professional and recreational bird watchers. The data are not standardized and the level of effort will not be evenly distributed across the landscape or among habitats. As a result, there is more information for areas favored by bird watchers (e.g., wildlife refuges) and areas with higher human densities (e.g., metropolitan areas). However, there are automated data quality-control features integrated into the submission process whereby unusual records are flagged and reviewed by local experts (eBird 2016).

A preliminary site visit was conducted by two Stantec biologists on February 23, 2017. The goal of the site visit was to collect information regarding the potential habitat within the Project. Representative potential habitat, eagle nests, and eagle observation photographs are in Appendix A.

4.0 RESULTS

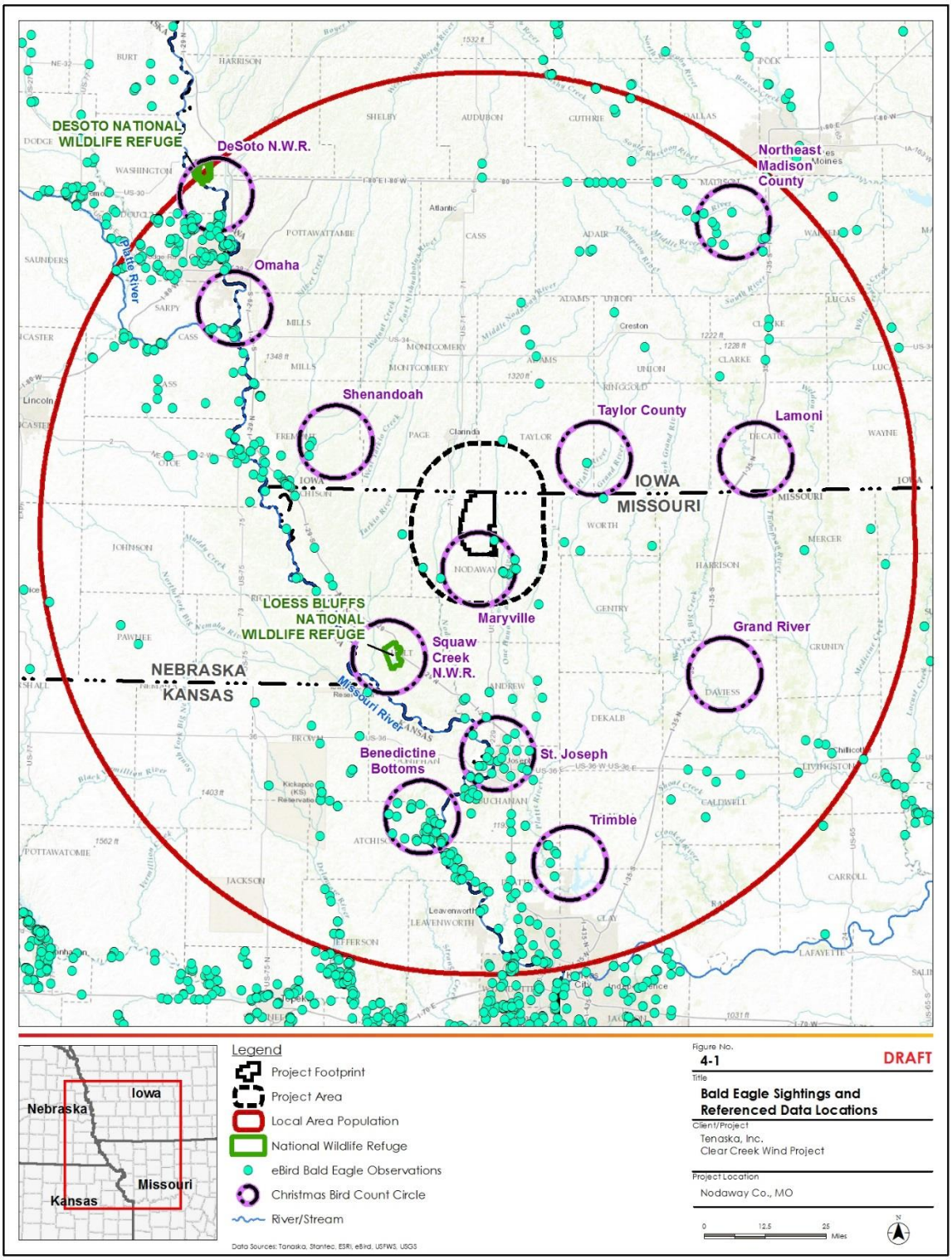
4.1 SEASONAL ABUNDANCE

The Project is located within the Bald Eagle's winter and breeding ranges. Winter-resident Bald Eagles begin arriving in Missouri in November and migrate north in late March (MDC 2015). During the winter, Bald Eagles occur in the highest concentrations around major bodies of water with reliable food sources. Statewide, lakes and rivers in northwest Missouri contain the highest concentrations of eagles (eBird 2017). Bald Eagles, within the northwest region, typically number more than 2,000 birds annually in the winter (MDC 2012) with higher abundances of eagles along the Missouri River.

Bald Eagles are expected to occur within the LAP as demonstrated by the distribution of eBird Bald Eagle sightings. Bald Eagle eBird sightings within the LAP in the last 6 years (2011-2016) are shown in Figure 4-1. The majority of these sightings were concentrated around the Missouri River, Platte River, Smithville Lake, Mozingo Lake, Loess Bluffs National Wildlife Refuge, and Indian Cave State Park.

Several areas within the LAP are surveyed as part of the CBC (e.g., Maryville, St. Joseph, Loess Bluffs NWR, Taylor County, and Shenandoah). In the last 5 years of surveys (2010-2015) the Maryville CBC circle (approximately 3 mi south of the Project) recorded a maximum annual count of 23 Bald Eagles in 2013 (Audubon 2017; See Figure 4-1). The Loess Bluffs NWR CBC circle, which is approximately 26 mi southwest of the Project, recorded an average of 157 Bald Eagles/year in the last five years, with a maximum annual count of 221 Bald Eagles in 2014. The St. Joseph CBC circle, located approximately 41 mi south of the Project Footprint, had an average of 38 Bald Eagles/year over the last five years, with a maximum annual count of 75 Bald Eagles (Audubon 2017). CBC circles within the Project LAP include the Missouri River and wildlife refuge locations that are expected to have higher concentrations of Bald Eagle occurrences than the Project Footprint due to relatively abundant nesting habitat and food sources. Although wintering Bald Eagles can be expected to occur throughout the LAP, Nodaway County Community Lake occurs is adjacent to the Project Footprint and could attract concentrations of wintering Bald Eagles. Nodaway County Community Lake could also provide suitable habitat for nesting Bald Eagles.

Bald Eagles breed in Missouri from December through June (USFWS 2007a; MDC 2012). Typical Bald Eagle breeding territories are about 0.4-0.8 square miles (1-2 square kilometers) and are limited by the availability of suitable nest trees and food sources (Buehler 2000). Nests are typically built at the top of a large tree, often adjacent to a reservoir or river. Bald Eagle nesting is further discussed in section 4.2.


DESOTO NATIONAL WILDLIFE REFUGE
DeSoto N.W.R.
Northeast Madison County
Omaha
Platte River
Shenandoah
Taylor County
Lamoni
IOWA
MISSOURI
LOESS BLUFFS NATIONAL WILDLIFE REFUGE
Maryville
Grand River
Squaw Creek N.W.R.
NEBRASKA
KANSAS
Missouri River
Benedictine Bottoms
St. Joseph
Trimble
Legend
Project Footprint
Project Area
Local Area Population
National Wildlife Refuge
eBird Bald Eagle Observations
Christmas Bird Count Circle
River/Stream
Nebraska
Iowa
Missouri
Kansas
Figure No.
4-1
DRAFT
Title
Bald Eagle Sightings and Referenced Data Locations
Client/Project
Tenaska, Inc.
Clear Creek Wind Project
Project Location
Nodaway Co., MO
Miles

4.2 NESTING RECORDS

Historically, Bald Eagles were nearly extirpated in Missouri by the 1950's and were reintroduced to the state from 1981 to 1990 (Suckling and Hodges, 2007; MDC 2016). In 1983 Bald Eagles were again observed nesting in Missouri (Suckling and Hodges 2007). Bald Eagle breeding pairs in Missouri expanded from 11 in 1990 to 123 in 2006 (USFWS 2015). Bald Eagle populations are increasing throughout much of their range in the continental United States, including Missouri (USFWS 2007b). In 2011 MDC reported 166 nest territories in the state (MDC 2012) with the majority of nests located in the central and west-central portions of the state.

The Project LAP spans portions of southwest- Iowa, southeast Nebraska, northeast Kansas, and northwest Missouri. Current and historical records of Bald Eagle nests in Nebraska are concentrated around the Missouri River, Platte River, and in the eastern half of the state. Iowa reported 84 active nests in 1998 spread among 42 Iowa Counties (Iowa DNR 2017). Bald Eagle nesting records in Kansas from 1989-1998 provided in Watkins and Mulhern (1999) were located near reservoirs. In Missouri, recent Bald Eagle nest counts reveal an increase in nests to 284 active nests as of the 2016 spring statewide survey (MDC 2016b).

Within the Project Area, suitable nesting habitat is most abundant along the One Hundred and Two River, Nodaway River, and Mozingo Lake (Figure 4-1). Based on Stantec's experience with other wind projects in the Great Plains, isolated large cottonwood (*Populus* spp.), sycamore (*Platanus* spp.) or oak (*Quercus* spp.) trees adjacent to stock ponds may also be suitable nest sites; however, this behavior is rare. Stantec did not locate any publicly available data on Bald Eagle nesting within the Project Footprint.

4.3 MIGRATION CORRIDORS

Johnsgard (2012) detailed two sites of significance to migratory birds in Missouri, which include migratory eagles. Migration throughout Missouri is characterized by broad migrations regionally with seasonal abundance in areas or importance, such as those detailed by Johnsgard (2012). These areas serve as stopovers and foraging areas. Neither of these sites of significance occur within the LAP, Project Area, or Project Footprint; the nearest being Loess Bluffs NWR (named Squaw Creek NWR at the time of the Johnsgard 2012 publication) approximately 26 mi from the Project.

A study of Bald Eagles involving radio tracking and band observation/recovery in Missouri between 1973 and 1978 resulted in 14 Bald Eagles being trapped, banded, and released with 6 of the eagles being outfitted with radio transmitters (Griffin et al. 1980). During the study 5 Missouri band recoveries were of eagles banded outside of the state. During the study period only one eagle banded in Missouri was recovered in Manitoba, Canada. Data from this study suggests that some Bald Eagles winter in or migrate through Missouri that originate from breeding grounds in Ohio, Michigan, Wisconsin, Minnesota, Ontario, and Saskatchewan (Griffin et al. 1980).

Since 2010, the George Miksch Sutton Avian Research Center (Sutton Center) in Oklahoma has tagged nine Bald Eagle chicks, that where hatched in Oklahoma, with satellite transmitters. The Sutton Center has not published the results of their tracking research, but the public can view the most current locations of tagged eagles on the Sutton Center's website (Sutton Center 2017a). The tracking locations visible on the website are limited to the 100 most recent locations, which currently includes movements from about August 2015 to January 2017. One of the nine Bald Eagles tracked by the Sutton Center traveled through the Project Area within their last recorded 100-movements. This eagle has posted tracking records dating between August 17, 2015 and April 10, 2016 and shows a movement through the Project Area between February 17, 2016 and February 19, 2016. While tracking locations do not provide a complete picture of the movement patterns of these Bald Eagles throughout the year the data represents one of the only sources of information about Bald Eagle movements in Missouri.

4.4 COMMUNAL ROOSTS

Potential Bald Eagle communal roosting habitat within the LAP occurs at large rivers including the Missouri River, Platte River, Nodaway Lake, and Loess Bluffs NWR. In the Project Area, communal roost habitat may occur along the Nodaway River, the One Hundred and Two River, and Mozingo Lake (see Figure 4-1). Communal roost habitat is limited within the Project Footprint as there are few large trees suitable for roosts. In addition, potential roost trees within the Project Footprint are generally not part of the forest blocks which would provide protection from winter winds. Stantec did not find any other information on the current location of communal roosts in the LAP, Project Area, or Project Footprint.

4.5 PREY AVAILABILITY OR FORAGING HOTSPOTS

The water features most likely to provide suitable foraging opportunities for Bald Eagles within the LAP include larger rivers, such as the Missouri River and Platte River, large reservoirs, and Loess Bluffs NWR. Within the Project Area: One Hundred and Two River, Nodaway River and their tributaries; as well as Nodaway County Community Lake and Mozingo Lake (see Figure 4-1) provide potential foraging opportunities. Small ponds within the Project Footprint are unlikely to attract concentrations of waterfowl or provide an abundance of fish. Although the majority of the landscape is used for crop production, grasslands and rangeland within the Project may be grazed by cattle. Cattle carcasses left in the open by local ranchers have the potential to attract eagles, especially during the winter. Lastly, there are no known prairie dog colonies within the Project Area or the Project Footprint which could be potential prey for eagles.

5.0 CONCLUSIONS

The ECPG provides a five-stage process for determining the potential risk of a wind project to eagle resources. This Stage 1 ERA is a review of desktop, landscape-level data regarding the potential occurrence of Bald Eagles in the Project Footprint, Project Area, and within the LAP. Within the ECPG, the USFWS provides five questions for wind developers to consider as part of the Stage 1 ERA to help place a prospective project into an appropriate preliminary risk category (USFWS 2013). Based on the preliminary results of the ERA, these questions and associated answers for the Project are as follows:

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

   Yes. Bald Eagles are known to occur throughout Missouri with the highest occurrences documented during the winter months, peaking from October through December, and continuing through March. Suitable habitat for breeding, migrating, or wintering Bald Eagles is present within the LAP along the Missouri River, Platte River, Smithville Lake, Indian Cave State Park, and Loess Bluffs NWR. In addition, suitable habitat within the Project Area is present at Nodaway County Community Lake, Mozingo Lake, One Hundred and Two River (Photo 1 in Attachment A), and Nodaway River. During the Site Visit on February 23, 2017 a Bald Eagle nest was observed along the One Hundred and Two River (Photo 2 in Attachment A). Bald Eagle occurrence within the Project Footprint is also possible due to the proximity of the One Hundred and Two River, Nodaway River, and Mozingo Lake. In addition, the presence of ponds and grasslands may provide foraging opportunities (e.g., waterfowl, cattle carcasses) within the Project Footprint. The current presence of nesting, foraging, or migrating Bald Eagles within the Project Footprint is unknown.

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

   No. The most valuable habitats to eagles within the LAP include the Missouri River, Platte River, and Loess Bluffs NWR. Within the Project Area, potential valuable habitat is located along the One Hundred and Two River east of the Project Footprint, the Nodaway River west of the Project Footprint, and Mozingo Lake, which is adjacent to the southeast portion of the Project Footprint. Based on publicly available data, the ERA did not identify any habitat within the Project Footprint that is known to be valuable to eagles that would be destroyed or degraded by the Project.

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

   Yes. The ERA identified a Bald Eagle nest within the Project Area which was identified during the initial site visit on February 23, 2017 (see Photo 2 in Attachment A). The nest occurs 7.9 miles northeast of the Project Footprint. No other important eagle-use areas (e.g., nests, roosts, or foraging hotspots) were identified within the Project Area; and no important eagle-use areas were found occurring within the Project Footprint. However, potential nesting and foraging habitat within the Project Area may exist along the One Hundred and Two River, Nodaway River, Nodaway County Community Lake, and Mozingo Lake. Site-specific surveys may be necessary to confirm the presence/absence of Bald Eagle nests along these water features. The necessity for additional surveys specifically targeting eagle-use areas or migration concentration sites can be determined through consultation with the USFWS.

4. ***Does existing or historical information indicate that habitat supporting abundant prey for eagles may be present within the geographic region under development consideration (acknowledging, wherever appropriate, that population levels of some prey species such as black-tailed jackrabbits (Lepus californicus) cycle dramatically such that they are abundant and attract eagles only in certain years)?***

   Yes. Publicly available information obtained for this ERA indicates the presence of habitats that may support sources of prey (i.e. fish, seasonal waterfowl, and carrion) for eagles within the LAP, Project Area, and Project Footprint. The LAP contains several Bald Eagle foraging hot spots including the Missouri River, Platte River, and Loess Bluffs NWR. One Hundred and Two River, Nodaway River, Nodaway County Community Lake, and Mozingo Lake may provide additional foraging opportunities within the Project Area. However, most ponds within the Project Footprint are small and unlikely to provide an abundance of prey.

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

   Maybe. Important eagle-use areas within the Project Area include the nest 7.9 miles northeast of the Project Footprint, One Hundred and Two River, Nodaway River, and Mozingo Lake. The waterways likely provide suitable breeding, migration stopover, and wintering habitats as well as foraging opportunities. Eagle nests have been identified within the LAP and the Project Area (7.9 miles northeast of the Project Footprint); however, there is little available nesting habitat within the Project Footprint. Significant adverse impacts on eagles are unknown given the lack of site-specific data for the Project Footprint. However, due to the proximity of eagle-use areas to the Project Footprint, impacts on eagles could occur, but site-specific surveys will be necessary to confirm these conclusions.

Based on publicly available information, our judgment is that the Project meets the criteria for Category 2 – High or Moderate Risk to Eagles. There are known important eagle-use areas or migration concentration sites within the Project Area (Category 2), specifically the eagle nest within the Project Area (7.9 Miles northeast of the Project Footprint). Aerial surveys are needed to adequately determine if eagle nests are present within the Project Footprint. As per the ECPG, projects in Category 2 may have opportunities to mitigate impacts and reduce risks to eagles. The preliminary conclusion of a Category 2 does not indicate that an eagle take permit may be recommended as the Project's risk category can potentially change based on additional site-specific surveys for eagles and/or minimization measures proposed by the Project. Stage 2 assessments (eagle use surveys and aerial nest surveys) would provide additional data for the category estimate for the Project.

Site-specific surveys would be necessary to document eagle activity within the Project Footprint and eagle nest locations within the Project Area, which are part of Stage 2 of the ECPG. The design and implementation of these surveys should be developed in coordination with the USFWS. To this end, the Project initiated coordination with the USFWS and with the Missouri Department of Conservation (MDC) in March 2017. The ERA represents a desktop review of eagle abundance, nesting, and migration behavior in the area and important eagle-use habitats in the LAP, Project Area, and Project Footprint. The results of Stage 2 surveys can be used to adjust the Project's risk Category 2 classification, as needed.

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Appendix A SITE PHOTOGRAPHS

Photo 1: Representative Habitat, One Hundred and Two River. Photographed on February 23, 2017.

Photo 2: Bald Eagle Nest located 7.9 miles northeast of the Project Footprint. Photographed on February 23, 2017.

Photo 3: Bald Eagle within the Project Area, 7 miles Northwest of the Project. Photographed on February 23, 2017.